Appendices (on CD)

A ADEQ February 23, 2011 Letter

B Request for No Further Action Determination for Soil from the Surface to Groundwater for the NFA Area Report

C Site Characterization Report

D Weekly Report 8-29-2003

E May 15, 2014 Monitoring Well Installation Report for wells MW-27, MW-28, MW-29S, MW-29M, MW-29D, and MW-30

F February 8, 2007 Product Recovery Termination Letter to ADEQ and February 13, 2007 ADEQ Email Concurrence

G Historical Groundwater Elevation and Apparent Free Product Thickness Data Through Fourth Quarter 2014

H Analytical Results for Shallow-Soil Vapor Sampling and Results of a Human Health Risk Screening Evaluation

K September 26, 2014 ADEQ email

L Hydrographs

M MTBE and TBA Charts

N Land Use Documentation

O Water Use Documentation

ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY

1110 West Washington Street • Phoenix, Arizona 85007
(602) 771-2300 • www.azdeq.gov

Janice K. Brewer
Governor

Henry R. Darwin
Acting Director

February 23, 2011
VRP 11:092

Mr. Paul Salcido
SFPP, L. P.
49 N. 53rd Avenue
Phoenix, Arizona 85043

Re: Request to Follow WQARF Process
Silvercroft Wash Release Site
Tucson, Arizona
Site Code: 506251-00

Mr. Salcido,

The petroleum hydrocarbon groundwater contaminant plume resulting from the SFPP , L.P. (SFFP) Silvercroft Wash Release site extends beyond the boundary of the release site at levels that exceed Arizona Aquifer Water Quality Standards (AWQS) and therefore, in accordance with the requirements of Arizona Revised Statutes (A.R.S.) §49-175(B), SFPP is required to follow the WQARF Remedy Selection Rule [Arizona Administrative Code (A.A.C.) R18-16-401 et seq.] process for the establishment of a final remedy for the Silvercroft Wash Release site. The Arizona Department of Environmental Quality (ADEQ) Voluntary Remediation program (VRP) has developed an outline for SFPP to follow the WQARF process within the VRP:

1) Prepare a draft remedial investigation (RI) report that includes reasonably foreseeable uses of land and water as outlined in R18-16-406(D).

2) Follow the applicable public notice requirements for the draft RI report as outlined in R18-16-406(F)

3) Comply with the process for soliciting proposed remedial objectives (ROs) and establishing ROs as outlined in R18-16-406(I).

4) Prepare a Final RI report in accordance with R18-16-406(J). The Final RI report will be accompanied by responsiveness summaries regarding comments, issues and concerns raised in the community involvement process. Notice of its availability will be made once it is final.

5) Prepare a feasibility study (FS) work plan and conduct a FS in accordance with R18-16-407.

February 23, 2011

6) Prepare a proposed remedial action plan (PRAP) in accordance with R18-16-408. Once the PRAP is submitted, SFPP will provide public notice under A.A.C. R18-16-408(C)(2). The notice will advise the public of the opportunity for comment on the PRAP, the closing date for these comments, and will announce the public meeting required under R18-16-404(D)(2)(d). After the meeting is held, and comments are received, SFPP shall provide a comprehensive responsiveness summary for all comments received and submit them to ADEQ.

7) Under A.A.C. R18-16-410, after ADEQ approves the preliminary remedial action plan and the comprehensive responsiveness summary, ADEQ prepares a Record of Decision (ROD) and provides public notice. However, A.A.C. R18-16-410(A) allows SFPP to submit a ROD and conduct the public notice under A.A.C. R18-16-413. For the purpose of this letter, a decision on which pathway to take is premature at this time.

8) The ROD will include a time-frame (usually 5-years) for review of the selected remedy for the site to determine its effectiveness in achieving the remedial objectives. The site will remain open until petroleum hydrocarbon groundwater contaminant levels off-site are below Aquifer Water Quality Standards.

Please call me at (602) 771-4229 if you have any questions or would like to set up a meeting to discuss this process further.

Sincerely,

Thomas Di Domizio, Manager
Voluntary Remediation Program

Request for No Further Action Determination for Soil from the Surface to Groundwater for the NFA Area

SFPP L.P. – Silvercroft Wash Release Site
Tucson, Arizona

January 19, 2004
LFR 014-10022-02

Prepared for:
SFPP, L.P.
1100 Town & Country Road
Orange, California 92868

Prepared by:
LFR Levine·Fricke
13880 North Northsight, Suite 115
Scottsdale, Arizona 85260

January 19, 2004 014-10022-02

Ms. Amanda Stone
Arizona Department of Environmental Quality
1100 West Washington Street
Phoenix, Arizona 85007

Subject: Request for No Further Action Determination for Soil from the Surface to Groundwater for the NFA Area, SFPP, L.P. – Silvercroft Wash Release Site, Tucson, Arizona

Dear Ms. Stone:

On behalf of SFPP, L.P. (SFPP), an operating partnership of Kinder Morgan Energy Partners (KMEP), LFR Levine·Fricke (LFR) is pleased to present the attached *Request for No Further Action Determination for Soil from the Surface to Groundwater for the NFA Area* for the SFPP Silvercroft Wash Release Site. This request for "No Further Action" determination is for specific impacts resulting from the July 30, 2003 rupture of the SFPP pipeline at the subject location. This submittal to the Arizona Department of Environmental Quality (ADEQ) addresses the Voluntary Remediation Program (VRP) reporting requirements given in A.R.S. 49-181.

The surface and near-surface area impacted by the release ("Impacted Area") included portions of the Silver Creek II Subdivision (lots 321, 328, 352, 353, 354, 355, and 356, portions of the utility easement west of these lots, the storm drain channel between lots 352 and 353, and limited areas of soil beneath Silver Island Way and Silverbell Tree Drive), and portions of Silvercroft Wash (Plate 1). The remaining lots and streets in the Silver Creek II Subdivision were not impacted by the release. The NFA Area is a subset of the Impacted Area, and includes lots 321, 328, 354, 355, and 356, beneath Silver Island Way, and beneath Silverbell Tree Drive.

Excavation of surface and near-surface impacted soil was the highest priority of initial remedial efforts, so that potential exposure pathways (dermal contact, ingestion, inhalation) to residents and workers would be removed. Confirmation soil samples collected following excavation and removal of affected soils within the impacted areas shown on Plate 1 indicated that remaining soils within the NFA Area and also within 10 feet of the surface at the site in the remaining impacted area are in compliance with ADEQ's applicable residential soil remediation levels (RSRLs) and minimum Groundwater Protection Levels (GPLs) for benzene, toluene, ethylbenzene, and total xylenes (BTEX), methyl-tert butyl ether (MTBE), and total petroleum hydrocarbons in the range from C_{10} to C_{32} (TPH [C_{10}-C_{32}]). Therefore, surface and near-surface remediation is considered complete in the NFA Area as well as in the surface and near-surface portions of the Impacted Area.

The subsurface soil area impacted by the release includes a column of soil from below the base of the release point excavation at 10 feet bgs, to groundwater at approximately 140 feet bgs. The radius of the affected soil column is approximately 40 feet from the release location. Although soil samples from all soil borings on lots 352 and 353 indicate concentrations below RSRLs and GPLs, the column of affected soil likely extends in the subsurface at depths greater than 10 feet below the northwestern corner of lot 352, the southwestern corner of lot 353, and the western end of the storm drain channel. To the extent that these areas do have soil above RSRLs and GPLs, they will be remediated as part of the implementation of the Remediation Work Plan. For this reason, these areas are not presently considered within the NFA Area.

The groundwater impact consists of a plume of phase-separated hydrocarbons (PSH) that has been delineated to the north, northeast, east, southeast, and south of the release point (Figure 2). The PSH plume is located at a depth of approximately 140 feet bgs beneath lots 352, 353, 354, 355, and 356, and may extend partially beneath Silver Island Way, Silverbell Tree Drive, lot 321, lot 351, the utility easement, and Silvercroft Wash. No dissolved-phase BTEX, MTBE, or polynuclear aromatic hydrocarbons (PAHs) have been detected in 7 groundwater monitoring wells outside of the PSH plume.

Ongoing subsurface remediation efforts will include vapor extraction and extraction of PSH. As per VRP requirements, a Remediation Work Plan (RWP) is being prepared to address further subsurface remediation efforts, and will be submitted to ADEQ in mid-January.

Based on the above information, on behalf of SFPP, we request that the ADEQ grant NFA status to soil from the surface to groundwater for BTEX, MTBE, and TPH (C_{10}-C_{32}) for the for the NFA Area, which includes the following:

- Lots 321, 328, 354, 355, and 356.
- Silver Island Way.
- Silverbell Tree Drive.

This NFA request does not include soil beneath the utility easement, lots 352 and 353, the storm drain channel, and Silvercroft Wash. Nor does it include groundwater impacts, as such area of impact will be the subject of a separate NFA request following completion of the subsurface soil and groundwater remediation efforts.

If you have any questions regarding the contents of the attached document, or require additional information, please contact Mark Sandon at (714) 560-4867.

Sincerely,

Eric Rogoff, R.G., C.E.G.
Senior Associate Hydrogeologist

Attachment

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APPENDICES

Note: Appendix A is attached to the main report. Hardcopies of Appendices B through E are approximately 2 feet thick, and one copy is being provided in 15 bound volumes to ADEQ for their files. For all other report copies, the Appendices are provided on 2 CDs. On the CD version of Appendix D, a file named "link from sample ID to scanned file name.xls" is provided to assist in finding the filename for a desired sample.

A Procedures
B Documentation of Air Monitoring During Demolition and Excavation
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D Analytical Laboratory Reports – Volumes 1 through 6
E Permits

CERTIFICATION

All hydrogeologic and geologic information, conclusions, and recommendations in this document have been prepared under the supervision of and reviewed by an LFR Levine·Fricke Arizona Registered Geologist.

Eric Rogoff, R.G., C.E.G. Date
Senior Associate Hydrogeologist
Arizona Registered Geologist 32828

COMMONLY USED ACRONYMS

AAC	Arizona Administrative Code
ADEQ	Arizona Department of Environmental Quality
ADHS	Arizona Department of Health Services
ADWR	Arizona Department of Water Resources
API	American Petroleum Institute
ARS	Arizona Revised Statutes
ASTM	American Society for Testing and Materials
AWQS	Aquifer Water Quality Standard
bgs	below ground surface
BTEX	benzene, toluene, ethylbenzene, total xylenes
CAP	Corrective Action Plan
CFR	Code of Federal Regulations
EPA	Environmental Protection Agency
GPL	Groundwater Protection Level
HBGL	Health Based Guidance Level
HCs	Hydrocarbons (C_{10}-C_{32})
LUST	Leaking Underground Storage Tank
NOV	Notice of Violation
PAH	Polynuclear Aromatic Hydrocarbon
SAF	State Assurance Fund
SCR	Site Characterization Report
SRL	Soil Remediation Level
TPH	Total Petroleum Hydrocarbons
UST	Underground Storage Tank
USTCA	UST Corrective Action
VOC	Volatile Organic Compound

1.0 INTRODUCTION

On behalf of SFPP, L.P. (SFPP), an operating partnership of Kinder Morgan Energy Partners (KMEP), LFR Levine·Fricke (LFR) is pleased to present the attached *Request for No Further Action Determination for Soil from the Surface to Groundwater for the NFA Area* for the SFPP Silvercroft Wash Release Site. This request for No Further Action (NFA) determination is for specific impacts resulting from the July 30, 2003 rupture of the SFPP pipeline at the Silvercroft Wash release site. This submittal to the Arizona Department of Environmental Quality (ADEQ) addresses the Voluntary Remediation Program (VRP) reporting requirements given in A.R.S. 49-181. The site location is shown in Figure 1.

Site characterization efforts have included drilling 51 soil borings and installing 16 groundwater monitoring wells. Collection of soil samples has been extensive, with a total of 446 samples collected to evaluate the extent of surface and near-surface impacts, subsurface impacts, and to evaluate the effectiveness of remedial excavations.

Remedial actions performed to date have included extraction of liquid hydrocarbons from the surface using vacuum trucks immediately following the release, excavation of surface and near-surface impacted soil, extraction of phase-separated hydrocarbons from the groundwater at approximately 140 feet below ground surface (bgs), and vapor extraction.

1.1 Description of the Surface and Near-Surface Impacted Area

The surface and near-surface area impacted by the release ("Impacted Area") included portions of the Silver Creek II Subdivision (lots 321, 328, 352, 353, 354, 355, and 356, portions of the utility easement west of these lots, the storm drain channel between lots 352 and 353, and limited areas of soil beneath Silver Island Way and Silverbell Tree Drive), and portions of Silvercroft Wash (Plate 1). The remaining lots and streets in the Silver Creek II Subdivision were not impacted by the release based on visual observations during emergency response activities, analysis results for surface and near-surface soil samples collected at the margins of the impacted area and on nearby lots, and analysis results for soil samples collected from groundwater monitoring well borings in streets. The NFA Area is a subset of the Impacted Area, and includes lots 321, 328, 354, 355, and 356, Silver Island Way, and Silverbell Tree Drive.

Excavation of surface and near-surface impacted soil was the highest priority of initial remedial efforts to eliminate potential exposure pathways (dermal contact, ingestion, inhalation) to residents and workers. LFR has performed extensive soil sampling to assess the area of soil impacted by the release, and to evaluate the sufficiency of remedial excavations in the impacted area. Confirmation soil samples collected following excavation and removal of affected soils within the impacted areas shown on Plate 1 indicated that remaining soils within the NFA Area and also within 10 feet of the surface at the site in the remaining impacted area are in compliance with ADEQ's applicable

residential soil remediation levels (RSRLs) and minimum Groundwater Protection Levels (GPLs) for benzene, toluene, ethylbenzene, and total xylenes (BTEX), methyl-tert butyl ether (MTBE), and total petroleum hydrocarbons in the range from C_{10} to C_{32} (TPH [C_{10}-C_{32}]). Therefore, surface and near-surface remediation is considered complete in the NFA Area as well as in the surface and near-surface portions of the Impacted Area.

1.2 Description of the Subsurface Impacted Area

Soil

The subsurface soil area impacted by the release includes a column of soil from below the base of the release point excavation at 10 feet bgs, to groundwater at approximately 140 feet bgs. The radius of the affected soil column is approximately 40 feet from the release location. Figure 2 illustrates the location of the affected soil column. Although soil samples collected from soil borings advanced on lots 352 and 353 indicate concentrations below RSRLs and GPLs, the column of affected soil likely extends in the subsurface at depths greater than 10 feet bgs below the northwestern corner of lot 352, the southwestern corner of lot 353, and the western end of the storm drain channel. Vapor extraction has been performed in vicinity of the affected soil column since the soil samples were collected, so hydrocarbon concentrations in soil have likely been reduced. However, as additional vapor extraction is planned, confirmation soil samples have not been collected to verify reduction of soil concentrations. To the extent that these areas do have soil above RSRLs and GPLs, they will be remediated as part of the implementation of the Remediation Work Plan. For this reason, these areas are not presently considered within the NFA Area.

Groundwater

The groundwater impact consists of a plume of phase-separated hydrocarbons (PSH) that has been delineated to the north, northeast, east, southeast, and south of the release point (Figure 3). The PSH plume is located at a depth of approximately 140 feet bgs beneath lots 352, 353, 354, 355, and 356, and may extend partially beneath Silver Island Way, Silverbell Tree Drive, lot 321, lot 351, the utility easement, and Silvercroft Wash. No dissolved-phase benzene, toluene, ethylbenzene, total xylenes (BTEX), methyl tert butyl ether (MTBE), or polynuclear aromatic hydrocarbons (PAHs) have been detected in 7 groundwater monitoring wells located outside of the PSH plume. Tetrachloroethene (PCE) concentrations associated with the Silverbell Jail Annex Landfill Water Quality Assurance Revolving Fund (WQARF) Site have been detected in wells to the north of Silverbell Tree Drive.

Subsurface Remediation

Ongoing subsurface remediation efforts will focus on the areas of soil and groundwater impacts noted above, and will include vapor extraction and extraction of PSH. Additional detailed documentation of site characterization and interim remediation of the deeper impacted soil beneath the release location and of groundwater from the date of the pipeline release to the present will be submitted in a Site Characterization Report (SCR) at a later date. As per VRP requirements, a Remediation Work Plan (RWP) is being prepared to address further subsurface remediation efforts, and will be submitted to ADEQ in mid-January. Relevant elements of the SCR and the RWP that pertain to the NFA request are discussed briefly in this document.

1.3 Definition of the Request for No Further Action

Based on the above information, on behalf of SFPP, we request that the ADEQ grant NFA status to soil from the surface to groundwater for BTEX, MTBE, and TPH (C_{10}-C_{32}) for the NFA Area, which includes the following:

- Lots 321, 328, 354, 355, and 356.
- Silver Island Way.
- Silverbell Tree Drive.

This NFA request does not include soil beneath the utility easement, lots 352 and 353, the storm drain channel, and Silvercroft Wash. Nor does it include groundwater impacts, as such area of impact will be the subject of a separate NFA request following completion of the subsurface soil and groundwater remediation efforts.

1.4 Report Contents According to Voluntary Remediation Program Statutes

Arizona Revised Statute A.R.S. 49-181 pertains to *Requests for No Further Action Determination* by ADEQ under the Voluntary Remediation Program (VRP). The requirements for reports submitted as requests for NFA determination are as follows:

A. Upon achieving the remediation levels and controls determined pursuant to section 49-175, subsection B, an applicant approved pursuant to section 49-174 may request the department to provide a determination that no further action is needed for a site *or portion* of a site by submitting a report to the department. The report shall include:

   1) A description of the specific contaminants for which a no further action determination is being sought.

2) A description of the actions taken to achieve remediation levels or controls determined in accordance with section 49-175, subsection B.

3) A description of any soil, water, or soil and water treatment systems used as part of the remediation.

4) Whenever institutional or engineering controls are placed on the site:

   (a) A demonstration that any engineering control or combination of engineering controls has been constructed, is functioning, and will be maintained.

   (b) A description of the proposed land use for the site and a demonstration that the use will not compromise the integrity of the engineering controls and will be in accordance with any institutional controls.

5) If postremediation monitoring is proposed, a description of the type of monitoring, monitoring locations, contaminants to be monitored, monitoring frequency and sampling procedures.

6) A description of community involvement activities undertaken to meet the requirements of section 49-176.

7) A list of permits under this title obtained for the remedial action or held by the applicant pertaining to the site.

1.5 Site-Specific VRP Report Contents

The requirements listed in Section 1.1 are addressed individually below. Where lengthy descriptions were necessary, a reference is listed for the section of this report that contains the required information.

A. Upon achieving the remediation levels… that no further action is needed for a site or portion of a site…

This request for NFA applies to soil extending from the surface to a depth of 10 feet for the entire site. **Section 2.0** provides background information and the site conceptual model as the context for evaluating the soil NFA request.

1) A description of the specific contaminants for which a no further action determination is being sought.

The specific contaminants in soil for which the NFA determination is being sought are BTEX, TPH (C_{10}-C_{32}); and MTBE.

2) A description of the actions taken to achieve remediation levels or controls determined in accordance with section 49-175, subsection B.

3) A description of any soil, water, or soil and water treatment systems used as part of the remediation.

Section 3.0 describes the actions taken to achieve remediation levels, and descriptions of soil and product treatment technologies employed to date at the site.

4) Whenever institutional or engineering controls are placed on the site:

   (a) A demonstration that any engineering control or combination of engineering controls has been constructed, is functioning, and will be maintained.

   (b) A description of the proposed land use for the site and a demonstration that the use will not compromise the integrity of the engineering controls and will be in accordance with any institutional controls.

Engineering controls are not necessary for the soil from the surface to the groundwater for the areas requested for the NFA determination, as impacted soils with concentrations above ADEQ RSRLs and minimum GPLs have been excavated and removed from the site**. Section 4.0** provides descriptions of the excavations and soil analytical results for confirmation soil samples and soil borings.

An enclosed remediation system will be utilized to address impacted vadose zone soil from beneath the release point to groundwater, and to address phase-separated hydrocarbons (PSH) on the groundwater surface at approximately 140 feet below the ground surface. **Section 5.0** provides a discussion of the land use for lots that the remediation enclosure and associated piping will be built upon.

5) If postremediation monitoring is proposed, a description of the type of monitoring, monitoring locations, contaminants to be monitored, monitoring frequency and sampling procedures.

No postremediation monitoring is proposed for the soil in the areas requested for the NFA determination. Postremediation monitoring for groundwater, and for vadose zone soils beneath the release point to groundwater, will be addressed in the RWP currently in preparation.

6) A description of community involvement activities undertaken to meet the requirements of section 49-176.

Section 6.0 describes the community involvement activities performed to meet the requirements of section 49-176.

7) A list of permits under this title obtained for the remedial action or held by the applicant pertaining to the site.

Section 7.0 provides a list of permits obtained for the remedial action or held by SFPP pertaining to the site.

2.0 BACKGROUND

2.1 Site Location

The Site is located west of the I-10 Freeway, north of Grant Road, and east of Silvercroft Wash, in the City of Tucson, Pima County, Arizona. The Site lies in the NW ¼; SW ¼; NW ¼; Section 34; Township 13 South; Range 13 East, as shown on the Jaynes, Arizona, 7.5 Minute U.S. Geological Survey Topographic Quadrangle (Figure 1). The Site lies at an elevation of approximately 2,290 feet above mean sea level (msl). The Site is located on the western side of the Silver Creek II subdivision, which is currently under construction, and is bounded on the west by Silvercroft Wash.

2.2 Characterization and Remediation Objectives

The SFPP pipeline release occurred on July 30, 2003. SFPP began emergency response activities immediately. Activities implemented by SFPP commencing on July 30 have been intensive and continuous in an effort to remediate affected soils, restore utilities, remove affected structures, characterize subsurface soil and groundwater impacts, and begin subsurface remediation. Plate 1 illustrates excavated areas, soil sampling locations, groundwater monitoring wells, and vapor wells installed to date.

Activities may be generally classified in the following categories:

1. SFPP Emergency Response

2. Surface Characterization, Verification of Initial Remediation, Silvercroft Wash Restoration, and Pipeline and Utility Restoration

3. Demolition of Five Houses

4. Subsurface Investigation

5. Additional Excavation

6. Remedial Conceptualization (vadose zone and groundwater)

The **goals and objectives** of these activities have included the following:

1. Protect the public, response personnel, and environmental contractors.

2. Recover released product from the ground surface, including streets, drainage channels, and Silvercroft Wash.

3. Immediately excavate hydrocarbon-affected surface soil from lots, streets, drainage channels, and Silvercroft Wash.

4. Restore fuel pipeline service.

5. Restore water line down Silver Island Way.

6. Extensive soil sample collection and analysis to ensure that surficial soil had been excavated to below ADEQ Residential Soil Remediation Levels (RSRLs) and minimum Groundwater Protection Levels (GPLs).

7. Evaluate the vertical and lateral extent of impacted soil beneath the release point excavation.

8. Determine the depth to groundwater.

9. Evaluate whether phase-separated hydrocarbons (PSH) were present at the groundwater table.

10. Delineate the lateral extent of PSH, if present.

11. Delineate the lateral extent of dissolved-phase hydrocarbons.

12. Evaluate, select, and implement interim remedial measures.

13. Perform remedial pilot tests for PSH extraction and vapor extraction.

14. Conceptualize and begin implementation of comprehensive remedial measures.

Results of the characterization activities and remedial pilot tests are being used to select remediation technologies, and allow the design and construction of soil and groundwater treatment system(s). These activities will be described in detail in the Remediation Work Plan (RWP) to be submitted to ADEQ in January 2004.

2.3 Communications

Commencing on July 30, 2003, SFPP has been in frequent communication with representatives from the following agencies:

- Arizona Department of Environmental Quality
- City of Tucson Fire Department
- City of Tucson Department of Transportation/Stormwater Runoff Section

- City of Tucson Construction Section
- City of Tucson Environmental Management
- Pima County Department of Transportation and Flood Control District
- Pima County Department of Environmental Quality

Weekly status reports (20 to date) have been provided to representatives of the above agencies since the release occurred, commencing on August 1, 2003.

In addition to the weekly reports, SFPP has also communicated details of the project to ADEQ through responses to ADEQ's Notice of Violation dated September 11, 2003, ADEQ's Request for Information dated September 11, 2003, ADEQ's Notice of Violation dated November 13, 2003, two work plans, a Site Characterization and Remediation Plan, a Quality Assurance Project Plan, reports of daily activities (not comprehensive) via email, and numerous meetings and telephone conversations.

Other agencies that SFPP has worked with on the project include:

- U.S. Department of Transportation
- U.S. Army Corps of Engineers
- U.S. Fish and Wildlife Service
- City of Tucson Police
- Arizona Corporation Commission
- Governor Napolitano's Office
- University of Arizona

2.4 Site Conceptual Model

The extensive site characterization and remediation efforts conducted to date have yielded a large body of data on which to develop a detailed Site Conceptual Model (SCM). The SCM is used to integrate all site data, identify data gaps, and to determine whether additional site information needs to be collected. In turn, the SCM is being used to guide ongoing characterization and remediation efforts. Findings from the investigation and remediation efforts to date have been summarized in 20 Weekly Reports to date, resulting in the following key points of the SCM:

Nature of the Release

- SFPP's operational data, metallurgy analysis of the affected portion of the pipeline, soil sample analyses, analyses of PSH samples from groundwater wells, and groundwater sample analyses indicate that the source of petroleum hydrocarbons was the July 30, 2003 rupture of the SFPP pipeline, with no evidence of leakage prior to the July 30, 2003 rupture. The material released was gasoline.

- At the request of ADEQ to develop a calculation for the release volume, Exponent Failure Analysis (Exponent), under contract with Fennemore Craig, legal counsel to SFPP, calculated an estimated volume of the release. Exponent's calculation resulted in a range of 442 to 455 barrels (1 barrel = 42 gallons) or up to 19,110 gallons of gasoline.

SFPP initially used vacuum trucks to recover product from the excavation at the release point, Silvercroft Wash, and various other areas at the site where gasoline had ponded on the ground surface. This recovery included water that was ponded in the Silvercroft Wash. The vacuum trucks were routed under appropriate manifests to the Tucson terminal and offloaded into an isolated storage tank to allow the gasoline/water mixture to separate.

Based on Exponent's estimated volume of the release and the volume of gasoline recovered in early response activities described in Section 3.1.2, SFPP estimates that a maximum of 11,197 gallons of gasoline remains in the subsurface environment.

Near-Surface Soil Remediation

- SFPP has excavated approximately 4,045 tons of impacted soil from within 10 feet of the surface. Excavated areas are shown on Plate 1 and Figures 4 through 12. Due to extensive surface remediation and restoration efforts, impacted surface soils above RSRLs and GPLs have been removed from the site, as indicated by 272 confirmation soil samples.

- As an additional remedial measure, although the release had not affected the entire surface area of lots 352, 353, 354, 355, and 356, the top 1 foot of soil on the entire surfaces of these lots was excavated and properly disposed of offsite. The surfaces of these lots were subsequently covered with 1 foot of clean imported fill.

Subsurface Soil Conditions

- Analytical methods used for soil sample analysis included SW8260B for BTEX and MTBE, and 8015AZR1 for TPH (C_{10}-C_{32}). Analytical results for BTEX, MTBE, and TPH (C_{10}-C_{32}) in soil samples collected from 31 shallow soil borings and 13 deep soil borings beneath lots 352, 353, 354, 355, and 356 indicate that soil beneath these lots are below ADEQ RSRLs and GPLs from the surface to groundwater. Analytical results from soil samples collected from 14 deep soil borings outside the affected area indicate that soil from the surface to groundwater is below ADEQ RSRLs and GPLs.

- A vertical column of petroleum-affected soil appears to exist from the base of the release point excavation (minimum of 10 feet below ground surface [bgs]) to the groundwater surface at approximately 140 feet bgs across an estimated radius of approximately 40 to 50 feet, based on soil sample analytical results from soil borings (Figure 2). Vapor extraction pilot testing has been performed for this area to remove

petroleum hydrocarbon mass and reduce the potential for vapor migration of hydrocarbons from this vicinity to the ground surface, and to minimize the potential for future groundwater impacts.

Groundwater Conditions

- As indicated by measurements in 16 groundwater monitoring wells installed to date (Figure 3), groundwater flows from the area of the release point toward the northeast. The groundwater gradient, illustrated in Figure 3, indicates a "low" area of flow convergence in the area beneath Silver Island Way, just north of Silverbell Tree Drive and Silver Honey Place. The flow convergence likely reflects recharge through the unlined bottom of Silvercroft Wash to the west, and from the Santa Cruz River to the northeast.

- Phase-separated hydrocarbons (PSH) have been measured in groundwater monitoring wells at a depth of approximately 140 feet bgs. The PSH plume, illustrated in Figure 3, has been delineated to the north, northeast, east, southeast, and south of the release point. The PSH plume is elongated to the northeast relative to the release point due to the local northeasterly groundwater flow direction. At ADEQ's request, SFPP has obtained access to the easement west of Silvercroft Wash so that two additional groundwater monitoring wells can be installed to the west and northwest of the release point. Installation of the wells is scheduled to begin January 12, 2004.

- Analytical methods used for analysis of groundwater samples have included SW8260B for BTEX, MTBE, and chlorinated hydrocarbons, and SW8310 for polynuclear aromatic hydrocarbons (PAHs). Dissolved-phase BTEX, MTBE, and PAHs in groundwater have been delineated to the north, northeast, east, southeast, and south. Installation of the two planned additional wells west of Silvercroft Wash will allow evaluation of the dissolved-phase constituents, if present, to the west and northwest.

- VOC contamination from the Silverbell Landfill has rendered groundwater over a large area in the site vicinity unsuitable for human or livestock consumption, agricultural, and industrial uses. Tetrachloroethene (PCE) contamination from the Silverbell Jail Annex Landfill WQARF site has been detected in wells installed by SFPP to investigate the extent of groundwater impacts associated with the SFPP pipeline release. Information on the Silverbell Jail Annex Landfill WQARF Site is posted on ADEQ's internet website at the following URL:

  http://www.adeq.state.az.us/environ/waste/sps/tucsites.html#silver

  A map of the area impacted by the Silverbell Jail Annex Landfill WQARF site may be viewed on ADEQ's internet website at the following URL:

  http://www.adeq.state.az.us/environ/waste/sps/images/silvera.gif

Potential for Environmental Receptors

- According to Tucson Water, the nearest water supply wells are at least 2½ miles from the release area, and have not been impacted by the release. The lateral extent of groundwater affected by the release is approximately 300 feet from the release point. Given the distance from the release area and the lack of a dissolved-phase plume associated with the release, it is extremely unlikely that the release would result in future impacts to existing supply wells.

- Due to the extensive excavation and efforts to restore near-surface soil to below ADEQ SRLs, there are no currently known human, ecological or surface water receptors.

3.0 ACTIONS TAKEN TO ACHIEVE REMEDIATION LEVELS

Since the pipeline rupture on July 30, 2003, extensive site characterization and remediation efforts have been performed in an extremely short timeframe. This section summarizes the activities performed. A detailed (but not necessarily comprehensive) timeline of events and communications with ADEQ is attached as Table 1.

3.1 Remedial Technologies Utilized to Date

3.1.1 Excavation

Excavation of hydrocarbon-affected soil was performed in surface areas affected by the pipeline release. The excavated areas and associated confirmation soil sample locations and analytical results are discussed in detail in Section 4.0.

Excavated soils were removed from the site and transported for disposal at either the Sonas Facility in Vickburg, Arizona, or the Waste Management Butterfield Landfill in Mobile, Arizona. The cumulative volume of soil excavated and disposed offsite was 4,046 tons (3,549 tons were disposed at Sonas, and 497 tons were disposed at the Butterfield facility). Records associated with the transport and disposal of excavated soils are attached in Appendix B.

3.1.2 PSH Removal

Boring RP-3, located approximately 37 feet north and 17 feet west of the pipeline release point, was the first boring at the site advanced to groundwater. Drilling of RP-3 began on Monday, October 6, 2003. Groundwater was encountered at approximately 140 feet on Thursday, October 9. At the time groundwater was encountered, no PSH were detected. The boring was advanced to a total depth of 170 feet bgs, and a groundwater monitoring well (later designated MW-2) was installed on October 9 and 10. Depth-to-water measurements taken on Friday, October 10 indicated a PSH thickness of 3.63 feet. Mr. Mark Sandon of SFPP telephoned Mr. Michael Traubert of ADEQ on October 10,

2003, to notify him that PSH had been measured in well MW-2. In the weeks that followed, SFPP began an intensive groundwater well installation effort to characterize the extent of the PSH plume, and to allow commencement of PSH extraction activities.

On Wednesday, October 29, 2003, TRC began extracting phase separated hydrocarbons (PSH or free product) from well MW-1. TRC initiated extraction of PSH from wells MW-2 and MW-3 on October 30, 2003 and November 6, 2003, respectively. Extraction pumps were placed in five additional wells (MW-4, MW-5, MW-8, MW-9, and MW-10) during the period of November 10-13, 2003. The extracted PSH and groundwater are stored onsite in appropriate containers with secondary and tertiary containment. These liquids were then removed from the site and appropriately stored and disposed as necessary to maintain sufficient volume capacity in the onsite tanks. Extracted PSH was transported to the Romic, Inc., facility in Chandler, Arizona. Extracted groundwater was transported to Thermo Fluids, Inc., of Phoenix, Arizona. Results of analytical testing at the Romic facility indicated the percentages of gasoline and entrained water in each truckload of PSH fluid. Shipping manifests and analytical results are provided in Appendix C.

As of November 17, 2003, a total of 3,520 gallons of gasoline were extracted from the following monitoring wells using 4-inch Hammerhead automatic positive air displacement pumps (Hammerhead):

MW-1;

MW-2;

MW-3;

MW-4;

MW-5;

MW-8;

MW-9; and

MW-10.

Further extraction conducted between December 4 and December 16, 2003 using the Hammerhead pumps resulted in an additional 2,957 gallons of gasoline removed from the surface of the water table. Since the Blackhawk Piston Pumps were installed in late December, an additional 950 gallons of gasoline have been recovered as of January 12, 2004. Including all PSH recovery methods conducted to date, SFPP estimates that a total of 7,913 gallons have been recovered as of January 12, 2004.

As a result of the initial recovery of PSH, close to 25,000 gallons of groundwater were extracted. The extracted groundwater was transported under proper manifest for appropriate disposal by ThermoFluids, Inc.

3.1.3 Vapor Extraction

TRC, Inc. was contracted by SFPP to mobilize their Dual-Phase Mobile Treatment Unit to the site to begin soil vapor extraction (SVE) from MW-1 and the 2-inch diameter vapor extraction well (VE-1) during the week ending October 31, 2003. Vapor extraction continued with wells MW-1 and VW-1, and the addition of vapor extraction in wells MW-3 and MW-4, through the week ending November 7, 2003. During the week ending November 14, 2003, additional wells were added, with soil hydrocarbon vapors being extracted from wells MW-1, MW-2, MW-3, MW-4, MW-5, MW-10, and VE-1. Hydrocarbon mass destruction calculations from the initiation of the soil-vapor extraction (SVE) operation through November 17, 2003, indicated that approximately 3,035 pounds of hydrocarbons (equivalent to 486 gallons) was recovered by the SVE system.

TRC performed a soil vapor extraction pilot test (SVEPT) on Saturday, December 6, 2003. The SVEPT was observed by Mr. James Jones of the Pima County Department of Environmental Quality (PCDEQ) as a portion of the requirements for obtaining a general permit for additional vapor extraction. LFR submitted a Soil Vapor Sampling and Analysis Protocol to PCDEQ on December 15, 2003. Soil vapor samples were collected on December 18 and 19, 2003. Analytical results and the status of the permit application will be updated in future weekly reports. SFPP intends to resume vapor extraction upon issuance of the general permit.

3.2 Summary of Activities by Week

The following section briefly summarizes the work performed at the site between July 30 and December 5, 2003. Additional details appear in each Weekly Report with the corresponding week ending date. Plate 1 illustrates excavation boundaries, soil sample locations, soil boring locations, and groundwater monitoring well locations. Soil sample maps for each week's activities are included as the figure numbers shown; and data are presented in the listed table numbers. Manifests for all excavated soil removed from the site are attached in Appendix C. Laboratory analysis reports are attached in Appendix D.

Week Ending August 1, 2003

The pipeline release was discovered at approximately 1:00 PM on Wednesday, July 30, 2003. SFPP immediately dispatched emergency response crews to the site, contacted the City of Tucson Fire Department (FD), and shut off valves along the pipeline to cease

flow of gasoline through the pipeline. Activities performed on Wednesday, July 30, 2003 included:

- setting up an exclusion zone to prevent unauthorized entry
- continuous air monitoring utilizing Lower Explosive Limit (LEL) meters and photoionization detectors (PIDs)
- barricading by the FD of several houses in the development that had been affected by the release
- development of a site-specific Health and Safety Plan
- application by the FD of approximately 1,000 gallons of suppression foam and water on the gasoline to contain vapors
- removal of seven vacuum truckloads of gasoline and water from Silvercroft Wash

On Thursday, July 31, 2003, SFPP contractors began removing affected soil from Silvercroft Wash. A total of 32 bins of soil containing approximately 20 tons of soil each were removed, as well as a stockpile of approximately 250 tons of soil. The soil was transported and disposed of at the Sonas facility in Vicksburg, Arizona, beginning Friday afternoon, and continuing through the weekend.

Week Ending August 8, 2003 (Figure 4, Table 2)

SFPP conducted removal of impacted soil associated with the release from the following identified affected areas:

- in the immediate area of the pipeline release in a 100-foot by 20-foot area, to a minimum depth of 10 feet, in the vicinity beneath the release location
- in Silvercroft Wash from 100 feet upstream (to the south) of the release point downstream to the confluence of an adjoining wash from the west
- constructed a new silt dam across Silvercroft Wash, imported clean fill, and re-graded the wash to the original flow contour
- excavated in the stormwater channel between lots 352 and 353 in areas that were accessible without compromising the existing house foundations
- along the Southwest Gas (natural gas) pipeline right-of-way
- along the access road that runs along the top of east side of Silvercroft Wash
- completed 72 separate waste manifests for each of the containers (soil bins and end dump trucks) for the transportation and proper disposal of the impacted soils to the Sonas Soil Recycling Facility in Vicksburg, Arizona

Other activities included the following:

- Southwest Gas personnel inspected the gas line and replaced the coating

- arranged for the collection of stormwater samples from the site immediately following the next two major rain events when there is appreciable runoff in Silvercroft Wash and the Santa Cruz River
- representatives from SFPP, the City of Tucson, Monterey Homes, and Borderland Construction met at the site on Friday, August 8, 2003 at 7:30 AM to discuss how to proceed with remaining remediation activities and reconstruction after all environmental remediation was completed

Week Ending August 15, 2003 (Figure 4, Table 2)

- received and analyzed analytical data from the previous week's remediation activities
- collected five surface water samples
- planned ongoing characterization and remediation activities based on interpretations of data received from the previous week

Week Ending August 22, 2003 (Figure 5, Table 3)

- excavated approximately 20 cubic yards of potentially affected soil during the installation of the temporary water line for the ongoing construction of homes in the subdivision
- collected additional storm water samples.
- collected soil samples underneath former location of excavated soil stockpile
- collected soil samples and pressure test water samples near and in Silvercroft Wash

Week Ending August 29, 2003 (Figures 5 and 6, Tables 3 and 4)

- excavated approximately 100 cubic yards of potentially affected soil during the replacement of the water valve junction
- replaced approximately 315 feet of water lines
- collected soil samples near housing foundations

Week Ending September 5, 2003 (Figure 7, Table 5)

- excavated approximately 33 cubic yards of potentially affected soil around sanitary sewer manhole #3
- excavated approximately 60 cubic yards of potentially affected soil along northeast curb of intersection of Silver Island Way and Silver Meadow Place

Week Ending September 12, 2003 (Figure 8)

- prepared for demolition of five houses and associated excavation and sampling activities

Week Ending September 19, 2003 (Figure 8)

- resubmitted demolition permits to the City of Tucson
- distributed public notices to residents in the Silver Creek I subdivision west of Silvercroft Wash, and to businesses along Jackrabbit Avenue
- URS Corporation installed four air monitoring stations around the perimeter of the demolition zone
- completed demolition of five houses

Week Ending September 26, 2003 (Figures 10 and 11, Tables 8 and 10)

- continued with debris removal and foundation slab demolition
- house and pad debris sampled, profiled, and accepted for disposal at Waste Management's Butterfield Landfill
- LFR advanced three boreholes in the vicinity of the release point to investigate the vertical extent of petroleum hydrocarbon-impacted soil
- subsequently backfilled two boreholes on the lots with cement/bentonite grout

Week Ending October 3, 2003 (Figures 10 and 11, Tables 8 and 10)

- completed removal of all slab material and house debris
- transported and disposed 1,448 tons of construction debris at Waste Management's Butterfield Landfill
- began removing the top 1 foot of soil on Lots 352 through 356
- additional excavation removed approximately 680 tons of soil from the excavation and the top 1 foot of soil
- removed 69 bins of debris and concrete from the demolished houses
- stockpiled soil was removed and transported to Sonas
- continuous air monitoring
- advanced Boring RP-2 adjacent to the release point; installed vapor well screened from 60 to 100 feet bgs
- advanced six shallow borings on each of the five lots on which the houses were demolished (Lots 352 through 356), with samples collected at 1 and 5 feet below the surface after 1 foot of topsoil was removed

Week Ending October 10, 2003 (Figures 8, 10, and 11; Tables 6, 8, and 10)

- excavation of additional soil along storm drain channel
- continuous air monitoring
- removal of ninety 20-ton truckloads (approximately 1,400 cubic yards) from the site; disposal at Sonas
- installation of soil boring RP-3/Groundwater monitoring well MW-2 approximately 37 feet north and 17 feet west of the pipeline release point
- first encounter of groundwater in RP-3 at approximately 140 feet bgs on Thursday, October 9; at the time groundwater was encountered, PSH was detected
- depth-to-water measurements taken the morning of Friday, October 10, indicated an apparent PSH thickness of 3.63 feet in RP-3/MW-2
- SFPP notified ADEQ regarding the PSH detection in MW-2 via telephone and in the Weekly Report on October 10, 2003
- began installation of Boring RP-4

Week Ending October 17, 2003 (Figures 8, 9 and 11; Tables 6, 7, and 10)

- completed excavation of additional soil along Silver Island Way, eastern end of the storm drain channel, and Silverbell Tree Drive
- installation of soil boring/groundwater monitoring wells MW-1, MW-3, and MW-6
- apparent PSH thickness ranged from 3.14 to 3.16 feet in well MW-1, and from 3.46 to 3.76 feet in well MW-2; no PSH was detected in well MW-6
- submitted additional Notice of Intent to drill (NOI) forms for 10 wells to the Arizona Department of Water Resources

Week Ending October 24, 2003 (Figure 11, Table 10)

- completed installation of well MW-5
- began installation of wells MW-4 and MW-7
- developed wells MW-1, MW-2, MW-3, and MW-6

Week Ending October 31, 2003 (Figure 11, Table 10)

- completed installation of MW-4, MW-7, and MW-9.
- collected a bailer sample from MW-7; purged three well volumes from MW-6 and collected a groundwater sample
- TRC began soil vapor and PSH extraction

Week Ending November 7, 2003 (Figure 11, Table 10)

- completed installation of MW-8, MW-10, and MW-11; collected a bailer sample from MW-7; purged three well volumes from MW-6 and collected a groundwater sample
- developed wells MW-4, MW-9, and MW-10
- surveyed casing locations and elevations in wells MW-4, MW-7, MW-9, and MW-10
- TRC continued soil vapor and PSH extraction

Week Ending November 14, 2003 (Figure 11, Table 10)

- completed installation of wells MW-12 and MW-13
- wells MW-8, MW-11, and MW-12 were developed
- surveyed casing locations and elevations in wells MW-8, MW-11, and MW-12
- TRC continued soil vapor and PSH extraction

Week Ending November 21, 2003 (Figure 11, Table 10)

- completed installation of wells MW-14, MW-15, and MW-16
- developed wells MW-13, MW-14, MW-15, and MW-16
- surveyed casing locations and elevations in wells MW-13, MW-14, MW-15, and MW-16
- purged and sampled wells MW-11, MW-12, and MW-13
- TRC ceased soil vapor and PSH extraction and left the site to allow Borderland Construction to reconstruct the drainage channel and replace the top 1 foot of soil that had been previously excavated from lots 352 through 356

Week Ending November 28, 2003 (Figures 11 and 12; Tables 10 and 11)

- Borderland Construction performed eight small sampling excavations at the west end of the storm drain channel under the direction of ATC Associates, Inc.; LFR and ATC Associates, Inc. collected soil samples at the bottom of the excavations
- purged and sampled wells MW-14, MW-15, and MW-16

Week Ending December 5, 2003 (Figure 11, Table 10)

- TRC returned to the site and resumed PSH extraction on December 4, 2003
- LFR gauged the product thickness in each well before TRC resumed extraction to assess remediation progress.

Ongoing work is focusing on remediation of the PSH plume and the affected subsurface soil column extending from the base of the release point excavation to groundwater. These efforts will continue to be documented in weekly reports. No additional surface remediation or characterization efforts are planned for soil within 10 feet of the ground surface, as confirmation soil samples representatitive of near-surface soil in place are below ADEQ RSRLs and GPLs, as described in the following sections.

4.0 SOIL INVESTIGATION RESULTS

4.1 Applicable Cleanup Standards

ADEQ regulatory guideline concentrations have been used to evaluate petroleum hydrocarbons (TPH [C_{10}-C_{32}] and BTEX) and fuel oxygenate (MTBE) concentrations in soil beneath the site. The applicable ADEQ regulatory guidelines are the SRLs and the GPLs presented in the table shown below. SRLs are cleanup levels based on human ingestion, inhalation, and dermal contact risk criteria determined by the Arizona Department of Health Services (Arizona Administrative Code, Title 18, Chapter 7, Article 2). The Arizona Residential SRLs (RSRLs) are a relevant cleanup standard for surface and near-surface soil at the site due to the proposed and existing residential land use.

Regulatory elines for Soil C trations			
Petroleum Hydrocarbon	**Minimum GPLs (mg/kg)**	**Reside SRLs (mg/kg)**	**Non-R ntial SRLs (m**
TPH	NA	NA	NA
TPH (C_{10-32})	NA	4,000	18,000
Benzene	0.71	0.62	1.4
Toluene	400	790	2,700
Ethylbenzene	120	1,500	2,700
Total Xylenes	2,200	2,800	2,800
MTBE	NA	320	3,300

NOTES: Minimum GPL = ADEQ Minimum Groundwater Protection Level
SRL = ADEQ Soil Remediation Level
NA = not applicable
MTBE = methyl tertiary-butyl ether

ADEQ's GPLs are concentrations of hydrocarbons that can remain in soil and be protective of groundwater quality. Residual petroleum-affected soil from the surface to the groundwater must be in compliance with the GPLs to prevent risk to groundwater. It is important to note that, although GPLs are generally lower than the RSRLs for most constituents, for some constituents (e.g., benzene) the RSRLs are lower than the GPLs. For some constituents (e.g., TPH [C_{10}-C_{32}] and MTBE), RSRLs exist but GPLs do not. Thus, whichever value is lower for a specific constituent in samples near the surface is the most conservative and appropriate cleanup standard.

ADEQ's methodology for the development of GPLs is described in *A Screening Method to Determine Soil Concentrations Protective of Groundwater Quality* (ADEQ, September 1996). This document allows use of three methods to establish GPLs for site cleanups:

1. **Minimum GPL:** ADEQ-established minimum GPLs represent soil concentrations protective of groundwater in a "worst-case" situation, where the soil profile is contaminated from the surface to the groundwater. This method is the most conservative; it results in the lowest soil concentrations of all three methods.

2. **Alternative GPL:** This site-specific method utilizes depth to groundwater and the vertical extent of contamination to determine a GPL. The site-specific information is plotted on modeled graphs developed by ADEQ to determine a GPL that will be protective given that the soil is not contaminated all the way to the groundwater. This method will allow soil concentrations which are higher than the minimum GPLs to remain in place.

3. **Use of a vadose and saturated zone contaminant fate and transport model for development of site-specific GPLs.** This method typically results in the highest allowable soil concentrations of the three methods, and is therefore subject to intense scrutiny by ADEQ before approval is granted.

For evaluation of the Silvercroft Wash release site soil samples, SFPP has selected the minimum GPLs as cleanup standards, as they are the most conservative.

4.2 Summary of Excavation Sampling

A summary of SFPP's process and rationale for excavating soil in connection with the corrective action activities for petroleum hydrocarbons in soil is presented below.

SFPP's methodology for determining the extent of soil excavation is based on three criteria: 1) visual observations; 2) field screening using a photoionization detector (PID), and 3) laboratory analysis of confirmation soil samples. Excavations were initiated in areas that were visibly affected by the pipeline release. Initially, excavations proceeded until visibly affected soils were removed. Excavations then continued until field screening using a photoionization detector (PID) indicated that hydrocarbons were not present. Confirmation soil samples were then collected to ensure that petroleum

hydrocarbon-impacted soils had been sufficiently excavated. After laboratory analysis confirmed that target analytes were below RSRLs and GPLs, the excavation was backfilled with clean imported fill.

Where practicable, excavation proceeded to the extent that petroleum hydrocarbons were not detected in confirmation soil samples. However, excavation was limited where additional excavation to nondetectable concentrations could have damaged underground utilities, and analytical results of confirmation soil samples indicated that concentrations were below RSRLs and GPLs. As an additional remedial measure, SFPP also excavated 1 foot of topsoil from the entire surfaces of lots 352, 353, 354, 355, and 356, and covered the lots with 1 foot of clean imported fill.

The following summary describes excavation and soil confirmation sampling activities on lots 321, 328, 352, 353, 354, 355, and 356 and other areas of the Silver Creek II Subdivision, as well as the analytical results received.

Areas Excavated During Initial Response Activities (Figures 4 through 7; Tables 2 through 5)

During the period between July 31 and September 5, 2003, SFPP performed initial remedial activities including excavations in the following areas:

- in the immediate area of the pipeline release
- in Silvercroft Wash
- in the storm-water channel between lots 352 and 353
- along the Southwest Gas (natural gas) pipeline right-of-way
- along the access road that runs along the top of the eastern side of Silvercroft Wash
- along the curbs at the intersection directly east of the storm-water channel (adjoining lots 321 and 328)
- excavated approximately 100 cubic yards of potentially affected soil during the replacement of the water line junction valve in the intersection directly east of the storm-water channel
- excavated approximately 20 cubic yards of potentially affected soil during the installation of the temporary water line for the ongoing construction of homes in the subdivision
- collected soil samples underneath former location of excavated soil stockpile
- collected soil samples and pressure test water samples in and near Silvercroft Wash
- replaced approximately 315 feet of water lines
- collected soil samples near housing foundations
- excavated approximately 33 cubic yards of potentially affected soil around sanitary sewer manhole #3

- excavated approximately 60 cubic yards of potentially affected soil along northeast curb of intersection of Silver Island Way and Silver Meadow Place

Detailed descriptions of these activities and maps illustrating sample locations were included in the weekly reports from Friday, August 1, 2003, through Friday, September 5, 2003. The maps are included as Figures 4 through 7.

Tables 2 through 5 include results of 136 soil samples collected following the excavation activities listed above. Results indicated the following:

- No detectable BTEX concentrations were found in 124 of the 136 samples. Of the 12 samples showing BTEX concentrations, all were below RSRLs and GPLs, with the exception of 2 samples that exceeded the GPL for benzene. One of these samples was from a location that was subsequently excavated and backfilled with clean imported fill. The other sample was from Silvercroft Wash; resampling at that location indicated no detectable BTEX or TPH (C_{10}-C_{32}) concentrations and MTBE at the detection limit (3 orders of magnitude below the RSRL).

- No detectable TPH (C_{10}-C_{32}) concentrations were found in 116 of the 117 samples analyzed for TPH (C_{10}-C_{32}). The single detection of TPH (C_{10}-C_{32}) was one order of magnitude below the RSRL, and was at a location that was subsequently excavated and backfilled with clean imported fill.

- No detectable MTBE concentrations were found in 87 of 134 samples analyzed for MTBE. Of the 47 samples indicating the presence of MTBE, all were from 1 to 4 orders of magnitude below the RSRL.

- No impacted soil with concentrations above RSRLs and GPLs remained at the curb excavations adjoining lots 321 and 328.

Lots 321, 328, 350, and 351

Soil samples were collected on lots 328, 321, 350, and 351 on August 27 and August 28, 2003 (Table 4). Locations are shown in Figure 6. A hand auger was used to collect soil samples at depths ranging from the ground surface to 5 feet bgs. Soil samples were collected on these lots to confirm that surface soil on the lots had not been impacted by the release. Findings were as follows:

- No detectable BTEX, MTBE or TPH (C_{10}-C_{32}) concentrations were found in any of the 13 samples analyzed.

Based on the above results, no excavation activities were performed on lots 321, 328, 350, and 351.

Lot 352

Eight of the confirmation samples for the storm drain channel were collected on the northern edge of lot 352 (sample IDs 157, 160, 161, 162, 168, 170, 174, and 176 on Figure 8 and Table 6). Findings are as follows:

- No detectable BTEX or TPH (C_{10}-C_{32}) were found in all eight samples analyzed.
- Six of the eight samples showed no detectable MTBE concentrations. The maximum MTBE detection was 0.72 parts per million (ppm), which is 3 orders of magnitude below the 320 ppm RSRL.

Using a hollow stem auger drill rig, six shallow soil borings were drilled on each of lots 352, 353, 354, 355, and 356, and one deep boring was drilled on lot 352. Locations are shown in Figure 10; analytical results are shown in Table 8. Samples were collected at 1 foot and 5 feet below the surface elevation after removal of the top 1 foot of soil. For lot 352, results of the six shallow borings indicated the following (Table 8):

- No detectable BTEX or TPH (C_{10}-C_{32}) concentrations were found in any of the 12 samples analyzed.
- No detectable MTBE concentrations were found in 11 of the 12 samples analyzed. The MTBE detection was 0.1 ppm, which is 3 orders of magnitude below the 320 ppm RSRL.

The results of the deep boring on lot 352 indicated the following (Table 8):

- No detectable BTEX concentrations were found in any of the seven samples analyzed.
- No detectable MTBE concentrations were found in three of the seven samples analyzed. The highest MTBE detection was 1.7 ppm, which is 2 orders of magnitude below the 320 ppm RSRL.

Lot 353

Nineteen of the confirmation samples for the storm drain channel were collected adjacent to or on lot 353 (sample IDs 156, 158, 159, 163, 165, 166, 167, 169, 171, 172, 178, 179, 180, 181, 182, 183, 184, and 185 on Figure 8 and Table 6). Analytical results indicate the following:

- No detectable benzene concentrations were found in any of the 19 samples analyzed.
- No detectable toluene, ethylbenzene or total xylenes concentrations were found in 17 of the 19 samples analyzed.

- The two samples indicating the presence of toluene, ethylbenzene or total xylenes showed concentrations 3 to 4 orders of magnitude below RSRLs and GPLs. The soils adjacent to the samples are now covered by 2 and 4 feet of clean imported fill used to backfill the excavation.

- No detectable MTBE concentrations were found in 11 of the 19 samples analyzed. The eight samples showing presence of MTBE had concentrations from 2 to 3 orders of magnitude below the RSRL.

- No detectable TPH (C_{10}-C_{32}) concentrations were found in any of the 19 samples analyzed for TPH (C_{10}-C_{32}).

For lot 353, the six shallow soil borings were drilled to depths ranging from 6 to 16 feet bgs. Analytical results of soil samples from the six shallow borings (Figure 10, Table 8) indicated the following:

- No detectable benzene or TPH (C_{10}-C_{32}) concentrations were found in any of the 24 samples analyzed.

- No detectable toluene, ethylbenzene or xylene concentrations were found in 19 of the 24 samples analyzed.

- Five of the 24 samples indicating the presence of toluene, ethylbenzene or xylene showed concentrations from 3 to 4 orders of magnitude below the respective RSRLs and GPLs.

- No detectable MTBE concentrations were found in 7 of the 24 samples analyzed.

- Seventeen of the 24 samples indicating the presence of MTBE showed concentrations from 1 to 3 orders of magnitude below the RSRL.

Lot 354

For lot 354, results of soil samples from the six shallow borings (Figure 10, Table 8) indicated the following:

- No detectable BTEX, MTBE or TPH (C_{10}-C_{32}) concentrations were found in any of the 12 samples analyzed.

Lot 355

For lot 355, results of soil samples from the six shallow borings (Figure 10, Table 8) indicated the following:

- No detectable BTEX, MTBE or TPH (C_{10}-C_{32}) concentrations were found in any of the 12 samples analyzed.

Lot 356

For lot 356, results of soil samples from the six shallow borings (Figure 10, Table 8) indicated the following:

- No detectable BTEX, MTBE or TPH (C_{10}-C_{32}) concentrations were found in any of the 12 samples analyzed.

Storm Drain Channel (Between Lots 352 and 353)

Thirty confirmation soil samples were collected from the storm drain channel. Soil sample names and analytical results are shown in Table 6. Sample locations are shown in Figure 8. Analytical results indicate the following:

- Benzene was not detected in any of the 30 samples analyzed.
- No detectable concentrations of toluene, ethylbenzene or xylenes were found in 28 of the 30 samples analyzed.
- The two samples with toluene, ethylbenzene or xylene detections had concentrations less than 1 ppm. The GPLs for toluene, ethylbenzene, and total xylenes are 400 ppm, 120 ppm, and 2,200 ppm, respectively.
- No detectable concentrations of TPH (C_{10}-C_{32}) were found in any of the 30 samples analyzed.
- Detectable concentrations of MTBE were found in 10 of the 30 samples analyzed. The maximum concentration detected was 6.4 ppm, and the RSRL is 320 ppm.

It is important to note that the sample names include the depth of sample collection in the excavation. For example, sample 11-Chn-Nwall-4, which exhibited the maximum MTBE concentration of 6.4 ppm, was collected 4 feet below the surface. Thus, the soil adjacent to sample 11-Chn-Nwall-4 is now covered by 4 feet of clean imported fill used to backfill the excavation.

Excavation Along Curb of Silver Island Way, Silverbell Tree Drive

Thirty-seven locations were sampled adjacent to lots 352, 353, 354, 355, and 356, as shown in Figure 9. BTEX, MTBE, and TPH (C_{10}-C_{32}) analytical results for the 45 soil samples submitted (Table 7) indicate the following:

- No detectable BTEX concentrations were found in any of the 45 samples analyzed.
- No detectable MTBE concentrations were found in 43 of the 45 samples analyzed. The MTBE concentrations detected in these two samples were 3 and 4 orders of magnitude below the 320 ppm RSRL.

- No detectable TPH (C_{10}-C_{32}) concentrations were found in any of the 45 samples analyzed.

Soil Sampling Conducted for the Week Ending 11/27/03

ATC Associates, Inc., consultant to Monterey Homes, directed excavations using a backhoe to collect soil samples near the western end of the storm drain channel on Monday, November 24, 2003. Eight excavations varying in depth from 3.5 to 5 feet were advanced in and adjacent to the western end of the storm drain channel by Borderland Construction. LFR and ATC Associates, Inc. each collected at least one sample from each excavation. The excavations were then backfilled. Figure 12 illustrates the locations of the soil samples. Table 11 presents analysis results of samples collected by LFR. All results indicated non-detectable concentrations or concentrations below the RSRLs and GPLs.

In conclusion, SFPP has collected and analyzed 274 soil samples within 10 feet of the surface to confirm that the extents of excavations were successful in removing petroleum-affected soils to below applicable ADEQ RSRLs and GPLs. Of the 273 samples representative of soil remaining in place, all 273 samples indicated either no detectable concentrations of BTEX, MTBE, and TPH (C_{10}-C_{32}), or detections that are 1 to 4 orders of magnitude below the RSRLs and GPLs. The one soil sample collected during excavation activities in the subdivision that exceeded the RSRL and GPL for benzene was from an area that was subsequently excavated and backfilled with clean soil.

4.3 Summary of Soil Sampling at Depth

As of December 5, 2003, 51 soil borings had been advanced, and 16 groundwater monitoring wells had been installed. Twenty-six (26) of the borings penetrated to depths less than 10 feet bgs, and 25 soil borings advanced to depths greater than 10 feet bgs. Specifications on the borings to depths greater than 10 feet bgs are summarized in Table 9.

A total of 172 soil samples were collected at depths greater than 10 feet bgs from the 25 soil borings included in Table 9. This report includes discussion of the soil sample analytical results only; details on well construction and findings of the groundwater investigation will be covered in a separate report.

Lithologies encountered during drilling of all borings have consisted of coarse sands and gravels to 175 feet bgs. Groundwater has been encountered at approximately 140 feet bgs in all borings. No perched groundwater was detected in the borings. Silt or clay lenses were not encountered between the surface and the groundwater table, with soil samples logged at 5-foot intervals in wells at and near the release point, and at 10-foot intervals in wells away from the release point.

Soil analytical results for borings L352 and L353 are summarized in Table 8. Samples from the RP and monitoring well borings are summarized in Table 10. Analytical results from the borings deeper than 10 feet bgs indicate the following:

- BTEX and MTBE analytical results for the L352 and L353 samples, and for wells MW-3, MW-4, MW-5, MW-6, MW-7, MW-8, MW-9, MW-10, MW-11, MW-12, MW-13, MW-14, MW-15, and MW-16 were either below their respective laboratory reporting limits or below their respective RSRLs and GPLs for soil samples extending from the ground surface to groundwater.

- Borings adjacent to the release point (RP, RP-2, and RP-4) exhibited BTEX and TPH (C_{10}-C_{32}) concentrations exceeding their respective RSRLs and GPLs, and MTBE exceeding the RSRL, in some samples from below the release point excavation at 15 feet bgs (the base of the release point excavation was 10 feet) to groundwater.

- Boring RP-3 (MW-2), located approximately 40 feet northwest of the release point, had only one sample with a benzene value slightly exceeding the GPL (75 feet). Borings MW-3 and MW-4, located approximately 43 feet and 54 feet from the release point, respectively, had no samples exceeding the RSRLs and GPLs for BTEX and MTBE. These results indicate that the lateral radius of the vertical cylindrical "column" of impacted soil below the release point excavation is limited to approximately 40 to 50 feet from the release point.

- All 140 soil samples collected below 10 feet bgs from borings located away from the impacted column of soil beneath the release point were below their respective laboratory reporting limits or their respective RSRLs and GPLs.

- Although analysis results for soil samples collected from borings advanced on lots 352 and 353 indicate concentrations below RSRLs and GPLs, the approximate 40-foot radius of the column of affected soil suggests that affected soil likely extends in the subsurface at depths greater than 10 feet bgs below the northwestern corner of lot 352, the southwestern corner of lot 353, and the western end of the storm drain channel.

5.0 PROPOSED LAND USE

Affected soil within 10 feet of the surface has been remediated to RSRLs and GPLs, as the site is in a residential zone. Although the soils on lots 352 through 356 meet the ADEQ RSRLs, these lots will not have residences reconstructed for at least the next several years; these lots will serve as a buffer zone, and as the proposed location of the groundwater and vapor extraction remediation system and associated piping. A wall will be constructed around the perimeter of lots 353, 354, 355, and 356 to prevent access to the public. SFPP is working with Monterey's architects to ensure that the remediation building and walls will match the design and material specifications of the other homes and walls in the subdivision.

6.0 COMMUNITY INVOLVEMENT ACTIVITIES

The intent of the remedial site work described in this report was to remediate the site to soil remediation levels that comply with A.R.S. §49-152 and the rules adopted pursuant to that section. As such, the community involvement requirements for the work described in this report, as appropriate to the scope and schedule of the remediation, are prescribed by A.R.S. §49-176(A)(2) and are listed below (Appendix I):

a. For field work conducted to remove contaminants of concern or that may result in noise, light, odor, dust, and other adverse impacts off of the site, provide general public notice. The general public notice shall be in the form of visible signage and direct mailing, door hangings, or a similar form of notice that is distributed in a manner sufficient to reach those who may be impacted. The general public notice shall identify the name and telephone number of a person who may be contacted for information regarding field work;

b. For remediation that will take more than one hundred eighty days to complete, provide general public notice regarding the nature and progress of the action and establish a document repository accessible to the public where information regarding the site and the remediation is available for review. The general notice may be in the form of fact sheets, newsletters, or news articles distributed by direct mailings, door hangings, or any other method of distribution sufficient to reach or be accessible to local government agencies persons within the community surrounding the site, and other persons who have requested information regarding the site and direct mail to affected water providers. The general notice shall identify the name and telephone number of a person who may be contacted for information regarding the remediation. The document repository shall be accessible during normal business hours or by appointment and shall contain all documents and information required to be prepared or maintained by this program (Voluntary Remediation Program) and any other documents and information deemed appropriate by the person conducting the work.

A site repository has been established and is located at ADEQ's Southern Regional Office located at 400 Congress St., Tucson, Arizona. The site repository contains copies of the pertinent documents that describe the nature of the release and the efforts conducted since the release. In addition, several community meetings have been held and notices of upcoming activities that may impact local residents, such as the installation of groundwater monitoring wells, have been hand delivered to area residents.

During the week ending September 19, 2003, SFPP distributed public notices to residents in the Silver Creek II subdivision west of Silvercroft Wash and to businesses along Jackrabbit Avenue. The purpose of the notice was to inform the community of the planned demolition of five houses in the vicinity of the Silvercroft Wash.

Several community involvement activities have been conducted since the date of the release to help inform the residents and area business of the status of the early response and site characterization activities. A brief description of these activities is listed below:

Public meeting held on November 28, 2003;

Public notice of demolition of 5 houses provided to residents in the western portion of the Silver Creek II subdivision and to businesses along Jackrabbit Avenue; and

Drilling notice provided to residents living adjacent to the utility easement when two additional monitoring wells were installed the week of January 12, 2004

Examples of public notices are shown in Section 10.0 of Appendix A.

7.0 PERMITS

Permits for work performed are attached in Appendix E. Permits include the following:

- Well permits were obtained from the Arizona Department of Water Resources (ADWR) prior to all drilling activities that may have potentially encountered groundwater.
- A Demolition Permit was obtained from the City of Tucson for the demolition of the five houses on lots 352, 253, 354, 355, and 356.
- TRC Inc., a subcontractor to SFPP, performed emergency response vapor extraction testing at the site. The emergency response work was performed under verbal notification and approval of numerous contacts at ADEQ and the Pima County Department of Environmental Quality (PCDEQ).
- SFPP is working with PCDEQ to obtain a general permit for vapor extraction. PCDEQ approved the "Soil Vapor Sampling and Analysis Protocol" (LFR, 12/12/03), which addresses sampling to evaluate soil vapor for VOC concentrations as required to obtain a general permit for vapor extraction. On Thursday, December 18, and Friday, December 19, 2003, vapor samples were collected from wells MW-1, MW-2, MW-3, MW-4, MW-5, MW-8, MW-9, MW-10, SVE-1, SVE-2 (multiple screen intervals: from 12-40, 45-75, and 90-120 ft bls), and SVM-1 (multiple screen intervals: from 12-40, 45-75, and 90-120 ft bls). Each vapor sample is being analyzed via Environmental Protection Agency (EPA) Method TO-15 for BTEX, MTBE, hydrocarbons in the range of C1-C10, and for PCE and TCE at the lowest possible reporting limit using selected ion monitoring. Analyses are being performed by Aerotech Environmental Laboratories, Phoenix, Arizona. Status of the analysis results and the general permit for vapor extraction will be included in future weekly reports.

8.0 SUMMARY AND CONCLUSIONS

8.1 Estimates of Pre-Remediation Volume

Exponent Failure Analysis (Exponent), under contract with Fennemore Craig, legal counsel to KMEP, calculated an estimated volume of the release. Exponent's calculation resulted in a range of 442 to 455 barrels (1 barrel = 42 gallons) or up to 19,110 gallons of gasoline. SFPP initially used vacuum trucks to recover product from the excavation at the release point, Silvercroft Wash, and various other areas at the site where gasoline had ponded on the ground surface. This recovery included water that was ponded in the Silvercroft Wash. The vacuum trucks were routed under appropriate manifests to the Tucson terminal and offloaded into an isolated storage tank to allow the gasoline/water mixture to separate.

8.2 Summary of Remediation to Date

Activities implemented by SFPP in response to the July 30, 2003 pipeline rupture have been intensive and continuous in an effort to remediate affected soils, restore utilities, remove affected structures, characterize subsurface soil and groundwater impacts, and begin subsurface remediation. Remedial measures and results to date have included the following:

- **Excavation** – 4,046 tons of surface and near-surface soils impacted by the release was removed from the site.

- **PSH Extraction** – Including all PSH recovery methods conducted to date, SFPP estimates that a total of 7,913 gallons have been recovered as of January 12, 2004. As a result of the initial recovery of PSH, close to 25,000 gallons of groundwater were extracted.

- **Vapor Extraction –** Approximately 3,035 pounds of hydrocarbons (equivalent to 486 gallons) was recovered by the SVE system through November 17, 2003.

8.3 Summary of Soil Sampling Results

Table 12 summarizes the number of soil samples collected from depths less than 10 feet of the ground surface, and depths greater than 10 feet from the ground surface, that appear in data tables 2 through 11. The total number of soil samples collected within 10 feet of the ground surface is 274, and the total number of soil samples collected at depths greater than 10 feet is 172. In total, 446 soil samples have been collected to assess the extent of petroleum hydrocarbon impacts to soil associated with the SFPP pipeline release, and to confirm the effectiveness of remedial excavation.

Table 13 presents a summary of exceedances of RSRLs and GPLs for BTEX, MTBE, and TPH (C_{10}-C_{32}) for samples collected within 10 feet of the ground surface after affected soil had been excavated. Of the 272 samples collected representative of soil remaining in

place, there were no exceedances of RSRLs or GPLs for BTEX, MTBE, and TPH (C_{10}-C_{32}).

Table 14 presents a summary of exceedances of RSRLs or GPLs for BTEX, MTBE, and TPH (C_{10}-C_{32}) for samples collected at depths greater than 10 feet. Table 14 illustrates that the exceedances of RSRLs and GPLs is limited to the soil borings advanced below the release point excavation within 40 feet of the release point (RP, RP-2, RP-3, and RP-4). The 116 samples collected further than 40 feet laterally away from the release point indicate that no exceedances of RSRLs and GPLs for BTEX, MTBE, and TPH (C_{10}-C_{32}) were detected. Thus, as indicated by the 272 soil samples collected within 10 feet of the surface and the 116 samples collected below 10 feet away from the release point, soil from the surface to the groundwater at approximately 140 feet bgs is below ADEQ RSRLs and GPLs, with the exception of the affected soil column below the release point excavation.

Preliminary vapor extraction testing using wells VE-1 (RP-2), MW-1 (RP-4), and MW-2 (RP-3) has likely reduced soil concentrations in the affected soil column below the release point excavation; the concentrations shown for samples from borings RP, RP-2, RP-3, and RP-4 represent pre-vapor extraction concentrations. SFPP plans to further remediate the affected soil column extending from beneath the release point excavation to the groundwater by ongoing vapor extraction. SFPP also intends to continue extraction of PSH from the groundwater, and is evaluating options for groundwater remediation. The RWP currently in preparation will fully address details and specifications of the subsurface remediation system.

8.4 Conclusion

In summary, surface and near-surface remediation at the site has been completed, based on the following:

- As indicated by analytical results for 272 samples, concentrations of BTEX, MTBE, and TPH (C_{10}-C_{32}) are not present in soil above RSRLs and GPLs within 10 feet of the surface due to comprehensive excavation and removal of affected soil from the site. This statement applies to the surface and near-surface area of the Silver Creek II Subdivision impacted by the release (lots 321, 328, 352, 353, 354, 355, and 356, portions of the utility easement west of these lots, the storm drain channel between lots 352 and 353, limited areas of soil beneath Silver Island Way and Silverbell Tree Drive), and portions of Silvercroft Wash.

- Although lots 352 and 353, the storm drain channel, the utility easement, and Silvercroft Wash are not included in the NFA request area, soil samples from these areas are below RSRLs and GPLs within 10 feet of the surface, indicating that these areas do not present a potential exposure pathway to residents or workers.

- The remaining lots and streets in the Silver Creek II Subdivision were not impacted by the release based on visual observations during emergency response activities,

analysis results for surface and near-surface soil samples collected at the margins of the impacted area and on nearby lots, and analysis results of soil samples collected from groundwater monitoring well borings located in streets.

Subsurface soil conditions are summarized as follows:

- As part of the site characterization effort, 51 soil borings have been drilled at the site, with 25 soil borings advanced to depths greater than 10 feet bgs. Of the 51 borings, only 4 of the borings had soil sample concentrations exceeding RSRLs and/or GPLs. These four borings are all located within the utility easement adjacent to or near the release point, and indicate that a "column" of soil with concentrations exceeding RSRLs and/or GPLs exists from below the base of the release point excavation at 10 feet bgs, to groundwater at approximately 140 feet bgs. The radius of the affected soil column is approximately 40 feet from the release location. Although soil samples from borings advanced on lots 352 and 353 indicate concentrations below RSRLs and GPLs, the column of affected soil likely extends in the subsurface at depths greater than 10 feet bgs below the northwestern corner of lot 352, the southwestern corner of lot 353, and the western end of the storm drain channel.

- For borings located outside of the affected column below the release point excavation, as indicated by analytical results for 116 samples collected below 10 feet bgs, concentrations of BTEX, MTBE, and TPH (C_{10}-C_{32}) are below ADEQ RSRLs and GPLs to groundwater. This statement applies to the utility easement to the north and south of the release point, to the majority of the areas of lots 352 and 353, to the majority of the storm drain channel, lots 354, 355, 356, and to the streets in the subdivision.

- SFPP intends to perform vapor extraction of the affected soil beneath the release point excavation, and continue extraction of PSH. As per VRP requirements, a Remediation Work Plan (RWP) is being prepared to address further subsurface remediation efforts, and will be submitted to ADEQ in mid-January.

In conclusion, SFPP requests that the ADEQ grant NFA status to soil from the surface to groundwater for BTEX, MTBE, and TPH (C_{10}-C_{32}) for the NFA Area, which includes the following:

- Lots 321, 328, 354, 355, and 356.

- Silver Island Way.

- Silverbell Tree Drive.

This NFA request does not include soil beneath the utility easement, lots 352 and 353, the storm drain channel, and Silvercroft Wash. Nor does it include groundwater impacts, as

such area of impact will be the subject of a separate NFA request following completion of the subsurface soil and groundwater remediation efforts.

9.0 REFERENCES

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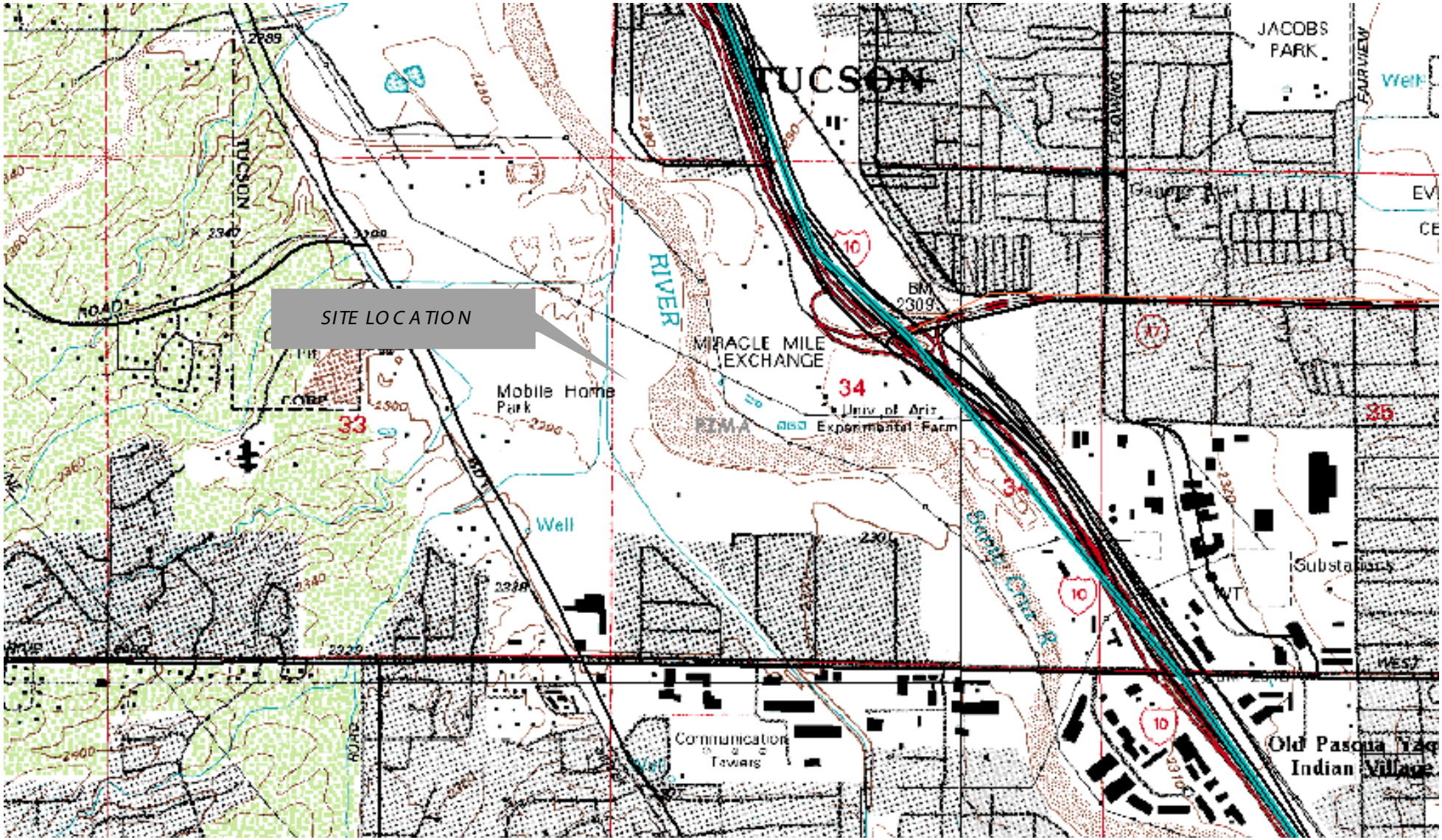

Base Map Source: USGS Jaynes 7.5-minute Topographical quad 1995

Tucson, Arizona

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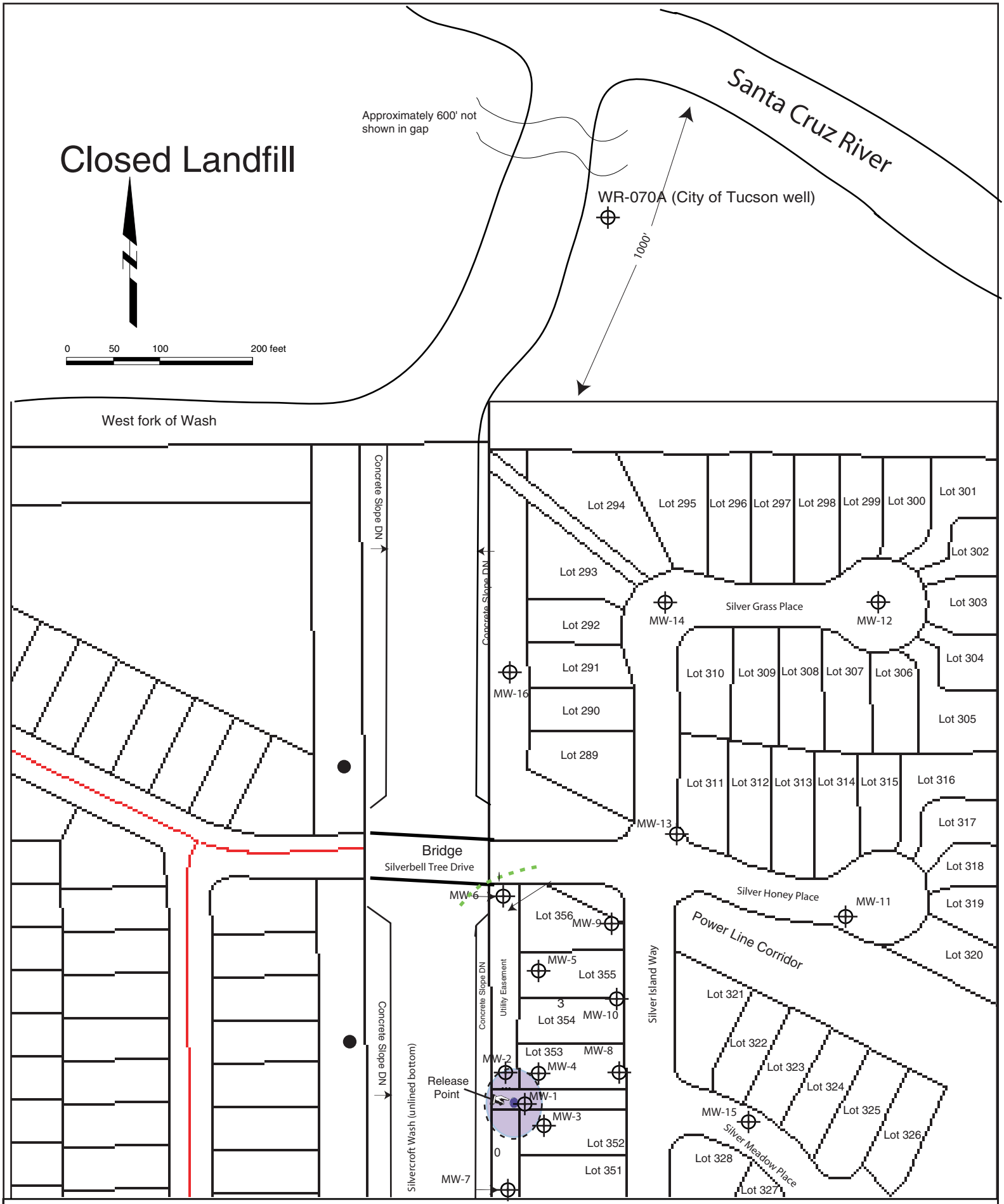
SFPP L.P. Silvercroft Wash Release Site
Remediation Work Plan
Figure 1
Site Vicinity
Project No. 014-10022-02



Base Map source: Pima County

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Existing Groundwater Monitoring Well

MW-3 Well Name

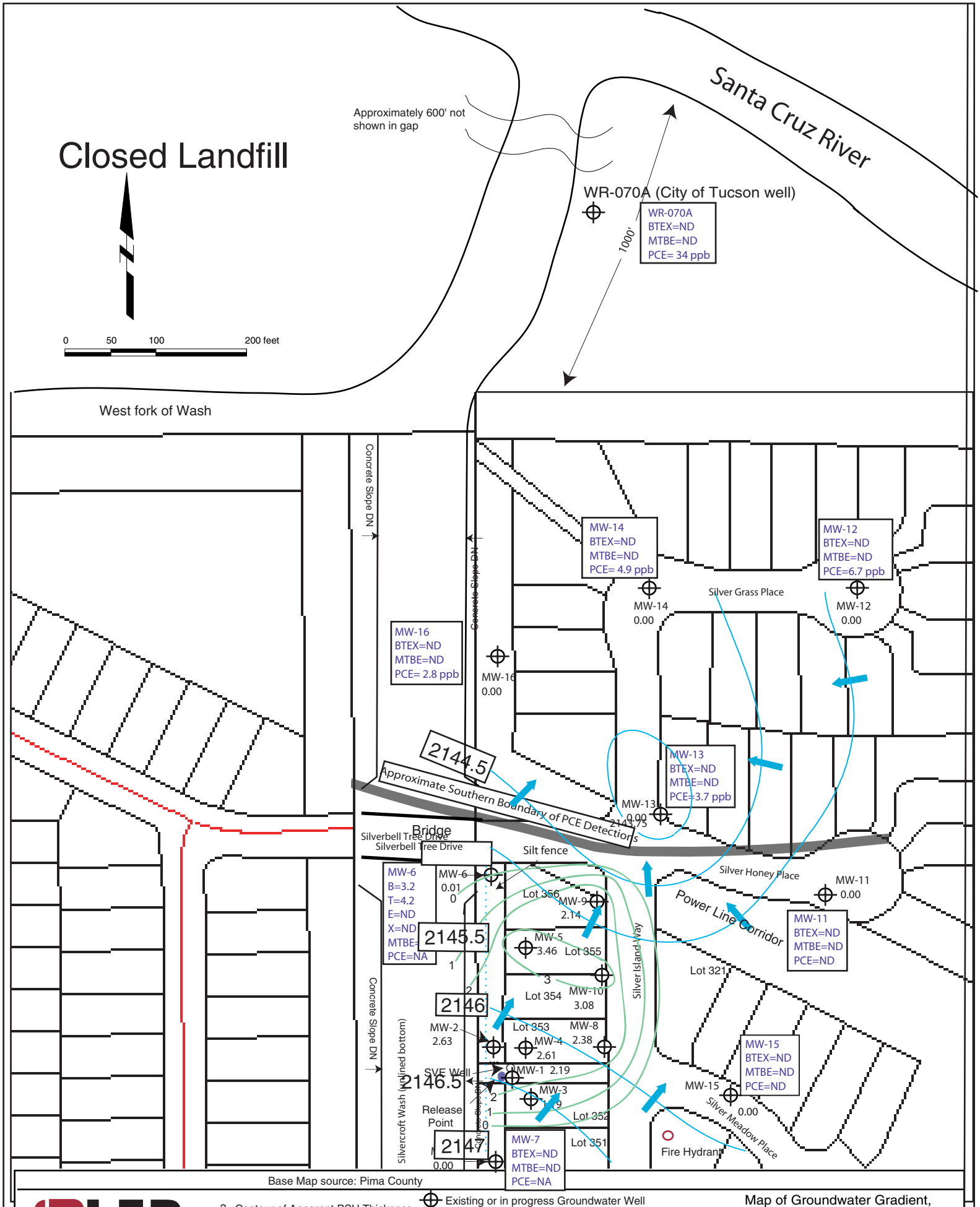
Well to be installed week beginning 1/12/04

Approximate Extent of Soil Deeper than 10 feet Exceeding ADEQ Cleanup Levels (All samples within 10 feet of the surface are in compliance)

Extent of Affected Subsurface Soil

Figure 2

Project No. 014-10022-00



Base Map source: Pima County

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2 Contour of Apparent PSH Thickness

MW-3 1.14 Well Name / Measured Apparent PSH Thickness

Existing or in progress Groundwater Well

Release Point

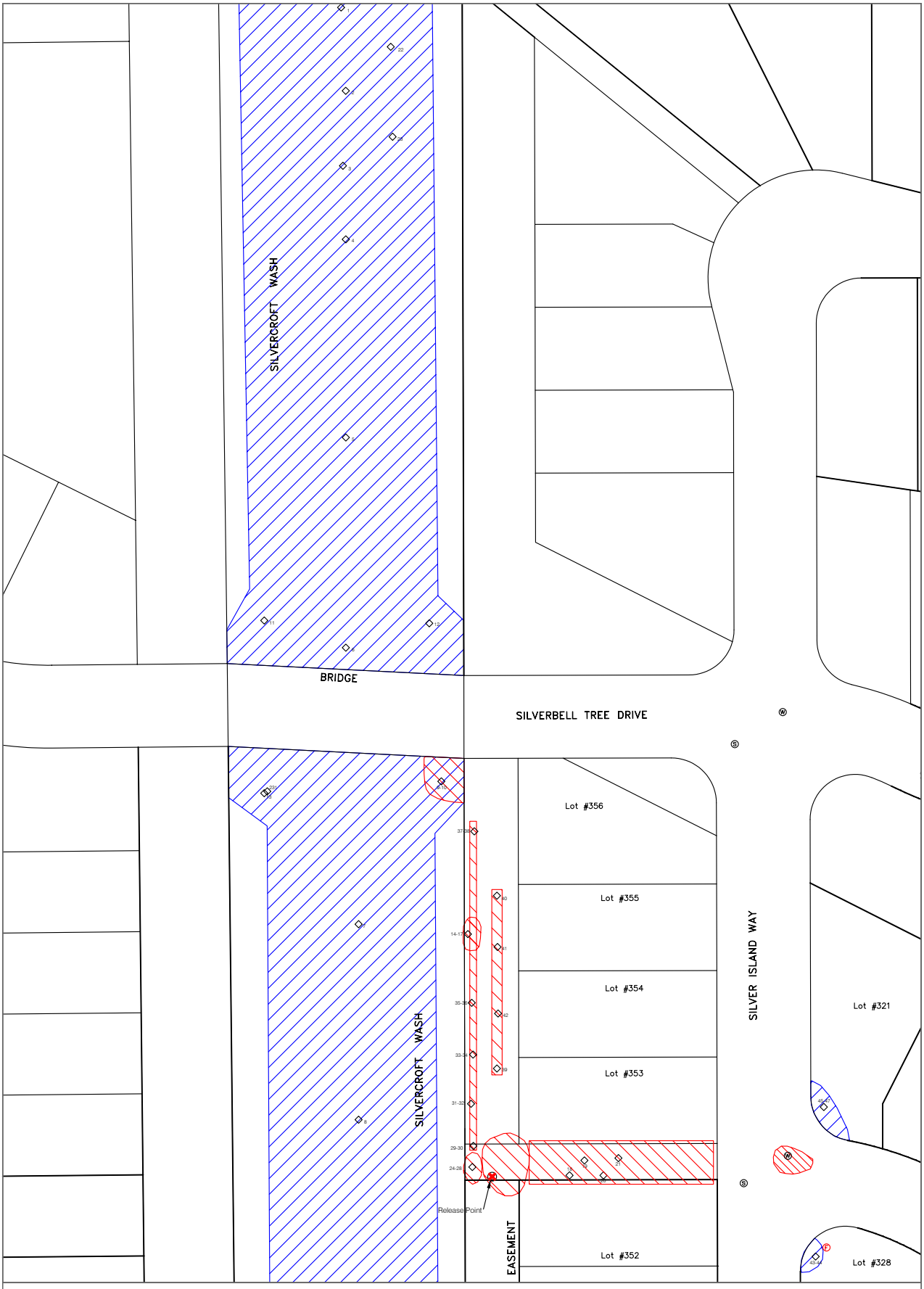
SVE Well

PSH was measured on 12/1/03
Groundwater sample collection dates range from 10/29/03 to 11/24/03 (see Table 2)

Map of Groundwater Gradient, Apparent PSH Thickness, Dissolved Concentrations

Figure 3

Project No. 014-10022-00



SFPP L.P. SILVERCROFT WASH RELEASE SITE

Soil Samples 8/1 through 8/8/2003
Initial Investigation and Excavation

Figure 4
Project No. 014-10022-00

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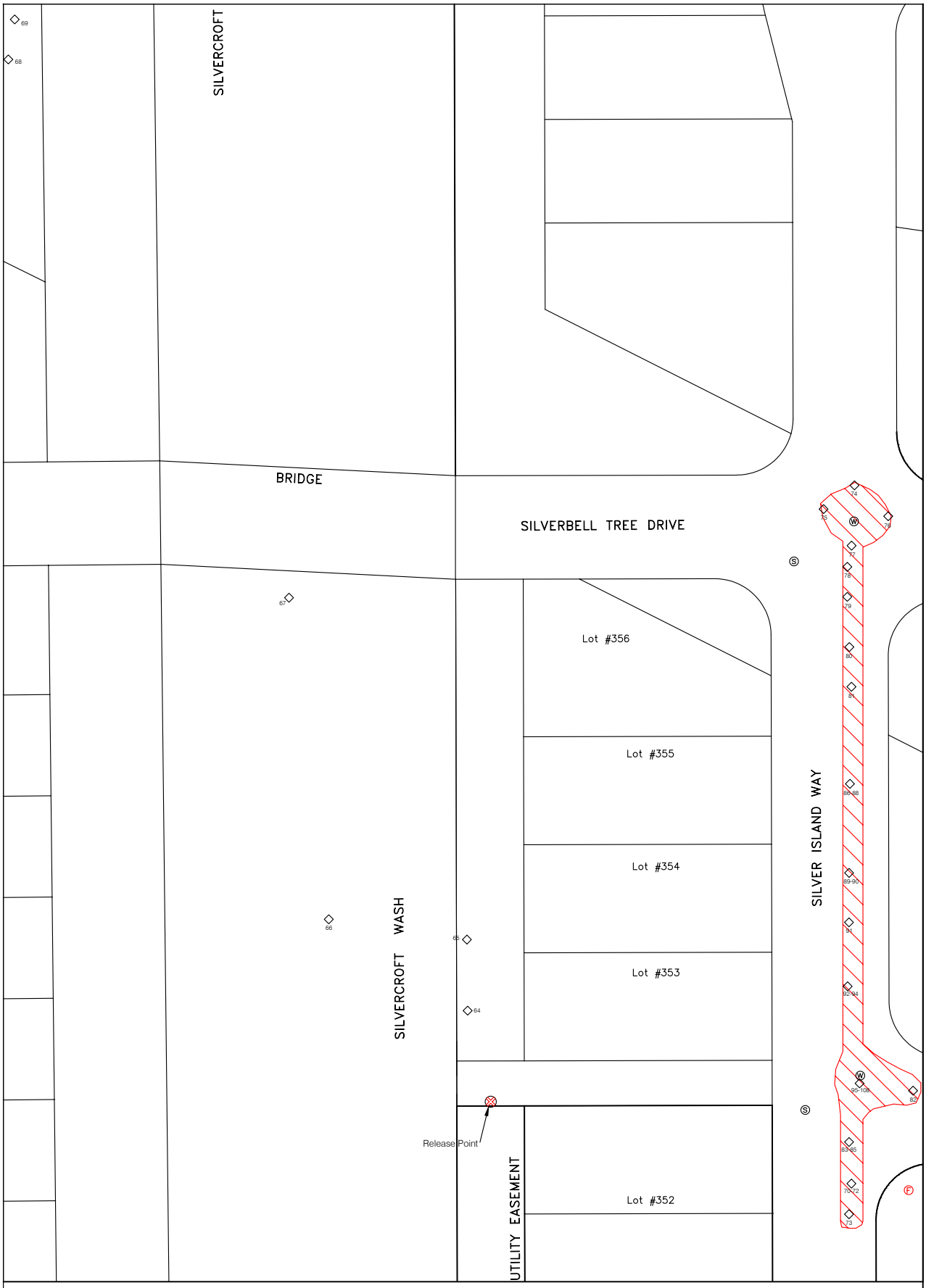

LEGEND

Excavation (Depth Greater Than 3 Feet)

73 Soil Sample Location

Fire Hydrant

Sewer Manhole

Water Valve

N

0 20 40 FEET

SFPP L.P. SILVERCROFT WASH RELEASE SITE

Soil Samples 8/20 through 8/27/2003
Initial Investigation and Excavation

Figure 5

Project No. 014-10022-00

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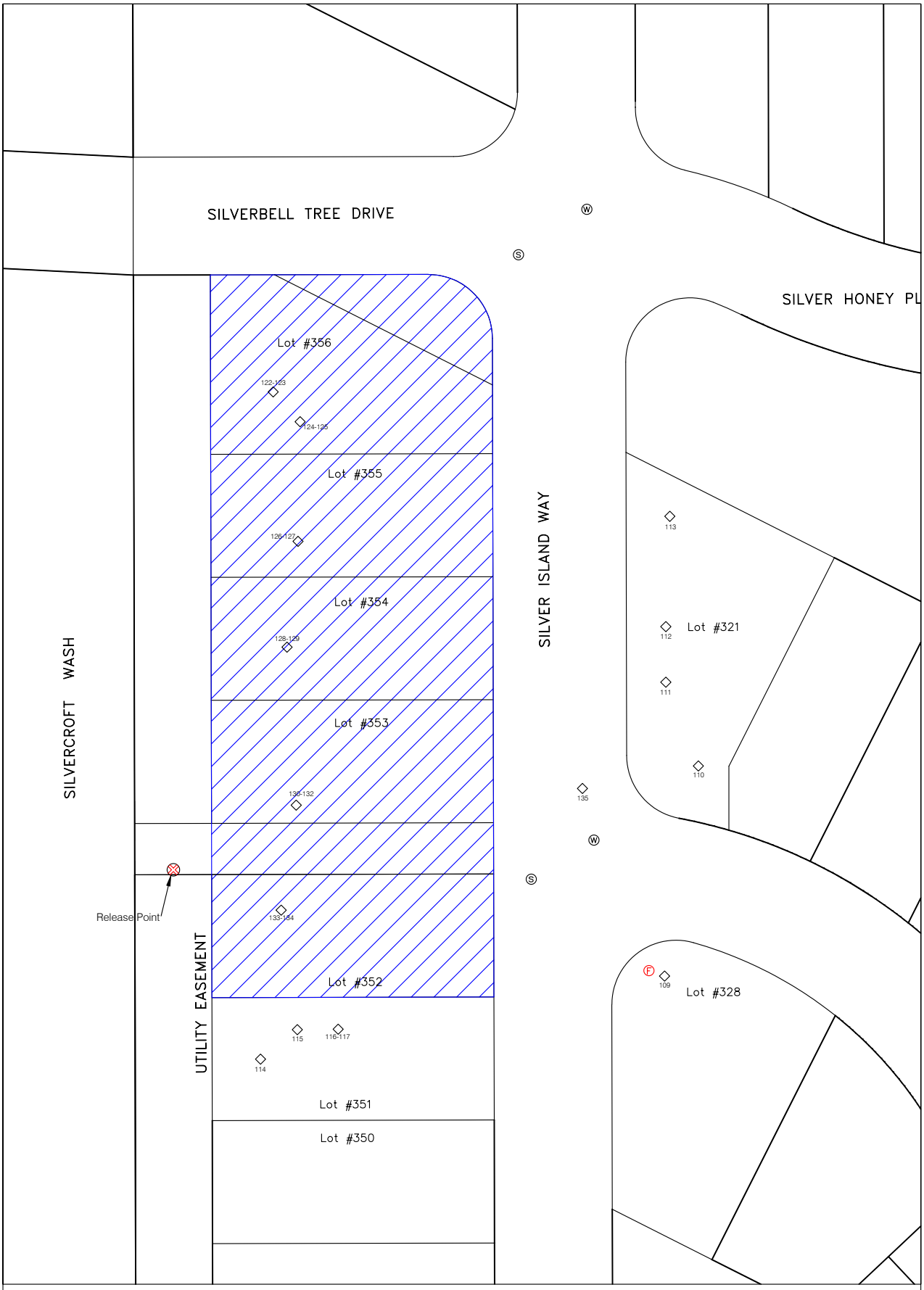

LEGEND

Excavation (Depth Less Than 3 Feet)

114 Soil Sample Location

Fire Hydrant

Sewer Manhole

Water Valve

N

0 12.5 25

SFPP L.P. SILVERCROFT WASH RELEASE SITE

Soil Samples 8/27 through 8/28/2003
Initial Investigation and Excavation

Figure 6

Project No. 014-10022-00

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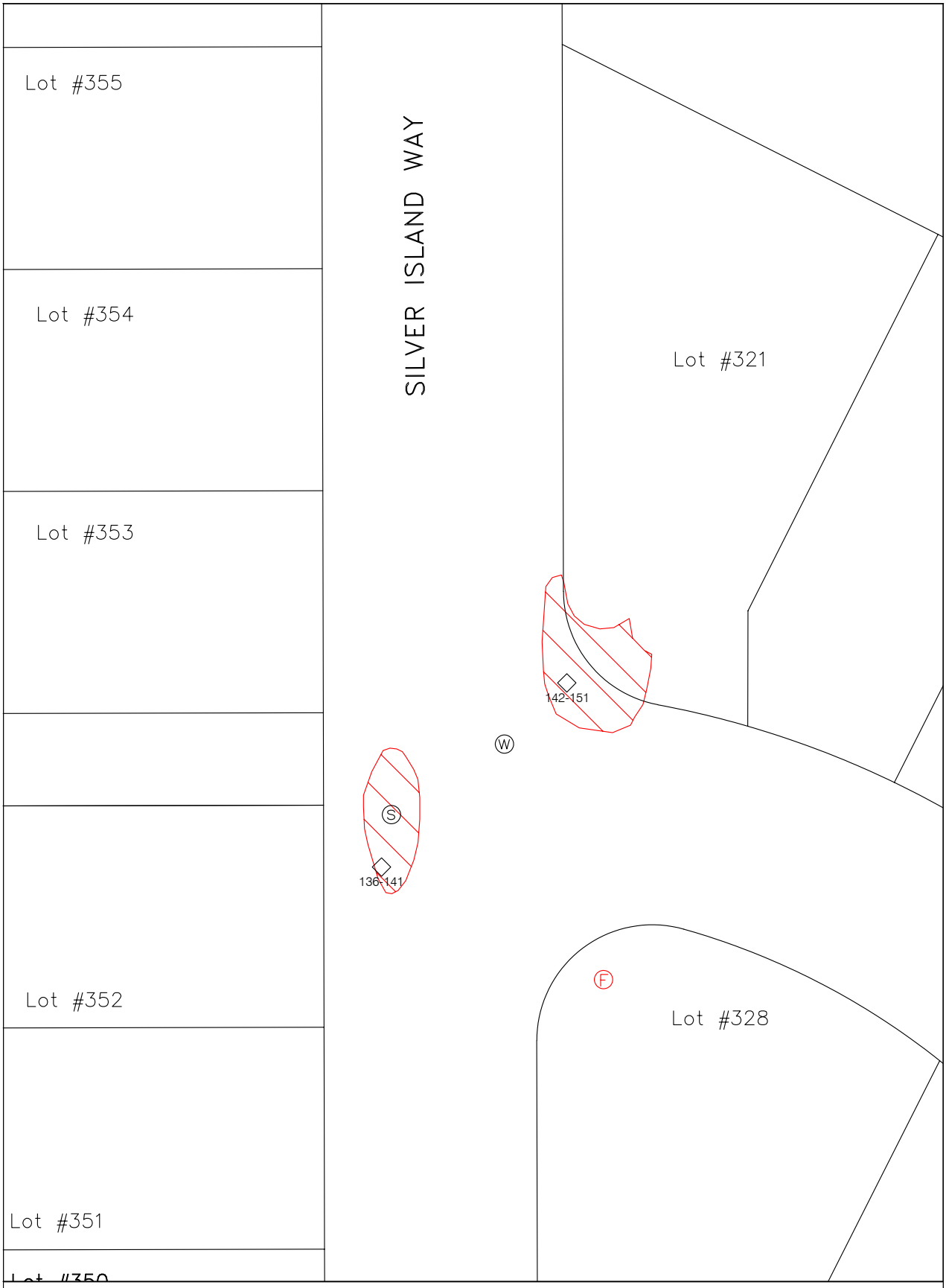

LEGEND

	Excavation (Depth Greater Than 3 Feet)
141-151	Soil Sample Location
F	Fire Hydrant
S	Sewer Manhole
W	Water Valve

N

0 10 20 FEET

SFPP L.P. SILVERCROFT WASH RELEASE SITE

Soil Samples 9/2 through 9/3/2003
Initial Investigation and Excavation

Figure 7
Project No. 014-10022-00

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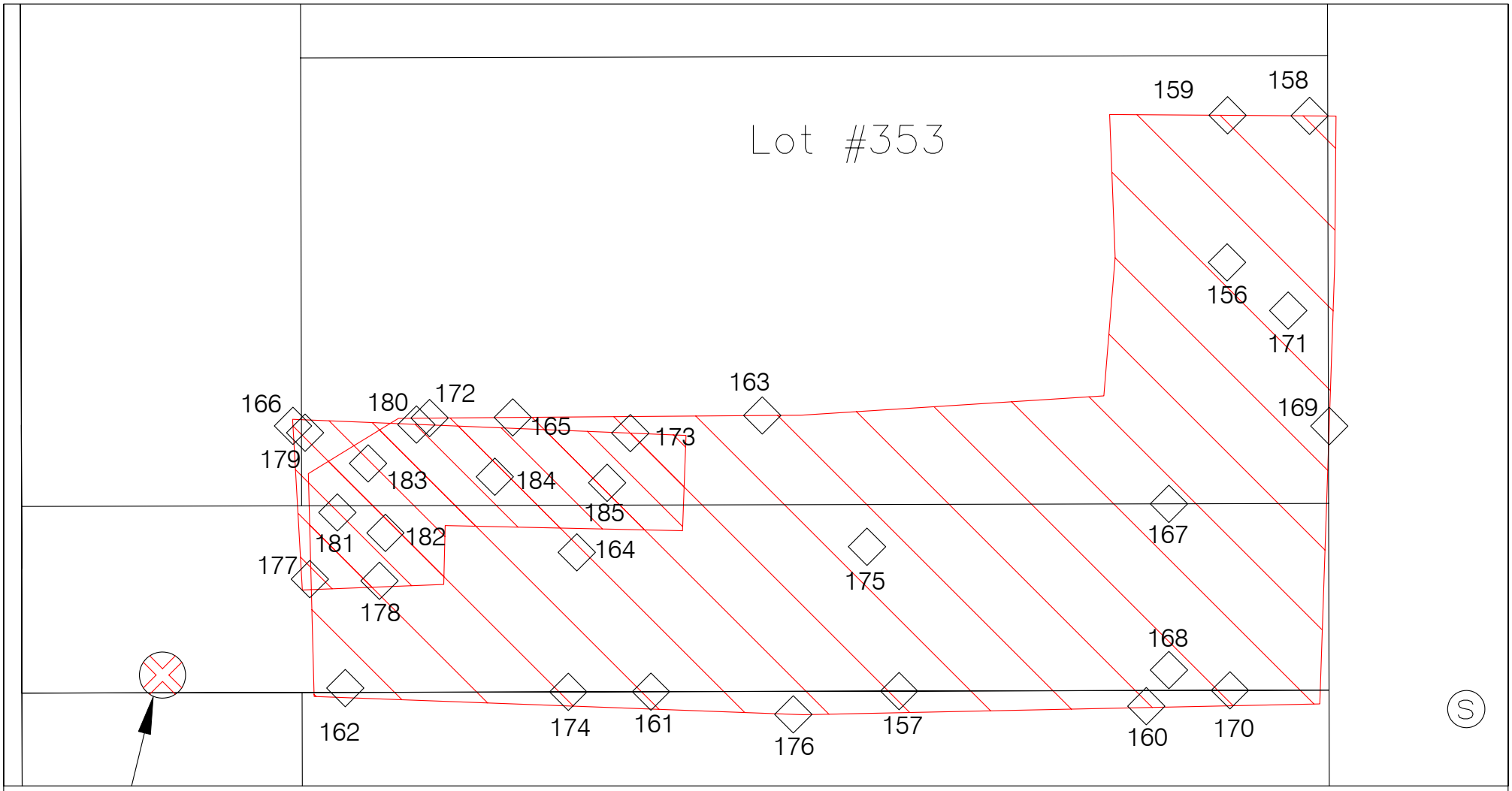

LEGEND

S	Sewer Manhole
	Release Point
196-197	Soil Sample Location
	Excavation (Depth Greater Than 3 Feet)

N

0 5 10 FEET

SFPP L.P. SILVERCROFT WASH RELEASE SITE

Soil Samples
Storm Drain Channel Excavation

Figure 8
Project No. 014-10022-00

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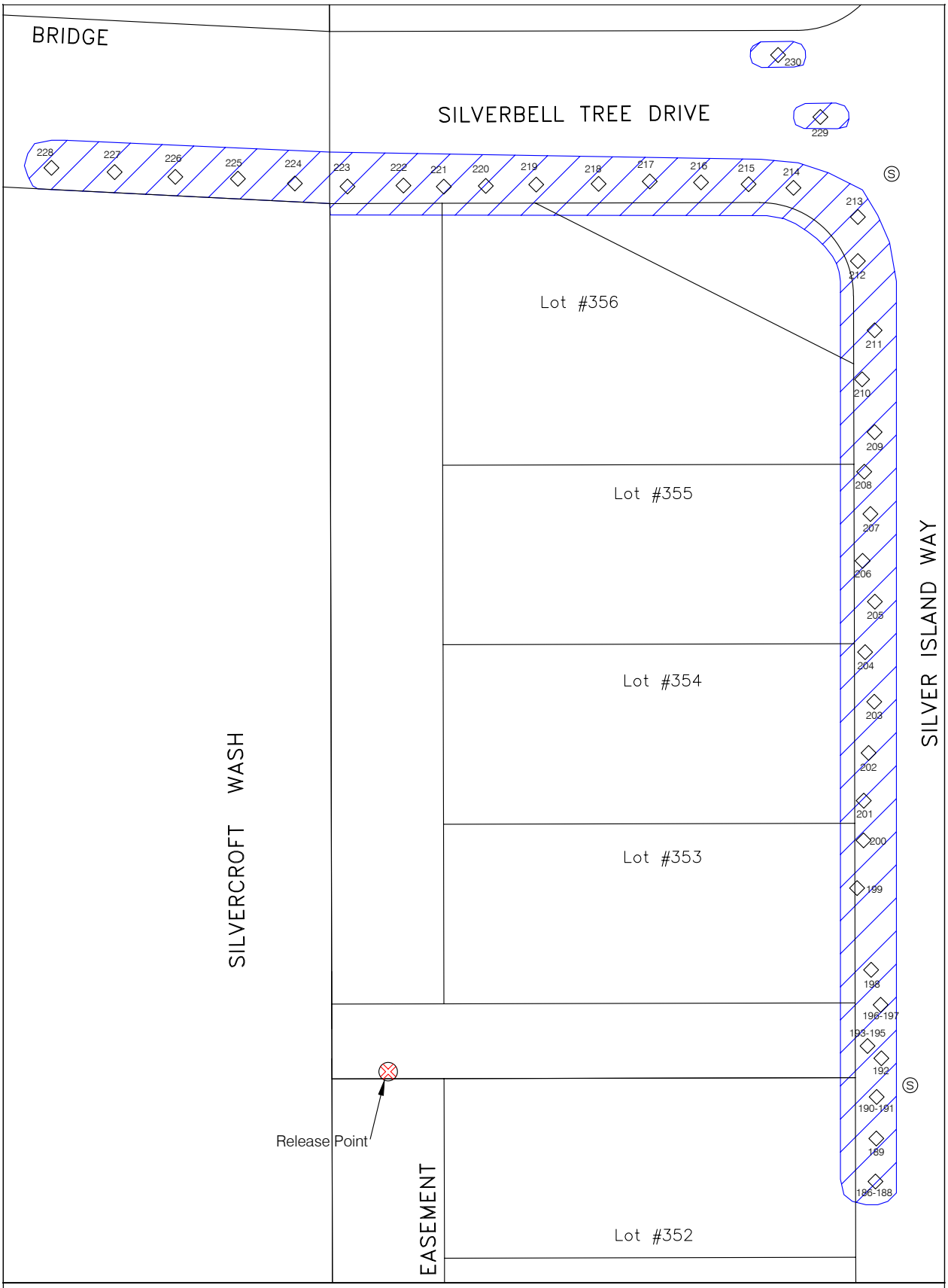

LEGEND

Excavation (Depth Less Than 3 Feet)

196-197 Soil Sample Location

Sewer Manhole

N

0 12.5 25 FEET

SFPP L.P. SILVERCROFT WASH RELEASE SITE

Soil Samples
Curb Excavation

Figure 9
Project No. 014-10022-00

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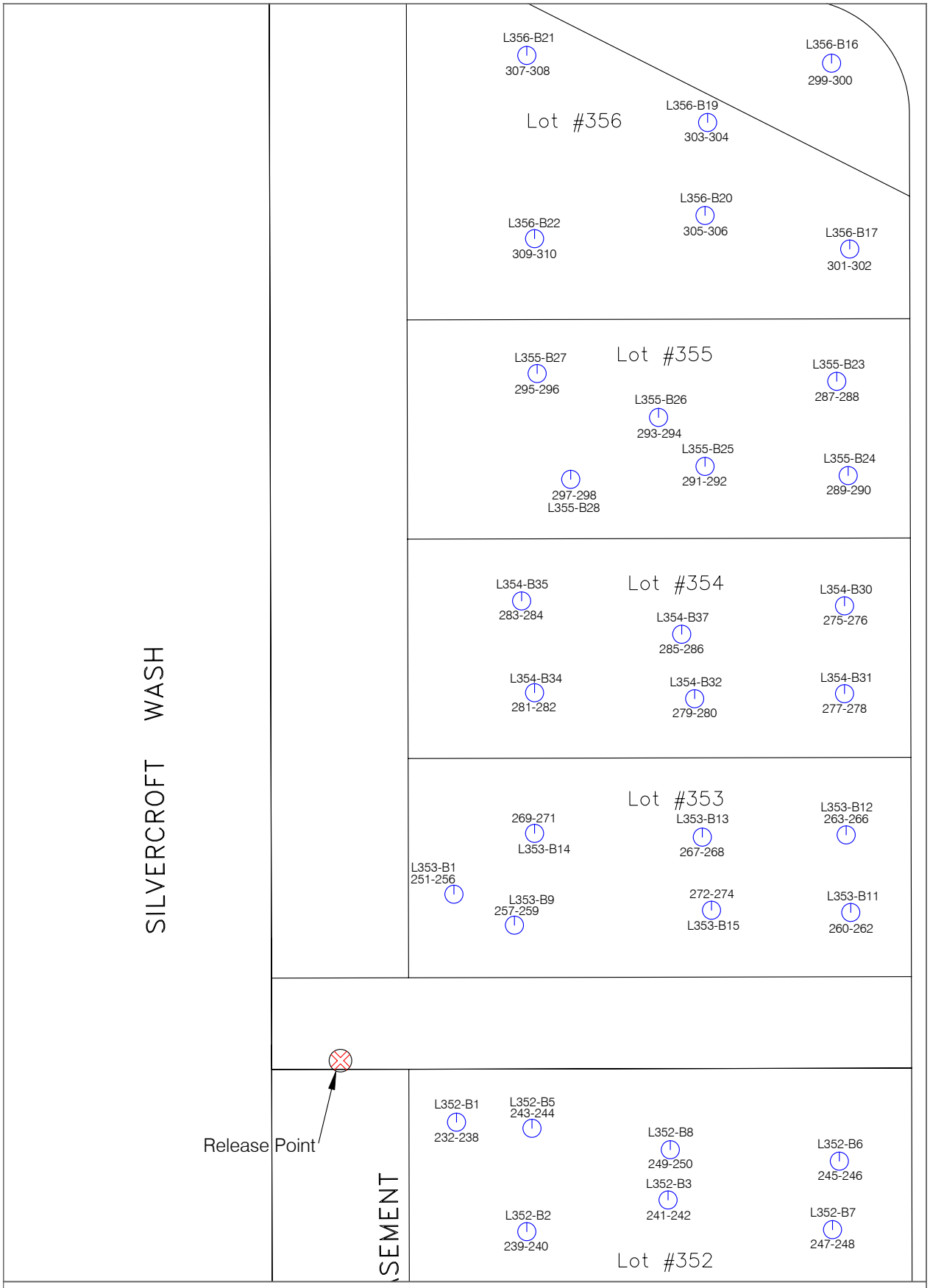

LEGEND

239-240 Soil Boring Sample Location

SFPP L.P. SILVERCROFT WASH RELEASE SITE

Shallow Soil Borings on Lots

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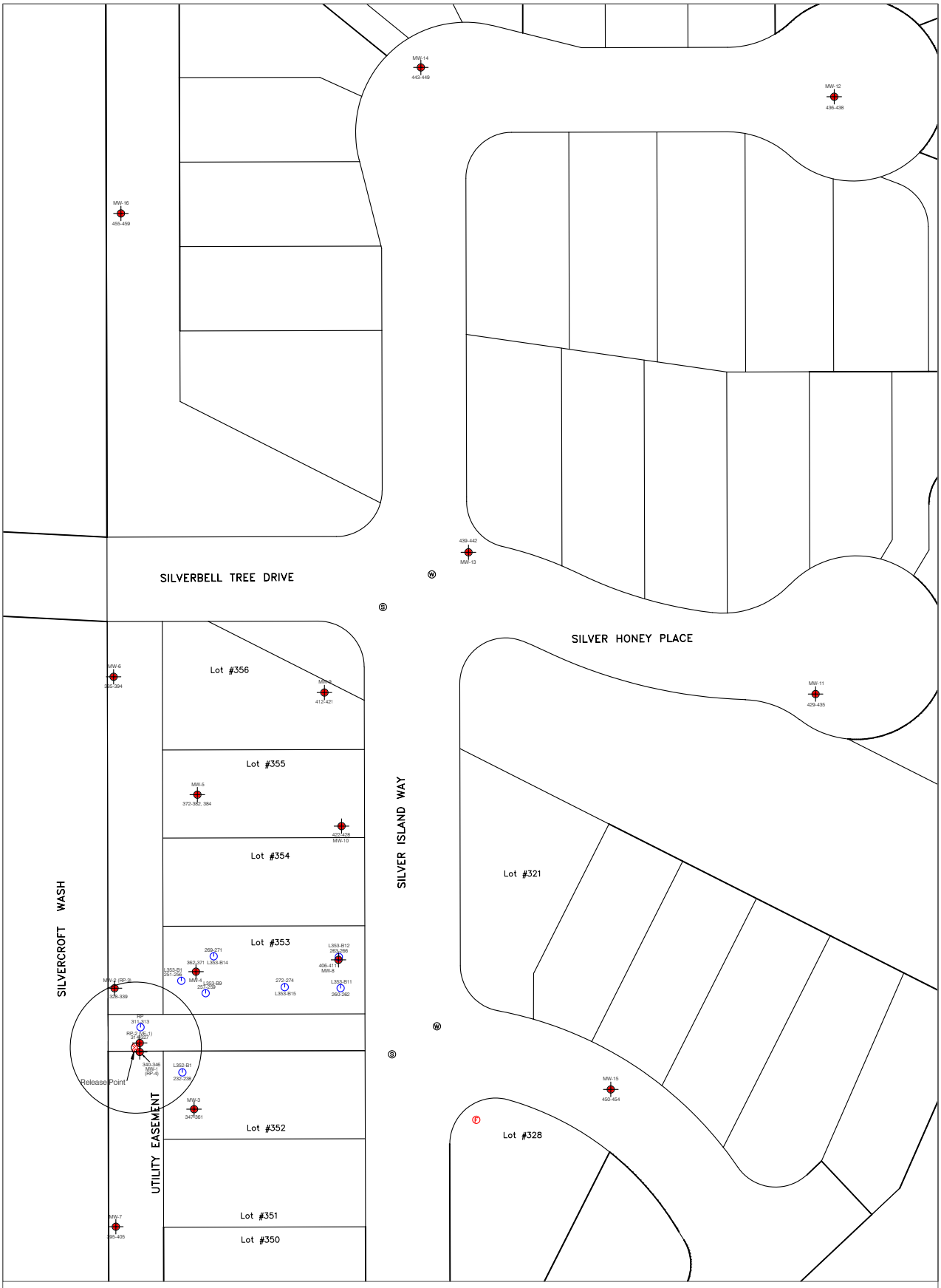
Figure 10

Project No. 014-10022-00



LEGEND

○	Approximate extent of affected soil column >10 feet bgs
312-313	Soil Boring Sample Location
340-352	Monitor Well Soil Sample Location
F	Fire Hydrant
S	Sewer Manhole
W	Water Valve

N

0 25 50 FEET

SFPP L.P. SILVERCROFT WASH RELEASE SITE

Deep Soil Borings

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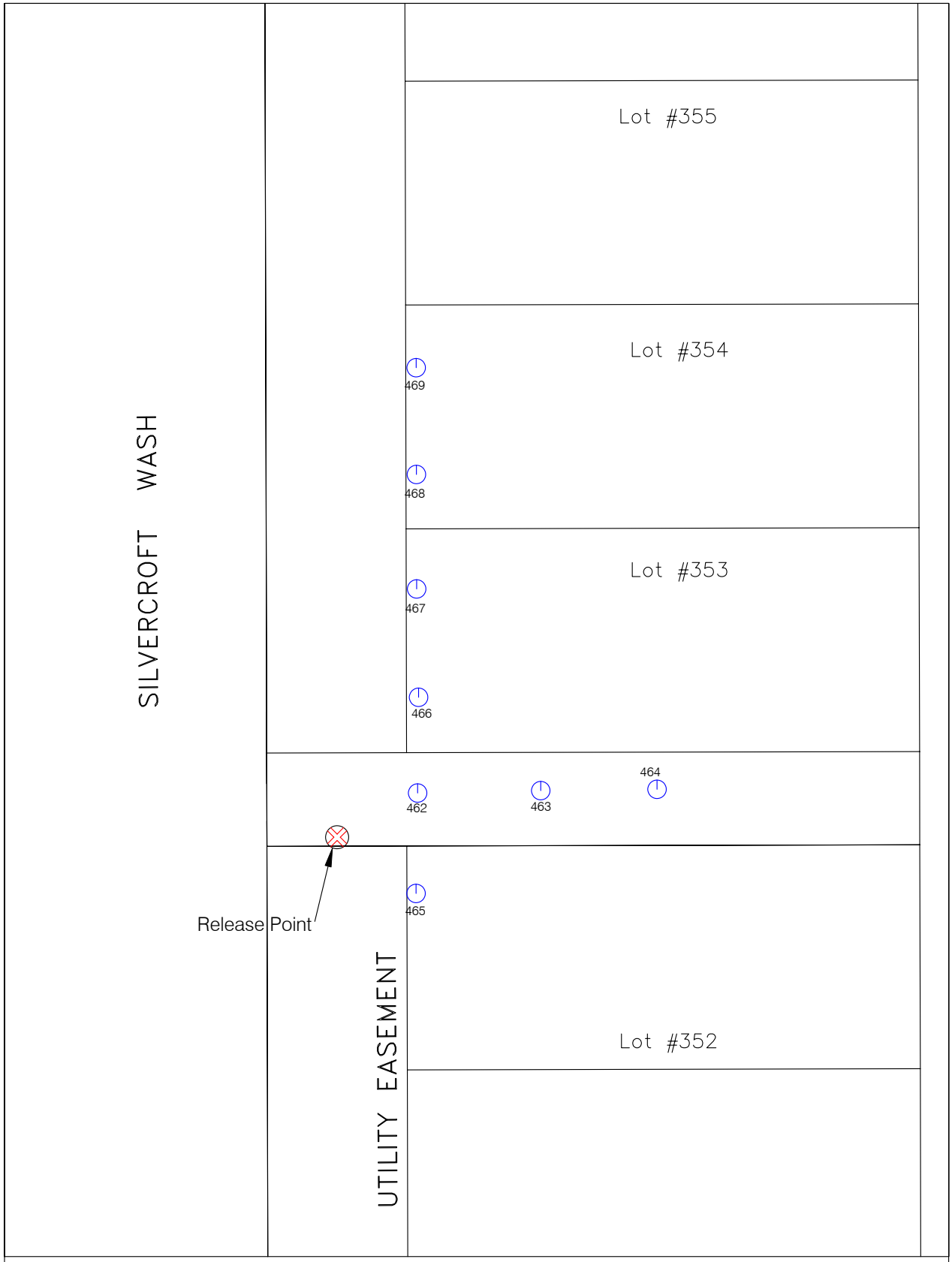
Figure 11

Project No. 014-10022-00



LEGEND

465 Soil Boring Sample Location

0 10 20 FEET

SFPP L.P. SILVERCROFT WASH RELEASE SITE

Soil Samples 11/24/2003
Backhoe Excavation

Figure 12
Project No. 014-10022-00

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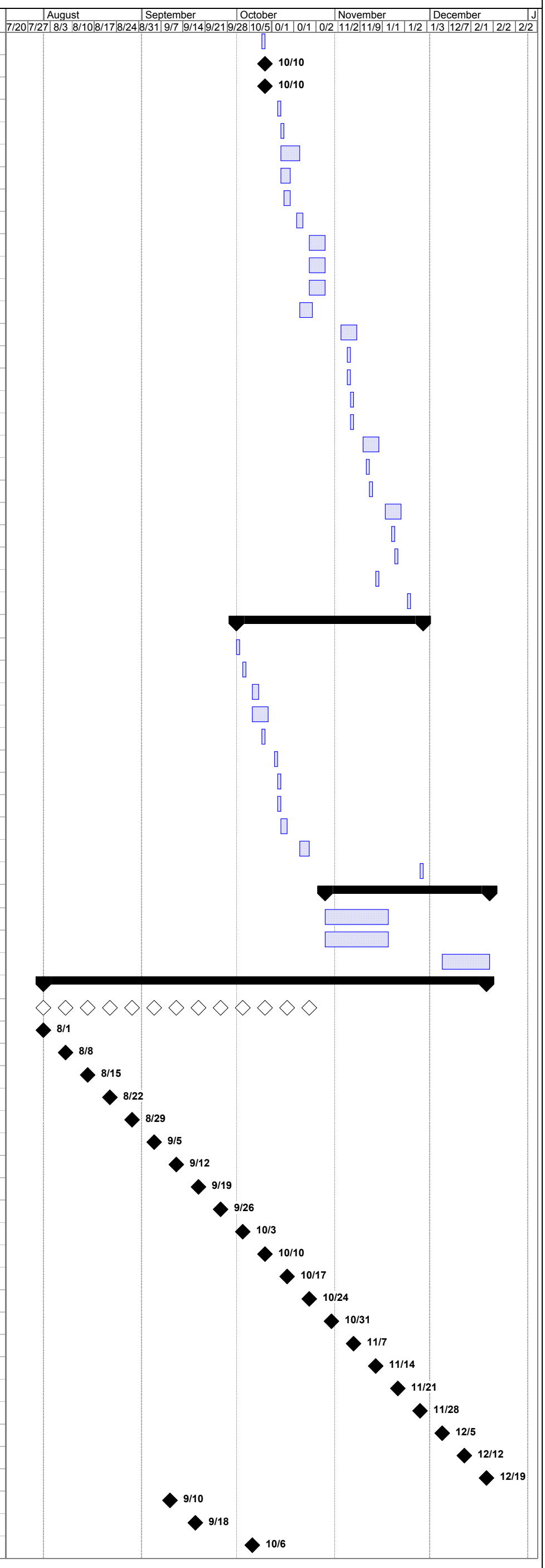
TABLE 1
Silvercroft Wash Release Site - Timeline of Events (7/30/03-12/19/03)

ID	Task Name
70	Groundwater Monitoring Well MW-2 installed in Boring RP-3
71	First detection of phase separated hydrocarbons (PSH) (MW-2)
72	Telephone notification of PSH by M. Sandon of SFPP to M. Traubert of ADEQ
73	Drilled Boring RP-4, collected 7 soil samples
74	Groundwater Monitoring Well MW-1 installed in Boring RP-4
75	Groundwater Monitoring Well MW-3 installed, 17 soil samples collected
76	Groundwater Monitoring Well MW-6 installed, 10 soil samples collected
77	Collection of 2 grab groundwater samples from MW-6
78	Groundwater Monitoring Well MW-5 installed, 10 soil samples collected
79	Groundwater Monitoring Well MW-4 installed
80	Groundwater Monitoring Well MW-7 installed
81	Groundwater Monitoring Well MW-9 installed
82	Wells MW-1, MW-2, MW-3, and MW-6 developed
83	Installed MW-8, MW-10, and MW-11
84	Collected bailer sample from MW-7
85	Purged and sampled from MW-6
86	Developed wells MW-4, MW-9, and MW-10
87	Surveyed wells MW-4, MW-7, MW-9, and MW-10
88	Installed wells MW-12 and MW-13
89	Developed wells MW-8, MW-11, and MW-12
90	Surveyed wells MW-8, MW-11, and MW-12
91	Installed wells MW-14, MW-15, and MW-16
92	Developed wells MW-13, MW-14, MW-15, and MW-16
93	Surveyed wells MW-13, MW-14, MW-15, and MW-16
94	Purged and sampled wells MW-11, MW-12, and MW-13
95	Purged and sampled wells MW-14, MW-15, and MW-16
96	**Additional Excavation**
97	Removal of top 1foot of soil on Lots 352-256
98	Stockpiled Soil Removed and Transported to Sonas
99	Soil Excavated Along Storm Drain Channel, Lots 352-3, collected 21 soil samples
100	90 Truckloads of Soil Transported to Sonas
101	Additional Excavation on West End of S.D. Channel, collected 9 soil samples
102	Borderland Removed Curb Along Silver Island Way
103	Soil Excavated From East End of Storm Drain Channel
104	Storm Drain Channel Backfilled
105	Excavation along Silver Island Way, Silverbell Tree Drive, collect 45 soil samples
106	Backfilling of excavation along Silver Island Way, Silverbell Tree Drive
107	Eight small excavations at west end of storm drain channel, soil sampling
108	**Subsurface Remediation**
109	Soil vapor extraction
110	PSH extraction
111	PSH Extraction
112	**Submittals to ADEQ**
113	**Weekly Reports**
114	Weekly Reports 1
115	Weekly Reports 2
116	Weekly Reports 3
117	Weekly Reports 4
118	Weekly Reports 5
119	Weekly Reports 6
120	Weekly Reports 7
121	Weekly Reports 8
122	Weekly Reports 9
123	Weekly Reports 10
124	Weekly Reports 11
125	Weekly Reports 12
126	Weekly Reports 13
127	Weekly Reports 14
128	Weekly Reports 15
129	Weekly Reports 16
130	Weekly Reports 17
131	Weekly Reports 18
132	Weekly Reports 19
133	Weekly Reports 20
134	Weekly Reports 21
135	**Workplan to Assess Excavation After House Demolition**
136	**Workplan for 3 Soil Borings**
137	**Response to ADEQ NOV and Request for Info Letters**

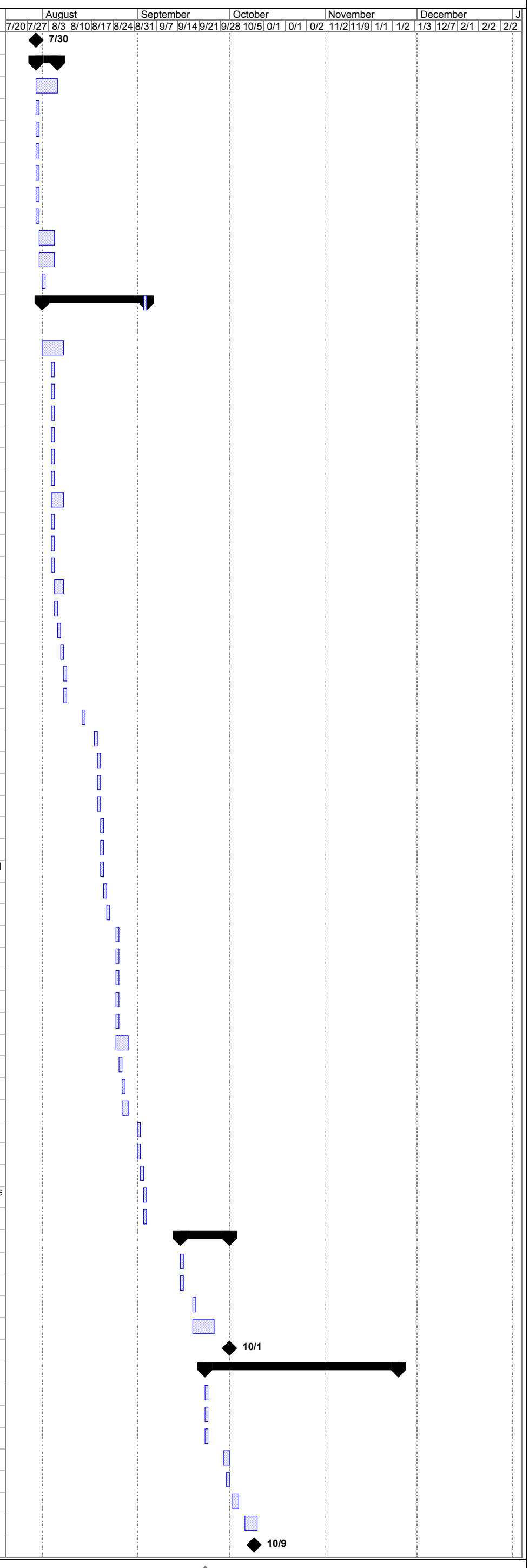


Project: TABLE 1 Silvercroft Timeline E
Date: Wed 1/21/04

		Progress		Rolled Up Task	
#□$□		Milestone		Rolled Up Milestone	
□□1□Task		Summary		Rolled Up Progress	

TABLE 1
Silvercroft Wash Release Site - Timeline of Events (7/30/03-12/19/03)

ID	Task Name
1	**Pipeline Release**
2	**SFPP Emergency Response**
3	Continuous monitoring begins
4	Tucson Fire Department (FD) barricades 5 houses
5	Site-specific H&S Plan developed
6	FD sprayed suppression foam on fuel
7	Seven vacuum truckloads of gasoline and water removed
8	Stormwater Runoff Sampling Plan created
9	5 Stormwater samples collected
10	Begin excavating, removing affected soil - 3 front end loaders onsite
11	Eighty Two (82) twenty-ton capacity rolloff bins of soil removed from site
12	Collect 3 bin samples for disposal profiling
13	**Surface Characterization, Initial Remediation Verification, Silvercroft Wash Restoration, Pipeline and Utility Restoration**
14	Collect 15 soil samples in bottom of Silvercroft Wash
15	Soil surrounding pipeline removed
16	Soil removed from wash 100 ft upstream
17	Silt Dam in Silvercroft Wash excavated, reconstructed
18	Soil removed between Lots 352 and 353
19	Soil removed along SW Gas Pipeline Right-of-Way
20	Soil removed from access road east of wash
21	Excavated soil screened, samples collected
22	72 waste manifests completed for soil disposal
23	Southwest Gas repaired affected coating
24	SFPP arranged for collection of stormwater samples
39	Collect 19 soil samples along SW gas line 120' N. of release pt.
40	Collect 4 soil samples in western end of drainage channel
41	Collect 1 bin sample for soil disposal profiling
42	Collect 1 bin sample for soil disposal profiling
25	SFPP, City of Tucson, Monterey, Borderland Meet
26	Excavation backfilled near water line junction valve
27	Collection of 4 stormwater runoff samples
28	Collection of 4 stormwater runoff samples
29	Temporary water line installed in Silver Island Way
30	Water line trench excavated and backfilled
32	SFPP performed Hydrostatic Pressure Test on pipeline
31	Collection of soil stockpile samples
33	Collection of 3 samples of water released during pipeline test
43	Collected 6 soil samples: 2 on east side of wash, 2 in wash and 2 under former location of stockpiled
44	Collect 3 soil samples at northeast corner of Silver Island Way and Silver Meadow Place
45	Collect 2 soil samples at southeast corner of Silver Island Way and Silver Meadow Place
34	SFPP replaced water valve in Silver Island Way
35	315 feet of water lines replaced in Silver Island Way
36	Soil samples collected near housing foundations
46	Collect 4 soil samples along silt fence line
47	Collect 4 surface water samples
48	Collect 22 soil samples in trench for new water line
49	Collect 1 sample for soil disposal profiling
50	Collect 17 soil samples in excavation around water valve junction
51	Collect 26 split soil samples with ATC on lots 321, 350, 328, 351, 352, 353, 354, 355, 356
37	Excavated soil around Sanitary Sewer Manhole #3
38	Excavated soil along NE curb of SI Way/ Silver Meadow Pl. intersection
52	Collect 6 soil samples in excavation around sewer manhole
53	Collect 10 soil samples in excavation at northeast corner of Silver Island Way and Silver Meadow Pla
54	Collect 1 sample for soil disposal profiling
55	**Demolition of 5 Houses**
56	Demolition Permits Resubmitted to City of Tucson
57	Public notices distributed to nearby residents and businesses
58	Installation of 4 air monitoring stations
59	Demolition of houses
60	Slab Material, House Debris Removal Completed
61	**Subsurface Investigation**
62	Drilled Boring L352-B1 (Lot 352) to 36 ft, collected 7 soil samples
63	Drilled Boring L353-B1 (Lot 353) to 31 ft, collected 6 soil samples
64	Drilled Boring RP (release point) to 25 ft, collected 3 soil samples
65	Drilled Boring RP-2 (release point) to 100 ft, collected 13 soil samples
66	Vapor well VE-1 installed in Boring RP-2
67	Drilled 30 shallow borings (6 each on Lots 352 through 356, collected 65 soil samples)
68	Drilled Boring RP-3, collected 11 soil samples
69	First encounter of groundwater at 140 Feet in RP-3



Project: TABLE 1 Silvercroft Timeline E
Date: Wed 1/21/04

´		Progress		Rolled Up Task	
#□$□		Milestone		Rolled Up Milestone	
□□1□Task		Summary		Rolled Up Progress	

Table 2
Soil Sample Results 8/1 through 8/8/2003
Initial Investigation and Excavation
Silvercroft Wash Release Site

Map ID #	Sample ID	Location	Depth (feet)	Sample Date	Collection Method	Benzene	Toluene	Ethyl-Benzene	Xylenes, Total	MtBE	TPH (C6-C10)	TPH (C10-C32)
1	JRR-HA1-1'	Wash, north of bridge	1.0	8/1/2003	Hand auger	<0.050	<0.050	<0.050	<0.20	<0.050	NA	NA
2	JRR-HA2-1.5'	Wash, north of bridge	1.5	8/1/2003	Hand auger	<0.050	<0.050	<0.050	<0.20	<0.050	NA	NA
3	JRR-HA3-1.2'	Wash, north of bridge	1.2	8/1/2003	Hand auger	<0.050	<0.050	<0.050	<0.20	<0.050	NA	NA
4	JRR-HA4-1'	Wash, north of bridge	1.0	8/1/2003	Hand auger	<0.050	<0.050	<0.050	<0.20	<0.050	NA	NA
5	JRR-HA5-1.5'	Wash, north of bridge	1.5	8/1/2003	Hand auger	<0.050	<0.050	<0.050	<0.20	<0.050	NA	NA
6	JRR-HA6	Wash, north of bridge	1.5	8/1/2003	Hand auger	<0.050	<0.050	0.067	<0.20	<0.050	<20	<130
7	JRR-HA7	Wash, south of bridge	1.5	8/1/2003	Hand auger	<0.050	<0.050	<0.050	<0.20	<0.050	<20	<130
8	JRR-HA8	Wash, south of bridge	1.5	8/1/2003	Hand auger	<0.050	<0.050	<0.050	<0.20	<0.050	<20	<130
9	Bridge-SEC-6.5'	Wash, south of bridge	6.5	8/4/2003	excavator bucket/shovel	<0.050	<0.050	<0.050	<0.20	<0.050	NA	NA
10	Bridge-SEC-S.Wall 4.5'	Wash, south of bridge	4.5	8/4/2003	excavator bucket/shovel	<0.050	<0.050	<0.050	<0.20	0.058	NA	NA
11	HA-9-1.5'	Wash, north of bridge	1.5	8/4/2003	Hand auger	<0.050	<0.050	<0.050	<0.20	<0.050	NA	NA
12	HA-10-1'	Wash, north of bridge	1.0	8/4/2003	Hand auger	<0.050	0.076	0.12	0.66	0.100	NA	NA
13	*HA-11-1.5' ****	Wash, south of bridge	1.5	8/4/2003	Hand auger	0.32	83	62	170	7.100	NA	NA
13	*HA-11-1.5' (reanalyzed) ****	Wash, south of bridge	1.5	8/4/2003	Hand auger	**2.5**	83	62	170	7.100	NA	NA
14	HA-20-6.5'	Along SW gas line, 120' N. or release pt.	6.5	8/5/2003	excavator bucket/shovel	<0.050	<0.050	<0.050	<0.20	<0.050	<20	<130
15	HA-21-6'	Along SW gas line, 120' N. or release pt.	6.0	8/5/2003	excavator bucket/shovel	<0.050	<0.050	<0.050	<0.20	<0.050	<20	<130
16	HA-22-6'	Along SW gas line, 120' N. or release pt.	6.0	8/5/2003	excavator bucket/shovel	<0.050	<0.050	<0.050	<0.20	0.080	<20	<130
17	HA-23-4'	Along SW gas line, 120' N. or release pt.	4.0	8/5/2003	excavator bucket/shovel	<0.050	<0.050	<0.050	<0.20	0.053	<20	<130
18	HA-30-1.5'	Western bottom of excavation in drainage channel	1.5	8/5/2003	Hand auger	<0.050	<0.050	<0.050	<0.20	<0.050	<20	<130
19	HA-31-2'	Western bottom of excavation in drainage channel	2.0	8/5/2003	Hand auger	<0.050	<0.050	<0.050	<0.20	0.360	<20	<130
20	HA-32-2'	Western bottom of excavation in drainage channel	2.0	8/5/2003	Hand auger	0.074	0.27	0.052	<0.20	3.200	<20	<130
21	HA-33-2'	Western bottom of excavation in drainage channel	2.0	8/5/2003	Hand auger	<0.050	<0.050	<0.050	<0.20	1.700	<20	<130
22	JRR-HA-40-2'	Wash, north of bridge	2.0	8/7/2003	Hand auger	<0.050	<0.050	<0.050	<0.20	<0.050	<20	<130
23	JRR-HA-41-1'	Wash, north of bridge	1.0	8/7/2003	Hand auger	<0.050	<0.050	<0.050	<0.20	<0.050	29	<130
24	EXV-50-S,Wall-4'	Along SW gas line, flush with release pt.	4.0	8/7/2003	excavator bucket/shovel	<0.050	<0.050	<0.050	<0.20	3.600	26	<130
25	EXV-51-E.Wall-1'	Along SW gas line, flush with release pt.	1.0	8/7/2003	excavator bucket/shovel	<0.050	<0.050	<0.050	<0.20	1.200	27	<130
26	EXV-52-N.Wall-4'	Along SW gas line, flush with release pt.	4.0	8/7/2003	excavator bucket/shovel	<0.050	<0.050	<0.050	<0.20	0.130	26	<130
27	EXV-Bot-53-6'	Along SW gas line, flush with release pt.	6.0	8/7/2003	excavator bucket/shovel	<0.050	<0.050	<0.050	<0.20	0.130	<20	<130
28	EXV-54-SWgas-2'	Along SW gas line, flush with release pt.	2.0	8/7/2003	excavator bucket/shovel	<0.050	0.056	<0.050	<0.20	1.900	<20	<130
29	TRCH-60-Bot-7'	Excavation atop SW gas line	7.0	8/7/2003	excavator bucket/shovel	<0.050	<0.050	<0.050	<0.20	0.250	<20	<130
30	TRCH-62-E.Wall-3'	Excavation atop SW gas line	3.0	8/7/2003	excavator bucket/shovel	<0.050	<0.050	<0.050	<0.20	0.160	<20	<130
31	TRCH-61-Bot-3.5'	Excavation atop SW gas line	3.5	8/7/2003	excavator bucket/shovel	<0.050	<0.050	<0.050	<0.20	0.800	<20	<130
32	TRCH-63-E.Wall-2'	Excavation atop SW gas line	2.0	8/7/2003	excavator bucket/shovel	<0.050	<0.050	<0.050	<0.20	0.120	<20	<130
33	TRCH-64-E.Wall-0'	Excavation atop SW gas line	0.0	8/7/2003	excavator bucket/shovel	<0.050	<0.050	<0.050	<0.20	0.600	<20	<130
34	TRCH-65-Bot-3.5'	Excavation atop SW gas line	3.5	8/7/2003	excavator bucket/shovel	<0.050	0.076	0.16	<0.20	1.500	<20	<130
35	TRCH-66-E.Wall-3'	Excavation atop SW gas line	3.0	8/7/2003	excavator bucket/shovel	<0.050	<0.050	<0.050	<0.20	0.072	<20	<130
36	TRCH-67-Bot-4'	Excavation atop SW gas line	4.0	8/7/2003	excavator bucket/shovel	<0.050	<0.050	<0.050	<0.20	0.190	<20	<130
37	TRCH-68-Bot-3.5	Excavation atop SW gas line	3.5	8/7/2003	excavator bucket/shovel	<0.050	<0.050	<0.050	<0.20	0.290	<20	<130
38	TRCH-69-E.Side-0'	Excavation atop SW gas line	0.0	8/7/2003	excavator bucket/shovel	<0.050	<0.050	<0.050	<0.20	0.072	<20	<130
39	SiltIne-Bot-70-1.3'	Excavation along siltline, located in access rd adjacent to wash	1.3	8/8/2003	shovel	<0.050	<0.050	<0.050	<0.20	0.170	<20	<130
40	SiltIne-71-Bot-1.3'	Excavation along siltline, located in access rd adjacent to wash	1.3	8/8/2003	shovel	<0.050	<0.050	<0.050	<0.20	<0.050	<20	<130
41	SiltIne-W.Side-72-6'	Excavation along siltline, located in access rd adjacent to wash	6.0	8/8/2003	shovel	<0.050	<0.050	<0.050	<0.20	0.052	<20	<130
42	SiltIne-73-E.Wall-7'	Excavation along siltline, located in access rd adjacent to wash	7.0	8/8/2003	shovel	<0.050	<0.050	<0.050	<0.20	0.490	<20	<130
43	SE-Curb-NW-Comp	Excavation at southeast curb of intersection	1.0	8/8/2003	shovel	<0.050	<0.050	<0.050	<0.20	<0.050	<20	<130
44	SE-Curb-SE-Comp	Excavation at southeast curb of intersection	1.0	8/8/2003	shovel	<0.050	<0.050	<0.050	<0.20	<0.050	<20	<130
45	NE Curb-SEC-80-4'	Excavation at northeast curb of intersection	4.0	8/8/2003	excavator bucket/shovel	<0.050	<0.050	<0.050	<0.20	<0.050	<20	<130
46	NE Curb-Bot-81-3'	Excavation at northeast curb of intersection	3.0	8/8/2003	excavator bucket/shovel	<0.050	0.79	1.4	4.8	0.670	46	<130
47	*NE Curb-N.Bot-82-4' ****	Excavation at northeast curb of intersection	4.0	8/8/2003	excavator bucket/shovel	**0.76**	14	9.2	27	12.000	240	<130
231	Bridg-SWC-2'	Wash, south of bridge (resampling of location #13)	2.0	10/2/2003	Hand auger	<0.050	<0.050	<0.050	<0.20	0.2	<130	<130
Arizona Soil Remediation Levels (Residential)						0.62	790	1500	2800	320.000	N/A	4100

Note: All results in milligrams per kilogram
< = nondetectable, less than the detection limit shown
NA = Not Analyzed
N/A = Not Applicable
*** = Sample collected from soil that was excavated and removed from the site; not representative of remaining soil

Table 3
Soil Sample Results 8/20 through 8/27/2003
Initial Investigation and Excavation
Silvercroft Wash Release Site

Map ID #	Sample ID	Location	Depth (feet)	Sample Date	Collection Method	Benzene	Toluene	Ethyl-Benzene	Xylenes, Total	MtBE	TPH (C6-C10)	TPH (C10-C32)
64	#1	Top of concrete embankment approximately 20' N. of release p	0.3	8/20/2003	hand trowel	<0.050	<0.050	<0.050	<0.20	<0.050	NA	NA
65	#3	Top of concrete embankment approximatley 60' N. of release p	0.3	8/20/2003	hand trowel	<0.050	<0.050	<0.050	<0.20	0.170	NA	NA
66	#4	In Silvercroft Wash, approximately 75' N. of release pt.	0.3	8/20/2003	hand trowel	<0.050	<0.050	<0.050	0.58	0.057	NA	NA
67	#5	In Silvercroft Wash along S. side of bridge	0.3	8/20/2003	hand trowel	<0.050	<0.050	<0.050	0.37	<0.050	NA	NA
68	#6	West of Wash, former location of excavated, stockpiled soil	0.3	8/20/2003	hand trowel	<0.050	<0.050	<0.050	<0.20	<0.050	NA	NA
69	#7	West of Wash, former location of excavated, stockpiled soil	0.3	8/20/2003	hand trowel	<0.050	<0.050	<0.050	<0.20	<0.050	NA	NA
70	Wtrline-1-Bot-4.5'	In trench for new water line	4.5	8/22/2003	excavator bucket/shovel	<0.050	<0.050	<0.050	<0.20	<0.050	<20	<130
71	Wtrline-2-E.Wall-3'	In trench for new water line	3.0	8/22/2003	excavator bucket/shovel	<0.050	<0.050	<0.050	<0.20	<0.050	<20	<130
72	Wtrline-3-W.Wall-2'	In trench for new water line	2.0	8/22/2003	excavator bucket/shovel	<0.050	<0.050	<0.050	<0.20	<0.050	<20	<130
73	Wtrline-4-S.Wall-4.5'	In trench for new water line	4.5	8/22/2003	excavator bucket/shovel	<0.050	<0.050	<0.050	<0.20	<0.050	<20	<130
74	Wtrlne-5-Bot-8'	In trench for new water line	8.0	8/25/2003	excavator bucket/shovel	<0.050	<0.050	<0.050	<0.20	<0.050	<20	<130
75	Wtrlne-6-W.Wall-6'	In trench for new water line	6.0	8/25/2003	excavator bucket/shovel	<0.050	<0.050	<0.050	<0.20	<0.050	<20	<130
76	Wtrlne-7-E.Wall-6'	In trench for new water line	6.0	8/25/2003	excavator bucket/shovel	<0.050	<0.050	<0.050	<0.20	<0.050	<20	<130
77	Wtrlne-8-N.Wall-4.7'	In trench for new water line	4.7	8/25/2003	excavator bucket/shovel	<0.050	<0.050	<0.050	<0.20	<0.050	<20	<130
78	Wtrlne-9-Bot-6'	In trench for new water line	6.0	8/25/2003	excavator bucket/shovel	<0.050	<0.050	<0.050	<0.20	<0.050	<20	<130
79	Wtrlne-10-W.Wall-3'	In trench for new water line	3.0	8/25/2003	excavator bucket/shovel	<0.050	<0.050	<0.050	<0.20	<0.050	<20	<130
80	Wtrlne-11-E.Wall-4'	In trench for new water line	4.0	8/25/2003	excavator bucket/shovel	<0.050	<0.050	<0.050	<0.20	<0.050	<20	<130
81	Wtrlne-12-Bot-6'	In trench for new water line	6.0	8/25/2003	excavator bucket/shovel	<0.050	<0.050	<0.050	<0.20	<0.050	<20	<130
82	WL-20-E.Pt.-4'	In trench for new water line	4.0	8/26/2003	excavator bucket/shovel	<0.050	<0.050	<0.050	<0.20	<0.50	<20	<130
83	WL-21-E.Wall-3'	In trench for new water line	3.0	8/26/2003	excavator bucket/shovel	<0.050	<0.050	<0.050	<0.20	<0.50	<20	<130
84	WL-22-W.Wall-3'	In trench for new water line	3.0	8/26/2003	excavator bucket/shovel	<0.050	<0.050	<0.050	<0.20	<0.50	<20	<130
85	WL-SWR-23-5.7'	In trench for new water line	5.7	8/26/2003	excavator bucket/shovel	<0.050	<0.050	<0.050	<0.20	<0.50	<20	<130
86	WL-30-3.5'-E.Wall	In trench for new water line	3.5	8/26/2003	excavator bucket/shovel	<0.050	<0.050	<0.050	<0.20	<0.50	<20	<130
87	WL-31-Bot-5.5'	In trench for new water line	5.5	8/26/2003	excavator bucket/shovel	<0.050	<0.050	<0.050	<0.20	<0.50	<20	<130
88	WL-32-W.Wall-3'	In trench for new water line	3.0	8/26/2003	excavator bucket/shovel	<0.050	<0.050	<0.050	<0.20	<0.50	<20	<130
89	WL-33-W.Wall-3.7'	In excavation around water valve junction	3.7	8/27/2003	excavator bucket/shovel	<0.050	<0.050	<0.050	<0.20	<0.50	<20	<130
90	WL-34-E.Wall-4.3'	In excavation around water valve junction	4.3	8/27/2003	excavator bucket/shovel	<0.050	<0.050	<0.050	<0.20	<0.50	<20	<130
91	WL-35-Bot-5.5'	In excavation around water valve junction	5.5	8/27/2003	excavator bucket/shovel	<0.050	<0.050	<0.050	<0.20	<0.50	<20	<130
92	WL-38-E.Wall-3'	In trench for new water line	3.0	8/27/2003	excavator bucket/shovel	<0.050	<0.050	<0.050	<0.20	<0.50	<20	<130
93	WL-36-Bot-6'	In trench for new water line	6.0	8/27/2003	excavator bucket/shovel	<0.050	<0.050	<0.050	<0.20	<0.50	<20	<130
94	WL-37-W.Wall-2.5'	In trench for new water line	2.5	8/27/2003	excavator bucket/shovel	<0.050	<0.050	<0.050	<0.20	<0.50	<20	<130
95	WV-40-S.Wall-14'	In excavation around water valve junction	14.0	8/27/2003	excavator bucket/shovel	<0.050	<0.050	<0.050	<0.20	<0.050	<20	<130
96	WV-41-N.Wall-12'	In excavation around water valve junction	12.0	8/27/2003	excavator bucket/shovel	<0.050	<0.050	<0.050	<0.20	0.053	<20	<130
97	WV-W.Bot-42-16'	In excavation around water valve junction	16.0	8/27/2003	excavator bucket/shovel	<0.050	<0.050	<0.050	<0.20	<0.50	<20	<130
98	WV-43-S.Side-7'	In excavation around water valve junction	7.0	8/27/2003	excavator bucket/shovel	<0.050	<0.050	<0.050	<0.20	0.680	<20	<130
99	WV-44-N.Side-6'	In excavation around water valve junction	6.0	8/27/2003	excavator bucket/shovel	<0.050	<0.050	<0.050	<0.20	0.600	<20	<130
100	WV-45-E.Wall-7'	In excavation around water valve junction	7.0	8/27/2003	excavator bucket/shovel	<0.050	<0.050	<0.050	<0.20	<0.050	<20	<130
101	WV-46-E.Wall-15'	In excavation around water valve junction	15.0	8/27/2003	excavator bucket/shovel	<0.050	<0.050	<0.050	<0.20	<0.50	<20	<130
102	WV-47-W.Bot-16'	In excavation around water valve junction	16.0	8/27/2003	excavator bucket/shovel	<0.050	<0.050	<0.050	<0.20	<0.50	<20	<130
103	WV-47-W.Bot-16' (mobile lab)	In excavation around water valve junction	16.0	8/27/2003	excavator bucket/shovel	<0.050	<0.10	<0.10	<0.15	NA	<10	NA
104	WV-48-W.Wall-14'	In excavation around water valve junction	14.0	8/27/2003	excavator bucket/shovel	<0.050	<0.050	<0.050	<0.20	<0.50	<20	<130
105	WV-49-W.Wall-7'	In excavation around water valve junction	7.0	8/27/2003	excavator bucket/shovel	<0.050	<0.050	<0.050	<0.20	0.500	<20	<130
106	WV-49-W.Wall-7' (mobile lab)	In excavation around water valve junction	7.0	8/27/2003	excavator bucket/shovel	<0.050	<0.10	<0.10	<0.15	NA	<10	NA
107	WV-50-NWSide-3'	In excavation around water valve junction	3.0	8/27/2003	excavator bucket/shovel	<0.050	<0.050	<0.050	<0.20	<0.50	<20	<130
108	WV-51-SESide-3'	In excavation around water valve junction	3.0	8/27/2003	excavator bucket/shovel	<0.050	<0.050	<0.050	<0.20	<0.50	<20	<130
Arizona Soil Remediation Levels (Residential)						0.62	790	1500	2800	320	N/A	4100

Note: All results in milligrams per kilogram
< = nondetectable, less than the detection limit shown
NA = Not Analyzed
N/A = Not Applicable

Table 4
Soil Sample Results 8/27 through 8/28/2003
Initial Investigation and Excavation
Silvercroft Wash Release Site

Map ID #	Sample ID	Location	Depth (feet)	Sample Date	Collection Method	Benzene	Toluene	Ethyl-Benzene	Xylenes, Total	MtBE	TPH (C6-C10)	TPH (C10-C32)
109	HA-328-N1-2.5	Lot 328	2.5	8/27/2003	Hand auger-drive samples	<0.050	<0.050	<0.050	<0.20	<0.50	<20	<130
110	HA-321-1-3	Lot 321	3.0	8/27/2003	Hand auger-drive samples	<0.050	<0.050	<0.050	<0.20	<0.50	<20	<130
111	HA-321-2-3	Lot 321	3.0	8/27/2003	Hand auger-drive samples	<0.050	<0.050	<0.050	<0.20	<0.50	<20	<130
112	HA-321-3-4	Lot 321	4.0	8/27/2003	Hand auger-drive samples	<0.050	<0.050	<0.050	<0.20	<0.50	<20	<130
113	HA-321-4-4	Lot 321	4.0	8/27/2003	Hand auger-drive samples	<0.050	<0.050	<0.050	<0.20	<0.50	<20	<130
114	HA-351-1-4	Lot 351	4.0	8/27/2003	Hand auger-drive samples	<0.050	<0.050	<0.050	<0.20	<0.50	<20	<130
115	HA-351-2-4	Lot 351	4.0	8/27/2003	Hand auger-drive samples	<0.050	<0.050	<0.050	<0.20	<0.50	<20	<130
116	HA-351-3-0	Lot 351	Surface	8/28/2003	Hand auger-drive samples	<0.050	<0.050	<0.050	<0.20	<0.50	<20	<130
117	HA-351-3-5	Lot 351	5.0	8/28/2003	Hand auger-drive samples	<0.050	<0.050	<0.050	<0.20	<0.50	<20	<130
118	HA-350-1-0	Lot 350	Surface	8/28/2003	Hand auger-drive samples	<0.050	<0.050	<0.050	<0.20	<0.50	<20	<130
119	HA-350-1-5	Lot 350	5.0	8/28/2003	Hand auger-drive samples	<0.050	<0.050	<0.050	<0.20	<0.50	<20	<130
120	HA-350-2-0	Lot 350	Surface	8/28/2003	Hand auger-drive samples	<0.050	<0.050	<0.050	<0.20	<0.50	<20	<130
121	HA-350-2-5	Lot 350	5.0	8/28/2003	Hand auger-drive samples	<0.050	<0.050	<0.050	<0.20	<0.50	<20	<130
122	HA-356-1-0	Lot 356	Surface	8/28/2003	Hand auger-drive samples	<0.050	<0.050	<0.050	<0.20	<0.50	<20	<130
123	HA-356-1-5	Lot 356	5.0	8/28/2003	Hand auger-drive samples	<0.050	<0.050	<0.050	<0.20	<0.50	<20	<130
124	HA-356-2-0	Lot 356	Surface	8/28/2003	Hand auger-drive samples	<0.050	<0.050	<0.050	<0.20	<0.50	<20	<130
125	HA-356-2-5	Lot 356	5.0	8/28/2003	Hand auger-drive samples	<0.050	<0.050	<0.050	<0.20	<0.50	<20	<130
126	HA-355-1-0	Lot 355	Surface	8/28/2003	Hand auger-drive samples	<0.050	<0.050	<0.050	<0.20	<0.50	<20	<130
127	HA-355-1-5	Lot 355	5.0	8/28/2003	Hand auger-drive samples	<0.050	<0.050	<0.050	<0.20	<0.50	<20	<130
128	HA-354-1-0	Lot 354	Surface	8/28/2003	Hand auger-drive samples	<0.050	<0.050	<0.050	<0.20	0.150	<20	<130
129	HA-354-1-5	Lot 354	5.0	8/28/2003	Hand auger-drive samples	<0.050	<0.050	<0.050	<0.20	<0.50	<20	<130
130	HA-353-1-0	Lot 353	Surface	8/28/2003	Hand auger-drive samples	<0.050	<0.050	<0.050	4.4	2.400	<20	<130
131	HA-353-SW-1	Lot 353	1.0	8/28/2003	Grab	<0.050	3.4	4.9	130	7.500	1500	460
132	HA-353-1-5	Lot 353	5.0	8/28/2003	Hand auger-drive samples	<0.050	<0.050	<0.050	<0.20	<0.50	<20	<130
133	HA-352-1-0	Lot 352	0.0	8/28/2003	Hand auger-drive samples	<0.050	<0.050	<0.050	<0.20	<0.50	<20	<130
134	HA-352-1-5	Lot 352	5.0	8/28/2003	Hand auger-drive samples	<0.050	<0.050	<0.050	<0.20	<0.50	<20	<130
135	WtrIn-Bot-5'	In trench for new water line	5.0	8/28/2003	excavator bucket/shovel	<0.050	<0.050	<0.050	<0.20	0.830	<20	<130
Arizona Soil Remediation Levels (Residential)						0.62	790	1500	2800	320	N/A	4100

Note: All results in milligrams per kilogram
< = nondetectable, less than the detection limit shown
NA = Not Analyzed
N/A = Not Applicable

Table 5
Soil Sample Results 9/2 through 9/3/2003
Initial Investigation and Excavation
Silvercroft Wash Release Site

Map ID #	Sample ID	Location	Depth (feet)	Sample Date	Collection Method	Benzene	Toluene	Ethyl-Benzene	Xylenes, Total	MtBE	TPH (C6-C10)	TPH (C10-C32)
136	SWR-1-N. Sand-5'	In excavation around sewer manhole	5.0	9/2/2003	excavator bucket/shovel	<0.050	<0.050	<0.050	<0.20	<0.050	<20	<130
137	SWR-2-S. Sand-5.5	In excavation around sewer manhole	5.5	9/2/2003	excavator bucket/shovel	<0.050	<0.050	<0.050	<0.20	<0.050	<20	<130
138	SWR-3-W.Curb-3'	In excavation around sewer manhole	3.0	9/2/2003	excavator bucket/shovel	<0.050	<0.050	<0.050	<0.20	<0.050	<20	<130
139	SWR-4-E.Side-1'	In excavation around sewer manhole	1.0	9/2/2003	excavator bucket/shovel	<0.050	<0.050	<0.050	<0.20	<0.050	<20	<130
140	SWR-5-S.End-3.5'	In excavation around sewer manhole	3.5	9/2/2003	excavator bucket/shovel	<0.050	<0.050	<0.050	<0.20	<0.050	<20	<130
141	SWR-6-N.End-3'	In excavation around sewer manhole	3.0	9/2/2003	excavator bucket/shovel	<0.050	<0.050	<0.050	<0.20	<0.050	<20	<130
142	NEC-1-N.Bot-5.7'	In excavation around northeast curb of intersection	5.7	9/3/2003	excavator bucket/shovel	<0.050	<0.050	<0.050	<0.20	0.150	<20	<130
143	NEC-2-S.Bot-7'	In excavation around northeast curb of intersection	7.0	9/3/2003	excavator bucket/shovel	<0.050	<0.050	<0.050	<0.20	0.130	<20	<130
144	NEC-3-S.Wall-5'	In excavation around northeast curb of intersection	5.0	9/3/2003	excavator bucket/shovel	<0.050	<0.050	<0.050	<0.20	0.076	<20	<130
145	NEC-4-NW.Wall-5'	In excavation around northeast curb of intersection	5.0	9/3/2003	excavator bucket/shovel	<0.050	<0.050	<0.050	<0.20	0.056	<20	<130
146	NEC-5-SW.Wall-4.5'	In excavation around northeast curb of intersection	4.5	9/3/2003	excavator bucket/shovel	<0.050	<0.050	<0.050	<0.20	<0.050	<20	<130
147	NEC-6-E.Bot.-5.5'	In excavation around northeast curb of intersection	5.5	9/3/2003	excavator bucket/shovel	<0.050	<0.050	<0.050	<0.20	0.069	<20	<130
148	NEC-7-SE.Wall-5.5'	In excavation around northeast curb of intersection	5.5	9/3/2003	excavator bucket/shovel	<0.050	<0.050	<0.050	<0.20	0.320	<20	<130
149	NEC-8-SSE.Wall-4.5	In excavation around northeast curb of intersection	4.5	9/3/2003	excavator bucket/shovel	<0.050	<0.050	<0.050	<0.20	0.170	<20	<130
150	NEC-9-N.Wall-3'	In excavation around northeast curb of intersection	3.0	9/3/2003	excavator bucket/shovel	<0.050	<0.050	<0.050	<0.20	<0.050	<20	<130
151	NEC-10-N.Bot.-5.5'	In excavation around northeast curb of intersection	5.5	9/3/2003	excavator bucket/shovel	<0.050	<0.050	<0.050	<0.20	<0.050	<20	<130
Arizona Soil Remediation Levels (Residential)						0.62	790	1500	2800	320	N/A	4100

Note: All results in milligrams per kilogram
< = nondetectable, less than the detection limit shown
NA = Not Analyzed
N/A = Not Applicable

Table 6
Soil Sample Results
Storm Drain Channel Excavation
Silvercroft Wash Release Site

Map ID #	Sample Name	MTBE	Benzene	Toluene	Ethyl-Benzene	Total Xylenes,	TPH C10-C32
156	1-Chn-Bot-0	<0.25	< 0.050	< 0.10	< 0.10	< 0.15	< 130
157	2-Chn-Swall-3	<0.25	< 0.050	< 0.10	< 0.10	< 0.15	< 130
158	3-Ewall-Curb-4	4.50	< 0.050	0.20	0.10	0.55	< 130
159	4-Ctr-Bot-11	< 0.25	< 0.050	< 0.10	< 0.10	< 0.15	< 130
160	5-Chn-Swall-5	< 0.25	< 0.050	< 0.10	< 0.10	< 0.15	< 130
161	6-Chn-Swall-6-4	< 0.25	< 0.050	< 0.10	< 0.10	< 0.15	< 130
162	7-Chn-Swall-7-3	0.72	< 0.050	< 0.10	< 0.10	< 0.15	< 130
163	8-Chn-Nwall-8-5	< 0.25	< 0.050	< 0.10	< 0.10	< 0.15	< 130
164	9-Chn-Btm-Cntr-2	< 0.25	< 0.050	< 0.10	< 0.10	< 0.15	< 130
165	10-Chn-Nwall-4	0.36	< 0.050	< 0.10	< 0.10	< 0.15	< 130
166	11-Chn-Nwall-4	6.40	< 0.050	< 0.10	< 0.10	< 0.15	< 130
167	12-Chn-Btm-10	< 0.25	< 0.050	< 0.10	< 0.10	< 0.15	< 130
168	13-Chn-Btm-7	< 0.25	< 0.050	< 0.10	< 0.10	< 0.15	< 130
169	14-Chn-Ewall-6	< 0.25	< 0.050	< 0.10	< 0.10	< 0.15	< 130
170	15-Chn-SECnr-6	0.60	< 0.050	< 0.10	< 0.10	< 0.15	< 130
171	16-Ex-Nside-10	< 0.25	< 0.050	< 0.10	< 0.10	< 0.15	< 130
172	17-Chn-Nwall-4	< 0.25	< 0.050	< 0.10	< 0.10	< 0.15	< 130
173	18-Chn-Nwall-4	< 0.25	< 0.050	< 0.10	< 0.10	< 0.15	< 130
174	19-Chn-Swall-4	< 0.25	< 0.050	< 0.10	< 0.10	< 0.15	< 130
175	20-Chn-Btm-Ctnr-4	< 0.25	< 0.050	< 0.10	< 0.10	< 0.15	< 130
176	21-Chn-Swall-4	< 0.25	< 0.050	< 0.10	< 0.10	< 0.15	< 130
177	22-Chn-SWCNR-1'	< 0.050	< 0.050	< 0.050	< 0.050	< 0.20	< 130
178	23-Chn-SWwall-1'	< 0.050	< 0.050	< 0.050	< 0.050	< 0.20	< 130
179	24-Chn-NWCNR-4'	0.45	< 0.050	< 0.050	< 0.050	< 0.20	< 130
180	25-Chn-Nwall-3'	< 0.050	< 0.050	< 0.050	< 0.050	< 0.20	< 130
181	26-Chn-BTM-3'	0.61	< 0.050	< 0.050	< 0.050	< 0.20	< 130
182	27-Chn-BTM-2'	0.43	< 0.050	< 0.050	< 0.050	< 0.20	< 130
183	28-Chn-BTM-2'	< 0.050	< 0.050	< 0.050	< 0.050	< 0.20	< 130
184	29-NEW-EX-BTM-2'	1.50	< 0.050	0.06	0.20	0.88	< 130
185	30-NEW-EX-BTM-6'	0.44	< 0.050	< 0.050	< 0.050	< 0.20	< 130
Arizona Soil Remediation Levels (Residential)			0.62	790	1500	2800	4100
Arizona Groundwater Protection Levels (GPLs)			0.71	400	120	2200	

Note: All results in milligrams per kilogram
NA = not applicable
<0.050 = not detected/ detection limit

Table 7
Soil Sample Results
Curb Excavation
Silvercroft Wash Release Site

Map ID #	Sample Name	MTBE	Benzene	Toluene	Ethyl-Benzene	Total Xylenes,	TPH C10-C32
186	1-curb-1'-BOT	<0.21	<0.052	<0.10	<0.10	<0.16	<130
187	1-curb-6"-WWALL	<0.20	<0.050	<0.10	<0.10	<0.15	<130
188	2-curb-6"-EWALL	<0.20	<0.050	<0.10	<0.10	<0.15	<130
189	2-curb-1'-BOT	<0.19	<0.047	<0.093	<0.093	<0.14	<130
190	3-curb-13"-BOT	<0.20	<0.050	<0.10	<0.10	<0.15	<130
191	3-curb-6"WWALL	<0.20	<0.050	<0.10	<0.10	<0.15	<130
192	4-curb-14"-BOT	<0.18	<0.045	<0.090	<0.090	<0.13	<130
193	5-curb-44"-BOT	<0.21	<0.052	<0.10	<0.10	<0.16	<130
194	5-curb-24"-WWALL	<0.20	<0.050	<0.10	<0.10	<0.15	<130
195	5-curb-15"-EWALL	<0.20	<0.050	<0.10	<0.10	<0.15	<130
196	6-curb-28"-BOT	<0.050	<0.050	<0.050	<0.050	<0.20	<130
197	6-curb-15"-EWALL	<0.050	<0.050	<0.050	<0.050	<0.20	<130
198	7-curb-15"-BOT	0.056	<0.050	<0.050	<0.050	<0.20	<130
199	8-curb-7"-BOT	<0.050	<0.050	<0.050	<0.050	<0.20	<130
200	9-curb-6"-BOT	0.12	<0.050	<0.050	<0.050	<0.20	<130
201	10-curb-6"-BOT	<0.050	<0.050	<0.050	<0.050	<0.20	<130
202	11-curb-18"-BOT	<0.050	<0.050	<0.050	<0.050	<0.20	<130
203	12-curb-1'-BOT	<0.050	<0.050	<0.050	<0.050	<0.20	<130
204	13-curb-17"-BOT	<0.050	<0.050	<0.050	<0.050	<0.20	<130
205	14-curb-1'-BOT	<0.050	<0.050	<0.050	<0.050	<0.20	<130
206	15-curb-15"-BOT	<0.050	<0.050	<0.050	<0.050	<0.20	<130
207	16-curb-16"-BOT	<0.050	<0.050	<0.050	<0.050	<0.20	<130
208	17-curb-17"-BOT	<0.17	<0.042	<0.083	<0.083	<0.12	<130
209	18-curb-17"-BOT	<0.19	<0.046	<0.093	<0.093	<0.14	<130
210	19-curb-16"-BOT	<0.19	<0.046	<0.093	<0.093	<0.14	<130
211	20-curb-16"-BOT	<0.17	<0.044	<0.087	<0.087	<0.13	<130
212	21-curb-1'-BOT	<0.17	<0.043	<0.087	<0.087	<0.13	<130
213	22-curb-21"-BOT	<0.19	<0.048	<0.095	<0.095	<0.14	<130
214	23-curb-13"-BOT	<0.17	<0.043	<0.086	<0.086	<0.13	<130
215	24-curb-19"-BOT	<0.19	<0.047	<0.094	<0.094	<0.14	<130
216	25-curb-1'-BOT	<0.18	<0.046	<0.092	<0.092	<0.14	<130
217	26-curb-31"-BOT	<0.20	<0.050	<0.10	<0.10	<0.20	<130
218	27-curb-18"-BOT	<0.20	<0.050	<0.10	<0.10	<0.20	<130
219	28-curb-10"-BOT	<0.20	<0.050	<0.10	<0.10	<0.20	<130
220	29-curb-8"-BOT	<0.20	<0.050	<0.10	<0.10	<0.20	<130
221	30-curb-11"-BOT	<0.20	<0.050	<0.10	<0.10	<0.20	<130
222	31-curb-6"-BOT	<0.20	<0.050	<0.10	<0.10	<0.20	<130
223	32-curb-8"-BOT	<0.20	<0.050	<0.10	<0.10	<0.20	<130
224	33-curb-6"-BOT	<0.20	<0.050	<0.10	<0.10	<0.20	<130
225	34-curb-8"-BOT	<0.20	<0.050	<0.10	<0.10	<0.20	<130
226	35-curb-1'-BOT	<0.20	<0.050	<0.10	<0.10	<0.20	<130
227	36-curb-6"-BOT	<0.20	<0.050	<0.10	<0.10	<0.20	<130
228	37-curb-10"-BOT	<0.20	<0.050	<0.10	<0.10	<0.20	<130
229	1-Str-15"	<0.20	<0.050	<0.10	<0.10	<0.20	<130
230	2-Str-13"	<0.20	<0.050	<0.10	<0.10	<0.20	<130
Arizona Soil Remediation Levels (Residential)			0.62	790	1500	2800	4100
Arizona Groundwater Protection Levels (GPLs)			0.71	400	120	2200	

Note: All results in milligrams per kilogram
NA = not applicable
<0.050 = not detected/ detection limit

Table 8
Shallow Soil Boring Results on Lots
Silvercroft Wash Release Site

Map ID #	Sample ID	Sample Date	Benzene	Toluene	Ethyl-Benzene	Xylenes, Total	MtBE	TPH total (C10-C32)
Arizona Soil Remediation Levels (Residential)			0.62	790	1500	2800	320.0	4100
Arizona Groundwater Protection Levels (GPLs)			0.71	400	120	2200	NA	
232	L352-B1-6'	9/23/2003	<0.050	<0.050	<0.050	<0.20	<0.20	<130
235	L352-B1-11'	9/23/2003	<0.050	<0.050	<0.050	<0.20	<0.20	<130
233	L352-B1-16'	9/23/2003	<0.050	<0.050	<0.050	<0.20	<0.20	<130
234	L352-B1-21'	9/23/2003	<0.050	<0.050	<0.050	<0.20	0.23	<130
236	L352-B1-26'	9/23/2003	<0.050	<0.050	<0.050	<0.20	0.83	<130
237	L352-B1-31'	9/23/2003	<0.050	<0.050	<0.050	<0.20	1.5	<130
238	L352-B1-36'	9/23/2003	<0.050	<0.050	<0.050	<0.20	1.7	<130
239	L352-B2-2'	10/1/2003	<0.050	<0.050	<0.050	<0.20	<0.050	<130
240	L352-B2-6'	10/1/2003	<0.050	<0.050	<0.050	<0.20	<0.050	<130
241	L352-B3-2'	10/1/2003	<0.050	<0.050	<0.050	<0.20	<0.050	<130
242	L352-B3-6'	10/1/2003	<0.050	<0.050	<0.050	<0.20	<0.050	<130
243	L352-B5-2'	10/1/2003	<0.050	<0.050	<0.050	<0.20	0.1	<130
244	L352-B5-6'	10/1/2003	<0.050	<0.050	<0.050	<0.20	<0.050	<130
245	L352-B6-2'	10/1/2003	<0.050	<0.050	<0.050	<0.20	<0.050	<130
246	L352-B6-6'	10/1/2003	<0.050	<0.050	<0.050	<0.20	<0.050	<130
247	L352-B7-2'	10/1/2003	<0.050	<0.050	<0.050	<0.20	<0.050	<130
248	L352-B7-6'	10/1/2003	<0.050	<0.050	<0.050	<0.20	<0.050	<130
249	L352-B8-2'	10/1/2003	<0.050	<0.050	<0.050	<0.20	<0.050	<130
250	L352-B8-6'	10/1/2003	<0.050	<0.050	<0.050	<0.20	<0.050	<130
251	L353-B1-6'	9/23/2003	<0.050	<0.10	<0.10	<0.15	0.7	<130
252	L353-B1-11'	9/23/2003	<0.050	<0.050	<0.050	<0.20	<0.20	<130
253	L353-B1-16'	9/23/2003	<0.050	<0.050	<0.050	<0.20	<0.20	<130
254	L353-B1-21'	9/23/2003	<0.050	<0.050	<0.050	<0.20	<0.20	<130
255	L353-B1-26'	9/23/2003	<0.050	<0.050	<0.050	<0.20	0.93	<130
256	L353-B1-31'	9/23/2003	<0.050	<0.050	<0.050	<0.20	2.4	<130
257	L353-B9-2'	10/2/2003	<0.050	<0.10	<0.10	<0.20	<0.20	<130
258	L353-B9-6'	10/2/2003	<0.050	<0.10	<0.10	<0.20	<0.20	<130
259	L353-B9-11'	10/2/2003	<0.050	<0.10	<0.10	<0.20	<0.20	<130
260	L353-B11-2'	10/1/2003	<0.050	<0.050	<0.050	0.2	<0.050	<130
261	L353-B11-6'	10/1/2003	<0.050	<0.050	<0.050	<0.20	2.0	<130
262	L353-B11-11'	10/1/2003	<0.050	<0.050	<0.050	<0.20	5.9	<130
263	L353-B12-2'	10/1/2003	<0.050	<0.050	<0.050	<0.20	7.4	<130
264	L353-B12-6'	10/1/2003	<0.050	<0.050	<0.050	<0.20	5.1	<130
265	L353-B12-11'	10/1/2003	<0.050	<0.050	<0.050	<0.20	0.7	<130
266	L353-B12-16'	10/1/2003	<0.050	<0.050	<0.050	<0.20	1.1	<130
267	L353-B13-2'	10/2/2003	<0.050	0.1	<0.10	1.7	11.3	<130
268	L353-B13-6'	10/2/2003	<0.050	0.2	<0.10	<0.20	3.0	<130
269	L353-B14-2'	10/2/2003	<0.050	<0.10	<0.10	0.2	2.9	<130
270	L353-B14-6'	10/2/2003	<0.050	<0.10	<0.10	<0.20	1.7	<130
271	L353-B14-11'	10/2/2003	<0.050	<0.10	<0.10	<0.20	0.3	<130
272	L353-B15-2'	10/2/2003	<0.050	0.4	0.1	1.3	10.9	<130
273	L353-B15-6'	10/2/2003	<0.050	<0.10	<0.10	<0.20	5.4	<130
274	L353-B15-11'	10/2/2003	<0.050	<0.10	<0.10	<0.20	0.2	<130
275	L354-B30-1'	10/2/2003	<0.050	<0.050	<0.050	<0.20	<0.050	<130
276	L354-B30-5'	10/2/2003	<0.050	<0.050	<0.050	<0.20	<0.050	<130
277	L354-B31-1'	10/2/2003	<0.050	<0.050	<0.050	<0.20	<0.050	<130
278	L354-B31-5'	10/2/2003	<0.050	<0.050	<0.050	<0.20	<0.050	<130
279	L354-B32-1'	10/2/2003	<0.050	<0.050	<0.050	<0.20	<0.050	<130
280	L354-B32-5'	10/2/2003	<0.050	<0.050	<0.050	<0.20	<0.050	<130
281	L354-B34-1'	10/2/2003	<0.050	<0.050	<0.050	<0.20	<0.050	<130
282	L354-B34-5'	10/2/2003	<0.050	<0.050	<0.050	<0.20	<0.050	<130
283	L354-B35-1'	10/2/2003	<0.050	<0.050	<0.050	<0.20	<0.050	<130
284	L354-B35-5'	10/2/2003	<0.050	<0.050	<0.050	<0.20	<0.050	<130
285	L354-B37-1'	10/2/2003	<0.050	<0.050	<0.050	<0.20	<0.050	<130
286	L354-B37-5'	10/2/2003	<0.050	<0.050	<0.050	<0.20	<0.050	<130
287	L355-B23-1'	10/2/2003	<0.050	<0.050	<0.050	<0.20	<0.050	<130
288	L355-B23-5'	10/2/2003	<0.050	<0.050	<0.050	<0.20	<0.050	<130
289	L355-B24-1'	10/2/2003	<0.050	<0.050	<0.050	<0.20	<0.050	<130
290	L355-B24-5'	10/2/2003	<0.050	<0.050	<0.050	<0.20	<0.050	<130
291	L355-B25-1'	10/2/2003	<0.050	<0.050	<0.050	<0.20	<0.050	<130
292	L355-B25-5'	10/2/2003	<0.050	<0.050	<0.050	<0.20	<0.050	<130
293	L355-B26-1'	10/2/2003	<0.050	<0.050	<0.050	<0.20	<0.050	<130
294	L355-B26-5'	10/2/2003	<0.050	<0.050	<0.050	<0.20	<0.050	<130
295	L355-B27-1'	10/2/2003	<0.050	<0.050	<0.050	<0.20	<0.050	<130
296	L355-B27-5'	10/2/2003	<0.050	<0.050	<0.050	<0.20	<0.050	<130
297	L355-B28-1'	10/2/2003	<0.050	<0.050	<0.050	<0.20	<0.050	<130
298	L355-B28-5'	10/2/2003	<0.050	<0.050	<0.050	<0.20	<0.050	<130

Table 8
Shallow Soil Boring Results on Lots
Silvercroft Wash Release Site

Map ID #	Sample ID	Sample Date	Benzene	Toluene	Ethyl-Benzene	Xylenes, Total	MtBE	TPH total (C10-C32)
Arizona Soil Remediation Levels (Residential)			0.62	790	1500	2800	320.0	4100
Arizona Groundwater Protection Levels (GPLs)			0.71	400	120	2200	NA	
299	L356-B16-2'	10/2/2003	<0.050	<0.050	<0.050	<0.20	<0.050	<130
300	L356-B16-6'	10/2/2003	<0.050	<0.050	<0.050	<0.20	<0.050	<130
301	L356-B17-2'	10/2/2003	<0.050	<0.050	<0.050	<0.20	<0.050	<130
302	L356-B17-6'	10/2/2003	<0.050	<0.050	<0.050	<0.20	<0.050	<130
303	L356-B19-2'	10/2/2003	<0.050	<0.050	<0.050	<0.20	<0.050	<130
304	L356-B19-6'	10/2/2003	<0.050	<0.050	<0.050	<0.20	<0.050	<130
305	L356-B20-2'	10/2/2003	<0.050	<0.050	<0.050	<0.20	<0.050	<130
306	L356-B20-6'	10/2/2003	<0.050	<0.050	<0.050	<0.20	<0.050	<130
307	L356-B21-2'	10/2/2003	<0.050	<0.050	<0.050	<0.20	<0.050	<130
308	L356-B21-6'	10/2/2003	<0.050	<0.050	<0.050	<0.20	<0.050	<130
309	L356-B22-2'	10/2/2003	<0.050	<0.050	<0.050	<0.20	<0.050	<130
310	L356-B22-6'	10/2/2003	<0.050	<0.050	<0.050	<0.20	<0.050	<130

Note: All results in milligrams per kilogram
NA = not applicable
<0.050 = not detected/ detection limit

Table 9
Summary of Borings Deeper than 10 Feet bgs
Silvercroft Wash

Boring Name	Well Name	Installation Week Ending (2003)	Total Depth (ft)	Location
L352-B1	-	9/26/2003	36	NW corner of Lot 352
L353-B1	-	9/26/2003	31	SW corner of Lot 353
RP	-	9/26/2003	29	Adjacent to release point
L353-B9	-	10/3/2003	11	Lot 353
L353-B11	-	10/3/2003	11	Lot 353
L353-B12	-	10/3/2003	16	Lot 353
L353-B14	-	10/3/2003	11	Lot 353
L353-B15	-	10/3/2003	11	Lot 353
RP-2	VE-1	10/3/2003	100	Adjacent to release point
RP-3	MW-2	10/10/2003	170	In easement approximately 37 feet north and 17 feet west of the release point
RP-4	MW-1	10/17/2003	170	In guide tube adjacent to release point
MW-3	MW-3	10/17/2003	175	Lot 352
MW-4	MW-4	10/31/2004	175	Lot 353
MW-5	MW-5	10/24/2003	175	Lot 355
MW-6	MW-6	10/17/2003	175	In easement approximately 20 feet south of Silverbell Tree Drive
MW-7	MW-7	10/31/2004	175	In easement approximately 100 feet south of release point
MW-8	MW-8	11/7/2003	175	Lot 353
MW-9	MW-9	10/31/2004	175	Lot 356
MW-10	MW-10	11/7/2003	175	Border of Lots 354 and 355
MW-11	MW-11	11/7/2003	175	Cul-de-sac of Silver Honey Place
MW-12	MW-12	11/14/2003	175	Cul-de-sac of Silver Grass Place
MW-13	MW-13	11/14/2003	175	Northeast corner of Silver Honey Place and Silver Island Way
MW-14	MW-14	11/21/2003	175	90 degree turn at Silver Grass Place and Silver Island Way
MW-15	MW-15	11/21/2003	175	Silver Meadow Place, in front of Lot 323
MW-16	MW-16	11/21/2003	175	In easement approximately 250 feet north of MW-6

Table 10
Deep Soil Boring Results
Silvercroft Wash Release Site

Map ID #	Sample ID	Sample Date	Benzene	Toluene	Ethyl-Benzene	Xylenes, Total	MtBE	TPH total (C10-C32)
Arizona Soil Remediation Levels (Residential)			0.62	790.00	1500.00	2800.00	320.00	4100.00
Arizona Groundwater Protection Levels (GPLs)			0.71	400.00	120.00	2200.00	NA	
390	MW-6-75'	10/15/2003	<0.052	<0.10	<0.10	<0.16	<0.21	<130
391	MW-6-85'	10/15/2003	<0.049	<0.097	<0.097	<0.15	<0.19	<130
392	MW-6-95'	10/15/2003	<0.052	<0.10	<0.10	<0.16	<0.21	<130
393	MW-6-115'	10/15/2003	<0.049	<0.098	<0.098	<0.15	<0.20	NA
394	MW-6-135'	10/15/2003	<0.050	<0.050	<0.050	<0.2	<0.050	<130
395	MW-7-15'	10/23/2003	<0.050	<0.050	<0.050	<0.2	<0.050	<130
396	MW-7-25'	10/23/2003	<0.050	<0.050	<0.050	<0.2	<0.050	<130
397	MW-7-35'	10/23/2003	<0.050	<0.050	<0.050	<0.2	<0.050	<130
398	MW-7-45'	10/23/2003	<0.050	<0.050	<0.050	<0.2	<0.050	<130
399	MW-7-55'	10/26/2003	<0.050	<0.050	<0.050	<0.2	<0.050	<130
400	MW-7-65'	10/26/2003	<0.050	<0.050	<0.050	<0.2	<0.050	<130
401	MW-7-75'	10/26/2003	<0.050	<0.050	<0.050	<0.2	<0.050	<130
402	MW-7-85'	10/26/2003	<0.050	<0.050	<0.050	<0.2	<0.050	<130
403	MW-7-95'	10/26/2003	<0.050	<0.050	<0.050	<0.2	<0.050	<130
404	MW-7-115'	10/26/2003	<0.050	<0.050	<0.050	<0.2	<0.050	<130
405	MW-7-125'	10/26/2003	<0.050	<0.050	<0.050	<0.2	<0.050	<130
406	MW-8-15'	11/3/2003	<0.050	<0.050	<0.050	<0.2	<0.050	<130
407	MW-8-60'	11/4/2003	<0.050	<0.050	<0.050	<0.2	<0.050	<130
408	MW-8-70'	11/4/2003	<0.050	<0.050	<0.050	<0.2	<0.050	<130
409	MW-8-120'	11/5/2003	<0.050	<0.050	<0.050	<0.2	<0.050	NA
410	MW-8-130'	11/5/2003	<0.050	<0.050	<0.050	<0.2	<0.050	<130
411	MW-8-140'	11/5/2003	<0.050	<0.050	<0.050	<0.2	<0.050	NA
412	MW-9-15'	10/28/2003	<0.050	<0.050	<0.050	<0.2	<0.050	<130
413	MW-9-25'	10/28/2003	<0.050	<0.050	<0.050	<0.2	<0.050	<130
414	MW-9-35'	10/28/2003	<0.050	<0.050	<0.050	<0.2	<0.050	<130
415	MW-9-45'	10/28/2003	<0.050	<0.050	<0.050	<0.2	<0.050	<130
416	MW-9-53'	10/28/2003	<0.050	<0.050	<0.050	<0.2	<0.050	<130
417	MW-9-65'	10/28/2003	<0.050	<0.050	<0.050	<0.2	<0.050	<130
418	MW-9-75'	10/28/2003	<0.050	<0.050	<0.050	<0.2	<0.050	<130
419	MW-9-85'	10/29/2003	<0.050	0.06	<0.050	<0.2	<0.050	<130
420	MW-9-95'	10/29/2003	<0.050	0.06	<0.050	<0.2	<0.050	<130
421	MW-9-115'	10/29/2003	<0.050	0.06	<0.050	<0.2	<0.050	<130
422	MW-10-15'	10/30/2003	<0.050	<0.050	<0.050	<0.2	<0.050	<130
423	MW-10-65'	10/30/2003	<0.050	<0.050	<0.050	<0.2	<0.050	NA
424	MW-10-85'	10/30/2003	<0.050	0.06	<0.050	<0.2	<0.050	NA
426	MW-10-115'	10/31/2003	<0.050	0.06	<0.050	<0.2	<0.050	<130
427	MW-10-125'	10/31/2003	<0.050	0.06	<0.050	<0.2	<0.050	NA
428	MW-10-135'	10/31/2003	<0.050	0.06	<0.050	<0.2	<0.050	<130
429	MW-11-45'	11/4/2003	<0.050	<0.050	<0.050	<0.2	<0.050	<130
430	MW-11-55'	11/4/2003	<0.050	<0.050	<0.050	<0.2	<0.050	<130
431	MW-11-75'	11/4/2003	<0.050	<0.050	<0.050	<0.2	<0.050	<130
432	MW-11-85'	11/5/2003	<0.050	<0.050	<0.050	<0.2	<0.050	NA
433	MW-11-95'	11/5/2003	<0.050	<0.050	<0.050	<0.2	<0.050	<130
434	MW-11-105'	11/6/2003	<0.050	<0.050	<0.050	<0.20	<0.050	NA
435	MW-11-135'	11/6/2003	<0.050	<0.050	<0.050	<0.20	<0.050	NA
436	MW-12-20'	11/6/2003	<0.050	<0.050	<0.050	<0.20	<0.050	<130
437	MW-12-40'	11/6/2003	<0.050	<0.050	<0.050	<0.20	<0.050	NA
438	MW-12-60'	11/7/2003	<0.050	<0.050	<0.050	<0.2	<0.050	<130
439	MW-13-35'	11/10/2003	<0.050	<0.050	<0.050	<0.2	<0.050	NA
440	MW-13-55'	11/10/2003	<0.050	<0.050	<0.050	<0.2	<0.050	NA
441	MW-13-75'	11/10/2003	<0.050	<0.050	<0.050	<0.2	<0.050	<130
442	MW-13-95'	11/10/2003	<0.050	<0.050	<0.050	<0.2	<0.050	<130
443	MW-14-20'	11/12/2003	<0.050	<0.050	<0.050	<0.20	<0.050	<130
444	MW-14-40'	11/12/2003	<0.050	<0.050	<0.050	<0.20	<0.050	NA
445	MW-14-60'	11/12/2003	<0.050	<0.050	<0.050	<0.20	<0.050	NA
446	MW-14-80	11/13/2003	<0.050	<0.050	<0.050	<0.20	<0.050	NA
447	MW-14-100'	11/13/2003	<0.050	<0.050	<0.050	<0.20	<0.050	NA
448	MW-14-120	11/13/2003	<0.050	<0.050	<0.050	<0.20	<0.050	NA
449	MW-14-140'	11/13/2003	<0.050	<0.050	<0.050	<0.20	<0.050	<130
450	MW-15-35'	11/14/2003	<0.050	<0.050	<0.050	<0.20	<0.050	NA
451	MW-15-55'	11/14/2003	<0.050	<0.050	<0.050	<0.20	<0.050	<130
452	MW-15-75'	11/14/2003	<0.050	<0.050	<0.050	<0.20	<0.050	<130
453	MW-15-95'	11/14/2003	<0.050	<0.050	<0.050	<0.20	<0.050	<130
454	MW-15-115'	11/17/2003	<0.050	<0.050	<0.050	<0.20	<0.050	<130
455	MW-16-20'	11/17/2003	<0.050	<0.050	<0.050	<0.20	<0.050	NA
456	MW-16-60'	11/17/2003	<0.050	<0.050	<0.050	<0.20	<0.050	NA
457	MW-16-80'	11/17/2003	<0.050	<0.050	<0.050	<0.20	<0.050	NA
458	MW-16-100'	11/17/2003	<0.050	<0.050	<0.050	<0.20	<0.050	NA
459	MW-16-120'	11/17/2003	<0.050	<0.050	<0.050	<0.20	<0.050	NA
460	RB-914A	10/28/2003	<0.050	<0.050	<0.050	<0.2	<0.050	<130
461	RB-936	10/28/2003	<0.050	<0.050	<0.050	<0.2	<0.050	<130

Note: All results in milligrams per kilogram
NA = not applicable
<0.050 = not detected/ detection limit

Table 10
Deep Soil Boring Results
Silvercroft Wash Release Site

Map ID #	Sample ID	Sample Date	Benzene	Toluene	Ethyl-Benzene	Xylenes, Total	MtBE	TPH total (C10-C32)
Arizona Soil Remediation Levels (Residential)			0.62	790.00	1500.00	2800.00	320.00	4100.00
Arizona Groundwater Protection Levels (GPLs)			0.71	400.00	120.00	2200.00	NA	
311	RP-15'	9/23/2003	**90.00**	340.00	**120.00**	339.00	**810.00**	**21700.00**
312	RP-20'	9/23/2003	**55.00**	240.00	78.00	225.00	**570.00**	**16100.00**
313	RP-25'	9/23/2003	**63.00**	230.00	80.00	240.00	310.00	**12000.00**
314	RP2-35'	9/29/2003	**62.00**	310.00	90.00	370.00	310.00	**7200.00**
315	RP2-40'	9/29/2003	**6.60**	84.00	40.00	160.00	35.00	**8600.00**
316	RP2-45'	9/29/2003	**0.85**	8.00	4.90	19.00	9.20	2600.00
317	RP2-50'	9/29/2003	**23.00**	150.00	50.00	170.00	130.00	**6200.00**
318	RP2-55'	9/30/2003	**47.00**	240.00	74.00	300.00	260.00	**6700.00**
319	RP2-60'	9/30/2003	**64.00**	330.00	94.00	460.00	**410.00**	4000.00
320	RP2-65'	9/30/2003	**21.00**	130.00	36.00	180.00	310.00	<1300
321	RP2-70'	9/30/2003	**45.00**	**530.00**	78.00	330.00	**630.00**	<1300
322	RP2-75'	9/30/2003	**45.00**	290.00	93.00	380.00	290.00	<1300
323	RP2-80'	9/30/2003	**140.00**	**900.00**	**270.00**	1100.00	**400.00**	1400.00
324	RP2-85'	9/30/2003	**30.00**	170.00	55.00	230.00	190.00	<1300
325	RP2-90'	9/30/2003	**35.00**	210.00	66.00	250.00	140.00	<1300
326	RP2-95'	9/30/2003	**92.00**	**530.00**	**130.00**	540.00	**380.00**	1600.00
327	RP2-100'	9/30/2003	**94.00**	**650.00**	**180.00**	690.00	240.00	1800.00
328	RP-3-10'	10/6/2003	<0.050	<0.10	<0.10	<0.15	<0.25	<130
329	RP-3-35'	10/6/2003	<0.050	<0.10	<0.10	<0.15	<0.25	<130
330	RP-3-50	10/8/2003	<0.050	<0.050	<0.050	<0.20	0.94	<130
331	RP-3-55	10/8/2003	<0.050	<0.050	<0.050	<0.20	0.18	<130
332	RP-3-65	10/8/2003	0.13	0.18	<0.050	<0.20	0.16	<130
333	RP-3-75	10/8/2003	**0.71**	1.70	0.18	0.75	0.33	<130
334	RP-3-85	10/8/2003	0.088	0.13	<0.050	<0.20	0.26	<130
335	RP-3-95	10/8/2003	0.16	1.10	0.85	4.70	4.80	<130
336	RP-3-105	10/8/2003	<0.050	<0.050	<0.050	<0.20	0.55	<130
337	RP-3-115	10/8/2003	**0.68**	1.40	0.16	0.58	3.10	**19000.00**
338	RP-3-125	10/8/2003	**110.00**	**640.00**	**180.00**	750.00	110.00	2200.00
339	*RP-3-135* ***	10/8/2003	**2500.00**	180.00	58.00	250.00	30.00	1500.00
340	RP-4-20'	10/14/2003	**31.00**	150.00	57.00	154.00	200.00	**4500.00**
341	RP-4-60'	10/14/2003	**99.00**	**500.00**	**120.00**	570.00	**490.00**	**4600.00**
342	RP-4-90'	10/14/2003	**110.00**	**590.00**	**160.00**	630.00	240.00	<1300
343	RP-4-105'	10/14/2003	**110.00**	**630.00**	**180.00**	680.00	**370.00**	<1300
344	RP-4-115'	10/14/2003	**99.00**	**660.00**	**170.00**	690.00	**350.00**	1500.00
345	RP-4-125'	10/14/2003	**87.00**	**550.00**	**150.00**	600.00	**350.00**	<1300
346	RP-4-135'	10/14/2003	**42.00**	310.00	88.00	380.00	210.00	NA
347	MW-3-20'	10/15/2003	<0.050	<0.10	<0.10	<0.10	<0.20	<130
348	MW-3-30'	10/15/2003	<0.047	<0.093	<0.093	<0.14	<0.19	<130
349	MW-3-40'	10/15/2003	<0.063	<0.13	<0.13	<0.19	<0.25	<130
350	MW-3-50'	10/15/2003	<0.054	<0.11	<0.11	<0.16	<0.22	<130
351	MW-3-60'	10/16/2003	<0.052	<0.10	<0.10	<0.16	<0.21	<130
352	MW-3-70'	10/16/2003	<0.052	<0.10	<0.10	<0.16	<0.21	<130
353	MW-3-80'	10/16/2003	<0.050	<0.10	<0.10	<0.15	<0.20	<130
354	MW-3-90'	10/16/2003	<0.056	<0.11	<0.11	<0.17	<0.22	<130
355	MW-3-100'	10/16/2003	<0.050	<0.050	<0.050	<0.2	<0.050	<130
356	MW-3-110'	10/16/2003	<0.050	<0.050	<0.050	<0.2	<0.050	<130
357	MW-3-120'	10/16/2003	<0.050	<0.050	<0.050	<0.20	<0.050	<130
360	MW-3-130'	10/16/2003	<0.050	<0.050	<0.050	<0.20	<0.050	<130
361	*MW-3-140'* **	10/16/2003	**110**	**750**	**220**	980	280	2900
362	MW-4-30'	10/21/2003	<0.050	<0.050	<0.050	<0.2	0.07	<130
363	MW-4-40'	10/21/2003	<0.050	<0.050	<0.050	<0.2	0.89	<130
364	MW-4-50'	10/21/2003	0.08	0.11	<0.050	<0.20	0.16	<130
365	MW-4-60'	10/22/2003	<0.050	<0.050	<0.050	<0.2	1.46	<130
366	MW-4-70'	10/22/2003	0.26	0.35	<0.050	<0.2	14.60	<130
367	MW-4-80'	10/22/2003	<0.050	0.05	<0.050	<0.2	0.06	<130
368	MW-4-90'	10/22/2003	<0.050	<0.050	<0.050	<0.2	<0.050	<130
369	MW-4-100'	10/22/2003	<0.25	0.76	0.75	4.00	5.90	160.00
370	MW-4-110'	10/22/2003	<0.25	0.29	0.39	2.10	3.70	<130
371	*MW-4-140'* **	10/22/2003	**14.00**	160.00	69.00	300.00	31.00	<130
372	MW-5-15'	10/21/2003	<0.050	<0.050	<0.050	<0.2	<0.050	NA
373	MW-5-35'	10/21/2003	<0.050	<0.050	<0.050	<0.2	<0.050	<130
374	MW-5-45'	10/21/2003	<0.050	<0.050	<0.050	<0.2	<0.050	<130
375	MW-5-55'	10/21/2003	<0.050	<0.050	<0.050	<0.2	<0.050	<130
376	MW-5-65'	10/21/2003	<0.050	<0.050	<0.050	<0.2	<0.050	<130
377	MW-5-75'	10/21/2003	<0.050	<0.050	<0.050	<0.2	<0.050	<130
378	MW-5-85'	10/21/2003	<0.050	<0.050	<0.050	<0.2	<0.050	<130
379	MW-5-95'	10/21/2003	<0.050	<0.050	<0.050	<0.2	<0.050	<130
380	MW-5-105'	10/21/2003	<0.050	<0.050	<0.050	<0.2	<0.050	<130
381	MW-5-115'	10/21/2003	<0.050	<0.050	<0.050	<0.2	<0.050	<130
382	MW-5-125'	10/21/2003	<0.050	<0.050	<0.050	<0.2	<0.050	<130
384	MW-5-135'	10/21/2003	<0.050	<0.050	<0.050	<0.2	<0.050	<130
385	MW-6-25'	10/14/2003	<0.073	<0.073	<0.073	<0.15	<0.29	NA
386	MW-6-35'	10/15/2003	<0.048	<0.097	<0.097	<0.15	<0.19	<130
387	MW-6-45'	10/15/2003	<0.058	<0.11	<0.11	<0.17	<0.23	<130
388	MW-6-55'	10/15/2003	<0.050	<0.10	<0.10	<0.15	<0.20	<130
389	MW-6-65'	10/15/2003	<0.11	<0.11	<0.11	<0.16	<0.21	<130

Table 11
Soil Sample Results 11/24/2003
Backhoe Excavation
Silvercroft Wash Release Site

Map ID #	Sample Name	MTBE	Benzene	Toluene	Ethyl-Benzene	Total Xylenes,	TPH C10-C32
462	1-DC-5'	11.00	<0.050	<0.050	<0.050	<0.20	pending
463	2-DC-4.5'	0.37	<0.050	<0.050	<0.050	<0.20	pending
464	3-DC-5'	<0.050	<0.050	<0.050	<0.050	<0.20	pending
465	4-SDC-5'	0.38	<0.050	<0.050	<0.050	<0.20	pending
466	5-NDC-3.5'	<0.050	<0.050	<0.050	<0.050	<0.20	pending
467	6-NDC-3.5'	3.40	<0.25	0.46	1.20	59.00	pending
468	7-NDC-3.5'	5.70	<0.25	30.00	61.00	240.00	pending
469	8-NDC-3.5'	<0.050	<0.050	<0.050	<0.050	<0.20	pending
Arizona Soil Remediation Levels (Residential)		320.00	0.62	790	1500	2800	4100
Arizona Groundwater Protection Levels (GPLs)		NA	0.71	400	120	2200	

Note: All results in milligrams per kilogram
NA = not applicable
<0.050 = not detected/ detection limit

Table 12
Summary of Samples Collected Above and Below 10 Feet bgs
Silvercroft Wash Release Site

	Number of Soil Samples	
Table	Depth<10 feet	Depth >10 feet
Table 2	49	0
Table 3	37	7
Table 4	27	0
Table 5	16	0
Table 6	30	0
Table 7	45	0
Table 8	62	17
Table 10	0	148
Table 11	8	0
SUM	274	172

TOTAL SOIL SAMPLES = 446

Table 13
Summary of Exceedances for Samples Within 10 Feet of Ground Surface
Silvercroft Wash Release Site

	No. of Samples Depth<10 ft bgs	Number of BTEX Exceedances	Number of MTBE Exceedances	Number of TPH (C10-32) Exceedances
Table 2	49	0*	0	0
Table 3	37	0	0	0
Table 4	27	0	0	0
Table 5	16	0	0	0
Table 6	30	0	0	0
Table 7	45	0	0	0
Table 8	62	0	0	0
Table 10	0	-	-	-
Table 11	8	0	0	0
SUM	274	0	0	0

** 2 samples representative of soil that was subsequently removed had exceedances.
Values shown are representative of soil in place.

Table 14
Summary of Exceedances for Samples Deeper than 10 Feet Below Ground Surface
Silvercroft Wash Release Site

Table	No. of Samples Depth>10 ft bgs	Number of BTEX Exceedances	Number of MTBE Exceedances	Number of TPH (C10-32) Exceedances
Table 2	0	-	-	-
Table 3	7	0	0	0
Table 4	0	-	-	-
Table 5	0	-	-	-
Table 6	0	-	-	-
Table 7	0	-	-	-
Table 8	17	0	0	0
Table 10 (with RP, RP-2, RP-3, RP-4)	148	32	10	10
Table 10 (without RP, RP-2, RP-3, RP-4)	**116**	**0**	**0**	**0**
Table 11	0	-	-	-

Sum (with RP, RP-2, RP-3, RP-4)	172
Sum (without RP, RP-2, RP-3, RP-4)	140

RP, RP-2, RP-3, RP-4 are representative of the affected soil beneath the release point excavation

APPENDIX A

Procedures

1.0 OVERVIEW

This Appendix provides procedures for excavation soil sampling, and collection of soil samples from subsurface borings. QA/QC procedures and management of investigative derived waste are also discussed.

2.0 EXCAVATION AND SOIL SAMPLING

2.1 Excavation Methodology

SFPP's methodology for determining the extent of excavation at the site was based on three criteria: 1) visual observations; 2) field screening using a photoionization detector (PID), and 3) laboratory analysis of confirmation soil samples. Excavations were initiated in areas that were visibly affected immediately after the pipeline release. Initially, excavations proceeded until visibly affected soils were removed. Excavations continued until field screening using a photoionization detector (PID) indicated that no petroleum hydrocarbons were present. Confirmation soil samples were then collected to ensure that petroleum hydrocarbon-impacted soils had been sufficiently excavated. After laboratory analysis confirmed that all analytes were below ADEQ Residential Soil Remediation Levels (RSRLs) and GPLs, the excavation was backfilled with clean imported fill.

Where practicable, excavation proceeded to the extent that nondetectable concentrations were achieved. Excavation was limited where additional excavation to nondetectable concentrations would damage underground utilities, and analytical results indicated that concentrations below RSRLs and GPLs were achieved.

2.2 Excavation Soil Sample Collection

Soil samples were collected from the depth(s) within the excavation showing the greatest field evidence of petroleum hydrocarbons, and at least every 10 feet along trenches, or excavation bottoms or sidewalls. Soil samples were collected from an excavation by pushing a stainless steel or brass sleeve into the center of a bucket (on the backhoe or trackhoe) of native soil immediately after the soil was removed from the excavation. If the excavation was shallow enough for safe entry, samples were collected directly from the native soil in the same manner. If the sleeve could not be pushed into the bucket because of cobbles, then the material was rejected as inappropriate for soil sampling. Composite soil samples are deemed not acceptable by ADEQ for characterization of excavations, and were therefore not collected for this purpose. Completely-filled sleeves were immediately sealed by completely covering the ends with a Teflon patch, covering the Teflon patch with a foil patch, and covering the patches with tight-fitting plastic caps. A number of soil samples were collected by driving 5 gram EnCore samplers directly into the backhoe bucket or native soil. Samples were submitted to a fixed-base or mobile analytical laboratory certified by the ADHS to perform the appropriate analysis on the

same day as sample collection. A properly completed chain-of-custody document accompanied all samples. Copies of the chain-of-custody forms are included in Appendix D.

Soil samples were extracted in accordance with an extraction method approved by the ADHS. Samples were immediately labeled, placed in a sealable plastic bag, and stored at approximately 4°C in a cooler filled with ice.

All excavated soils associated with the release were removed from the Site, and backfilled with clean imported fill as required for initial abatement action under 40 CFR 280.62. Manifests for loads of soil removed are included in Appendix B.

3.0 WELL INSTALLATION

Well installation activities at the site have consisted of drilling, soil sampling, monitoring well construction, well development, groundwater sampling, and surveying. As this report focuses on soil, only those protocols pertaining to soil sampling are included.

3.1 Drilling and Sampling

For all borings, soil samples were collected in brass sleeves inside a split spoon sampler, which were driven into native, undisturbed soil by a 140-pound hammer on the drill rig's boom. Only brass sleeves that contained no headspace were submitted for laboratory analysis. Soil samples were not collected from auger cuttings or from the cyclone of air-method drilling rigs. The geologist placed samples in Ziploc baggies and monitored headspace readings with a PID. These readings, along with lithologic descriptions, will be included in boring logs that will be submitted with the Site Characterization Report. Soil samples were submitted to one of the following ADHS-certified laboratories for analysis: Turner Laboratories, Inc., Tucson, Arizona; Transwest Geochem, Inc., Phoenix Arizona; or Columbia Analytical Services, Phoenix, Arizona.

To describe subsurface lithology, and to determine the vertical and horizontal extent of hydrocarbon-impacted soil, soil samples were collected every 5 to 10 feet during drilling of borings near the release point, and every 20 feet in borings farther from the release point.

4.4 Analytical Protocols

All soil and groundwater samples were analyzed for benzene, toluene, ethylbenzene, xylenes (BTEX), and methyl tertiary-butyl ether (MTBE) using EPA Method 8260B. If enough soil was recovered from the split spoon sampler, the samples were also analyzed for Volatile Fuel Hydrocarbons and Diesel Range/Oil Range Organics (C_{10}-C_{32}) using ADHS 8015 AZ R1. Due to soil matrix (cobbles and gravels) approximately 10 to 20% of

split spoon samplers did not fill a brass sleeve without headspace. In such cases, 5 grams were collected with an EnCore sampler, which is sufficient material for EPA Method 8260B only. Tables from the ADEQ Leaking Underground Storage Tank Site Characterization Manual (LSCM) summarizing detection limits and compounds of concern are attached as Section 9.0.

5.0 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

All activities were performed consistent with procedures described in the Quality Assurance Project Plan (QAPP) (LFR, October 28, 2003). If field conditions required variations to the methods described in the QAPP, LFR personnel selected procedures, equipment, and provide documentation to ensure that quality met or exceeded standards described in the QAPP.

Measures were taken to ensure that samples were representative of the soil and groundwater conditions being investigated. In addition, the sample labeling, sample control, and decontamination procedures listed below were followed.

5.1 Sample Labeling and Control

Field personnel described all sampling activities in a field logbook. Logbook entries for all sampling activities, and associated chain of custody forms, included the following information for each sample:

- a unique sample identification number
- sampling location description
- date/time of sample collection
- sampling data/remarks

All soil samples were promptly labeled, placed in coolers, and kept on ice until they were delivered to the laboratory. Samples were either delivered to a local laboratory at the end of the day, or shipped at the end of the day for next-morning delivery to an out-of-town laboratory.

Strict chain-of-custody (COC) procedures were maintained for all soil samples collected for analytical testing. COC records were used to track all samples from the time of sampling to the arrival of samples at the laboratory. Three original copies of the COC record accompanied the sample shipment to the laboratory and was signed and retained by the receiving laboratory's sample custodian. A copy of the COC record was also retained by the field sampling personnel.

6.0 DECONTAMINATION PROCEDURES

All equipment was properly decontaminated in accordance with ASTM D 5088-90 (*Practice for Decontamination of Field Equipment Used at Nonradioactive Waste Sites*).

All drilling equipment that came in contact with the soil below the ground surface was cleaned before and after use in each boring. All sampling equipment that came in contact with the soil or groundwater as part of the sample collection process (including bailers, pumps, trowels or split-spoons) was cleaned between sampling locations/intervals. Decontamination procedures are described below.

Equipment was protected from all forms of chemical contact between final rinse and initial use. Equipment (bailers, augers, pumps etc.) that were not be used immediately following cleaning in the decontamination area were wrapped in foil and/or placed on 6-ml polyethylene sheeting until the equipment was needed.

6.1 Drilling Equipment

Prior to mobilization, the drilling rig and associated equipment was thoroughly cleaned to remove oil, grease, mud, and other foreign matter. Equipment was not lubricated with substances containing VOCs. In addition, before initiating drilling at a subsequent location, the auger cutting bits, samplers, drill steel, and any associated equipment was thoroughly cleaned by the drilling contractor at a decontamination area to prevent potential cross-contamination from the previous drilling location.

Cleaning of drilling equipment was accomplished by thoroughly flushing with a high-pressure, hot water spray gun to remove all visible sediments. Special attention was given to the threaded sections of the drill rods and split-spoon samplers. The rinsate water was allowed to evaporate. The equipment was inspected by field personnel after cleaning and prior to initiation of drilling activities.

Well construction materials (such as screen, casing, centralizers) were cleaned by flushing with potable water using a high-pressure, hot water washer spray gun system prior to installation.

6.2 Soil Sampling Equipment

The following procedures were followed to decontaminate soil sampling equipment:

1. Wash and scrub, if necessary, with a non-phosphate detergent (Liquinox or equivalent) and potable water solution.

2. Rinse with potable water.

3. Rinse twice with distilled or deionized water.

4. Air dry or dry with a clean towel.

6.5 Personnel Decontamination

All personnel were decontaminated as required prior to leaving the Site. At a minimum, personnel washed their faces and hands with clean water prior to eating and drinking during breaks, and prior to leaving the Site. Decontamination procedures and exclusion zones for controlling employee exposure were addressed in the site-specific Health and Safety Plan (HSP). A decontamination area was prepared during well installation activities. The decontamination area was covered with plastic liners and constructed to provide containment of the decontamination water.

7.0 MANAGEMENT OF INVESTIGATION DERIVED WASTE

Excavated soil, drill cuttings, drilling water, well development water, and purged water from sampling events were generated during the project. Excavated soils transported from the Site were managed in accordance with solid waste requirements and the petroleum contaminated soil rules AAC R18-8-1601 et. seq. The following tasks were performed to manage the investigation derived waste (IDW).

7.1 Drill Cuttings

Soil cuttings were generated during drilling activities at the Site. Cuttings were placed in roll-off bins for temporary onsite storage. If necessary, a drying agent was added to the cuttings to remove excess fluids.

A composite sample was collected from the bins for waste characterization. The samples were analyzed for VOCs using EPA Methods 8260. The soil cuttings from the drilling and well installation activities were characterized as nonhazardous and were approved for disposal at Butterfield Landfill in Mobile, Arizona. If the samples exceed the ADEQ Residential Soil Remediation Levels (SRLs), the following analyses may need to be performed to characterize the drill cuttings:

8.0 HEALTH AND SAFETY PLAN

A separate site-specific Health and Safety Plan (HSP) was prepared for this project. All field personnel were familiarized with the information and procedures outlined in the HSP. All onsite subcontractor personnel were briefed on the requirements of the HSP before beginning work each day, and were required to sign the HSP.

The field procedures utilized for this investigation involved the collection of soil and groundwater samples that may have potentially contained petroleum hydrocarbons and VOCs. Provisions for health and safety were designed to ensure the following:

1. Personnel working at the Site would not be adversely exposed to potentially harmful concentrations of the hydrocarbons released from the pipeline, or from VOC concentrations associated with the Silverbell Landfill WQARF site.

2. The health and safety of the general public and the environment would not be compromised by migration of impacted materials.

3. Compliance with applicable governmental (Occupational Safety and Health Administration) and non-governmental (American Conference of Governmental Industrial Hygienists) regulations and guidelines.

9.0 ANALYTICAL GUIDELINES

A1. Laboratory Detection Limits

1. A2. Compounds of Concern

Table A1. Minimum (Non-Detection) Reporting Limits

Selected Common Petroleum Compounds[1]	Minimum Reporting Limit		Analytical Method[2]
	Soil (milligram/ kilogram)	GW (microgram/ liter)	
Total Petroleum Hydrocarbons (TPH) (for investigative screening and not for release confirmation or remediation)	20	N/A	418.1AZ
Hydrocarbons (C10 -C32) (HCs)	80	N/A	8015AZ
Benzene	0.05	1	8021[3] or 8260[4]
Toluene	0.10	2	8021[3] or 8260[4]
Ethyl benzene	0.10	2	8021[3] or 8260[4]
Total Xylenes	0.15	3	8021[3] or 8260[4]
Chlorobenzene	0.05	1	8021[3] or 8260[4]
1,2-Dichlorobenzene (1,2 - DCE)	0.1	1	8021[3] or 8260[4]
1,3-Dichlorobenzene (1,3 - DCE)	0.1	1	8021[3] or 8260[4]
1,4-Dichlorobenzene (1,4 - DCE)	0.1	1	8021[3] or 8260[4]
1,2-Dichloroethane (1,2 - DCA)	0.05	1	8021[3] or 8260[4]
Methyl tertiary butyl ether (MTBE)	0.25	5	8260[4]
Benzo(a)pyrene	0.01	0.10	8310
Naphthalene	0.1	2	8310

Notes:

1 Consult with the Arizona Department of Health Services (ADHS) or an Arizona-licensed laboratory about minimum reporting limits for other compounds of concern. The information on this table will be updated or expanded periodically to reflect corrections or additional parameter information.

2 These analytical methods are currently approved as of the date of this guidance document. Consult with the ADHS for information on newly approved, substitute, or equivalent reference methods.

3 When EPA Method 8021 is referenced, use the standard list of compounds identified as 8021AZ, or use 8021 if parameters are suspected or known to exist at the site that are not included in the 8021AZ list.

4 When EPA Method 8260 is referenced, use the standard list of compounds identified as 8260AZ, or use 8260 if parameters are suspected or known to exist at the site that are not included in the 8260AZ list.

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Table A2. Compounds of Concern

PRODUCT TYPE	SOIL				GROUNDWATER (GW)			
	BTEX	HC	PAH *	Add. *	BTEX	HC	PAH *	Add. *
Gasoline [c]	YES	NR	1	2	YES	NR	3	4
Kerosene / Jet Fuel	YES	YES	1	2	YES	NR	YES	4
Diesel / Light Fuel Oils	5	YES	1	2	YES	NR	YES	4
Heavy Fuel/New Oils	5	YES	1	2	YES	NR	YES	4
Used Oil	5	YES	1	2	YES	NR	YES	4
Unknown	YES	YES	1	2	YES	NR	YES	4

Codes:

1 Analyze two samples for PAHs using EPA Method 8310. One in the soil column above 15 feet below ground surface (bgs) and one in the soil column below 15 feet bgs, with the highest contaminant concentrations based on field instrumentation or laboratory HC test results if required.

2 Analyze two samples for applicable additives using EPA Method 8260. Analyze the sample with the highest contaminant concentration based on field instrumentation or laboratory test results, and the vertical non-detect sample.

3 Analyze for PAHs using EPA Method 8310 in the initial GW sample(s) collected from the well located nearest the release point. Test for PAHs, as applicable, in other GW wells if the source well sample results indicate contaminant levels exceeding the applicable standards.

4 Analyze for additives using EPA Method 8260 in the initial GW sample(s) collected from each well. If additives are not detected, subsequent sampling for additives is not required.

[b] Analyze one sample for BTEX using EPA Method 8021 in the soil column above 15 feet bgs with the highest contaminant concentrations based on field instrumentation or laboratory test results.

Abbreviations:

Add. = petroleum additives
BTEX = benzene, toluene, ethylbenzene, and xylenes
HC = hydrocarbons
VOC = volatile organic compounds
AWQS = Arizona Water Quality Standard
HC = Hydrocarbons C10 to C32
PAH = polynuclear aromatic hydrocarbons

Notes:

a Polynuclear Aromatic Hydrocarbons (PAHs)[1] (* indicates chemical with an AWQS)
Acenaphthene, Anthracene, Benz(a)anthracene, **Benzo(a)pyrene** *, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Chrysene, Dibenz(a,h)anthracene, Fluoranthene, Fluorene, Indeno(1,2,3-cd)pyrene, Naphthalene, Pyrene

b Common Petroleum Additives: (* indicates chemical with an AWQS)
1,2-Dichloroethane (1,2-DCA) * **Ethylene dibromide (EDB)** * Methylethyl ketone (MEK)
Methyl tertiary butyl ether (MTBE) Methyl isobutyl ketone (MIBK)

c Analyze for the presence of HC (C10-32) in soils beneath "gasoline" UST system(s) only when uncertain about the products historically stored or if it is known that other product(s) were previously stored in the UST. Otherwise, HC analysis is not required.

10.0 PUBLIC NOTICES

Examples of public notices are attached following this section.

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Documentation of Air Monitoring During Demolition and Excavation

APPENDIX C

Manifests

APPENDIX D

Analytical Laboratory Reports

APPENDIX E

Permits

Site Characterization Report
SFPP L.P. – Silvercroft Wash Release Site
Tucson, Arizona

April 13, 2004
LFR 014-10022-01

Prepared for
SFPP, L.P.
1100 Town & Country Road
Orange, California 92868

Prepared by
LFR Levine·Fricke
13880 North Northsight, Suite 115
Scottsdale, Arizona 85260

April 13, 2004 014-10022-06

Mr. Michael Traubert
Arizona Department of Environmental Quality
1100 West Washington Street
Phoenix, Arizona 85007

Subject: Site Characterization Report
SFPP, L.P. – Silvercroft Wash Release Site, Tucson, Arizona

Dear Mr. Traubert:

On behalf of SFPP, L.P. (SFPP), an operating partnership of Kinder Morgan Energy Partners (KMEP), LFR Levine·Fricke (LFR) is pleased to present this Site Characterization Report to the Arizona Department of Environmental Quality (ADEQ).

If you have any questions regarding the contents of the attached document, or require additional information, please contact Mark Sandon at (714) 560-4867.

Sincerely,

Eric Rogoff, R.G., C.E.G.
Senior Associate Hydrogeologist

cc: Mark Sandon, KMEP

Attachment

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APPENDICES

Note: Appendix F is attached to the main report. Hardcopies of Appendices A through E are over 1 foot thick, and one copy is being provided in 8 bound volumes to ADEQ for their files. For all other report copies, the Appendices are provided on 2 CDs.

A Environmental Data Resources, Inc. (EDR) Records Search Report

B Well/Boring Logs

C Laboratory Analytical Results – Product Samples

D Soil Analytical Laboratory Reports, including QA/QC Analyses

E Groundwater Analytical Laboratory Reports, including QA/QC Analyses

F Surveyor's Reports

CERTIFICATION

All hydrogeologic and geologic information, conclusions, and recommendations in this document have been prepared under the supervision of and reviewed by an LFR Levine·Fricke Arizona Registered Geologist.

Eric Rogoff, R.G., C.E.G. Date
Senior Associate Hydrogeologist
Arizona Registered Geologist 32828

COMMONLY USED ACRONYMS

AAC	Arizona Administrative Code
ADEQ	Arizona Department of Environmental Quality
ADHS	Arizona Department of Health Services
ADWR	Arizona Department of Water Resources
API	American Petroleum Institute
ARS	Arizona Revised Statutes
ASTM	American Society for Testing and Materials
AWQS	Aquifer Water Quality Standard
bgs	below ground surface
BTEX	benzene, toluene, ethylbenzene, total xylenes
CAP	Corrective Action Plan
CFR	Code of Federal Regulations
EPA	Environmental Protection Agency
GPL	Groundwater Protection Level
HBGL	Health Based Guidance Level
HCs	Hydrocarbons (C_{10}-C_{32})
LUST	Leaking Underground Storage Tank
NOV	Notice of Violation
PAH	Polynuclear Aromatic Hydrocarbon
SAF	State Assurance Fund
SCR	Site Characterization Report
SRL	Soil Remediation Level
TPH	Total Petroleum Hydrocarbons
UST	Underground Storage Tank
USTCA	UST Corrective Action
VOC	Volatile Organic Compound

INTRODUCTION

On behalf of SFPP, L.P. (SFPP), an operating partnership of Kinder Morgan Energy Partners (KMEP), LFR Levine·Fricke (LFR) is pleased to submit this Site Characterization Report for the SFPP Silvercroft Wash Release Site in Tucson, Arizona. ("the Site").

The Site is located west of the I-10 Freeway, north of Grant Road, along Silvercroft Wash, in the City of Tucson, Pima County, Arizona. The Site lies in the NW 1/4; SW 1/4; NW 1/4; Section 34; Township 13 South; Range 13 East as shown on the Jaynes, Arizona 7.5 Minute U.S. Geological Survey Topographic Quadrangle (Figure 1). The Site lies at an elevation of approximately 2,290 feet above mean sea level (msl).

The pipeline release location is in the utility easement along the eastern edge of Silvercroft Wash, and along the western side of the Silver Creek II Subdivision, a residential development which is currently under construction (Figure 2). The surface and near-surface area impacted by the release ("Impacted Area") included portions of the Silver Creek II Subdivision (lots 321, 328, 352, 353, 354, 355, and 356, portions of the utility easement west of these lots, the storm drain channel between lots 352 and 353, and limited areas of soil beneath Silver Island Way and Silverbell Tree Drive), and portions of Silvercroft Wash (Plate 1). The remaining lots and streets in the Silver Creek II Subdivision were not impacted by the release based on visual observations during emergency response activities, analysis results for surface and near-surface soil samples collected at the margins of the impacted area and on nearby lots, and analysis results of soil samples collected from groundwater monitoring well borings located in streets.

Twenty-six wells have been installed at the site to delineate free product, and to delineate dissolved-phase BTEX concentrations above AWQS. Remedial activities to date have been extensive, and have consisted of excavation, vapor extraction, and free product extraction.

Although the Silvercroft Wash Site is not an underground storage tank (UST) site, the substance released was refined petroleum hydrocarbons. Accordingly, this document incorporates material elements of ADEQ's Underground Storage Tank Division's Leaking Underground Storage Tank (LUST) Release Reporting & Corrective Action Guidance (August 20, 2002) (RRCAG). This report is organized according to "Section 4.3.1 Site Characterization Report Contents" (pp 4-25 through 4-31 of the RRCAG). To assist the reader, the information for each section specified in the RRCAG is shown verbatim, ***in boldface and italic***.

1.0 SUMMARY SITE HISTORY

1. A summary site history that includes:

a. Information on the release(s), including the nature of the release(s), the regulated substance(s) released, the estimated quantity of the release(s), and the estimated time period when the release(s) was occurring;

On July 30, 2003, at approximately 1:00 p.m., a rupture occurred in a portion of the SFPP pipeline that was transporting gasoline between Tucson and Phoenix, Arizona. The rupture was located approximately 18 feet east of the eastern embankment of Silvercroft Wash and on the southern side of the drainage channel between lots 352 and 353 as shown in Figure 2.

The rupture was detected by a series of pressure monitoring sensors within the pipeline system. By 1:11 p.m., the pumps at the SFPP Tucson Terminal were shut down. SFPP's operational data, metallurgy analysis of the affected portion of the pipeline, soil sample analyses, analyses of free product samples from groundwater wells, and groundwater sample analyses indicate that the source of petroleum hydrocarbons was the July 30, 2003 rupture of the SFPP pipeline, with no evidence of leakage prior to the July 30, 2003 rupture.

SFPP initially used vacuum trucks to recover released gasoline from the excavation at the release point, Silvercroft Wash, and various other areas at the site where gasoline had ponded on the ground surface. This recovery included water that was ponded in the Silvercroft Wash and water and fire retardant foam applied to the area by the Tucson Fire Department during the response. The vacuum trucks were routed under appropriate manifests (might be bill of lading I will check) to the Tucson terminal and offloaded into an isolated storage tank to allow the gasoline/water mixture to separate.

b. Past and present land use of the facility, and present land use of adjacent properties and each parcel of property potentially impacted by the release(s). The present land use of all properties within 1/4 mile of the outermost extent of contaminated surface water or groundwater must be included if a corrective action standard determined by a Tier 2 or Tier 3 evaluation under the corrective action standards determination of R18-12-263(B) is to be used for water(s) contaminated at the LUST site;

Silver Creek II – East Side of Silvercroft Wash

SFPP has obtained the Phase I Environmental Site Assessment: Silver Creek II:, Resubdivision of Tierra Del Sol Lot 2, Tucson, AZ 85745 (Engineering And Environmental Consultants Inc. (EEC) July 3, 2002). This lot is identified as Pima County Assessor's Parcel 103-18-0120, lots 289 through 356, Parcel "A", Common Area "A", and Common Area "B" (drainage area) (Figure 3). In order to evaluate the historical use of the property and the adjacent properties, EEC examined 11 aerial photographs

dating from 1953 through 2000, performed a limited Phase II test drilling program, and obtained information from the previous property owner. The following text from the EEC Phase I summarizes the site history on the east side of Silvercroft Wash:

> "The 1953 aerial photograph (not provided) shows the property with no buildings and no farming activity. In February 1960 , an active farmstead occupied the site. The configuration of the development mimics the current outline of the parcel. Silvercroft Wash is unconfined, and gravel operations have begun west of the northwest corner of the current property. The 1957 aerial photograph (not provided) is similar to the 1960 photo."
>
> "The 1973, 1980, and 1983 aerial photographs are similar, in that they show that farming is no longer occurring on the property and the buildings are in increasing disrepair. The May 12, 1980 photograph shows less equipment and vehicles than the earlier photograph. Silvercroft Wash has been channelized, but not stabilized. The gravel operation to the northwest has been closed, and mounds of dirt are piled to the south of the former site. Although the sources of the piles is unknown, it is most likely from the dredging of the new wash channel."
>
> "The October 3, 1983 photograph (not included) shows the Santa Cruz River flowing bank-to-bank, with an exaggerated curve that replaced the southernmost building on the property. The August 1988 photo shows new "main" channel in the southeast corner of the property. The buildings are now gone, although the "footprint" of the central structure is still visible. Silvercroft Wash has been stabilized and land to the west has been graded."
>
> "The January 20, 1993 flood photograph (not included) shows the Santa Cruz River flowing bank-full again, with even more cutting on the curve on the southeast portion of the property. The resulting stream channel is shown on the December 4, 2000, aerial photograph. The bank-protected area of the floodplain appears as a dark line through the property, on the west side of the active channel. The Silverbell subdivision to the west of Silvercroft Wash is completed."
>
> "These photographs show that no sand and gravel operations occurred on the property. The finding is important because excavated pits were generally the basis for siting landfills. Landfilled debris that was found on the Silverbell I development was primarily in the area of excavation shown on the 1960 aerial photograph."

Silver Creek I – West Side of Silvercroft Wash

SFPP has obtained the State of Arizona Department of Real Estate Subdivision Public Report for the Silver Creek I Subdivision (Registration No. DM 98-016314, 1998) (Figure 4). The following excerpt describes results of a Phase I Environmental Site Assessment performed for this subdivision:

"Environmental Engineering Consultants, Inc. (EEC) has performed a Phase I Environmental Site Assessment (ESA) in conformance with the scope and limitation of the American Society for Testing and Materials (ASTM) Practice E 1527-97 of a rectangular parcel of land, consisting of approximately 61.6 acres, with the designation of Silver Creek, Lots 1 through 288 and Common Area "A" (Landscaping) and "B" (Park) Tucson, Arizona 85745. The property is on the east side of Silverbell Road west of Silvercroft Wash. The property is a resubdivision of Lot 1 of Tierra del Sol."

"FINDINGS"

"Grading and infrastructure construction is currently ongoing at the property, which was previously vacant land. This Phase I ESA has revealed no evidence of recognized environmental conditions, as defined by ASTM, in connection with the property, with the following exception:"

- "The northeast corner of the property is south of the southern boundary of the Silverbell Jail House Water Quality Assurance Revolving Fund (WQARF) site, and within the boundary of the Miracle Mile Interchange WQARF site. The groundwater, which is at depths greater than 100 feet below the site, within the WQARF site is contaminated with volatile organic compounds, which are believed to have originated from landfills north and east of the subject property. The site has no history of use of the included chemicals, and is not considered a potentially responsible party to the WQARF site. Tucson Water will service the subdivision. Trace amounts of tetrachloroethylene (also called perchloroethelene or PCE) were found on two shallow soil gas samples at the northeastern corner of the property. A consequent risk evaluation indicated that concentrations are less than those that pose an occupational inhalation risk."
- "The property may have been the site of a small sand or a gravel operation in the early 1960s. Aerial photographs and previous reports indicate such operation. The land has been refilled, but a neighbor interviewed previously indicated that he believes that no legal or illegal waste material was placed on the subject property."

c. Name and address of the owner of each property impacted by the release(s) and, if a corrective action standard determined by a Tier 2 or Tier 3 evaluation under the corrective action standards determination of R18-12-263(B) is to be used for surface water and groundwater contamination at the LUST site, the name and address of property owners and other persons using or having rights to use water within 1/4 mile of the outermost extent of contaminated water. ADWR may be contacted for assistance in determining those entities having water rights in the area of interest.

The pipeline release location is in the utility easement on the western side of the Silver Creek II Subdivision. Silver Creek II is a residential neighborhood being developed by Monterey Homes, Inc. At the time of the release, homes in the neighborhood were under

construction and unoccupied. Currently, construction of the homes has been completed, but the houses have not yet been occupied.

The surface and near-surface area impacted by the release ("Impacted Area") included portions of the Silver Creek II Subdivision (lots 321, 328, 352, 353, 354, 355, and 356, portions of the utility easement west of these lots, the storm drain channel between lots 352 and 353, and limited areas of soil beneath Silver Island Way and Silverbell Tree Drive), and portions of Silvercroft Wash (Plate 1). The remaining lots and streets in the Silver Creek II Subdivision were not impacted by the release. As of April 8, 2004, none of the homes in Silver Creek II have been occupied. SFPP has installed 6 groundwater monitoring wells in the City of Tucson (COT) park property on the west side of Silvercroft Wash, and one groundwater monitoring well in COT drainageway property on the south side of Painted Hills Wash. These properties are non-residential. Three groundwater monitoring wells have been installed in COT streets in the Silver Creek I Subdivision, an occupied residential neighborhood to the west of Silvercroft Wash.

Affected soil within 10 feet of the surface has been remediated to ADEQ Residential Soil Remediation Levels (RSRLs) and Groundwater Protection Levels (GPLs), as the site is in a residential zone. Although the soils on lots 352 through 356 meet the ADEQ RSRLs, these lots are not planned for residential construction at this time; these lots will serve in part as the proposed location of the groundwater and vapor extraction remediation system and associated piping. A wall has been constructed around the perimeter of lots 353, 354, 355, and 356 to prevent access to the public. SFPP worked with Monterey's architects to ensure that the remediation building and walls match the design and material specifications of the other homes and walls in the subdivision.

Adjacent Lands and Vicinity. Land to the north is City owned property, land to the southeast is a mobile home park and plant nursery, land to the east is the Santa Cruz River. The plat shows Silvercroft Wash to the east of the subdivision.

Water Rights. Water rights within ¼ mile of the area affected by the pipeline release belong to the City of Tucson.

d. Events resulting in environmental impacts at the site prior to the release.

Sites With Known Impacts

The Silverbell Jail Annex Landfill Water Quality Assurance Revolving Fund (WQARF) site (Silverbell Landfill) is located less than 400 feet northwest and downgradient of MW-14 on the northern perimeter of the Site. VOC contamination from the Silverbell Landfill has rendered groundwater over a large area in the site vicinity unsuitable for human or livestock consumption, agricultural, and industrial uses. Tetrachloroethene (PCE) contamination from the Silverbell Jail Annex Landfill WQARF site has been detected in wells installed by SFPP to investigate the extent of groundwater impacts associated with the SFPP pipeline release. Figure 5 illustrates the extent of the Silverbell

WQARF Landfill chlorinated solvent plume, and the extent of the free product and dissolved-phase petroleum hydrocarbon plume associated with the SFPP pipeline release.

The Silverbell Landfill is a closed municipal solid waste landfill owned and operated by the City of Tucson (COT) and includes two disposal cells encompassing about 40 acres total. The South Cell was the first cell used for disposal, and was used between 1966 and 1973. It is currently covered with soil. Starting in 1973 and continuing through 1977, disposal operations occurred at the North Cell, which is now covered with soil, revegetated, and underlies the Silverbell Golf Course. The southern boundary of the South Cell's perimeter is located approximately 900 feet northwest of the release point.

In the fall of 1983, groundwater sample results collected from an area just east of Silverbell Landfill indicated concentrations of volatile organic compounds (VOCs), including PCE and trichloroethylene (TCE). At this time, the site was identified as the Miracle Mile Interchange Area (MMIA). After further investigation, the MMIA has been split into two separate WQARF sites: Silverbell Landfill and Miracle Mile. The current boundaries of the Silverbell Landfill site include a small portion of the University of Arizona Landfill located described in the following section.

In June 1995, the City of Tucson Environmental Management Division (COTEMD) submitted an interim final remedial action plan (RAP) to ADEQ which was subsequently approved. The approved interim final remedy in the RAP included a groundwater pump and treat system and treatment by air stripping utilizing a carbon filter. However, this remedy was never implemented. A soil vapor extraction (SVE) system was operated in the apparent source area from October 1999 to November 2002. Results of an SVE rebound test indicated the presence of a small source in the southern portion of the North Cell. On October 2, 2003, four soil vapor extraction wells and one air injection well for the North Cell SVE system were put back into operation. The COTEMD is currently evaluating a groundwater remedy consisting of monitored natural attenuation with enhanced bioremediation for the source areas. A pilot test for this remedy began June 25, 2003 and could last up to two years.

Sites Potentially Impacting the Vicinity

University of Arizona Landfill. The University of Arizona Landfill (UA Landfill) is located just east of the Silverbell Landfill on the opposite side of the Santa Cruz River. The UA Landfill was also known as the UA Experimental Farms Site and was closed in 1995. Although investigated as a potential source of PCE and TCE impacts, data from a remedial investigation conducted in 1995 indicated that the UA Landfill was not contributing to the groundwater impacts at the Silverbell Landfill.

Underground Storage Tank (UST) Sites. An environmental records search for the site vicinity was performed by Environmental Data Resources, Inc. (EDR), in accordance with search requirements of the ASTM Standard Practice for Environmental Site Assessments (E1527-00) (EDR, March 03, 2004). The full report is attached as Appendix A. EDR identified 13 sites on ADEQ's Leaking Underground Storage Tank (LUST) list

within a one-mile radius of the site. The sites are plotted on Figure 6, with full descriptions given in Appendix A. Of the 13 sites, 9 have been closed with Tier 1 Assessments, 2 have been closed with Tier 2 Assessments, and 2 had cases referred as the sites were not under UST jurisdiction. Sites appearing on the Leaking Underground Storage Tank (LUST) list may have impacted groundwater quality in the past, contributing to petroleum hydrocarbon concentrations that have been detected in wells in the vicinity (ADWR, 2001).

The EDR Report identified 7 UST sites within 0.75 miles of the site. Site names, addresses, and summary information are included in Appendix A.

2.0 DESCRIPTION OF EXTENT OF CONTAMINATION DETERMINATION

2. A concise description of factors considered in and the rationale used for determining the full extent of contamination, including…:

The factors considered in and the rationale used for determining the full extent of contamination have been based on intensive and continuous efforts since the release to remediate affected soils, restore utilities, remove affected structures, characterize subsurface soil and groundwater impacts, and begin subsurface remediation. Activities may be generally classified in the following categories:

1. SFPP Emergency Response

2. Surface Characterization, Verification of Initial Remediation, Silvercroft Wash Restoration, and Pipeline and Utility Restoration

3. Demolition of Five Houses

4. Subsurface Investigation

5. Additional Excavation

6. Remedial Conceptualization (groundwater)

The goals and objectives of these activities have included the following:

1. Protect the public, response personnel, and environmental contractors.

2. Recover released product from the ground surface, including streets, drainage channels, and Silvercroft Wash.

3. Immediately excavate hydrocarbon-affected surface soil from lots, streets, drainage channels, and Silvercroft Wash.

4. Restore fuel pipeline service.

5. Restore water line down Silver Island Way.

6. Extensive soil sample collection to ensure that surficial soil had been excavated to below ADEQ Residential Soil Remediation Levels (RSRLs), and identifying where additional excavation would be needed to excavate remaining soils to concentrations below the RSRLs.

7. Evaluate the vertical and lateral extent of impacted soil beneath the release point excavation.

8. Determine the depth to groundwater.

9. Evaluate whether free product was present at the groundwater table.

10. Delineate the lateral extent of free product.

11. Delineate the lateral extent of dissolved-phase hydrocarbons.

12. Evaluate, select, and implement interim remedial measures.

13. Perform remedial pilot tests

14. Conceptualize and begin implementation of comprehensive remedial measures.

A detailed (but not necessarily comprehensive) timeline of events and communications is attached as Table 1.

a. Selection of soil sampling locations and points;

Following removal of gasoline from the surface immediately after the release, excavation of surface and near-surface impacted soil was the highest priority of initial remedial efforts, so that potential exposure pathways (dermal contact, ingestion, inhalation) to residents and workers would be removed. Confirmation soil samples collected following excavation and removal of affected soils within the impacted areas shown on Plate 1 of the Soil NFA Report (LFR, January 19, 2004), and included in this report for the reader's convenience, indicated that remaining soils within the NFA Area and also within 10 feet of the surface at the site in the remaining impacted area are in compliance with ADEQ's applicable residential soil remediation levels (RSRLs) and minimum Groundwater Protection Levels (GPLs) for benzene, toluene, ethylbenzene, and total xylenes (BTEX), methyl-tert butyl ether (MTBE), and total petroleum hydrocarbons in the gasoline range from C_{10} to C_{32} (TPH [C_{10}-C_{32}]). Therefore, surface and near-surface remediation is considered complete in the NFA Area as well as in the surface and near-surface portions of the Impacted Area.

b. Selection of the location and number of groundwater wells, if groundwater is encountered during the investigation;

The locations and numbers of groundwater monitoring wells were selected for the following purposes:

- Allow evaluation of the groundwater gradient and flow direction(s)
- Delineate the free product plume
- Delineate the dissolved-phase plume of BTEX above the AWQS values.

Twenty-six (26) wells have been installed in the pursuit and successful achievement of these objectives. Well locations are plotted on an aerial photograph of the site in Figure 7.

c. Selection of surface water sampling locations, if surface water is encountered during the investigation; and…

Immediately following the pipeline release, a stormwater runoff sampling plan was prepared. Seventeen stormwater samples were collected over four precipitation events as emergency response activities progressed. Results were summarized in Table 3 of the September 19, 2003 Weekly Report (included as Table 2 in this report). All stormwater samples collected from the last 3 sampling events had no detectable BTEX or MTBE concentrations.

As per the RRCAG, no additional stormwater sampling is planned for the following reasons:

- Excavation of impacted soils above RSRLs and GPLs is complete.
- Remaining impacted soils are not in contact with surface water.
- Due to the depth to groundwater of approximately 140 feet bgs, there is no possibility that the highest downgradient groundwater levels for some portion of the year are at or above the elevation of the downgradient receiving stream.

d. Any differences from generally accepted industry standards that occurred during the performance of investigation activities and justification for the methodology used to complete the investigation.

Site assessment and remediation activities have been performed according to generally accepted industry standards. Soil and groundwater samples were collected using the sampling methods included in the Sampling and Analysis Plan (Appendix B of the Site Characterization and Remediation Plan [LFR, October 28, 2003]). Field activities were performed in accordance with the Quality Assurance Project Plan (LFR, October 28, 2003).

3.0 BEDROCK INFORMATION

The RRCAG requires the following:

3. Information on bedrock, if encountered during the investigation, as follows:

a. Depth to bedrock,

b. Bedrock lithology, and

c. Description of the slope of the vadose zone/bedrock interface.

Bedrock was not encountered to the total depth of investigation, which consists of 26 wells drilled to total depths of approximately 170 feet below ground surface (bgs). Groundwater is encountered at approximately 140 feet bgs.

4.0 HYDROLOGY

4. The hydrologic characteristics of groundwater and surface water of the local area within 1/4 mile of either the facility boundary or the outermost extent of contamination associated with the release, whichever is the further distance, as follows:

a. A description of the local known or estimated depth to groundwater and, if groundwater is threatened or impacted, the gradient, flow direction, confining layers, multiple aquifers, seasonal or historic water table fluctuation, or quality that may affect the construction or location of additional groundwater monitor wells or responses to contaminated soil, surface water or groundwater; and…

The Regional Aquifer underlying the Tucson Basin consists of three primary water-bearing units. These units, in descending stratigraphic order are the Quaternary age Fort Lowell Formation, the Tertiary Tinaja Beds, and the Tertiary Pantano Formation. The Fort Lowell Formation is the most productive part of the aquifer. Recent Quaternary surficial deposits overlie these formations. These surficial deposits are typically gravel and gravelly sand with local sand and sandy silt, and range in thickness from a thin veneer to tens of feet (Davidson, 1973). Water level data in the local area show an annual decline of 1.5 feet per year in the majority of wells from the years 1980 to 2000 (ADWR, 2001).

The regional groundwater flow direction is toward the north to northwest (Tucson Water, 1996). The northwesterly flow gradient has persisted as evidenced by a groundwater contour map of the Silverbell Landfill WQARF Site for water levels provided by the City of Tucson Environmental Management Division (COTEMD) (Figure 8).

The shallowest groundwater beneath the Site was encountered at approximately 140 feet bgs, based on 26 groundwater monitoring wells as part of the Site characterization. Groundwater elevations dropped approximately 1 foot from October, 2003, to March

2004, in the majority of groundwater monitoring wells at the site (Figure 9). This period of record is too short to allow evaluation of seasonal fluctuations. No confining layers or multiple aquifers have been found to 170 feet bgs, which is the vertical extent of investigation.

The groundwater gradient is approximately 0.004 feet per foot in a northwest direct on the west side of Silvercroft Wash. The gradient is approximately 0.006 feet per foot of the east side of Silvercroft Wash and is predominantly north on the south side of Silverbell Tree Drive, and predominantly west on the north side of Silverbell Tree Drive.

Groundwater quality in the site vicinity is impacted by the Silverbell Jail Annex Landfill (WQARF) site, located less than 400 feet northwest and downgradient of MW-14 on the northern perimeter of the Site. VOC contamination from the Silverbell Landfill has rendered groundwater over a large area in the site vicinity unsuitable for human or livestock consumption, agricultural, and industrial uses. Tetrachloroethene (PCE) contamination from the Silverbell Jail Annex Landfill WQARF site has been detected in wells installed by SFPP to investigate the extent of groundwater impacts associated with the SFPP pipeline release.

b. A description of the local surface water including the nature and uses of any waters of the United States or any unique waters designation under Title 18, Chapter 11, Article 1, Appendix B.

The nature of the surface waters must be identified as perennial, ephemeral, or intermittent, and the known or estimated local gradient and flow direction must be included.

The list of United States waters within ¼ mile of the Site include Silvercroft Wash and the Santa Cruz River (Figure 7). Both are ephemeral, meaning that they go dry during protracted rainless periods when percolation depletes all flow. The Painted Hills Wash joins Silvercroft Wash approximately 720' north of the release point; however, it is not classified as a United States water. When surface runoff is present, both Silvercroft Wash and the Santa Cruz River both flow northward by the site, and Painted Hills Wash flows eastward into Silvercroft Wash.

c. In cases of potential commingling of off-site contaminant plumes, the following information for the sites contributing to the contaminant plume:

i. A brief description of the site lithology;

Regional Lithology

AWDR divides hydrogeology in the site vicinity into three hydrologic units – Unit 1, Unit 2, and Unit 3. Unit 1, in the Site vicinity, is comprised entirely of the Fort Lowell Formation, which is characterized by unconsolidated to weakly indurated gravels to clayey silts. ADWR reports that perching conditions, as a result of clay lenses impeding

downward movement of water in the unsaturated zone, are present in sporadic locations throughout the Fort Lowell formation. However, no perched water or competent clay lenses that could serve as an aquitard or confining layer were encountered during drilling of monitoring wells at the site. Furthermore, ADWR reports that Unit 1 is completely dewatered in the Site Vicinity. Unit 2 is comprised of the Upper Tinaja Beds, a formation which contains distinctly coarser materials than surrounding units. Uninterrupted gravels were consistently encountered in most boreholes from 130 to 170 feet bgs, or elevations of 2160 to 2120 feet above mean sea level. Groundwater encountered beneath the Site occurs within Unit 2. Unit 3 is comprised of the Middle and Lower Tinaja beds and the Pantano formation; the contact for which is approximately 1790 feet above mean sea level or 330 feet below the deepest boring at the Site. (ADWR 2001).

Lithology of the Site Vicinity

As evidenced by the logs of 26 wells drilled at the site, the lithology beneath the site consists primarily of sands and gravels to 170 feet bgs, which is the total depth investigated. Logs of the borings advanced at the site are included in Appendix B. Lithologic fencelines have been prepared for the five traverses (A-A', B-B', C-C', D-D', and E-E') shown in Figure 10. The fencelines are illustrated in Figures 11 through 15. Examination of the fencelines indicates the following:

- Although sediments throughout the study area are generally coarse, the area to the west of Silvercroft Wash indicates a greater percentage of gravels than the predominantly coarse sands observed on the east side of Silvercroft Wash.
- Silts are observed near the surface, and are more prevalent nearer to Silvercroft Wash. This is consistent with the fining-upward sequence typical of a desert fluvial depositional setting.

ii. Depth to groundwater;

Depth to groundwater during the study period from October 2003 to the present ranges from approximately 139 feet to 146 feet bgs. Water levels collected to date are summarized in Table 3.

iii. Type and concentrations of COCs;

COCs from the SFPP pipeline release are typical of gasoline and include BTEX and MTBE. COCs most likely originating from the Silverbell WQARF Landfill Site detected in SFPP wells include PCE and TCE. PCE and TCE are not components of the products refined petroleum products shipped through the SFPP pipeline.

iv. Description of the horizontal and vertical extent of impacted soil;

A comprehensive summary of the horizontal and vertical extent of impacted soil was given in the Request for No Further Action Determination for Soil from the Surface to Groundwater for the NFA Area (LFR, January 19, 2004). As the Soil NFA Report

consisted of 15 bound volumes with a thickness of approximately 2 feet thick, the information is not being resubmitted in this report for the sake of brevity. In summary, the horizontal and vertical extent of impacted soils is as follows:

- The surface and near-surface area impacted by the release ("Impacted Area") included portions of the Silver Creek II Subdivision (lots 321, 328, 352, 353, 354, 355, and 356, portions of the utility easement west of these lots, the storm drain channel between lots 352 and 353, and limited areas of soil beneath Silver Island Way and Silverbell Tree Drive), and portions of Silvercroft Wash (Plate 1). The remaining lots and streets in the Silver Creek II Subdivision were not impacted by the release
- Following recovery of product from the surface immediately after the release, excavation of surface and near-surface impacted soil was the highest priority of initial remedial efforts, so that potential exposure pathways (dermal contact, ingestion, inhalation) to residents and workers would be removed. Confirmation soil samples collected following excavation and removal of affected soils within the impacted areas shown on Plate 1 indicated that remaining soils within the NFA Area and also within 10 feet of the surface at the site in the remaining impacted area are in compliance with ADEQ's applicable residential soil remediation levels (RSRLs) and minimum Groundwater Protection Levels (GPLs) for benzene, toluene, ethylbenzene, and total xylenes (BTEX), methyl-tert butyl ether (MTBE), and total petroleum hydrocarbons in the gasoline range from C_{10} to C_{32} (TPH [C_{10}-C_{32}]). Therefore, surface and near-surface remediation is considered complete in the NFA Area as well as in the surface and near-surface portions of the Impacted Area.
- A vertical column of petroleum-affected soil appears to exist from the base of the release point excavation (minimum of 10 feet below ground surface [bgs]) to the groundwater surface at approximately 140 feet bgs across an estimated radius of approximately 40 to 50 feet, based on soil sample analytical results from soil borings.

v. Description of the horizontal and vertical extent of impacted groundwater and/or surface water;

Depth to groundwater measurements and apparent free product thickness measurements in wells are compiled in Table 3. Table 5 presents the most recent analytical results received for samples collected from wells not having free product to date. Free product has not been measured in monitoring wells MW-18, MW-21, MW-22, MW-23, MW-24, MW-25 and MW-26. The ongoing absence of free product in these wells indicates that the free product plume has been delineated, and does not appear to be spreading or migrating.

The outline of the plume of dissolved-phase BTEX concentrations above AWQS is shown in Figure 16. Findings of BTEX concentrations below AWQS values in wells MW-18, MW-24, MW-25, MW-26 and WR-359A indicate that the dissolved-phase hydrocarbon plume is delineated in the downgradient direction on the west side of Silvercroft Wash. With the exception of groundwater samples collected from MW-21, concentrations of BTEX above AWQS have not been detected in other site monitoring

wells. As BTEX above AWQS values has not been detected in any wells not having product on the east side of Silvercroft Wash (MW-7, MW-11, MW-12, MW-13, MW-14, MW-15, MW-16), the dissolved-phase plume is delineated.

PCE was detected in the most recent samples collected from wells MW-7, MW-12, MW-13, MW-14, MW-16, MW-18, MW-24, WR-359A, MW-26, and WR-070. TCE was detected in the most recent sample collected from WR-070. PCE and TCE are not constituents of the gasoline, diesel, and jet fuels shipped through the SFPP pipelines, and therefore, the release from the SFPP pipeline is not a potential source of PCE or TCE. The source of PCE is most likely the Silverbell Landfill WQARF Site located to the northwest of the subdivision.

Table 5 includes results of the City of Tucson's weekly sampling and analysis of well WR-070 through December 24, 2003. Well WR-070 continues to have PCE concentrations above Aquifer Water Quality Standards (AWQS) in every sample, and detections of TCE below AWQS in every sample. No BTEX or MTBE was detected in any of the WR-070 samples. The source of the PCE and TCE is the Silverbell Landfill WQARF Site.

vi. A figure depicting the location of monitor wells and the extent of the contaminant plume; and

Figure 16 illustrates the locations of groundwater monitoring wells, the approximate boundary of the free product plume, and the approximate boundary of dissolved-phase BTEX concentrations above AWQS.

vii. Available free product information.

Product samples from wells RP3, MW3, MW1, MW9, MW2, MW4, MW5, and MW10 were submitted to Zymax Envirotechnology, Inc., of San Luis Obispo, on October 13, November 5, and November 6, 2003. The purpose of the analyses were to determine the type(s) of petroleum product(s) present in the samples. Zymax was not provided any information in regards to the location where the samples were collected, the nature of the release, the type of petroleum product(s) which may have been present, or the age of the release. The analyses performed were:

1. C3-C44 whole oil analysis by high resolution GC/FID

2. Fuel Oxygenates by EPA Method 1625 Mod

Zymax' interpretation of the results, attached in Appendix C, included the following:

- the samples are all similar in composition
- all appear to be a high octane gasoline (premium), with high alkylate and toluene concentrations
- all samples contain MTBE and TAME

- the samples show small differences in evaporation, but not necessarily enough to say the samples were released at different times. Such minor differences may result from differences in lithologic material properties that the product had moved through.
- The samples show very little weathering/evaporation.

A product sample was collected on February 3, 2004 from well MW-17, located on the west side of Silvercroft Wash, and submitted to Zymax using the same analytical methods as the samples above. Zymax concluded that the product is pure gasoline, and is similar in composition to product samples collected from wells on the east side of Silvercroft Wash.

The above findings are consistent with the one-time rupture release scenario, as all samples indicate one type of product only. Had the release occurred over a longer time period, the analytical results would have indicated the presence of other products shipped through the pipeline (e.g. diesel, jet fuel).

Table 3 presents the most recent depth-to-water and depth-to-free product measurements collected. No free product was measured in MW-18, MW-21, MW-22, MW-23, MW-24, MW-25 and MW-26. The ongoing absence of product in these wells indicates that the free product plume continues to be delineated on the west side of Silvercroft Wash. As wells to the north, east, and south of the release point location continue to have no free product, the free product plume is delineated, and does not appear to be spreading or migrating. Figure 16 illustrates the approximate boundary of the free product plume.

Table 3 presents a summary of depth-to water and depth to free product measurements collected to date. Extraction of the free product has resulted in significant reductions in the apparent free product thickness east of Silvercroft Wash, as indicated in Figure 17. Significant reductions have also been observed in wells on the west side of Silvercroft Wash, as indicated in Figure 18.

5.0 REMEDIAL CORRECTIVE ACTIONS

5. A description of all remedial corrective actions initiated as of the time of the report.

Activities implemented by SFPP in response to the July 30, 2003 pipeline rupture have been intensive and continuous in an effort to remediate affected soils, restore utilities, remove affected structures, characterize subsurface soil and groundwater impacts, and begin subsurface remediation. A detailed description and chronology of site activities were given in the Soil NFA Report; Table 1 presents a timeline of activities. In addition to the emergency response product recovery in Silvercroft Wash and demolition/removal of affected structures, remedial measures implemented to date have included the following:

Excavation. 4,046 tons of surface and near-surface soils impacted by the release were removed from the site. Excavation activities and results of soil analytical samples were

described in detail in the Request for No Further Action Determination for Soil from the Surface to Groundwater for the NFA Area (LFR, January 19, 2004).

Vapor Extraction. Approximately 3,035 pounds of hydrocarbons (equivalent to 486 gallons) was recovered by the soil vapor extraction (SVE) system from October 29, 2003, through November 17, 2003. Based on findings of PCE from the Silverbell Landfill WQARF Site in soil vapor in the vicinity of the pipeline release, SFPP has been negotiating general permit and individual permit requirements with Pima County Department of Environmental Quality (PDEQ) so that vapor extraction may resume.

Free Product Extraction. Free product extraction began on October 29, 2003, and has continued to the present. Extracted gasoline has been transported to Romic Environmental Inc., of Chandler, Arizona, for recycling.

6.0 SUMMARY OF INVESTIGATION RESULTS AND STATEMENT OF FUTURE CORRECTIVE ACTIONS

6. A concise summary of the results of the investigation and a statement of intended future corrective actions as follows:

Shallow Site Characterization and Remediation – East Side of Silvercroft Wash and Within Silvercroft Wash

Characterization and remediation of shallow soil at the site has been completed. For details, please see the following LFR reports submitted on behalf of SFPP to ADEQ by Monterey Homes under their Voluntary Remediation Program (VRP) process:

- Request for No Further Action Determination for Soil from the Surface to Groundwater for the NFA Area, SFPP, L.P. – Silvercroft Wash Release Site, Tucson, Arizona, January 19, 2003.
- Proposed Remediation Work Plan, SFPP, L.P. – Silvercroft Wash Release Site, Tucson, Arizona, January 23, 2004

ATC Associates, Inc. submitted a report to ADEQ documenting their sampling results on behalf of Monterey along with the January 19, 2004 LFR report.

Subsurface Site Characterization – East Side of Silvercroft Wash

- 16 groundwater monitoring wells have been installed on the east side of Silvercroft Wash (Figure 7).
- The free product plume is delineated on the east side of Silvercroft Wash by 7 wells (MW-7, MW-11, MW-12, MW-13, MW-14, MW-15, and MW-16).

- Groundwater monitoring is being performed monthly, with groundwater samples being collected from wells not having free product.
- Dissolved-phase constituents above Arizona Aquifer Water Quality Standards (AWQS) for BTEX have not been detected in wells MW-7, MW-11, MW-12, MW-13, MW-14, MW-15, and MW-16, indicating delineation of dissolved phase constituents in groundwater on the east side of Silvercroft Wash.
- PCE has been detected in groundwater samples collected from wells MW-12, MW-13, MW-14, MW-16 in every sampling event. TCE has not been detected in these wells. The source of PCE is most likely the Silverbell Landfill WQARF Site located to the northwest of the subdivision.
- The City of Tucson (COT) sampled their well WR-070 on a bi-weekly basis from October 21, 2003, through January 29, 2004. No BTEX and MTBE have been detected in any groundwater samples from WR-070. PCE and TCE have been detected in every sample event, with PCE concentrations consistently exceeding the AWQS by an order of magnitude (Table 5).

Subsurface Site Characterization – West Side of Silvercroft Wash

- 10 groundwater monitoring wells have been installed on the west side of Silvercroft Wash
- Soil samples were collected at 20-foot intervals during installation of the 10 wells on the west side of Silvercroft Wash. Analytical results indicate that BTEX and MTBE were not present in the collected soil samples. Results indicate TPH concentrations of 320 and 230 ppm in the 100 and 120-foot samples from well MW-20. These TPH concentrations are well below the 4100 ppm RSRL for TPH. TPH was not detected in other samples analyzed from borings on the west side of the wash.
- Free product was present in 3 of the 10 wells on the west side of Silvercroft Wash (MW-17, MW-19, and MW-20). Free product extraction was initiated promptly in each of these three wells (see the "Remediation – West Side of Silvercroft Wash" section below).
- The free product plume is delineated on the west side of Silvercroft Wash by 7 wells (MW-18, MW-21, MW-22, MW-23, MW-24, MW-25, and MW-26).
- Dissolved-phase constituents above AWQS for BTEX have not been detected in wells MW-18, MW-22, MW-23, MW-24, MW-25, and MW-26. Well MW-21 is the only well in which dissolved phase constituents above AWQS for BTEX have been detected. The BTEX plume has been delineated downgradient of MW-21 as indicated by analytical results from wells MW-25 and MW-26.
- The City of Tucson (COT) sampled their well WR-359 on a bi-weekly basis from October 21, 2003, through January 15, 2004. Well WR-359 is located approximately 1000 feet northwest (regionally downgradient) of the release point. BTEX and MTBE have not been detected in groundwater samples from WR-359. PCE has been detected in every sample event, with PCE concentrations historically exceeding the AWQS.

- Groundwater elevation contours across and to the west side of Silvercroft Wash indicate that recharge through the wash is resulting in a local groundwater flow divide superimposed on the regional northwesterly gradient.

Remediation – East Side of Silvercroft Wash

- Free product extraction is continuing on the east side of Silvercroft Wash. As of April 1, 2004, the cumulative total of gasoline extracted from the free product plume on the east side of Silvercroft Wash is approximately 13,433 gallons, plus 1,700 gallons of fluid from the Hammerhead submersible pumps. The actual percentages of gasoline and water may be determined by analysis pursuant to disposal at the Romic Environmental Inc. facility in Chandler, Arizona. The effects of pumping and temperature change have not been accounted for in the recovered volume.
- The presence of PCE and TCE in soil vapors in the vicinity of the pipeline release has prevented permitting of an SVE system by the Pima County Department of Environmental Quality (PDEQ). In response to a request by PDEQ, wells MW-3, MW-4, MW-5, MW-12 and SVE-1 were vapor purged and sampled on January 28, 2004. A letter report summarizing the analytical results and requesting a permit to resume vapor extraction was submitted to PDEQ on February 20, 2004, with copies also provided to ADEQ. The results indicated detections of PCE and TCE, with concentrations generally increasing northward consistent with observed groundwater concentrations. The source of the PCE and TCE vapors is most likely the Silverbell Landfill WQARF site. Product released from the SFPP pipeline contains no PCE or TCE.
- In accordance with the ADEQ's Attachment B, §IV.D of the General Air Quality Control Permit for Soil Vapor Extraction Units (SVEU), SFPP submitted a notice of movement for a Soil Vapor Extraction Unit (SVEU-1) to Pima County Department of Environmental Quality (PDEQ). SVEU-1 is owned and operated by Northstar Environmental Remediation, Mission Viejo, CA (ADEQ ATO No. 110842, general permit coverage no. 31836, exp. date 6/27/05). This SVEU is portable and incorporates thermal oxidizer for air pollution control. The SVEU will be operated within the requirements of the General Permit. LFR anticipates operation of the SVEU will begin on April 12, 2004, following the 10-day PDEQ review period.

Remediation – West Side of Silvercroft Wash

- Free product extraction was initiated promptly in each of the three wells on the west side of Silvercroft Wash where free product was detected (MW-17, MW-19, and MW-20). As of March 25, 2004, the cumulative total of gasoline extracted from the west side of Silvercroft Wash is approximately 6,833 gallons. This figure is subject to confirmation per Romic and the effects of pumping and temperature change.
- As indicated by the lack of detections of petroleum hydrocarbons in all soil samples collected at 20-foot intervals during installation of the 10 wells on the west side of Silvercroft Wash, no further action is needed for soil on the west side of Silvercroft Wash.

Future Corrective Actions

Product Removal. Extraction of free product will continue from existing wells where free product is present. Extraction will continue until depth to product and depth to water measurements indicate that residual saturation (the saturation limit at which product will no longer flow) into wells is reached.

Vapor Extraction. Based on findings of PCE from the Silverbell Landfill WQARF Site in soil vapor in the vicinity of the pipeline release, SFPP has been negotiating general permit and individual permit requirements with Pima County Department of Environmental Quality (PDEQ) so that vapor extraction may resume. In accordance with the ADEQ's Attachment B, §IV.D of the General Air Quality Control Permit for Soil Vapor Extraction Units (SVEU), SFPP submitted a notice of movement for a Soil Vapor Extraction Unit (SVEU-1) to Pima County Department of Environmental Quality (PDEQ). SVEU-1 is owned and operated by Northstar Environmental Remediation, Mission Viejo, CA (ADEQ ATO No. 110842, general permit coverage no. 31836, exp. date 6/27/05). This SVEU is portable and incorporates thermal oxidizer for air pollution control. The SVEU will be operated within the requirements of the General Permit. Operation of the SVEU is scheduled to begin April 13, 2004, following the 10-day PDEQ review period.

a. The extent, location, magnitude and volume of documented soil, surface water and groundwater contamination;

Soil. 4,046 tons of surface and near-surface soils impacted by the release were removed from the site. Excavation activities and results of soil analytical samples were described in detail in the Request for No Further Action Determination for Soil from the Surface to Groundwater for the NFA Area (LFR, January 19, 2004). Excavation of hydrocarbon-affected soil was performed in surface areas affected by the pipeline release. The excavated areas and associated confirmation soil sample locations and analytical results are discussed in detail in Section 4.0 of the NFA.

A vertical column of petroleum affected soil exists from the base of the release point excavation (approximately 10 feet bgs) to the groundwater surface at approximately 140 feet bgs. The estimated radius of the column of affected soil is approximately 30 to 50 feet (Figure 19). Vapor extraction is planned for this area to remove petroleum hydrocarbon mass and reduce the potential for vapor migration of hydrocarbons from this vicinity to the ground surface, and to minimize the potential for groundwater impacts.

Surface Water. Silvercroft Wash and the Santa Cruz River are both ephemeral, and have water only when precipitation is sufficient to produce runoff. As the release happened during monsoon season, runoff events did occur within the timeframe of the emergency response activities. Seventeen stormwater samples were collected over four precipitation events as emergency response activities progressed. Results are summarized in Table 3 of the September 19, 2003 Weekly Report. All stormwater samples collected from the last 3 sampling events had no detectable BTEX or MTBE concentrations.

Groundwater. Table 3 presents the most recent depth-to-water and depth-to-free product measurements collected. Free product was not present in MW-18, MW-21, MW-22, MW-23, MW-24, MW-25 and MW-26. The ongoing absence of free product in these wells indicates that the free product plume continues to be delineated on the west side of Silvercroft Wash. As wells to the north, east, and south of the release point location continue to have no free product, the free product plume is delineated, and does not appear to be spreading or migrating. Figure 16 illustrates the approximate boundary of the free product plume.

Findings of BTEX concentrations below AWQS values in wells MW-18, MW-24, MW-25, MW-26 and WR-359A indicate that the dissolved-phase hydrocarbon plume is delineated in the downgradient direction on the west side of Silvercroft Wash. As BTEX above AWQS values has not been detected in any wells not having product on the east side of Silvercroft Wash (MW-7, MW-11, MW-12, MW-13, MW-14, MW-15, MW-16), the dissolved-phase plume is delineated in all directions. The outline of the plume of dissolved-phase BTEX concentrations above AWQS is shown in Figure 16.

PCE was detected in the most recent samples collected from wells MW-7, MW-12, MW-13, MW-14, MW-16, MW-18, MW-24, WR-359A, MW-26, and WR-070. TCE was detected in the most recent sample collected from WR-070. PCE and TCE are not constituents of the gasoline, diesel, and jet fuels shipped through the SFPP pipelines, and therefore, the release from the SFPP pipeline is not a potential source of PCE or TCE. The source of PCE is most likely the Silverbell Landfill WQARF Site located to the northwest of the subdivision.

b. The volume, contaminant concentration, and disposition of any contaminated soil or water removed from the LUST site;

Excavated soils were removed from the site and transported for disposal at either the Sonas Facility in Vickburg, Arizona, or the Waste Management Butterfield Landfill in Mobile, Arizona. The cumulative volume of soil excavated and disposed offsite was 4,046 tons (3,549 tons were disposed at Sonas, and 497 tons were disposed at the Butterfield facility). Records associated with the transport and disposal of excavated soils were provided in Appendix B of the Soil NFA Report.

Extracted free product and groundwater have been stored onsite in appropriate containers with secondary and tertiary containment. The free product and water are then removed from the Site. The free product is disposed by Romic Environmental Technologies, Inc., and the water is disposed by ThermoFluids, Inc. Extracted gasoline has been transported to Romic Environmental Inc., of Chandler, Arizona, for recycling.

c. A conceptual site model (see Section 4.1.3);

Site Conceptual Model

Site Geology, Hydrology, and Hydrocarbon Distribution in the Subsurface. The extensive site characterization and remediation efforts conducted to date have yielded a large body of data on which to develop a detailed Site Conceptual Model (SCM). A schematic of the SCM is shown in Figure 20, which is fenceline CM-CM' (location shown in Figure 7). The SCM is used to integrate site data, identify data gaps, and to determine whether additional site information needs to be collected. In turn, the SCM is being used to guide ongoing characterization and remediation efforts. Findings from the investigation and remediation efforts to date have been summarized in 35 Weekly Reports to date, resulting in the following key points of the SCM:

Nature of the Release. SFPP's operational data, metallurgy analysis of the affected portion of the pipeline, soil sample analyses, analyses of free product samples from groundwater wells, and groundwater sample analyses indicate that the source of petroleum hydrocarbons was the July 30, 2003 rupture of the SFPP pipeline, with no evidence of leakage prior to the July 30, 2003 rupture. The material released was gasoline.

Subsurface Soil Conditions

- Excavation of surface and near-surface impacted soils, described in detail in the Soil NFA Report, has been completed.
- A vertical column of unsaturated, petroleum-affected soil appears to exist from the base of the release point excavation (minimum of 10 feet below ground surface [bgs]) to the groundwater surface at approximately 140 feet bgs across an estimated radius of approximately 40 to 50 feet, based on soil sample analytical results from soil borings.
- Soil in the vadose zone and in the saturated zone consists primarily of coarse-grained gravels and sands.

Groundwater Conditions

- Groundwater is encountered at approximately 140 feet below grade. No perched groundwater or aquitards were encountered above the groundwater table. No confining layers or multiple aquifers have been encountered to 170 feet bgs, which is the vertical extent of assessment drilling.
- Free product has been measured in groundwater monitoring wells at a depth of approximately 140 feet bgs. The free product plume, illustrated in Figure 16, has been delineated in all directions.
- Extraction of free product, which began in October and is ongoing, has resulted in significant reductions in the apparent thickness measurements of free product in affected wells.
- Dissolved-phase BTEX, MTBE, and polynuclear aromatic hydrocarbons (PAHs) in groundwater have been delineated in all directions (Figure 16, Table 5). With the

exception of MW-21, concentrations of BTEX above Aquifer Water Quality Standards (AWQS) have not been detected.

- As indicated by measurements in 26 groundwater monitoring wells installed to date (Figure 3), groundwater on the east side of Silvercroft Wash flows from the area of the release point toward the northeast. The groundwater gradient, illustrated in Figure 16, indicates a "low" area of flow convergence in the area beneath Silver Island Way, just north of Silverbell Tree Drive and Silver Honey Place. The flow convergence on the east side of Silvercroft Wash likely reflects recharge through the unlined bottom of Silvercroft Wash to the west, and from the Santa Cruz River to the northeast.
- Groundwater flow on the west side of Silvercroft Wash is generally to the northwest, consistent with the regional groundwater flow direction. Figure 16 illustrates the groundwater flow divide resulting from recharge through the unlined bottom of Silvercroft Wash.
- VOC contamination from the Silverbell Landfill has rendered groundwater over a large area in the site vicinity unsuitable for human or livestock consumption, agricultural, and industrial uses. Tetrachloroethene (PCE) contamination from the Silverbell Jail Annex Landfill WQARF site has been detected in wells installed by SFPP to investigate the extent of groundwater impacts associated with the SFPP pipeline release.

Exposure Pathway Assessment

Exposure pathways are routes through which chemicals migrate from their sources to potential receptors. Exposure pathways are determined by environmental conditions (e.g., depth to groundwater), the potential for a chemical to move from one medium to another (e.g., from soil to air), and by behavior of potential receptors (e.g., facility worker activities). Although an unlimited number of exposure scenarios and pathways are hypothetically possible at a given site, an analysis of actual site conditions is needed to determine which pathways are complete given the sources and activities at the Site. For an exposure pathway to be complete, the following four elements must be present (U.S. EPA, 1989):

- a chemical source;
- a transport mechanism;
- a receptor; and
- an exposure pathway.

If one or more of these elements are absent, the exposure pathway is not complete.

A conceptual exposure model for the Site is presented in Figure 21. The conceptual exposure model identifies potential current and future sources, transport mechanisms, exposure pathways, and receptors in the vicinity of the Site. Figure 21 identifies which

sources, transport mechanisms, and exposure pathways are being evaluated for the Silvercroft Release Site.

The status of the exposure pathway assessment is shown below.

1. Identification of the possible contaminants involved. SFPP's operational data and sample data collected to date indicate that the subsurface impact is due to the July 30, 2003 rupture of the SFPP pipeline, which released gasoline.

2. Identification and characterization of the source(s) of the contaminants. The source of petroleum hydrocarbons is due to the rupture of the SFPP pipeline on July 30, 2003.

3. Delineation of potential migration pathways through environmental media (i.e., soils, groundwater, surface water, air and biota, man-made conduits such as sewer lines and utility trenches, etc.). SFPP excavated 4,046 tons of surface and near-surface soils impacted by the release, and removed the excavated soil from the site. Excavation activities and results of soil analytical samples were described in detail in the Request for No Further Action Determination for Soil from the Surface to Groundwater for the NFA Area (LFR, January 19, 2004).

Excavated soil was subsequently replaced with clean imported backfill. The water line and affected manholes in streets were also excavated and replaced. Based on analyses of approximately 298 confirmation soil samples, SFPP believes there is no remaining risk from man-made conduits resulting from the release. As an additional measure, the top one foot of soil on the entire surfaces of Lots 352 to 356 was excavated and properly disposed of offsite. The surfaces of these lots were covered with one foot of clean imported fill.

A vertical column of petroleum affected soil exists from the base of the release point excavation to the groundwater surface at approximately 140 feet bgs. The estimated radius of the column of affected soil is approximately 30 to 50 feet. Vapor extraction is planned for this area to remove petroleum hydrocarbon mass and reduce the potential for vapor migration of hydrocarbons from this vicinity to the ground surface, and to minimize the potential for groundwater impacts. Outside of this 30 to 50-foot column, analytical results for soil samples collected from 30 shallow soil borings and 26 deep soil borings indicate that soil from the surface to groundwater is below ADEQ RSRLs on residential lots, and beneath City of Tucson streets, parks, and drainageways.

Free product has been detected in groundwater monitoring wells at a depth of approximately 140 feet bgs. SFPP has completed an extensive characterization effort with respect to the free product and dissolved phase hydrocarbon plumes. Water supply wells are at least 2 ½ miles from the release area, and have not been impacted by the release. Ongoing remediation efforts are intended to prevent hydrocarbons from impacting supply wells, although the distance from the release area to the wells makes this extremely unlikely in any event.

Based on the above remediation and characterization findings, there are no known human or ecological receptors impacted by the release.

4. Establishment of background concentrations of contaminants for each contaminated media. Theoretically, background concentrations of petroleum hydrocarbons in the site vicinity should not be detectable in soil or groundwater in the site vicinity, and SFPP is implementing investigation and remediation efforts at the Site based on this assumption. However, nearby sites (e.g. Silverbell Landfill WQARF Site) do have known chlorinated VOC contamination of soil and groundwater, and such constituents have been detected in wells that were installed to delineate the dissolved-phase plume. SFPP performed a EDR Radius Search (Appendix A), which identified nearby WQARF, LUST, and RCRA sites.

5. Identification and characterization of potential receptors (i.e., human and ecological). Due to extensive surface remediation and restoration efforts (excavation, replacement with clean imported backfill), impacted surface soils above RSRLs have been removed from the site. Due to the depth to groundwater and remaining impacted soil, the lack of impacts to existing water supply wells, and the distance from the site to identified water supply wells, there are no currently known human or ecological receptors.

The Arizona Game and Fish Department (AZGFD) had established homes for Sonoran desert burrowing owls along the west bank of Silvercroft Wash prior to the release, which currently lies within the subsurface hydrocarbon plume. SFPP has been working diligently with the AZGFD and the City of Tucson (owners of the land the owls occupy) to not disturb the owls. The City of Tucson has future plans to develop this area into a park. No other ecologically sensitive areas or potential recreation areas are within 500 feet of the Site or documented contaminant plume. No schools, day care centers, hospitals or nursing homes are located within 500 feet of the Site or documented contaminant plume.

According to Tucson Water, the nearest water supply wells are at least 2½ miles from the release area, and have not been impacted by the release. The lateral extent of groundwater affected by the release is approximately 400 feet from the release point. Given these distances, and the apparent stability of the free product and dissolved-phase BTEX plumes observed to date, as well as the ongoing removal of free product, it is extremely unlikely that the release would result in future impacts to existing supply wells.

Due to the extensive excavation and efforts to restore near-surface soil to below ADEQ SRLs, there are no currently known human, ecological or surface water receptors.

6. Determination of the limits of the study area boundaries. Based on the results of characterization and remediation work conducted to date, the study area boundaries for affected subsurface soil are within a radius of approximately 30 to 50 feet of the release point, and continue vertically from the base of the release point excavation (approximately 10 feet bgs) to approximately 140 feet bgs (depth to groundwater).

In regards to the soil exposure pathway, SFPP has collected and analyzed 298 soil samples to confirm that the extent of excavation was successful in removing petroleum-affected soils to below ADEQ RSRLs. Of the 298 samples, 297 indicate either no detectable concentrations of BTEX, MTBE, and TPH, or detections that are 1 to 4 orders of magnitude below the RSRLs. The one sample in the subdivision that exceeded the RSRL for benzene was from an area that was subsequently excavated and backfilled with clean soil.

A vertical column of petroleum affected soil exists from the base of the release point excavation to the groundwater surface at approximately 140 feet bgs. The estimated radius of the column of affected soil is approximately 30 to 50 feet. Vapor extraction is planned for this area to remove petroleum hydrocarbon mass and reduce the potential for vapor migration of hydrocarbons from this vicinity to the ground surface, and to minimize the potential for groundwater impacts. Analytical results for soil samples collected from 30 shallow soil borings and 5 deep soil borings indicate that soil from the surface to groundwater is below ADEQ RSRLs on residential lots.

d. The LUST site classification described in R18-12-260.01(E);

Not applicable.

e. The documentation, described under R18-12-263(C), of the Tier 1 evaluation and of each additional tier evaluation performed as of the date of the report must be included; and

Not applicable.

f. Recommendations for future remedial corrective actions or LUST case closure.

Planned future remedial corrective actions will include the following:

Product Removal. Extraction of free product will continue from existing wells where free product is detected. Extraction will continue until residual saturation (the saturation limit at which product will no longer flow) into wells is reached.

Vapor Extraction. SFPP intends to perform vapor extraction of the affected soil beneath the release point excavation, and continue extraction of free product. Based on findings of PCE from the Silverbell Landfill WQARF Site in soil vapor in the vicinity of the pipeline release, SFPP has been negotiating general permit and individual permit requirements with Pima County Department of Environmental Quality (PDEQ) so that vapor extraction may resume. In accordance with the ADEQ's Attachment B, §IV.D of the General Air Quality Control Permit for Soil Vapor Extraction Units (SVEU), SFPP submitted a notice of movement for a Soil Vapor Extraction Unit (SVEU-1) to Pima County Department of Environmental Quality (PDEQ). SVEU-1 is owned and operated by Northstar Environmental Remediation, Mission Viejo, CA (ADEQ ATO No. 110842, general permit coverage no. 31836, exp. date 6/27/05). This SVEU is portable and incorporates thermal oxidizer for air pollution control. The SVEU will be operated within

the requirements of the General Permit. Operation of the SVEU is scheduled to begin April 13, 2004, following the 10-day PDEQ review period. It is likely the SVE will incorporate the use of a Thermal oxidizer because it is capable of sustaining a temperature greater than 1600 degrees needed to completely destruct the chlorinated VOCs as well as the gasoline. An internal combustion engine, commonly used on fresh gasoline spills due to the ability to destruct high vapor concentrations, is not being considered at this time because the incomplete combustion of chlorinated VOCs can precipitate cancer causing dioxins.

7.0 DESCRIPTION OF NEARBY FEATURES, SENSITIVE RECEPTORS, SURFACE WATER, GROUNDWATER WITHIN ¼ MILE

7. A site location map that includes the labeled location of the following that occur within 1/4 mile of either the facility property boundaries or the outer boundaries of the characterized contamination, whichever is the greater area:

a. Property boundaries of the facility where the release(s) occurred;

Please see Figures 2, 3, 4, and 7.

b. Named and unnamed streets, roads, alleys and other thoroughfares;

These features appear on Figures 3 and 4.

c. General land use of properties and locations of any schools, day care centers, hospitals, nursing homes, other potentially sensitive receptor populations, and other LUST sites with designated LUST case number;

No schools, day care centers, hospitals, nursing homes, other potentially sensitive receptor populations are located within 1 mile of the site. An environmental records search for the site vicinity was performed by Environmental Data Resources, Inc. (EDR), in accordance with search requirements of the ASTM Standard Practice for Environmental Site Assessments (E1527-00) (EDR, March 03, 2004). The full report is attached as Appendix A. EDR identified 13 sites on ADEQ's Leaking Underground Storage Tank (LUST) list within a one-mile radius of the site. The sites are plotted on Figure 6 with full descriptions given in Appendix A. Of the 13 sites, 9 have been closed with Tier 1 Assessments, 2 have been closed with Tier 2 Assessments, and 2 had cases referred as the sites were not under UST jurisdiction. Sites appearing on the Leaking Underground Storage Tank (LUST) list may have impacted groundwater quality in the past, contributing to petroleum hydrocarbon concentrations that have been detected in wells in the vicinity (ADWR, 2001).

The EDR Report identified 7 UST sites within 0.75 miles of the site. Site names, addresses, and summary information are included in Appendix A.

d. Wells discovered or installed during the investigation. Each well must be identified by any assigned ADWR number, and for wells without an assigned ADWR number, the number assigned by the owner or operator;

SFPP installed 26 wells during this investigation. The well names assigned by SFPP and ADWR numbers are shown in Table 6.

e. Any surface water bodies, including flow direction; and

United States waters within ¼ mile of the Site include Silvercroft Wash and the Santa Cruz River. Both are ephemeral, meaning that they go dry during protracted rainless periods when percolation depletes all flow. Both Silvercroft Wash and the Santa Cruz River flow northward by the Silver Creek II subdivision. The Painted Hills Wash flows eastward into Silvercroft Wash approximately 720' north of the release point; however, it is not classified as a United States water.

f. Groundwater flow direction determined under or reported for LUST, Superfund and WQARF sites.

Figure 8 illustrates the groundwater gradient for the Silverbell Landfill vicinity constructed by the City of Tucson Environmental Management Division (COTEMD) for October, 2003. The figure shows a northwesterly flow direction in the vicinity of the Silvercroft Wash Release Site.

The City of Tucson Environmental Management Division (COTEMD) has a network of groundwater monitoring wells in the vicinity which were installed to monitor VOC contamination of groundwater from the Silverbell Landfill WQARF Site. COTEMD well WR-070 is located approximately 200 feet north of the Silver Creek Subdivision boundary, as shown in Figure 7. COTEMD began weekly sampling of well WR-070 on October 21, 2003, to evaluate whether the SFPP pipeline release had affected groundwater quality in this vicinity. The results to date are summarized in Table 5. All samples from WR-070 have shown no detections of BTEX and MTBE, indicating that the dissolved-phase hydrocarbon plume from the SFPP pipeline release does not extend as far north as WR-070.

TCE and PCE are also included in Table 5, as they are contaminants of concern associated with the Silverbell Landfill WQARF Site. TCE and PCE are not components of gasoline, so any detections of TCE or PCE in the SFPP wells would indicate impacts from the landfill. The one sample from WR-070 analyzed for VOCs indicated a PCE concentration of 26 parts per billion (ppb), which is in excess of the 5 ppb Arizona Water Quality Standard (AWQS) for PCE.

Table 5 summarizes historical VOC groundwater data for well WR-070A from the COTEMD database. The results indicate PCE concentrations in excess of the 5 ppb AWQS for PCE in all monitoring events, and TCE concentrations in excess of the 5 ppb AWQS for 3 events.

Data collected on March 29, 2004, from wells not having measurable free product, was used to construct the groundwater contours shown on Figure 16. The contours on the east side of Silvercroft Wash indicate a similar flow configuration to earlier maps prepared for the site. Contours across and to the west side of Silvercroft Wash indicate that recharge through the wash is resulting in a groundwater flow divide.

8.0 DESCRIPTION OF NEARBY FEATURES, SENSITIVE RECEPTORS, SURFACE WATER, GROUNDWATER WITHIN 500 FEET

8. A site vicinity map that includes the labeled location of the following that occur within 500 feet of either the facility property boundaries or the outer boundaries of the characterized contamination, whichever is the greater area:

a. Property boundaries of the facility where the release(s) occurred;

Figure 21 illustrates the extent of the affected soil column beneath the release point excavation, the extent of free product, and the extent of the dissolved phase BTEX plume above AWQS.

b. Named and unnamed streets, roads, alleys and other thoroughfares;

Figures 2, 3, 4 and 7 illustrate these features.

c. General land use of properties and locations of any schools, day care centers, hospitals, nursing homes, and other potentially sensitive receptor populations;

The site is adjacent to two residential neighborhoods. No schools, day care centers, hospitals, nursing homes, or other potentially sensitive receptor populations are within 500 feet of the site.

d. All wells discovered or installed during the investigation. Each well must be identified by any assigned ADWR number, and for wells without an assigned ADWR number, the number assigned by the owner or operator;

Table 6 presents ADWR numbers and well names for all 26 wells installed at the site. Analytical data has also been received for City of Tucson wells WR-070A, and WR-0359A.

e. Any surface water bodies, including flow direction; and

United States waters within ¼ mile of the Site include Silvercroft Wash and the Santa Cruz River. Both are ephemeral, meaning that they go dry during protracted rainless periods when percolation depletes all flow. Both Silvercroft Wash and the Santa Cruz River flow northward by the Silver Creek II subdivision. The Painted Hills Wash flows

eastward into Silvercroft Wash approximately 720' north of the release point; however, it is not classified as a United States water.

f. Groundwater flow direction.

Data collected on March 29, 2004, from wells not having free product, was used to construct the groundwater contours shown on Figure 16. The contours on the east side of Silvercroft Wash indicate a similar flow configuration to earlier maps prepared for the site, which were included in weekly reports submitted to ADEQ. Contours across and to the west side of Silvercroft Wash indicate that recharge through the wash is resulting in a groundwater flow divide.

9.0 DESCRIPTION OF STRUCTURES, GROUND COVER, EXCAVATIONS, UTILITIES, DRAINAGES, WELLS, LAND USE IMPACTS, SOIL SAMPLING, SURFACE WATER SAMPLING, GROUNDWATER CONTAMINATION EXTENT, GROUNDWATER FLOW

9. A site plan or plans, as necessary to maintain clarity of the display, that includes the labeled location of the following that occur within the area investigated:

a. Property boundaries of the facility and other properties;

b. Named and unnamed streets, roads, alleys and other thoroughfares;

c. Any buildings, structures, or above ground storage tanks on the facility;

d. Type and extent of on-site ground-surface cover, indicated as asphalt, concrete, soil, or another specific type of cover;

At the time of the release, Silver Island Way and Silverbell Tree Drive were paved with asphalt, and curbs had been installed. However, sewer lines and manways were exposed. Concrete pads and houses existed on lots 352 through 356, with no landscaping on the remainder of these lots. The storm drainage channel between lots 352 and 353 was graded soil. Silvercroft Wash had sloped concrete sides and an unlined bottom.

Following completion of soil excavation and demolition of the 5 houses, the roads were repaved, curbs were rebuilt, and the storm drainage channel has been lined with concrete. A gated wall has been built around lots 352 through 356, and the area of these lots outside of the wall has been landscaped. The soil inside the walls has been covered with gravel.

e. The UST involved in the release(s), point of the release(s), and other present and former tanks including all piping and above ground ancillary equipment. The size and contents of each tank must be identified. If any information required by this

subsection on tanks, other than the UST that is the cause of the release(s), is not known, estimated information must be provided and indicated as such;

Not applicable.

f. Area of any existing or previous excavations resulting from UST corrective actions related to this release(s) and the position of all existing excavated soil stockpiles;

Extensive details of the excavation and stockpiling activities were provided to ADEQ in the Request for No Further Action Determination for Soil from the Surface to Groundwater for the NFA Area, SFPP, L.P. – Silvercroft Wash Release Site, Tucson, Arizona ("Soil NFA Report") (LFR, June 19, 2004). As this submittal consisted of 15 bound volumes with a thickness of approximately 2 feet, the material is not being resubmitted. We respectfully request that the reviewer review the Soil NFA Report for information pertaining to this topic.

g. Known above or below ground utility corridors, sewer systems, irrigation canals, and drainage channels within and adjacent to the area investigated;

SFPP described extensive excavation and sampling efforts in utility corridors, along sewer lines, and in drainage channels in the Soil NFA Report. The material is not repeated in this report, and we respectfully request that the reviewer review the Soil NFA Report for information pertaining to this topic.

h. Wells discovered or installed during the investigation. Each well must be identified by any assigned ADWR number, and for wells without an assigned ADWR number, the number assigned by the owner or operator;

No wells were discovered during the investigation. Wells installed by SFPP are summarized in Table 6.

i. Land use of properties that are impacted by the release(s);

The pipeline release location is in the utility easement on the western side of the Silver Creek II Subdivision. Silver Creek II is a residential neighborhood being developed by Monterey Homes, Inc. At the time of the release, homes in the neighborhood were under construction and unoccupied. Currently, construction of the homes has been completed, but the houses have not yet been occupied.

The surface and near-surface area impacted by the release ("Impacted Area") included portions of the Silver Creek II Subdivision (lots 321, 328, 352, 353, 354, 355, and 356, portions of the utility easement west of these lots, the storm drain channel between lots 352 and 353, and limited areas of soil beneath Silver Island Way and Silverbell Tree Drive), and portions of Silvercroft Wash (Plate 1). The remaining lots and streets in the Silver Creek II Subdivision were not impacted by the release. As of April 8, 2004, none of the homes in Silver Creek II have been occupied. SFPP has installed 6 groundwater

monitoring wells in the City of Tucson (COT) park property on the west side of Silvercroft Wash, and one groundwater monitoring well in COT drainageway property on the south side of Painted Hills Wash. These properties are non-residential. Three groundwater monitoring wells have been installed in COT streets in the Silver Creek I Subdivision, an occupied residential neighborhood to the west of Silvercroft Wash.

Affected soil within 10 feet of the surface has been remediated to ADEQ Residential Soil Remediation Levels (RSRLs) and Groundwater Protection Levels (GPLs), as the site is in a residential zone. Although the soils on lots 352 through 356 meet the ADEQ RSRLs, these lots are not planned for residential construction at this time; these lots will serve in part as the proposed location of the groundwater and vapor extraction remediation system and associated piping. A wall has been constructed around the perimeter of lots 353, 354, 355, and 356 to prevent access to the public. SFPP worked with Monterey's architects to ensure that the remediation building and walls match the design and material specifications of the other homes and walls in the subdivision.

j. Structures surrounding the facility that are impacted by the release(s);

SFPP demolished the 5 houses under construction on lots 352 through 356. SFPP also performed excavations in Silver Island Way and Silverbell Tree Drive that required re-paving which has been completed. The storm drain channel between lots 352 and 353 was excavated and has since been rebuilt.

k. Full lateral extent of soil contamination, boreholes and other sample collection locations, including the sampling locations used during any UST closure activities related to the release(s);

Please see the Soil NFA Report for comprehensive coverage of this topic.

l. Surface water bodies with all sample collection locations, documented full lateral extent of surface water contamination and the flow direction;

URS, Inc. (URS) collected storm-water runoff samples on August 18, 2003. The samples were collected in five locations: in Silvercroft wash, upstream and downstream of the confluence with the west fork, in the west fork itself, and in the Santa Cruz River. The sample locations are shown in Figure 24.

Results for the stormwater runoff samples (designated K-M Loc. #1 through K-M Loc. #4) collected on August 14, 2003 showed no detectable concentrations of MTBE and BTEX.

m. Groundwater monitor wells, documented full lateral extent of groundwater contamination, and seasonal and historic directions of groundwater flow and hydraulic gradients, if groundwater has been impacted, threatened, or investigated; and

The gradient on March 29, 2004 indicates flow from the area of the release point towards the northeast. The gradient indicates a "low" area of flow convergence in the area beneath Silver Island Way, just north of Silverbell Tree Drive and Silver Honey Place. The flow convergence likely reflects recharge through the unlined bottom of Silvercroft Wash to the west, and from the Santa Cruz River to the northeast. Monthly groundwater sampling of all wells began in late December, 2003.

n. Groundwater elevation contours and seasonal and historic directions of groundwater flow and hydraulic gradients, if groundwater has been impacted, threatened, or investigated.

Figure 16 illustrates the groundwater gradient and flow direction beneath the site.

The lack of a dissolved-phase plume both in downgradient and crossgradient directions of the free product plume indicates that one or more processes are preventing dissolved-phase concentrations from building up to detectable levels in the groundwater. Possible mechanisms that may prevent such a build-up of detectable concentrations include the following:

- The proximity of unlined Silvercroft Wash and the Santa Cruz River result in significant recharge to the groundwater during runoff events. Large runoff events were observed in August and September, 2003. Due to the coarse sand and gravel extending from the surface to the groundwater, the travel time of recharge from the drainages to the groundwater is likely very rapid (on the order of days or weeks). Such abundant and rapid recharge would result in high dissolved oxygen concentrations in the groundwater, which in turn may promote rapid biodegradation of dissolved-phase hydrocarbon constituents.
- The relatively steep groundwater gradient, combined with the high transmissivity of the aquifer materials, will result in a very rapid effective velocity for advective groundwater flow. If the advective groundwater flow velocity exceeds the kinematic dissolution rates of hydrocarbon constituents into groundwater, a dissolved phase groundwater plume will not develop.
- Enhanced biodegradation due to cometabolism of dissolved-phase hydrocarbons in the presence of VOCs is commonly observed. Thus, it is possible that the presence of PCE from the Silverbell landfill detected downgradient of the plume may enhance biodegradation of dissolved hydrocarbon constituents.

10.0 ANALYTICAL RESULTS

10. A tabulation of field screening and laboratory analytical results acquired during the investigation. The tabulations must include the following:

a. Sample location identification number.

b. Sample number.

c. Collection depth.

d. Date each sample was collected.

e. Analytical result with unit of measure.

A summary table of soil analytical data from deep borings is included as Table 4.

A summary table of groundwater analytical data is included as Table 5.

11.0 LABORATORY REPORTS, QA/QC

11. Copies of laboratory reports and chain-of-custody forms supporting the tabulation described in subsection 10, and any supporting laboratory documents that report any analytical quality assurance and quality control anomalies experienced by the laboratory.

Copies of all soil analytical laboratory reports, including QA/QC analyses, are included in Appendix D.

Copies of all groundwater analytical laboratory reports, including QA/QC analyses, are included in Appendix E.

12.0 WATER LEVEL DATA

12. A tabulation of water level data acquired in investigating the full extent of contamination. The tabulation must include the following:

a. Groundwater monitor well site identification number and ADWR registration number.

b. Date of measurement.

c. Elevation above mean sea level, or other established benchmark, of top of casing, water level, and, if present, free product level.

d. Screened interval.

e. Depth to water and, if present, free product and thickness of free product.

A summary table of all groundwater levels and apparent product thickness measurements collected to date is included as Table 3.

Well construction information and surveyed top-of-casing elevations are included in Table 6.

13.0 WELLS REGISTERED WITH ADWR

13. A tabulation of wells registered with the ADWR, and any other known or observed wells located within 1/4 mile of the facility property boundary. For ADWR registered wells, the list must include the ADWR registration number, water use category, reported water level, and drill date, if recorded.

No active water wells for domestic use have been identified within a ¼ mile radius of the Site. (EDR 2004).

Table 6 includes all wells registered with the ADWR within ¼ mile of the site boundary.

14.0 LITHOLOGIC LOGS

14. The lithologic log developed for each borehole, excavation, monitor well, and sample collection location installed to investigate the full extent of contamination that contains the following information:

a. The identification number assigned to the subsurface penetration;

b. Date and method of the subsurface penetration;

c. Depth of penetration;

d. Depth and description of lithologies encountered see Appendix E);

e. Depth of each sample collected including sample identification number;

f. Field screening results of each sample collected; and

g. Other information describing subsurface lithology.

Lithologic logs for each well are included in Appendix B. Cross sections illustrating the lithologies encountered by drilling are illustrated in Figures 11 through 15.

15.0 WELL CONSTRUCTION AND SURVEY INFORMATION

15. The as built construction diagram of each well installed to investigate the full extent of contamination that contains the following:

a. The unique identification number assigned to the well;

b. Date of installation;

c. Total depth and diameter of hole;

d. Casing material, diameter, and screened interval;

e. Intervals for the annular fill materials described as sand, grout, or another specified material;

f. Surface completion information; and

g. Identification of the surveyed fixed reference point used to determine the elevation in relation to sea level, or other established benchmark, of the well head and the determined elevation of the well head for groundwater monitor wells.

h. Copies of original elevation survey information.

Well specifications are similar for all wells installed to date. The wells are constructed of 4-inch diameter schedule 80 PVC. The screened interval extends from 130 to 170 feet bgs. The slot size is 0.02-inch. The sand pack is 8/12 mesh silica sand, and extends from 125 to 170 feet bgs. A 5-foot bentonite seal was emplaced from 120 to 125 feet bgs. Cement bentonite grout extends from the surface to 120 feet. Each well has been or will be completed with an above ground standpipe, extending approximately 4 feet above ground surface. Wells can be converted to surface flush-mount vaults at a later date, as needed. Figure 22 illustrates a schematic of the well construction details. Boring logs for the existing wells are included in Appendix B. Survey data are included in Appendix F.

16.0 ADDITIONAL INFORMATION

16. Additional information the owner or operator determines is necessary to verify that the requirements for site investigations have been met.

SFPP believes that the information needed to meet the requirements for site investigations have been provided in the other sections of this report, and the Request for Soil NFA.

17.0 STATEMENT OF ADEQUACY

17. A statement of professional opinion with regard to the adequacy of the site characterization investigation and the SCR in complying with the requirements of A.R.S. § 49-1005 and A.A.C. R18-12-262.

The site characterization investigation was directed by, and this SCR was prepared, under the direction of an Arizona-registered geologist. Field work was performed, and the SCR was prepared, in accordance with the generally accepted standards and level of skill and care under similar conditions and circumstances established by the environmental consulting industry. LFR's opinion is that this document meets the requirements of

A.R.S. § 49-1005 and A.A.C. R18-12-262. Please see the certification page following the Table of Contents for the signature of the LFR Arizona-registered geologist.

18.0 REFERENCES

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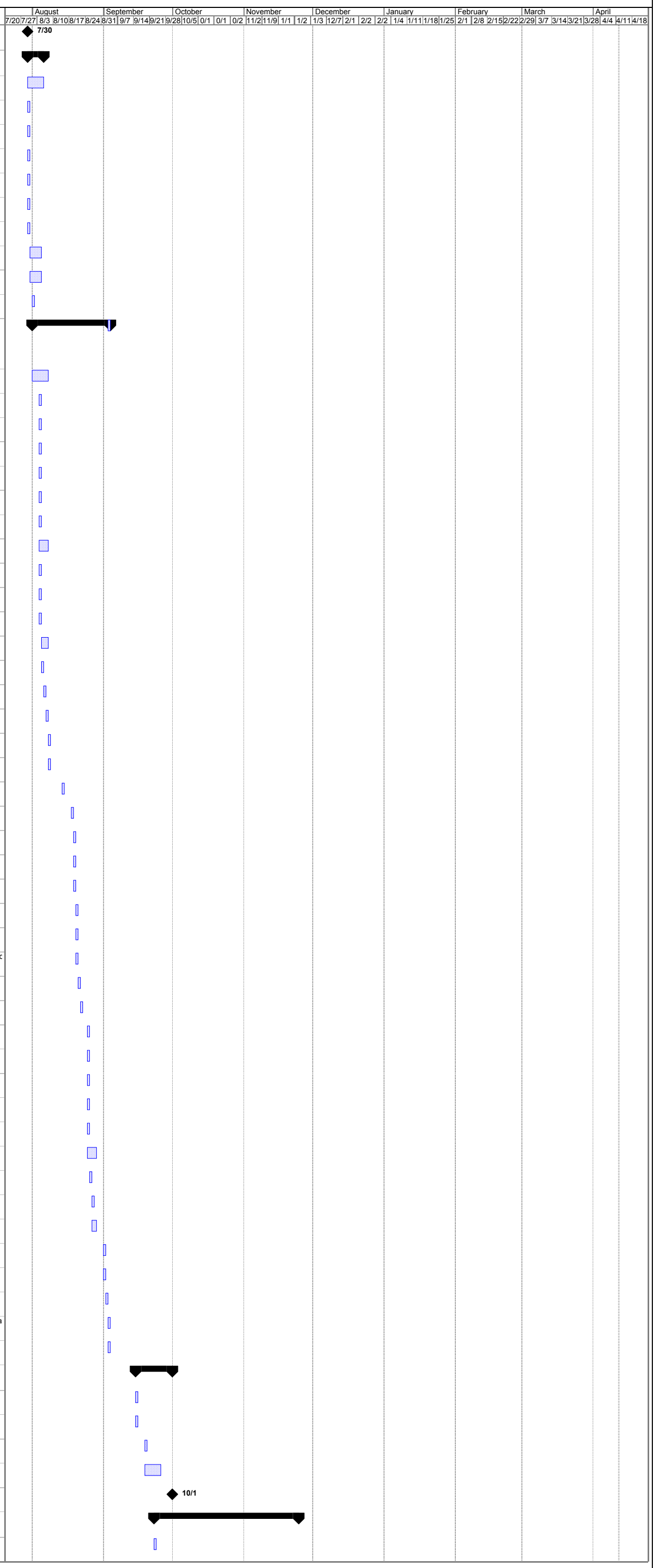
TABLE 1
Silvercroft Wash Release Site - Timeline of Events (7/30/03-4/12/04)

ID	Task Name
1	**Pipeline Release**
2	**SFPP Emergency Response**
3	Continuous monitoring begins
4	Tucson Fire Department (FD) barricades 5 houses
5	Site-specific H&S Plan developed
6	FD sprayed suppression foam on fuel
7	Seven vacuum truckloads of gasoline and water removed
8	Stormwater Runoff Sampling Plan created
9	5 Stormwater samples collected
10	Begin excavating, removing affected soil - 3 front end loaders onsite
11	Eighty Two (82) twenty-ton capacity rolloff bins of soil removed from site
12	Collect 3 bin samples for disposal profiling
13	**Surface Characterization, Initial Remediation Verification, Silvercroft Wash Restoration, Pipeline and Utility Restoration**
14	Collect 15 soil samples in bottom of Silvercroft Wash
15	Soil surrounding pipeline removed
16	Soil removed from wash 100 ft upstream
17	Silt Dam in Silvercroft Wash excavated, reconstructed
18	Soil removed between Lots 352 and 353
19	Soil removed along SW Gas Pipeline Right-of-Way
20	Soil removed from access road east of wash
21	Excavated soil screened, samples collected
22	72 waste manifests completed for soil disposal
23	Southwest Gas repaired affected coating
24	SFPP arranged for collection of stormwater samples
39	Collect 19 soil samples along SW gas line 120' N. of release pt.
40	Collect 4 soil samples in western end of drainage channel
41	Collect 1 bin sample for soil disposal profiling
42	Collect 1 bin sample for soil disposal profiling
25	SFPP, City of Tucson, Monterey, Borderland Meet
26	Excavation backfilled near water line junction valve
27	Collection of 4 stormwater runoff samples
28	Collection of 4 stormwater runoff samples
29	Temporary water line installed in Silver Island Way
30	Water line trench excavated and backfilled
32	SFPP performed Hydrostatic Pressure Test on pipeline
31	Collection of soil stockpile samples
33	Collection of 3 samples of water released during pipeline test
43	Collected 6 soil samples: 2 on east side of wash, 2 in wash and 2 under former location of stc
44	Collect 3 soil samples at northeast corner of Silver Island Way and Silver Meadow Place
45	Collect 2 soil samples at southeast corner of Silver Island Way and Silver Meadow Place
34	SFPP replaced water valve in Silver Island Way
35	315 feet of water lines replaced in Silver Island Way
36	Soil samples collected near housing foundations
46	Collect 4 soil samples along silt fence line
47	Collect 4 surface water samples
48	Collect 22 soil samples in trench for new water line
49	Collect 1 sample for soil disposal profiling
50	Collect 17 soil samples in excavation around water valve junction
51	Collect 26 split soil samples with ATC on lots 321, 350, 328, 351, 352, 353, 354, 355, 356
37	Excavated soil around Sanitary Sewer Manhole #3
38	Excavated soil along NE curb of SI Way/ Silver Meadow Pl. intersection
52	Collect 6 soil samples in excavation around sewer manhole
53	Collect 10 soil samples in excavation at northeast corner of Silver Island Way and Silver Mea
54	Collect 1 sample for soil disposal profiling
55	**Demolition of 5 Houses**
56	Demolition Permits Resubmitted to City of Tucson
57	Public notices distributed to nearby residents and businesses
58	Installation of 4 air monitoring stations
59	Demolition of houses
60	Slab Material, House Debris Removal Completed
61	**Subsurface Investigation (East Side of Wash)**
62	Drilled Boring L352-B1 (Lot 352) to 36 ft, collected 7 soil samples

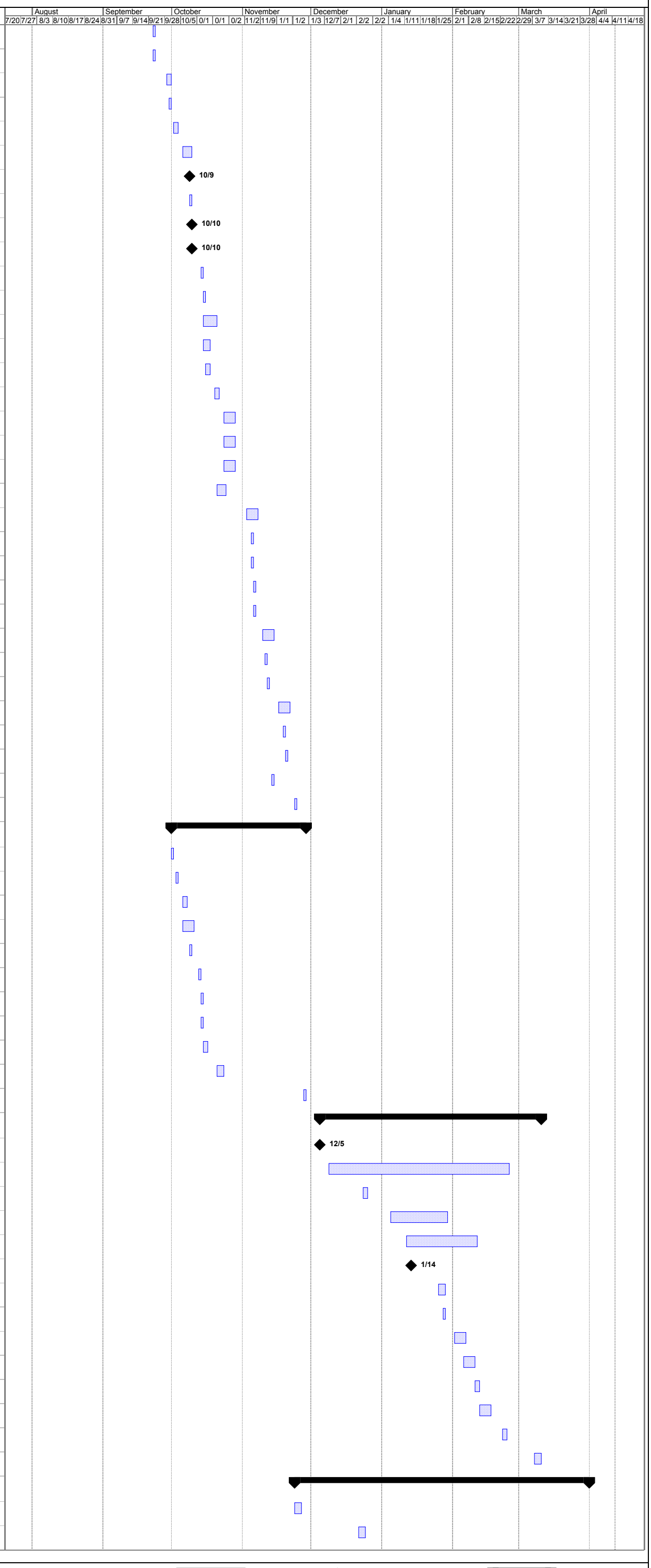


Project: TABLE 1 Silvercroft Timeline E
Date: Mon 4/12/04

Task | Milestone | Rolled Up Task | Rolled Up Progress
Progress | Summary | Rolled Up Milestone

TABLE 1
Silvercroft Wash Release Site - Timeline of Events (7/30/03-4/12/04)

ID	Task Name
63	Drilled Boring L353-B1 (Lot 353) to 31 ft, collected 6 soil samples
64	Drilled Boring RP (release point) to 25 ft, collected 3 soil samples
65	Drilled Boring RP-2 (release point) to 100 ft, collected 13 soil samples
66	Vapor well VE-1 installed in Boring RP-2
67	Drilled 30 shallow borings (6 each on Lots 352 through 356, collected 65 soil samples)
68	Drilled Boring RP-3, collected 11 soil samples
69	First encounter of groundwater at 140 Feet in RP-3
70	Groundwater Monitoring Well MW-2 installed in Boring RP-3
71	First detection of phase separated hydrocarbons (PSH) (MW-2)
72	Telephone notification of PSH by M. Sandon of SFPP to M. Traubert of ADEQ
73	Drilled Boring RP-4, collected 7 soil samples
74	Groundwater Monitoring Well MW-1 installed in Boring RP-4
75	Groundwater Monitoring Well MW-3 installed, 17 soil samples collected
76	Groundwater Monitoring Well MW-6 installed, 10 soil samples collected
77	Collection of 2 grab groundwater samples from MW-6
78	Groundwater Monitoring Well MW-5 installed, 10 soil samples collected
79	Groundwater Monitoring Well MW-4 installed
80	Groundwater Monitoring Well MW-7 installed
81	Groundwater Monitoring Well MW-9 installed
82	Wells MW-1, MW-2, MW-3, and MW-6 developed
83	Installed MW-8, MW-10, and MW-11
84	Collected bailer sample from MW-7
85	Purged and sampled from MW-6
86	Developed wells MW-4, MW-9, and MW-10
87	Surveyed wells MW-4, MW-7, MW-9, and MW-10
88	Installed wells MW-12 and MW-13
89	Developed wells MW-8, MW-11, and MW-12
90	Surveyed wells MW-8, MW-11, and MW-12
91	Installed wells MW-14, MW-15, and MW-16
92	Developed wells MW-13, MW-14, MW-15, and MW-16
93	Surveyed wells MW-13, MW-14, MW-15, and MW-16
94	Purged and sampled wells MW-11, MW-12, and MW-13
95	Purged and sampled wells MW-14, MW-15, and MW-16
96	**Additional Excavation**
97	Removal of top 1foot of soil on Lots 352-256
98	Stockpiled Soil Removed and Transported to Sonas
99	Soil Excavated Along Storm Drain Channel, Lots 352-3, collected 21 soil samples
100	90 Truckloads of Soil Transported to Sonas
101	Additional Excavation on West End of S.D. Channel, collected 9 soil samples
102	Borderland Removed Curb Along Silver Island Way
103	Soil Excavated From East End of Storm Drain Channel
104	Storm Drain Channel Backfilled
105	Excavation along Silver Island Way, Silverbell Tree Drive, collect 45 soil samples
106	Backfilling of excavation along Silver Island Way, Silverbell Tree Drive
107	Eight small excavations at west end of storm drain channel, soil sampling
108	**Subsurface Investigation (West Side of Wash)**
109	Site Tour with ADEQ- discussion of westside well placement
110	Negotiate access agreements with City of Tucson for well locations
111	Coordinate/meet with AZ Game and Fish re Burrowing Owl locations
112	Coordinate/meet with City of Tucson Parks Representative re well locations
113	Installation of Wells MW-17 and MW-18
114	First discovery of PSH in a westside well (MW-17)
115	Installation of MW-19
116	Development of MW-17, MW-18, and MW-19
117	Installation of MW-20 and MW-21
118	Installation of MW-22
119	Installation of MW-23
120	Installation of MW-24
121	Installation of MW-25
122	Installation of MW-26
123	**Groundwater Monitoring**
124	First Monthly Event
125	Second Monthly Event

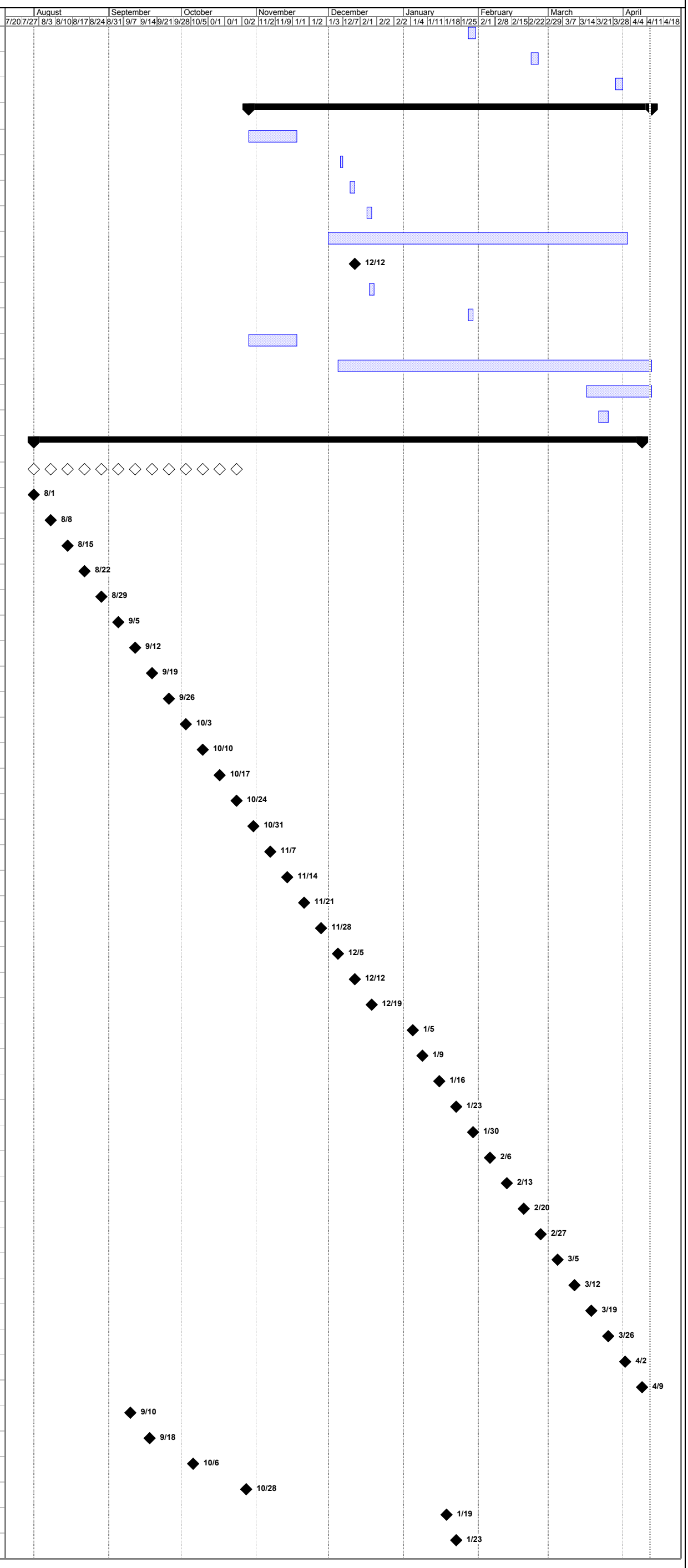


Project: TABLE 1 Silvercroft Timeline E
Date: Mon 4/12/04

Task | Milestone | Rolled Up Task | Rolled Up Progress
Progress | Summary | Rolled Up Milestone

TABLE 1
Silvercroft Wash Release Site - Timeline of Events (7/30/03-4/12/04)

ID	Task Name
126	Third Monthly Event (includes east and west side wells)
127	Fourth Monthly Event (includes east and west side wells)
128	Fifth Monthly Event (includes east and west side wells)
129	**Subsurface Remediation**
130	Soil vapor extraction
131	Soil vapor extraction pilot test
132	Installation of nested soil vapor extraction well VE-2
133	Installation of nested soil vapor monitoring well VMW-1
134	Negotiate General VES Permit with PDEQ
135	Submit Soil Vapor Sampling Plan to PDEQ
136	Collect Soil Vapor Samples (1st round)
137	Collect Soil Vapor Samples (2nd round)
138	PSH extraction (East Side)
139	PSH Extraction (East Side)
140	PSH Extraction (West Side)
141	Shallow Soil Vapor Sampling (East and West sides)
142	**Submittals to ADEQ**
143	**Weekly Reports**
144	Weekly Reports 1
145	Weekly Reports 2
146	Weekly Reports 3
147	Weekly Reports 4
148	Weekly Reports 5
149	Weekly Reports 6
150	Weekly Reports 7
151	Weekly Reports 8
152	Weekly Reports 9
153	Weekly Reports 10
154	Weekly Reports 11
155	Weekly Reports 12
156	Weekly Reports 13
157	Weekly Reports 14
158	Weekly Reports 15
159	Weekly Reports 16
160	Weekly Reports 17
161	Weekly Reports 18
162	Weekly Reports 19
163	Weekly Reports 20
164	Weekly Reports 21
165	Update Report
166	Weekly Reports 22
167	Weekly Reports 23
168	Weekly Reports 24
169	Weekly Reports 25
170	Weekly Reports 26
171	Weekly Reports 27
172	Weekly Reports 28
173	Weekly Reports 29
174	Weekly Reports 30
175	Weekly Reports 31
176	Weekly Reports 32
177	Weekly Reports 33
178	Weekly Reports 34
179	Weekly Reports 35
180	**Workplan to Assess Excavation After House Demolition**
181	**Workplan for 3 Soil Borings**
182	**Response to ADEQ NOV and Request for Info Letters**
183	**Site Assessment and Remediation Plan**
184	**Request for NFA for Soil**
185	**Proposed Remediation Work Plan**



Project: TABLE 1 Silvercroft Timeline E
Date: Mon 4/12/04

Progress | Milestone | Summary | Rolled Up Task | Rolled Up Milestone | Rolled Up Progress

Table 2
Surface Water Sampling Results
Silvercroft Release Site

Sample ID	Sample Date	Benzene	Toluene	Ethyl-benzene	Xylenes, Total	MtBE
JRR-SW.W.Fork 72' W. of Confluence	8/1/2003	ND<5.0	ND<5.0	ND<5.0	ND<5.0	1.4
JRR-SW-CTR 72' N. of Confluence	8/1/2003	ND<5.0	ND<5.0	ND<5.0	ND<5.0	3.9
JRR-RW-W.Bank 70' N. of Confluence	8/1/2003	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
JRR-SW-E.Side 108' S. of Bridge	8/1/2003	ND<5.0	53	ND<5.0	140	47
JRR-SW-CTR-1' S. of Bridge	8/1/2003	ND<5.0	220	180	610	280
KM-Loc-#1	8/14/2003	ND<25	ND<25	ND<25	ND<25	ND<2.5
KM-Loc-#2	8/14/2003	ND<25	ND<25	ND<25	ND<25	ND<2.5
KM-Loc-#3	8/14/2003	ND<25	ND<25	ND<25	ND<25	ND<2.5
KM-Loc-#4	8/14/2003	ND<25	ND<25	ND<25	ND<25	ND<2.5
KM-Loc-#1	8/18/2003	ND<5.0	ND<5.0	ND<5.0	ND<5.0	1.3
KM-Loc-#2	8/18/2003	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
KM-Loc-#3	8/18/2003	ND<5.0	ND<5.0	ND<5.0	ND<5.0	0.9
KM-Loc-#4	8/18/2003	ND<5.0	ND<5.0	ND<5.0	ND<5.0	0.56
#1	*8/25/2003*	*<25*	*<25*	*<25*	*<25*	*<2.5*
#2	*8/25/2003*	*<25*	*<25*	*<25*	*<25*	*<2.5*
#3	*8/25/2003*	*<25*	*<25*	*<25*	*<25*	*<2.5*
#4	*8/25/2003*	*<25*	*<25*	*<25*	*<25*	*<2.5*

ND< = nondedectable concentration, less than the detection limit shown.
Note: All results in micrograms per liter
All surface samples were collected at strategic locations in
Silvercroft Wash, Painted Hills Wash, and the Santa Cruz River
as shown in Figure 24

Table 3
Groundwater Elevation Data
Silvercroft Wash Release Site

Well Name	ADWR #	Well Depth	Screened Interval	Datum Elevation	Date Measured	Depth to Product	Depth to Water	Apparent Product Thickness	Specific Gravity	Adjusted Depth to Groundwater	Potentiometric Surface Elevation
MW-01	55-200448	170.0	120-170	2291.24	10/17/03	144.24	147.38	3.14	0.80	144.87	2146.37
MW-01				2291.24	10/21/03	144.28	147.39	3.11	0.80	144.90	2146.34
MW-01				2291.24	10/23/03	144.25	147.55	3.30	0.80	144.91	2146.33
MW-01				2291.24	10/27/03	144.39	147.42	3.03	0.80	145.00	2146.24
MW-01				2291.24	10/28/03	144.40	147.42	3.02	0.80	145.00	2146.24
MW-01				2291.24	10/30/03			3.02			
MW-01				2291.24	11/24/03	144.83	147.01	2.18	0.80	145.27	2145.97
MW-01				2291.24	11/26/03	146.96	149.18	2.22	0.80	147.40	2143.84
MW-01				2291.24	12/01/03	146.91	149.10	2.19	0.80	147.35	2143.89
MW-01				2291.24	12/19/03			1.50			
MW-01				2291.24	01/26/04	146.71	147.34	0.63	0.80	146.84	2144.40
MW-01				2291.24	02/05/04	146.79	147.31	0.52	0.80	146.89	2144.35
MW-01				2291.24	02/19/04	146.88	147.22	0.34	0.80	146.95	2144.29
MW-01				2291.24	03/08/04	146.85	147.69	0.84	0.80	147.02	2144.22
MW-01				2291.24	03/15/04	146.92	147.75	0.83	0.80	147.09	2144.15
MW-01				2291.24	03/22/04	146.92	147.72	0.80	0.80	147.08	2144.16
MW-01				2291.24	03/29/04	146.99	147.80	0.81	0.80	147.15	2144.09
MW-02	55-200449	170.0	130-170	2289.74	10/10/03	143.92	147.55	3.63	0.80	144.65	2145.09
MW-02				2289.74	10/13/03	142.63	146.11	3.48	0.80	143.33	2146.41
MW-02				2289.74	10/14/03	142.57	146.33	3.76	0.80	143.32	2146.42
MW-02				2289.74	10/15/03	142.63	146.13	3.50	0.80	143.33	2146.41
MW-02				2289.74	10/16/03	142.68	146.14	3.46	0.80	143.37	2146.37
MW-02				2289.74	10/17/03	142.67	146.13	3.46	0.80	143.36	2146.38
MW-02				2289.74	10/21/03	142.72	146.07	3.35	0.80	143.39	2146.35
MW-02				2289.74	10/23/03	142.58	146.37	3.79	0.80	143.34	2146.40
MW-02				2289.74	10/27/03	142.79	146.24	3.45	0.80	143.48	2146.26
MW-02				2289.74	10/28/03	142.81	146.19	3.38	0.80	143.49	2146.25
MW-02				2289.74	10/29/03	142.80	146.20	3.40	0.80	143.48	2146.26
MW-02				2289.74	10/30/03	141.36	145.47	4.11	0.80	142.18	2147.56
MW-02				2289.74	11/24/03	143.23	145.80	2.57	0.80	143.74	2146.00
MW-02				2289.74	11/26/03	145.16	147.73	2.57	0.80	145.67	2144.07
MW-02				2289.74	12/01/03	143.21	145.84	2.63	0.80	143.74	2146.00
MW-02				2289.74	12/19/03			2.24			
MW-03	55-200451	170.0	130-170	2291.93	10/20/03	146.93	147.85	0.92	0.80	147.11	2144.82
MW-03				2291.93	10/20/03	144.40	145.44	1.04	0.80	144.61	2147.32
MW-03				2291.93	10/23/03	144.45	145.51	1.06	0.80	144.66	2147.27

Table 3
Groundwater Elevation Data
Silvercroft Wash Release Site

Well Name	ADWR #	Well Depth	Screened Interval	Datum Elevation	Date Measured	Depth to Product	Depth to Water	Apparent Product Thickness	Specific Gravity	Adjusted Depth to Groundwater	Potentiometric Surface Elevation
MW-03				2291.93	10/27/03	144.45	145.50	1.05	0.80	144.66	2147.27
MW-03				2291.93	10/28/03	144.48	145.58	1.10	0.80	144.70	2147.23
MW-03				2291.93	10/29/03	144.50	145.60	1.10	0.80	144.72	2147.21
MW-03				2291.93	10/30/03	144.49	145.66	1.17	0.80	144.72	2147.21
MW-03				2291.93	10/31/03	144.45	145.66	1.21	0.80	144.69	2147.24
MW-03				2291.93	11/03/03	144.56	145.65	1.09	0.80	144.78	2147.15
MW-03				2291.93	11/04/03	144.53	145.67	1.14	0.80	144.76	2147.17
MW-03				2291.93	11/24/03	144.65	145.84	1.19	0.80	144.89	2147.04
MW-03				2291.93	11/26/03	146.48	147.65	1.17	0.80	146.71	2145.22
MW-03				2291.93	12/01/03	146.35	147.54	1.19	0.80	146.59	2145.34
MW-03				2291.93	12/19/03			0.45			
MW-03				2291.93	01/26/04	146.36	146.62	0.26	0.80	146.41	2145.52
MW-03				2291.93	02/05/04	146.61	147.04	0.43	0.80	146.70	2145.23
MW-03				2291.93	02/19/04	146.51	146.63	0.12	0.80	146.53	2145.40
MW-03				2291.93	03/08/04	146.58	146.95	0.37	0.80	146.65	2145.28
MW-03				2291.93	03/15/04	146.63	147.03	0.40	0.80	146.71	2145.22
MW-03				2291.93	03/22/04	146.64	147.00	0.36	0.80	146.71	2145.22
MW-03				2291.93	03/29/04	146.71	147.06	0.35	0.80	146.78	2145.15
MW-04	55-200802	170.0	130-170	2290.93	10/30/03			3.36			
MW-04				2290.93	10/31/03	144.02	147.42	3.40	0.80	144.70	2146.23
MW-04				2290.93	11/03/03	144.15	147.25	3.10	0.80	144.77	2146.16
MW-04				2290.93	11/04/03	144.15	147.51	3.36	0.80	144.82	2146.11
MW-04				2290.93	11/24/03	144.42	147.00	2.58	0.80	144.94	2145.99
MW-04				2290.93	11/26/03	146.17	148.79	2.62	0.80	146.69	2144.24
MW-04				2290.93	12/1/03	144.43	147.04	2.61	0.80	144.95	2145.98
MW-04				2290.93	12/19/03			2.17			
MW-04				2290.93	01/26/04	146.50	147.05	0.55	0.80	146.61	2144.32
MW-04				2290.93	02/05/04	146.46	146.64	0.18	0.80	146.50	2144.43
MW-04				2290.93	02/19/04	146.31	147.88	1.57	0.80	146.62	2144.31
MW-04				2290.93	03/08/04	146.45	147.89	1.44	0.80	146.74	2144.19
MW-04				2290.93	03/15/04	146.72	147.45	0.73	0.80	146.87	2144.06
MW-04				2290.93	03/22/04	146.72	147.38	0.66	0.80	146.85	2144.08
MW-04				2290.93	03/29/04	146.81	148.45	1.64	0.80	147.14	2143.79
MW-05	55-200803	170.0	130-170	2291.67	10/22/03	144.70	148.70	4.00	0.80	145.50	2146.17
MW-05				2291.67	10/23/03	144.60	149.03	4.43	0.80	145.49	2146.18
MW-05				2291.67	10/27/03	144.90	148.91	4.01	0.80	145.70	2145.97

Table 3
Groundwater Elevation Data
Silvercroft Wash Release Site

Well Name	ADWR #	Well Depth	Screened Interval	Datum Elevation	Date Measured	Depth to Product	Depth to Water	Apparent Product Thickness	Specific Gravity	Adjusted Depth to Groundwater	Potentiometric Surface Elevation
MW-05				2291.67	10/28/03	144.96	148.93	3.97	0.80	145.75	2145.92
MW-05				2291.67	10/29/03	144.98	148.88	3.90	0.80	145.76	2145.91
MW-05				2291.67	10/30/03	144.93	148.43	3.50	0.80	145.63	2146.04
MW-05				2290.84	10/31/03	144.25	148.19	3.94	0.80	145.04	2145.80
MW-05				2290.84	11/03/03	144.32	148.10	3.78	0.80	145.08	2145.76
MW-05				2290.84	11/04/03	144.30	148.02	3.72	0.80	145.04	2145.80
MW-05				2290.84	11/24/03	144.49	148.03	3.54	0.80	145.20	2145.64
MW-05				2290.84	11/26/03	146.31	149.81	3.50	0.80	147.01	2143.83
MW-05				2290.84	12/01/03	144.54	148.00	3.46	0.80	145.23	2145.61
MW-05				2290.84	12/19/03			1.95			
MW-05				2291.67	01/26/04	146.86	147.11	0.25	0.80	146.91	2144.76
MW-05				2291.67	02/05/04	146.86	147.11	0.25	0.80	146.91	2144.76
MW-05				2291.67	03/29/04	146.65	148.45	1.80	0.80	147.01	2144.66
MW-06	55-200804	170.0	130-170	2289.64	10/21/03	None	144.22	0.00		144.22	2145.42
MW-06				2289.64	10/23/03	None	144.15	0.00		144.15	2145.49
MW-06				2289.64	10/27/03	None	144.29	0.00		144.29	2145.35
MW-06				2289.64	10/28/03	None	144.39	0.00		144.39	2145.25
MW-06				2289.64	10/29/03	None	145.32	0.00		145.32	2144.32
MW-06				2289.64	10/30/03	None	144.26	0.00		144.26	2145.38
MW-06				2289.64	10/31/03	None	144.36	0.00		144.36	2145.28
MW-06				2289.64	11/03/03	None	144.42	0.00		144.42	2145.22
MW-06				2289.64	11/04/03	None	144.38	0.00		144.38	2145.26
MW-06				2289.64	11/05/03	None	144.43	0.00		144.43	2145.21
MW-06				2289.64	11/06/03	None	144.35	0.00		144.35	2145.29
MW-06				2289.64	11/07/03	None	144.44	0.00		144.44	2145.20
MW-06				2289.64	11/10/03	None	144.44	0.00		144.44	2145.20
MW-06				2289.64	11/11/03	None	144.47	0.00		144.47	2145.17
MW-06				2289.64	11/12/03	None	144.48	0.00		144.48	2145.16
MW-06				2289.64	11/13/03	None	144.51	0.00		144.51	2145.13
MW-06				2289.64	11/14/03	None	144.46	0.00		144.46	2145.18
MW-06				2289.64	11/17/03	None	144.46	0.00		144.46	2145.18
MW-06				2289.64	11/18/03	None	144.47	0.00		144.47	2145.17
MW-06				2289.64	11/19/03	None	144.46	0.00		144.46	2145.18
MW-06				2289.64	11/20/03	None	144.55	0.00		144.55	2145.09
MW-06				2289.64	11/24/03	None	144.51	0.00		144.51	2145.13
MW-06				2289.64	11/26/03	144.58	144.59	0.01	0.80	144.58	2145.06

Table 3
Groundwater Elevation Data
Silvercroft Wash Release Site

Well Name	ADWR #	Well Depth	Screened Interval	Datum Elevation	Date Measured	Depth to Product	Depth to Water	Apparent Product Thickness	Specific Gravity	Adjusted Depth to Groundwater	Potentiometric Surface Elevation
MW-06				2289.64	12/01/03	sheen	144.39	0.00	0.80	144.39	2145.25
MW-06				2289.64	12/19/03			2.24			
MW-07	55-200805	170.0	130-170	2289.77	10/27/03	None	142.03	0.00		142.03	2147.74
MW-07				2289.77	10/28/03	None	142.42	0.00		142.42	2147.35
MW-07				2289.77	10/29/03	None	142.46	0.00		142.46	2147.31
MW-07				2289.77	10/30/03	None	142.45	0.00		142.45	2147.32
MW-07				2289.77	10/31/03	None	142.40	0.00		142.40	2147.37
MW-07				2289.77	11/03/03	None	142.55	0.00		142.55	2147.22
MW-07				2289.77	11/04/03	None	142.50	0.00		142.50	2147.27
MW-07				2289.77	11/05/03	None	142.54	0.00		142.54	2147.23
MW-07				2289.77	11/06/03	None	142.47	0.00		142.47	2147.30
MW-07				2289.77	11/07/03	None	142.56	0.00		142.56	2147.21
MW-07				2289.77	11/10/03	None	142.57	0.00		142.57	2147.20
MW-07				2289.77	11/11/03	None	142.61	0.00		142.61	2147.16
MW-07				2289.77	11/12/03	None	142.59	0.00		142.59	2147.18
MW-07				2289.77	11/13/03	None	142.63	0.00		142.63	2147.14
MW-07				2289.77	11/14/03	None	142.58	0.00		142.58	2147.19
MW-07				2289.77	11/17/03	None	142.61	0.00		142.61	2147.16
MW-07				2289.77	11/18/03	None	142.59	0.00		142.59	2147.18
MW-07				2289.77	11/19/03	None	142.57	0.00		142.57	2147.20
MW-07				2289.77	11/20/03	None	142.67	0.00		142.67	2147.10
MW-07				2289.77	11/24/03	None	142.63	0.00		142.63	2147.14
MW-07				2289.77	11/26/03	None	142.71	0.00		142.71	2147.06
MW-07				2289.77	12/01/03	None	142.63	0.00		142.63	2147.14
MW-07				2289.77	1/19/04	None	143.00	0.00		143.00	2146.77
MW-07				2289.77	1/26/04	None	143.12	0.00		143.12	2146.65
MW-07				2289.77	1/29/04	None	143.15	0.00		143.15	2146.62
MW-07				2289.77	02/05/04	None	143.00	0.00		143.00	2146.77
MW-07				2289.77	02/12/04	None	143.26	0.00		143.26	2146.51
MW-07				2289.77	02/23/04	None	143.31	0.00		143.31	2146.46
MW-07				2289.77	03/02/04	None	143.31	0.00		143.34	2146.43
MW-07				2289.77	03/08/04	None	143.31	0.00		143.41	2146.36
MW-07				2289.77	03/15/04	None	143.45	0.00		143.41	2146.36
MW-07				2289.77	03/22/04	None	143.48	0.00		143.48	2146.29
MW-07				2289.77	03/29/04	None	143.51	0.00		143.51	2146.26
MW-08	55-200806	170.0	130-170	2291.56	11/06/03	144.22	146.33	2.11	0.80	144.64	2146.92

Table 3
Groundwater Elevation Data
Silvercroft Wash Release Site

Well Name	ADWR #	Well Depth	Screened Interval	Datum Elevation	Date Measured	Depth to Product	Depth to Water	Apparent Product Thickness	Specific Gravity	Adjusted Depth to Groundwater	Potentiometric Surface Elevation
MW-08				2291.56	11/07/03	144.28	146.46	2.18	0.80	144.72	2146.84
MW-08				2291.56	11/10/03	144.27	146.52	2.25	0.80	144.72	2146.84
MW-08				2291.56	11/11/03	144.31	146.42	2.11	0.80	144.73	2146.83
MW-08				2291.56	11/24/03	144.57	146.99	2.42	0.80	145.05	2146.51
MW-08				2291.56	11/26/03	144.69	147.08	2.39	0.80	145.17	2146.39
MW-08				2291.56	12/01/03	144.61	146.99	2.38	0.80	145.09	2146.47
MW-08				2291.56	12/19/03			1.90			
MW-08				2291.56	01/26/04	146.36	146.62	0.26	0.80	146.41	2145.15
MW-08				2291.56	02/05/04	146.36	146.62	0.26	0.80	146.41	2145.15
MW-09	55-200807	170.0	130-170	2290.66	10/31/03	144.56	146.14	1.58	0.80	144.88	2145.78
MW-09				2290.66	11/03/03	144.53	146.49	1.96	0.80	144.92	2145.74
MW-09				2290.66	11/04/03	144.49	146.44	1.95	0.80	144.88	2145.78
MW-09				2290.66	11/05/03	144.50	146.46	1.96	0.80	144.89	2145.77
MW-09				2290.66	11/06/03	144.46	146.43	1.97	0.80	144.85	2145.81
MW-09				2290.66	11/07/03	144.54	146.57	2.03	0.80	144.95	2145.71
MW-09				2290.66	11/24/03	144.70	146.53	1.83	0.80	145.07	2145.59
MW-09				2290.66	11/26/03	144.47	146.66	2.19	0.80	144.91	2145.75
MW-09				2290.66	12/01/03	144.60	146.74	2.14	0.80	145.03	2145.63
MW-09				2290.66	12/19/03			1.43			
MW-10	55-200808	170.0	130-170	2291.22	11/04/03	144.67	148.14	3.47	0.80	145.36	2145.86
MW-10				2291.22	11/05/03	144.71	148.19	3.48	0.80	145.41	2145.81
MW-10				2291.22	11/06/03	144.66	148.14	3.48	0.80	145.35	2145.87
MW-10				2291.22	11/07/03	144.74	148.21	3.47	0.80	145.43	2145.79
MW-10				2291.22	11/10/03	144.75	148.19	3.44	0.80	145.44	2145.78
MW-10				2291.22	11/24/03	144.56	147.85	3.29	0.80	145.22	2146.00
MW-10				2291.22	11/26/03	146.72	149.81	3.09	0.80	147.34	2143.88
MW-10				2291.22	12/01/03	144.92	148.00	3.08	0.80	145.54	2145.68
MW-10				2291.22	12/19/03			2.22			
MW-10				2291.22	03/29/04	146.61	148.19	1.58	0.80	146.93	2144.29
MW-11	55-200809	170.0	130-170	2288.12	11/07/03	None	142.51	0.00		142.51	2145.61
MW-11				2288.12	11/10/03	None	142.57	0.00		142.57	2145.55
MW-11				2288.12	11/11/03	None	142.61	0.00		142.61	2145.51
MW-11				2288.12	11/12/03	None	142.58	0.00		142.58	2145.54
MW-11				2288.12	11/13/03	None	142.64	0.00		142.64	2145.48
MW-11				2288.12	11/14/03	None	142.64	0.00		142.64	2145.48
MW-11				2288.12	11/17/03	None	142.65	0.00		142.65	2145.47

Table 3
Groundwater Elevation Data
Silvercroft Wash Release Site

Well Name	ADWR #	Well Depth	Screened Interval	Datum Elevation	Date Measured	Depth to Product	Depth to Water	Apparent Product Thickness	Specific Gravity	Adjusted Depth to Groundwater	Potentiometric Surface Elevation
MW-11				2288.12	11/18/03	None	142.61	0.00		142.61	2145.51
MW-11				2288.12	11/19/03	None	142.59	0.00		142.59	2145.53
MW-11				2288.12	11/20/03	None	142.68	0.00		142.68	2145.44
MW-11				2288.12	11/24/03	None	142.66	0.00		142.66	2145.46
MW-11				2288.12	11/26/03	None	142.66	0.00		142.66	2145.46
MW-11				2288.12	12/01/03	None	142.69	0.00		142.69	2145.43
MW-11				2288.12	1/19/04	None	143.22	0.00		143.22	2144.90
MW-11				2288.12	1/26/04	None	143.29	0.00		143.29	2144.83
MW-11				2288.12	1/29/04	None	143.37	0.00		143.37	2144.75
MW-11				2288.12	02/05/04	None	143.46	0.00		143.46	2144.66
MW-11				2288.12	02/12/04	None	143.48	0.00		143.48	2144.64
MW-11				2288.12	02/23/04	None	143.51	0.00		143.51	2144.61
MW-11				2288.12	03/02/04	None	143.51	0.00		143.54	2144.58
MW-11				2288.12	03/08/04	None	143.51	0.00		143.61	2144.51
MW-11				2288.12	03/15/04	None	143.66	0.00		143.61	2144.51
MW-11				2288.12	03/22/04	None	143.69	0.00		143.69	2144.43
MW-11				2288.12	03/29/04	None	143.75	0.00		143.75	2144.37
MW-12	55-200810	170.0	130-170	2289.48	11/12/03	None	142.25	0.00		142.25	2147.23
MW-12				2289.48	11/13/03	None	144.28	0.00		144.28	2145.20
MW-12				2289.48	11/14/03	None	144.18	0.00		144.18	2145.30
MW-12				2289.48	11/17/03	None	144.25	0.00		144.25	2145.23
MW-12				2289.48	11/18/03	None	144.22	0.00		144.22	2145.26
MW-12				2289.48	11/19/03	None	144.20	0.00		144.20	2145.28
MW-12				2289.48	11/20/03	None	144.28	0.00		144.28	2145.20
MW-12				2289.48	11/24/03	None	144.28	0.00		144.28	2145.20
MW-12				2289.48	11/26/03	None	144.33	0.00		144.33	2145.15
MW-12				2289.48	12/01/03	None	144.31	0.00		144.31	2145.17
MW-12				2289.48	1/19/04	None	144.38	0.00		144.38	2145.10
MW-12				2289.48	1/26/04	None	144.46	0.00		144.46	2145.02
MW-12				2289.48	1/29/04	None	144.55	0.00		144.55	2144.93
MW-12				2289.48	02/05/04	None	144.64	0.00		144.64	2144.84
MW-12				2289.48	02/12/04	None	144.65	0.00		144.65	2144.83
MW-12				2289.48	02/23/04	None	144.67	0.00		144.67	2144.81
MW-12				2289.48	03/02/04	None	144.67	0.00		144.68	2144.80
MW-12				2289.48	03/08/04	None	144.67	0.00		144.76	2144.72
MW-12				2289.48	03/15/04	None	144.81	0.00		144.76	2144.72

Table 3
Groundwater Elevation Data
Silvercroft Wash Release Site

Well Name	ADWR #	Well Depth	Screened Interval	Datum Elevation	Date Measured	Depth to Product	Depth to Water	Apparent Product Thickness	Specific Gravity	Adjusted Depth to Groundwater	Potentiometric Surface Elevation
MW-12				2289.48	03/22/04	None	144.81	0.00		144.81	2144.67
MW-12				2289.48	03/29/04	None	144.88	0.00		144.88	2144.60
MW-13				2287.16	11/14/03	None	143.36	0.00		143.36	2143.80
MW-13				2287.16	11/17/03	None	143.32	0.00		143.32	2143.84
MW-13				2287.16	11/18/03	None	143.35	0.00		143.35	2143.81
MW-13				2287.16	11/19/03	None	143.26	0.00		143.26	2143.90
MW-13				2287.16	11/20/03	None	143.38	0.00		143.38	2143.78
MW-13				2287.16	11/24/03	None	143.38	0.00		143.38	2143.78
MW-13				2287.16	11/26/03	None	143.31	0.00		143.31	2143.85
MW-13				2287.16	12/01/03	None	143.41	0.00		143.41	2143.75
MW-13				2287.16	1/19/04	None	144.00	0.00		144.00	2143.16
MW-13				2287.16	1/26/04	None	144.10	0.00		144.10	2143.06
MW-13				2287.16	1/28/04	None	144.15	0.00		144.15	2143.01
MW-13	55-201302	170.0	130-170	2287.16	02/05/04	None	144.24	0.00		144.24	2142.92
MW-13				2287.16	02/12/04	None	144.26	0.00		144.26	2142.90
MW-13				2287.16	02/12/04	None	144.26	0.00		144.26	2142.90
MW-13				2287.16	02/23/04	None	144.29	0.00		144.29	2142.87
MW-13				2287.16	03/02/04	None	144.29	0.00		144.31	2142.85
MW-13				2287.16	03/08/04	None	144.29	0.00		144.38	2142.78
MW-13				2287.16	03/15/04	None	144.42	0.00		144.38	2142.78
MW-13				2287.16	03/22/04	None	144.44	0.00		144.44	2142.72
MW-13				2287.16	03/29/04	None	144.51	0.00		144.51	2142.65
MW-14				2287.83	11/18/03	None	143.55	0.00		143.55	2144.28
MW-14				2287.83	11/19/03	None	143.45	0.00		143.45	2144.38
MW-14				2287.83	11/20/03	None	143.61	0.00		143.61	2144.22
MW-14				2287.83	11/24/03	None	143.57	0.00		143.57	2144.26
MW-14				2287.83	11/26/03	None	143.62	0.00		143.62	2144.21
MW-14				2287.83	12/01/03	None	143.54	0.00		143.54	2144.29
MW-14				2287.83	1/19/04	None	144.25	0.00		144.25	2143.58
MW-14				2287.83	1/26/04	None	144.32	0.00		144.32	2143.51
MW-14				2287.83	1/28/04	None	144.39	0.00		144.39	2143.44
MW-14	55-201303	170.0	130-170	2287.83	02/05/04	None	144.50	0.00		144.50	2143.33
MW-14				2287.83	02/12/04	None	144.51	0.00		144.51	2143.32
MW-14				2287.83	02/12/04	None	144.51	0.00		144.51	2143.32
MW-14				2287.83	02/23/04	None	144.57	0.00		144.57	2143.26
MW-14				2287.83	03/02/04	None	144.57	0.00		144.54	2143.29

Table 3
Groundwater Elevation Data
Silvercroft Wash Release Site

Well Name	ADWR #	Well Depth	Screened Interval	Datum Elevation	Date Measured	Depth to Product	Depth to Water	Apparent Product Thickness	Specific Gravity	Adjusted Depth to Groundwater	Potentiometric Surface Elevation
MW-14				2287.83	03/08/04	None	144.57	0.00		144.60	2143.23
MW-14				2287.83	03/15/04	None	144.65	0.00		144.60	2143.23
MW-14				2287.83	03/22/04	None	144.67	0.00		144.67	2143.16
MW-14				2287.83	03/29/04	None	144.70	0.00		144.70	2143.13
MW-15				2289.02	11/19/03	None	143.60	0.00		143.60	2145.42
MW-15				2289.02	11/19/03	None	143.22	0.00		143.22	2145.80
MW-15				2289.02	11/20/03	None	143.23	0.00		143.23	2145.79
MW-15				2289.02	11/24/03	None	143.28	0.00		143.28	2145.74
MW-15				2289.02	11/26/03	None	143.30	0.00		143.30	2145.72
MW-15				2289.02	12/01/03	None	143.30	0.00		143.30	2145.72
MW-15				2289.02	1/26/04	None	143.70	0.00		143.70	2145.32
MW-15				2289.02	1/28/04	None	143.70	0.00		143.70	2145.32
MW-15	55-201304	170.0	130-170	2289.02	02/05/04	None	143.87	0.00		143.87	2145.15
MW-15				2289.02	02/12/04	None	143.89	0.00		143.89	2145.13
MW-15				2289.02	02/23/04	None	143.93	0.00		143.93	2145.09
MW-15				2289.02	03/02/04	None	143.93	0.00		143.96	2145.06
MW-15				2289.02	03/08/04	None	143.93	0.00		144.04	2144.98
MW-15				2289.02	03/15/04	None	144.11	0.00		144.04	2144.98
MW-15				2289.02	03/22/04	None	144.11	0.00		144.11	2144.91
MW-15				2289.02	03/29/04	None	144.17	0.00		144.17	2144.85
MW-16				2289.99	11/19/03	None	146.25	0.00		146.25	2143.74
MW-16				2289.99	11/19/03	None	145.85	0.00		145.85	2144.14
MW-16				2289.99	11/20/03	None	145.80	0.00		145.80	2144.19
MW-16				2289.99	11/24/03	None	145.91	0.00		145.91	2144.08
MW-16				2289.99	11/26/03	None	145.97	0.00		145.97	2144.02
MW-16				2289.99	12/01/03	None	145.90	0.00		145.90	2144.09
MW-16				2289.99	1/26/04	None	146.35	0.00		146.35	2143.64
MW-16				2289.99	1/29/04	None	146.40	0.00		146.40	2143.59
MW-16	55-201305	170.0	130-170	2289.99	02/05/04	None	146.51	0.00		146.51	2143.48
MW-16				2289.99	02/12/04	None	146.53	0.00		146.53	2143.46
MW-16				2289.99	02/23/04	None	146.54	0.00		146.54	2143.45
MW-16				2289.99	03/02/04	None	146.54	0.00		146.53	2143.46
MW-16				2289.99	03/08/04	None	146.54	0.00		146.60	2143.39
MW-16				2289.99	03/15/04	None	146.65	0.00		146.60	2143.39
MW-16				2289.99	03/22/04	None	146.65	0.00		146.65	2143.34
MW-16				2289.99	03/29/04	None	146.69	0.00		146.69	2143.30

Table 3
Groundwater Elevation Data
Silvercroft Wash Release Site

Well Name	ADWR #	Well Depth	Screened Interval	Datum Elevation	Date Measured	Depth to Product	Depth to Water	Apparent Product Thickness	Specific Gravity	Adjusted Depth to Groundwater	Potentiometric Surface Elevation
MW-17	55-201838	170.0	130-170	2286.59	1/26/04	141.18	144.36	3.18	0.80	141.82	2144.77
MW-17				2286.59	1/29/04	141.27	144.35	3.08	0.80	141.89	2144.70
MW-17				2286.59	02/05/04	141.18	144.36	3.18	0.80	141.82	2144.77
MW-17				2286.04	02/19/04	141.91	142.28	0.37	0.80	141.98	2144.06
MW-17				2286.59	03/08/04	142.08	144.28	2.20	0.80	142.52	2144.07
MW-17				2286.59	03/15/04	142.16	144.24	2.08	0.80	142.58	2144.01
MW-17				2286.59	03/22/04	142.19	144.16	1.97	0.80	142.58	2144.01
MW-17				2286.59	03/29/04	142.27	144.19	1.92	0.80	142.65	2143.94
MW-18	55-201839	170.0	130-170	2283.75	1/26/04	None	140.12	0.00		140.12	2143.63
MW-18				2283.75	1/29/04	None	140.20	0.00		140.20	2143.55
MW-18				2283.75	02/05/04	None	140.27	0.00		140.27	2143.48
MW-18				2283.75	02/12/04	None	140.30	0.00		140.30	2143.45
MW-18				2283.75	02/23/04	None	140.34	0.00		140.34	2143.41
MW-18				2283.75	03/02/04	None	140.34	0.00		140.33	2143.42
MW-18				2283.75	03/08/04	None	140.34	0.00		140.40	2143.35
MW-18				2283.75	03/15/04	None	140.43	0.00		140.40	2143.35
MW-18				2283.75	03/22/04	None	140.45	0.00		140.45	2143.30
MW-18				2283.75	03/29/04	None	140.49	0.00		140.49	2143.26
MW-19	55-202059	170.0	130-170	2286.04	1/26/04	140.28	142.91	2.63	0.80	140.81	2145.23
MW-19				2286.04	1/29/04	140.27	142.95	2.68	0.80	140.81	2145.23
MW-19				2286.04	02/05/04	141.95	142.05	0.10	0.80	141.97	2144.07
MW-19				2286.04	03/08/04	141.00	143.20	2.20	0.80	141.44	2144.60
MW-19				2286.04	03/15/04	141.63	143.75	2.12	0.80	142.05	2143.99
MW-19				2286.04	03/22/04	141.11	143.15	2.04	0.80	141.52	2144.52
MW-19				2286.04	03/29/04	141.19	143.18	1.99	0.80	141.59	2144.45
MW-20	55-202060	170.0	130-170	2287.11	02/05/04	141.47	142.98	1.51	0.80	141.77	2145.34
MW-20				2287.11	02/19/04	142.33	144.15	1.82	0.80	142.69	2144.42
MW-20				2287.11	03/08/04	142.46	144.16	1.70	0.80	142.80	2144.31
MW-20				2287.11	03/15/04	142.54	144.17	1.63	0.80	142.87	2144.24
MW-20				2287.11	03/22/04	142.55	144.14	1.59	0.80	142.87	2144.24
MW-20				2287.11	03/29/04	142.08	143.59	1.51	0.80	142.38	2144.73
MW-21	55-202203	170.0	130-170	2283.76	02/05/04	None	140.51	0.00		140.51	2143.25
MW-21				2283.76	02/12/04	None	140.50	0.00		140.50	2143.26
MW-21				2283.76	02/23/04	None	140.50	0.00		140.50	2143.26
MW-21				2283.76	03/02/04	None	140.50	0.00		140.51	2143.25
MW-21				2283.76	03/08/04	None	140.50	0.00		140.58	2143.18

Table 3
Groundwater Elevation Data
Silvercroft Wash Release Site

Well Name	ADWR #	Well Depth	Screened Interval	Datum Elevation	Date Measured	Depth to Product	Depth to Water	Apparent Product Thickness	Specific Gravity	Adjusted Depth to Groundwater	Potentiometric Surface Elevation
MW-21				2283.76	03/15/04	None	140.62	0.00		140.58	2143.18
MW-21				2283.76	03/22/04	None	140.63	0.00		140.63	2143.13
MW-21				2283.76	03/29/04	None	140.67	0.00		140.67	2143.09
MW-22	55-202202	170.0	130-170	2284.45	02/12/04	None	139.93	0.00		139.93	2144.52
MW-22				2284.45	02/23/04	None	139.96	0.00		139.96	2144.49
MW-22				2284.45	03/02/04	None	139.96	0.00		139.96	2144.49
MW-22				2284.45	03/08/04	None	139.96	0.00		140.04	2144.41
MW-22				2284.45	03/15/04	None	140.08	0.00		140.04	2144.41
MW-22				2284.45	03/22/04	None	140.10	0.00		140.10	2144.35
MW-22				2284.45	03/29/04	None	140.13	0.00		140.13	2144.32
MW-23	55-202348	170.0	130-170	2285.12	02/12/04	None	139.32	0.00		139.32	2145.80
MW-23				2285.12	02/23/04	None	139.38	0.00		139.38	2145.74
MW-23				2285.12	03/02/04	None	139.38	0.00		139.41	2145.71
MW-23				2285.12	03/08/04	None	139.38	0.00		139.48	2145.64
MW-23				2285.12	03/15/04	None	139.53	0.00		139.48	2145.64
MW-23				2285.12	03/22/04	None	139.54	0.00		139.54	2145.58
MW-23				2285.12	03/29/04	None	139.58	0.00		139.58	2145.54
MW-24	55-202347	170.0	130-170	2281.47	02/19/04	None	139.16	0.00		139.16	2142.31
MW-24				2281.47	02/23/04	None	139.08	0.00		139.08	2142.39
MW-24				2281.47	03/02/04	None	139.08	0.00		139.09	2142.38
MW-24				2281.47	03/08/04	None	139.08	0.00		139.16	2142.31
MW-24				2281.47	03/15/04	None	139.19	0.00		139.16	2142.31
MW-24				2281.47	03/22/04	None	139.19	0.00		139.19	2142.28
MW-24				2281.47	03/29/04	None	139.23	0.00		139.23	2142.24
MW-25	55-202436	170.0	130-170	2282.66	2/25/04	None	140.89	0.00		140.89	2141.77
MW-25				2282.66	03/02/04	None	140.89	0.00		140.63	2142.03
MW-25				2282.66	03/08/04	None	140.89	0.00		140.70	2141.96
MW-25				2282.66	03/15/04	None	140.74	0.00		140.70	2141.96
MW-25				2282.66	03/22/04	None	140.73	0.00		140.73	2141.93
MW-25				2282.66	03/29/04	None	140.76	0.00		140.76	2141.90
MW-26	55-202593	170.0	130-170	2283.93	03/15/04	None	142.67	0.00		141.70	2142.23
MW-26				2283.93	03/22/04	None	142.67	0.00		142.67	2141.26
MW-26				2283.93	3/29/04	None	142.71	0.00		142.71	2141.22

Table 4
Soil Sample Results - Deep Borings
Silvercroft Wash Release Site

Well	Sample Date	Benzene	Toluene	Ethyl-Benzene	Total Xylenes	MTBE	TPH	TCE	PCE
RP-15'	9/23/03	90.00	340.00	120.00	339.00	810.00	21700.00		
RP-20'	9/23/03	55.00	240.00	78.00	225.00	570.00	16100.00		
RP-25'	9/23/03	63.00	230.00	80.00	240.00	310.00	12000.00		
R-2-35'	9/29/03	62.00	310.00	90.00	370.00	310.00	7200.00		
RP2-40'	9/29/03	6.60	84.00	40.00	160.00	35.00	8600.00		
RP2-45'	9/29/03	0.85	8.00	4.90	19.00	9.20	2600.00		
RP2-50'	9/29/03	23.00	150.00	50.00	170.00	130.00	6200.00		
RP2-100'	9/30/03	94.00	650.00	180.00	690.00	240.00	1800.00		
RP2-55'	9/30/03	47.00	240.00	74.00	300.00	260.00	6700.00		
RP2-60'	9/30/03	64.00	330.00	94.00	460.00	410.00	4000.00		
RP2-65'	9/30/03	21.00	130.00	36.00	180.00	310.00	<1300		
RP2-70'	9/30/03	45.00	530.00	78.00	330.00	630.00	<1300		
RP2-75'	9/30/03	45.00	290.00	93.00	380.00	290.00	<1300		
RP2-80'	9/30/03	140.00	900.00	270.00	1100.00	400.00	1400.00		
RP2-85'	9/30/03	30.00	170.00	55.00	230.00	190.00	<1300		
RP2-90'	9/30/03	35.00	210.00	66.00	250.00	140.00	<1300		
RP2-95'	9/30/03	92.00	530.00	130.00	540.00	380.00	1600.00		
RP-3-10'	10/6/03	<0.050	<0.10	<0.10	<0.15	<0.25	<130		
RP-3-35'	10/6/03	<0.050	<0.10	<0.10	<0.15	<0.25	<130		
RP-3-50	10/8/03	<0.050	<0.050	<0.050	<0.20	0.94	<130		
RP-3-55	10/8/03	<0.050	<0.050	<0.050	<0.20	0.18	<130		
RP-3-65	10/8/03	0.13	0.18	<0.050	<0.20	0.16	<130		
RP-3-75	10/8/03	0.71	1.70	0.18	0.75	0.33	<130		
RP-3-85	10/8/03	0.088	0.13	<0.050	<0.20	0.26	<130		
RP-3-95	10/8/03	0.16	1.10	0.85	4.70	4.80	<130		
RP-3-105	10/8/03	<0.050	<0.050	<0.050	<0.20	0.55	<130		
RP-3-115	10/8/03	0.68	1.40	0.16	0.58	3.10	19000.00		
RP-3-125	10/8/03	110.00	640.00	180.00	750.00	110.00	2200.00		
RP-3-135	10/8/03	2500.00	180.00	58.00	250.00	30.00	1500.00		
RP-3-WT	10/9/03	35000.00	78000.00	4500.00	43000.00	650000.00	NA		
RP-4-20'	10/14/03	31.00	150.00	57.00	154.00	200.00	4500.00		
RP-4-60'	10/14/03	99.00	500.00	120.00	570.00	490.00	4600.00		
RP-4-90'	10/14/03	110.00	590.00	160.00	630.00	240.00	<1300	ND	ND
RP-4-105'	10/14/03	110.00	630.00	180.00	680.00	370.00	<1300	ND	ND
RP-4-115'	10/14/03	99.00	660.00	170.00	690.00	350.00	1500.00	ND	ND
RP-4-135'	10/14/03	42.00	310.00	88.00	380.00	210.00	NA	ND	ND
RP-4-125'	10/14/03	87.00	550.00	150.00	600.00	350.00	<1300	ND	ND
MW-3-20'	10/15/03	<0.050	<0.10	<0.10	<0.10	<0.20	<130		
MW-3-30'	10/15/03	<0.047	<0.093	<0.093	<0.14	<0.19	<130		
MW-3-40'	10/15/03	<0.063	<0.13	<0.13	<0.19	<0.25	<130		
MW-3-50'	10/15/03	<0.054	<0.11	<0.11	<0.16	<0.22	<130		
MW-3-60'	10/16/03	<0.052	<0.10	<0.10	<0.16	<0.21	<130		
MW-3-70'	10/16/03	<0.052	<0.10	<0.10	<0.16	<0.21	<130		
MW-3-80'	10/16/03	<0.050	<0.10	<0.10	<0.17	<0.22	<130		
MW-3-90'	10/16/03	<0.056	<0.11	<0.11	<0.17	<0.22	<130		
MW-3-100'	10/16/03	<0.050	<0.050	<0.050	<0.2	<0.050	<130		
MW-3-120'	10/16/03	<0.050	<0.050	<0.050	<0.20	<0.050	<130		
MW-3-130'	10/16/03	<0.050	<0.050	<0.050	<0.20	<0.050	<130		
MW-3-140'	10/16/03	110	750	220	980	280	2900		
MW-3-110'	10/16/03	<0.050	<0.050	<0.050	<0.2	<0.050	<130		
MW-4-30'	10/21/03	<0.050	<0.050	<0.050	<0.2	0.07	<130	ND	ND
MW-4-40'	10/21/03	<0.050	<0.050	<0.050	<0.2	0.89	ND	ND	ND
MW-4-50'	10/21/03	0.08	0.11	<0.050	<0.20	0.16	ND		
MW-4-60'	10/22/03	ND	ND	ND	ND	1.46	<130	ND	ND
MW-4-70'	10/22/03	0.26	0.35	ND	ND	14.60	<130	ND	ND
MW-4-80'	10/22/03	ND	0.05	ND	ND	0.06	<130	ND	ND
MW-4-90'	10/22/03	ND	ND	ND	ND	ND	<130	ND	ND
MW-4-100'	10/22/03	<0.25	0.76	0.75	4.00	5.90	160.00	ND	ND
MW-4-110'	10/22/03	<0.25	0.29	0.39	2.10	3.70	<130	ND	ND
MW-4-140'	10/22/03	14.00	160.00	69.00	300.00	31.00	<130		
MW-5-15'	10/21/03	<0.050	<0.050	<0.050	<0.2	<0.050	NA	ND	ND
MW-5-35'	10/21/03	<0.050	<0.050	<0.050	<0.2	<0.050	<130	ND	ND
MW-5-45'	10/21/03	<0.050	<0.050	<0.050	<0.2	<0.050	<130		
MW-5-55'	10/21/03	<0.050	<0.050	<0.050	<0.2	<0.050	<130	ND	ND
MW-5-65'	10/21/03	<0.050	<0.050	<0.050	<0.2	<0.050	<130	ND	ND
MW-5-75'	10/21/03	<0.050	<0.050	<0.050	<0.2	<0.050	<130	ND	ND
MW-5-85'	10/21/03	<0.050	<0.050	<0.050	<0.2	<0.050	<130	ND	ND
MW-5-95'	10/21/03	<0.050	<0.050	<0.050	<0.2	<0.050	<130	ND	ND
MW-5-105'	10/21/03	<0.050	<0.050	<0.050	<0.2	<0.050	<130		
MW-5-115'	10/21/03	<0.050	<0.050	<0.050	<0.2	<0.050	<130	ND	ND
MW-5-125'	10/21/03	<0.050	<0.050	<0.050	<0.2	<0.050	<130	ND	ND
MW-5-135'	10/21/03	<0.050	<0.050	<0.050	<0.2	<0.050	<130	ND	ND
MW-6-25'	10/14/03	<0.073	<0.073	<0.073	<0.15	<0.29	NA		
MW-6-35'	10/15/03	<0.048	<0.097	<0.097	<0.15	<0.19	<130	ND	ND
MW-6-45'	10/15/03	<0.058	<0.11	<0.11	<0.17	<0.23	<130	ND	ND
MW-6-55'	10/15/03	<0.050	<0.10	<0.10	<0.15	<0.20	<130	ND	ND

Table 4
Soil Sample Results - Deep Borings
Silvercroft Wash Release Site

Well	Sample Date	Benzene	Toluene	Ethyl-Benzene	Total Xylenes	MTBE	TPH	TCE	PCE
MW-6-65'	10/15/03	<0.11	<0.11	<0.11	<0.16	<0.21	<130	ND	ND
MW-6-75'	10/15/03	<0.052	<0.10	<0.10	<0.16	<0.21	<130	ND	ND
MW-6-85'	10/15/03	<0.049	<0.097	<0.097	<0.15	<0.19	<130		
MW-6-95'	10/15/03	<0.052	<0.10	<0.10	<0.16	<0.21	<130	ND	ND
MW-6-115'	10/15/03	<0.049	<0.098	<0.098	<0.15	<0.20	NA	ND	ND
MW-6-135'	10/15/03	<0.050	<0.050	<0.050	<0.2	<0.050	<130	ND	ND
MW-7-45'	10/23/03	<0.050	<0.050	<0.050	<0.2	<0.050	<130	ND	ND
MW-7-35'	10/23/03	<0.050	<0.050	<0.050	<0.2	<0.050	<130	ND	ND
MW-7-25'	10/23/03	<0.050	<0.050	<0.050	<0.2	<0.050	<130	ND	ND
MW-7-15'	10/23/03	<0.050	<0.050	<0.050	<0.2	<0.050	<130	ND	ND
MW-7-55'	10/26/03	<0.050	<0.050	<0.050	<0.2	<0.050	<130	ND	ND
MW-7-65'	10/26/03	<0.050	<0.050	<0.050	<0.2	<0.050	<130		
MW-7-75'	10/26/03	<0.050	<0.050	<0.050	<0.2	<0.050	<130	ND	ND
MW-7-85'	10/26/03	<0.050	<0.050	<0.050	<0.2	<0.050	<130	ND	ND
MW-7-95'	10/26/03	<0.050	<0.050	<0.050	<0.2	<0.050	<130	ND	ND
MW-7-115'	10/26/03	<0.050	<0.050	<0.050	<0.2	<0.050	<130	ND	ND
MW-7-125'	10/26/03	<0.050	<0.050	<0.050	<0.2	<0.050	<130	ND	ND
MW-8-15'	11/3/03	<0.050	<0.050	<0.050	<0.2	<0.050	<130	pending	pending
MW-8-60'	11/4/03	<0.050	<0.050	<0.050	<0.2	<0.050	<130	pending	pending
MW-8-70'	11/4/03	<0.050	<0.050	<0.050	<0.2	<0.050	<130		
MW-8-120'	11/5/03	<0.050	<0.050	<0.050	<0.2	<0.050	NA	0.05	0.05
MW-8-130'	11/5/03	<0.050	<0.050	<0.050	<0.2	<0.050	<130	27	53
MW-8-140'	11/5/03	<0.050	<0.050	<0.050	<0.2	<0.050	NA		
MW-9-15'	10/28/03	<0.050	<0.050	<0.050	<0.2	<0.050	<130	ND	ND
MW-9-25'	10/28/03	<0.050	<0.050	<0.050	<0.2	<0.050	<130	ND	ND
MW-9-35'	10/28/03	<0.050	<0.050	<0.050	<0.2	<0.050	<130	ND	ND
MW-9-45'	10/28/03	<0.050	<0.050	<0.050	<0.2	<0.050	<130	ND	ND
MW-9-53'	10/28/03	<0.050	<0.050	<0.050	<0.2	<0.050	<130	ND	ND
MW-9-65'	10/28/03	<0.050	<0.050	<0.050	<0.2	<0.050	<130		
MW-9-75'	10/28/03	<0.050	<0.050	<0.050	<0.2	<0.050	<130	pending	pending
MW-9-85'	10/29/03	<0.050	<0.050	<0.050	<0.2	<0.050	<130	pending	pending
MW-9-95'	10/29/03	<0.050	<0.050	<0.050	<0.2	<0.050	<130	pending	pending
MW-9-115'	10/29/03	<0.050	<0.050	<0.050	<0.2	<0.050	<130	pending	pending
MW-10-15'	10/30/03	<0.050	<0.050	<0.050	<0.2	<0.050	<130		
MW-10-65'	10/30/03	<0.050	<0.050	<0.050	<0.2	<0.050	NA		
MW-10-85'	10/30/03	<0.050	0.06	<0.050	<0.2	<0.050	NA		
MW-10-15'	10/31/03						<130		
MW-10-115'	10/31/03	<0.050	<0.050	<0.050	<0.2	<0.050	<130		
MW-10-125'	10/31/03	<0.050	<0.050	<0.050	<0.2	<0.050	NA		
MW-10-135'	10/31/03	<0.050	<0.050	<0.050	<0.2	<0.050	<130		
MW-11-45'	11/4/03	<0.050	<0.050	<0.050	<0.2	<0.050	<130		
MW-11-55'	11/4/03	<0.050	<0.050	<0.050	<0.2	<0.050	<130		
MW-11-75'	11/4/03	<0.050	<0.050	<0.050	<0.2	<0.050	<130		
MW-11-85'	11/5/03	<0.050	<0.050	<0.050	<0.2	<0.050	NA		
MW-11-95'	11/5/03	<0.050	<0.050	<0.050	<0.2	<0.050	<130		
MW-11-105'	11/6/03	<0.050	<0.050	<0.050	<0.20	<0.050	NA		
MW-11-135'	11/6/03	<0.050	<0.050	<0.050	<0.20	<0.050	NA		
MW-12-20'	11/6/03	<0.050	<0.050	<0.050	<0.20	<0.050	<130		
MW-12-40'	11/6/03	<0.050	<0.050	<0.050	<0.20	<0.050	NA		
MW-12-60'	11/7/03	<0.050	<0.050	<0.050	<0.20	<0.050	<130		
MW-12-140'	11/11/03						NA		
MW-13-35'	11/10/03	<0.050	<0.050	<0.050	<0.2	<0.050	NA		
MW-13-55'	11/10/03	<0.050	<0.050	<0.050	<0.2	<0.050	NA		
MW-13-75'	11/10/03	<0.050	<0.050	<0.050	<0.2	<0.050	<130		
MW-13-95'	11/10/03	<0.050	<0.050	<0.050	<0.2	<0.050	<130		
MW-13-115'	11/11/03	<0.050	<0.050	<0.050	<0.2	<0.050	<130		
MW-13-135'	11/11/03	<0.050	<0.050	<0.050	<0.2	<0.050	<130		
MW-13-140'	11/11/03	<0.050	<0.050	<0.050	<0.2	<0.050	NA		
MW-14-20'	11/12/03	<0.050	<0.050	<0.050	<0.20	<0.050	<130		
MW-14-40'	11/12/03	<0.050	<0.050	<0.050	<0.20	<0.050	NA		
MW-14-60'	11/12/03	<0.050	<0.050	<0.050	<0.20	<0.050	NA		
MW-14-80	11/13/03	<0.050	<0.050	<0.050	<0.20	<0.050	NA		
MW-14-100'	11/13/03	<0.050	<0.050	<0.050	<0.20	<0.050	NA		
MW-14-120	11/13/03	<0.050	<0.050	<0.050	<0.20	<0.050	NA		
MW-14-140'	11/13/03	<0.050	<0.050	<0.050	<0.20	<0.050	<130		
MW-15-35'	11/14/03	<0.050	<0.050	<0.050	<0.20	<0.050	NA		
MW-15-55'	11/14/03	<0.050	<0.050	<0.050	<0.20	<0.050	<130		
MW-15-75'	11/14/03	<0.050	<0.050	<0.050	<0.20	<0.050	<130		
MW-15-95'	11/14/03	<0.050	<0.050	<0.050	<0.20	<0.050	<130		
MW-15-115'	11/17/03	<0.050	<0.050	<0.050	<0.20	<0.050	<130		
MW-16-20'	11/17/03	<0.050	<0.050	<0.050	<0.20	<0.050	NA		
MW-16-60'	11/17/03	<0.050	<0.050	<0.050	<0.20	<0.050	NA		
MW-16-80'	11/17/03	<0.050	<0.050	<0.050	<0.20	<0.050	NA		
MW-16-100'	11/17/03	<0.050	<0.050	<0.050	<0.20	<0.050	NA		

Table 4
Soil Sample Results - Deep Borings
Silvercroft Wash Release Site

Well	Sample Date	Benzene	Toluene	Ethyl-Benzene	Total Xylenes	MTBE	TPH	TCE	PCE
MW-16-120'	11/17/03	<0.050	<0.050	<0.050	<0.20	<0.050	NA		
MW-17-40'	1/12/04	ND	ND	ND	ND	ND	ND		
MW-17-60'	1/12/04	ND	ND	ND	ND	ND	ND		
MW-17-80'	1/12/04	ND	ND	ND	ND	ND	ND		
MW-17-100'	1/12/04	ND	ND	ND	ND	ND	ND		
MW-17-120'	1/13/04	ND	ND	ND	ND	ND	ND		
MW-18-40'	1/15/04	ND	ND	ND	ND	ND	ND		
MW-18-60'	1/15/04	ND	ND	ND	ND	ND	ND		
MW-18-80'	1/15/04	ND	ND	ND	ND	ND	ND		
MW-18-100'	1/15/04	ND	ND	ND	ND	ND	ND		
MW-18-120'	1/15/04	ND	ND	ND	ND	ND	ND		
MW-19-40'	1/20/04	ND	ND	ND	ND	ND	ND		
MW-19-60'	1/20/04	ND	ND	ND	ND	ND	ND		
MW-19-80'	1/20/04	ND	ND	ND	ND	ND	ND		
MW-19-100'	1/20/04	ND	ND	ND	ND	ND	ND		
MW-19-120'	1/20/04	ND	ND	ND	ND	ND	ND		
MW-20-40'	1/30/04	ND	ND	ND	ND	ND	ND		
MW-20-60'	1/30/04	ND	ND	ND	ND	ND	ND		
MW-20-80'	1/30/04	ND	ND	ND	ND	ND	ND		
MW-20-100'	2/2/04	ND	ND	ND	ND	ND	320		
MW-20-120'	2/2/04	ND	ND	ND	ND	ND	230		
MW-21-20'	2/4/04	ND	ND	ND	ND	ND	ND		
MW-21-40'	2/4/04	ND	ND	ND	ND	ND	ND		
MW-21-60'	2/4/04	ND	ND	ND	ND	ND	ND		
MW-21-80'	2/4/04	ND	ND	ND	ND	ND	ND		
MW-21-120'	2/4/04	ND	ND	ND	ND	ND	ND		
MW-22-20'	2/5/04	ND	ND	ND	ND	ND	-		
MW-22-40'	2/5/04	ND	ND	ND	ND	ND	-		
MW-22-60'	2/5/04	ND	ND	ND	ND	ND	-		
MW-22-80'	2/5/04	ND	ND	ND	ND	ND	-		
MW-22-100'	2/6/04	ND	ND	ND	ND	ND	-		
MW-22-120'	2/6/04	ND	ND	ND	ND	ND	-		
MW-23-40'	2/9/04	ND	ND	ND	ND	ND	-		
MW-23-60'	2/9/04	ND	ND	ND	ND	ND	-		
MW-23-80'	2/10/04	ND	ND	ND	ND	ND	ND		
MW-23-100'	2/10/04	ND	ND	ND	ND	ND	ND		
MW-23-120'	2/10/04	ND	ND	ND	ND	ND	ND		
MW-24-40'	2/13/04	ND	ND	ND	ND	ND	ND		
MW-24-60'	2/13/04	ND	ND	ND	ND	ND	ND		
MW-24-80'	2/16/04	ND	ND	ND	ND	ND	ND		
MW-24-100';	2/16/04	ND	ND	ND	ND	ND	ND		
MW-24-120'	2/16/04	ND	ND	ND	ND	ND	ND		
MW-25-20'	2/23/04	ND	ND	ND	ND	ND	ND		
MW-25-40'	2/23/04	ND	ND	ND	ND	ND	ND		
MW-25-60'	2/24/04	ND	ND	ND	ND	ND	ND		
MW-25-80'	2/24/04	ND	ND	ND	ND	ND	ND		
MW-25-100'	2/24/04	ND	ND	ND	ND	ND	ND		
MW-25-120'	2/24/04	ND	ND	ND	ND	ND	ND		
MW-26-20'	3/8/04	pending	pending	pending	pending	pending	-		
MW-26-40'	3/8/04	pending	pending	pending	pending	pending	pending		
MW-26-60'	3/9/04	pending	pending	pending	pending	pending	ND		
MW-26-80'	3/9/04	pending	pending	pending	pending	pending	ND		
MW-26-100'	3/9/04	pending	pending	pending	pending	pending	ND		
MW-26-120'	3/9/04	pending	pending	pending	pending	pending	ND		
Detection Limit		0.05	0.05	0.05	0.20	0.05	130		
Arizona Soil Remediation Levels (Residential)		0.62	790	1500	2800	320	4,100		

Notes: All results and standards are in milligrams per kilogram
** Indicates duplicate sample
ND = Not Detected
- = Not Analyzed
Bold font indicates value in excess of standard
N/A = not applicable, no standard exists
varies = PAH analysis includes numerous constituents with variable detection limits and standard values.
pending - result will be transmitted upon receipt from laboratory

Table 5
Groundwater Analytical Results Received Through 3/30/04
Silvercroft Wash Release Site

Well	Sample Date	MTBE	Benzene	Toluene	Ethyl-Benzene	Total Xylenes	TPH	TCE	PCE	PAH
EB-1***	2/23/2004	ND	ND	5.7	2.20	8.80	-	ND	ND	-
EB-2***	2/25/2004	ND	20.00	59.0	5.80	19.40	-	ND	ND	-
MW-6	10/17/2003*	1.35	ND	ND	ND	ND	ND	-	-	-
MW-6	10/29/2003	88	3.2	4.2	ND	ND	ND	-	-	-
MW-7	10/27/2003*	2	ND	2.0	0.5	2.5	ND	-	-	-
MW-7	11/6/2003	ND	ND	ND	ND	ND	-	ND	ND	-
MW-7	12/22/2003	ND	ND	ND	ND	ND	ND	ND	ND	-
MW-7	1/29/2004	ND	ND	4.8	1.8	9.5	-	ND	ND	-
MW-7	2/24/2004	ND	ND	0.7	ND	1.6	-	ND	0.6	
MW-11	11/14/2003	ND	ND	ND	ND	ND	-	ND	ND	ND
MW-11	12/22/2003	ND	ND	ND	ND	ND	-	ND	ND	-
MW-11	1/28/2004	ND	0.6	8.4	3.1	16.4	-	ND	ND	-
MW-11	2/23/2004	ND	ND	0.7	ND	0.6	-	ND	ND	-
MW-911**	2/23/2004	ND	ND	ND	ND	ND	-	ND	ND	
MW-12	11/19/2003	ND	ND	ND	ND	ND	-	ND	**6.7**	ND
MW-12	12/23/2003	ND	ND	ND	ND	ND	-	ND	**6.1**	-
MW-12	1/28/2004	ND	0.8	7.7	2.6	13.8	-	ND	3.9	-
MW-12**	1/28/2004	ND	0.8	8.0	2.7	14.9	-	ND	3.9	-
MW-12	2/23/2004	ND	ND	1.3	0.6	2.7	-	ND	2.7	-
MW-912**	2/23/2004	ND	ND	2.0	ND	3.9	-	ND	2.2	
MW-13	11/19/2003	ND	ND	ND	ND	ND	-	ND	3.7	ND
MW-13	12/23/2003	ND	ND	ND	ND	ND	-	ND	4.6	-
MW-13	1/29/2004	ND	0.6	6.4	2.3	11.8	-	ND	2.4	-
MW-13	2/24/2004	ND	ND	1.0	ND	1.7	-	ND	1.4	-
MW-14	11/24/2003	ND	ND	ND	ND	ND	-	ND	4.9	ND
MW-14	12/23/2003	ND	ND	ND	ND	ND	-	ND	**6.9**	-
MW-14	1/29/2004	ND	0.7	8.6	3	16.3	-	ND	3.0	-
MW-14	2/23/2004	ND	ND	1.9	0.9	3.8	-	ND	2.7	-
MW-15	11/24/2003	ND	ND	ND	ND	ND	-	ND	ND	ND
MW-15	12/22/2003	ND	ND	ND	ND	ND	-	ND	ND	-
MW-15	1/28/2004	ND	1	12.0	4.3	22.2	-	ND	ND	-
MW-15	2/24/2004	ND	ND	ND	ND	ND	-	ND	ND	-
MW-16	11/24/2003	ND	ND	ND	ND	ND	-	ND	2.8	ND
MW-16	11/24/2003**	ND	ND	ND	ND	ND	-	ND	2.8	ND
MW-16	12/23/2003	ND	ND	ND	ND	ND	-	ND	3.3	-
MW-16	1/29/2004	ND	ND	5.1	1.9	10.1	-	ND	2.8	-
MW-16	2/24/2004	ND	ND	0.7	ND	0.7	-	ND	2.8	-
MW-916**	2/24/2004	ND	ND	ND	ND	ND		ND	3.0	-
MW-18	1/30/2004	180	ND	4.6	1.6	8.6	-	ND	4.0	-
MW-18	2/24/2004	600	ND	1.6	0.6	2.2	-	ND	2.7	-
MW-18EB***	1/30/2004	ND	**7.9**	55.0	11	57	-	ND	ND	-
MW-918**	2/24/2004	930	ND	1.4	ND	ND	-	ND	3.0	-
MW-21	2/12/2004	2500000	**320**	220.0	14	153	-	pending	pending	-

Table 5
Groundwater Analytical Results Received Through 3/30/04
Silvercroft Wash Release Site

Well	Sample Date	MTBE	Benzene	Toluene	Ethyl-Benzene	Total Xylenes	TPH	TCE	PCE	PAH
MW-91**	2/12/2004	19000	**360**	220.0	ND	13	-	pending	pending	-
MW-921**	2/25/2004	27000	**1700**	**1200.0**	110	360	-	ND	ND	-
MW-21	2/25/2004	21000	**1200**	970.0	63	209	-	ND	ND	-
LFR-150-021204***	2/12/2004	ND	ND	ND	ND	ND	-	pending	pending	-
MW-22	2/17/2004	ND	ND	2.0	0.9	3.9	ND	ND	ND	-
MW-22	2/25/2004	ND	ND	ND	ND	ND	-	ND	ND	-
MW-23	2/17/2004	ND	ND	ND	0.6	3.1	ND	ND	ND	-
MW-23	2/25/2004	ND	ND	1.0	ND	2.1	-	ND	ND	-
MW-24	2/24/2004	ND	ND	0.6	ND	0.6	-	ND	**18.0**	-
MW-24	3/29/2004	ND	ND	ND	ND	ND	-	ND	**18.0**	-
MW-25	3/2/2004	ND	0.8	3.7	0.9	4.1	-	ND	ND	-
MW-925**(MW-25)	3/2/2004	ND	ND	2.4	ND	1.3	-	ND	ND	-
MW-25	3/29/2004	ND	ND	ND	ND	ND	-	ND	ND	-
MW-26	3/16/2004	ND	ND	ND	ND	ND	-	ND	2.5	-
MW-26	3/29/2004	ND	ND	ND	ND	ND	-	ND	2.6	-
MW-926	3/29/2004	ND	ND	ND	ND	ND	-	ND	2.6	-
WR-070A	10/21/2003	NA	ND	ND	ND	ND	ND	4.6	**26.0**	-
WR-070A	10/30/2003	ND	ND	ND	ND	ND	ND	-	-	-
WR-070A	11/5/2003	ND	ND	ND	ND	ND	-	-	-	-
WR-070A	11/13/2003	ND	ND	ND	ND	ND	-	3.9	**34.4**	-
WR-070A	11/20/2003	ND	ND	ND	ND	ND	-	3.4	**31.7**	-
WR-070A	11/26/2003	ND	ND	ND	ND	ND	-	4.6	**51.5**	-
WR-070A	12/4/2003	ND	ND	ND	ND	ND	-	4.4	**50.3**	-
WR-070A	12/11/2003	ND	ND	ND	ND	ND	-	4.4	**55.9**	-
WR-070A	12/18/2003	ND	ND	ND	ND	ND	-	4	**48.2**	-
WR-070A	12/24/2003	ND	ND	ND	ND	ND	-	4.1	**49.5**	-
WR-070A	1/2/2004	ND	ND	ND	ND	ND	-	3.9	**52.8**	-
WR-070A	1/8/2004	ND	ND	ND	ND	ND	-	4.3	**51.4**	-
WR-070A	1/15/2004	ND	ND	ND	ND	ND	-	4.8	**64.4**	-
WR-070A	1/29/2004	ND	ND	ND	ND	ND	-	3.3	**46.0**	-
WR-070A	2/13/2004	ND	ND	ND	ND	ND	-	3.3	**41.0**	-
WR-359A	11/13/2003	ND	ND	ND	ND	ND	-	ND	**5.6**	-
WR-359A	11/20/2003	ND	ND	ND	ND	ND	-	ND	**6.1**	-
WR-359A	11/26/2003	ND	ND	ND	ND	ND	-	ND	**5.4**	-
WR-359A	12/4/2003	ND	ND	ND	ND	ND	-	ND	**5.4**	-
WR-359A	1/8/2004	ND	ND	ND	ND	ND	-	ND	**4.5**	-
WR-359A	2/12/2004	ND	ND	ND	ND	ND	-	ND	**3.8**	-
Trip Blank	1/30/2004	ND	ND	ND	ND	ND	-	ND	ND	-
Detection Limit		0.50	0.50	0.5	0.50	1.50	13, 20	0.50	0.5	varies
Aquifer Water Quality Standards (AWQS)		N/A	**5**	**1000.0**	**700**	**10000**	N/A	**5**	**5.0**	varies

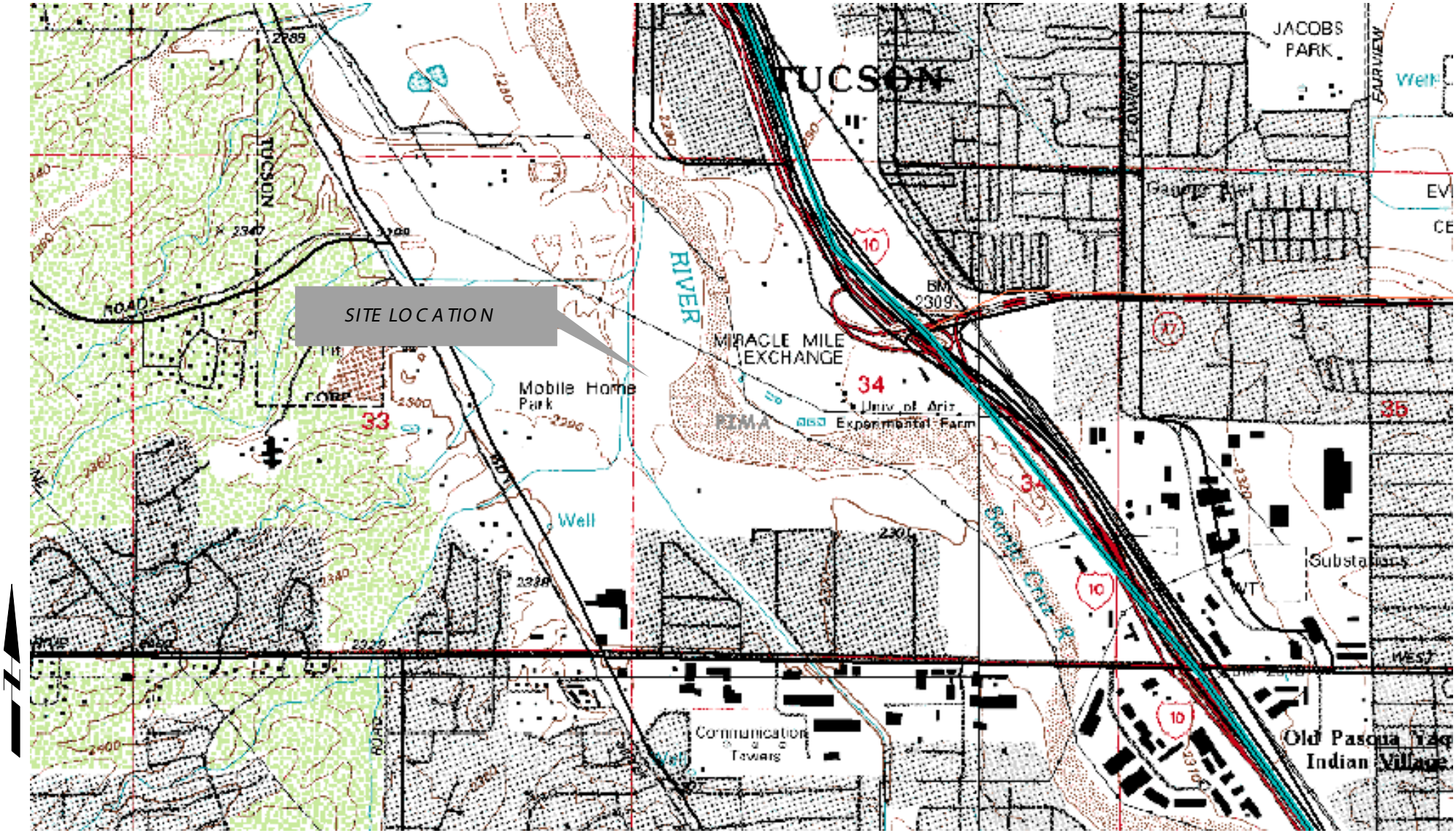
Notes: All results and standards are in micrograms per liter
Results for samples collected 12/22, 12/23/03, 1/28/04, 1/29/04, and 1/30/04 are preliminary.
Samples from well WR-070A were collected by the City of Tucson, remaining samples were collected by LFR
* Indicates samples was collected with a bailer and prior to development; 3 well volumes were purged prior to collecting all other samples
** Indicates duplicate sample
*** Indicates equipment blank
ND = Not Detected
- = Not Analyzed
Bold font indicates value in excess of AWQS
N/A = not applicable, no standard exists
varies = PAH analysis includes numerous constituents with variable detection limits and AWQS values.

Table 5
Groundwater Analytical Results Received Through 3/30/04
Silvercroft Wash Release Site

Well	Sample Date	MTBE	Benzene	Toluene	Ethyl-Benzene	Total Xylenes	TPH	TCE	PCE	PAH

Table 6
Well Information Summary
Silvercroft Wash Release Site

Well Name	ADWR #	Well Depth	Screened Interval	Datum Elevation
MW-1	55-200448	170.0	120-170	2291.24
MW-2	55-200449	170.0	130-170	2289.74
MW-3	55-200451	170.0	130-170	2291.93
MW-4	55-200802	170.0	130-170	2290.93
MW-5	55-200803	170.0	130-170	2291.67
MW-6	55-200804	170.0	130-170	2289.64
MW-7	55-200805	170.0	130-170	2289.77
MW-8	55-200806	170.0	130-170	2291.56
MW-9	55-200807	170.0	130-170	2290.66
MW-10	55-200808	170.0	130-170	2291.22
MW-11	55-200809	170.0	130-170	2288.12
MW-12	55-200810	170.0	130-170	2289.48
MW-13	55-201302	170.0	130-170	2287.16
MW-14	55-201303	170.0	130-170	2287.83
MW-15	55-201304	170.0	130-170	2289.02
MW-16	55-201305	170.0	130-170	2289.99
MW-17	55-201838	170.0	130-170	2286.59
MW-18	55-201839	170.0	130-170	2283.75
MW-19	55-202059	170.0	130-170	2286.04
MW-20	55-202060	170.0	130-170	2287.11
MW-22	55-202202	170.0	130-170	2284.45
MW-21	55-202203	170.0	130-170	2283.76
MW-24	55-202347	170.0	130-170	2281.47
MW-23	55-202348	170.0	130-170	2285.12
MW-25	55-202436	170.0	130-170	2282.66
MW-26	55-202593	170.0	130-170	2283.93



Base Map Source: USGS Jaynes 7.5-minute Topographical quad 1995

Tucson, Arizona

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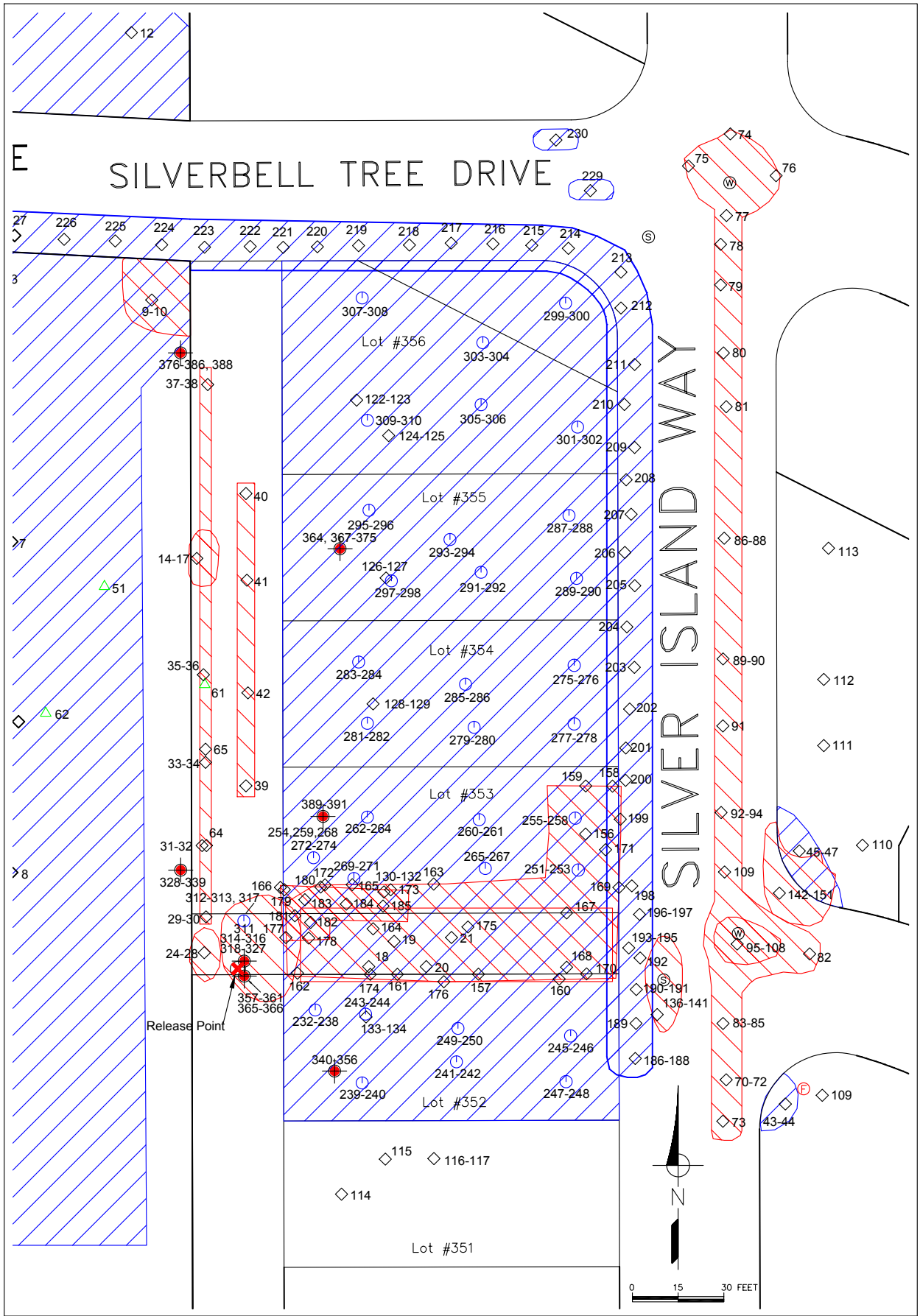
Site Vicinity-Silvercroft Wash
Figure 1

Project No. 014-10022-00



LEGEND

62	Surface Water Sample Locations
114	Soil Sample Locations
	Release Point
Lot #351	Lot Number
239-240	Soil Boring Sample Location
340-356	Monitor Well Soil Sample Location
	Excavation (Depth Less Than 3 Feet)
	Excavation (Depth Greater Than 3 Feet)

SFPP L.P. SILVERCROFT WASH
RELEASE SITE

SFPP L.P. a subsidiary of KMEP

SITE MAP

Figure 2
14-10022-00

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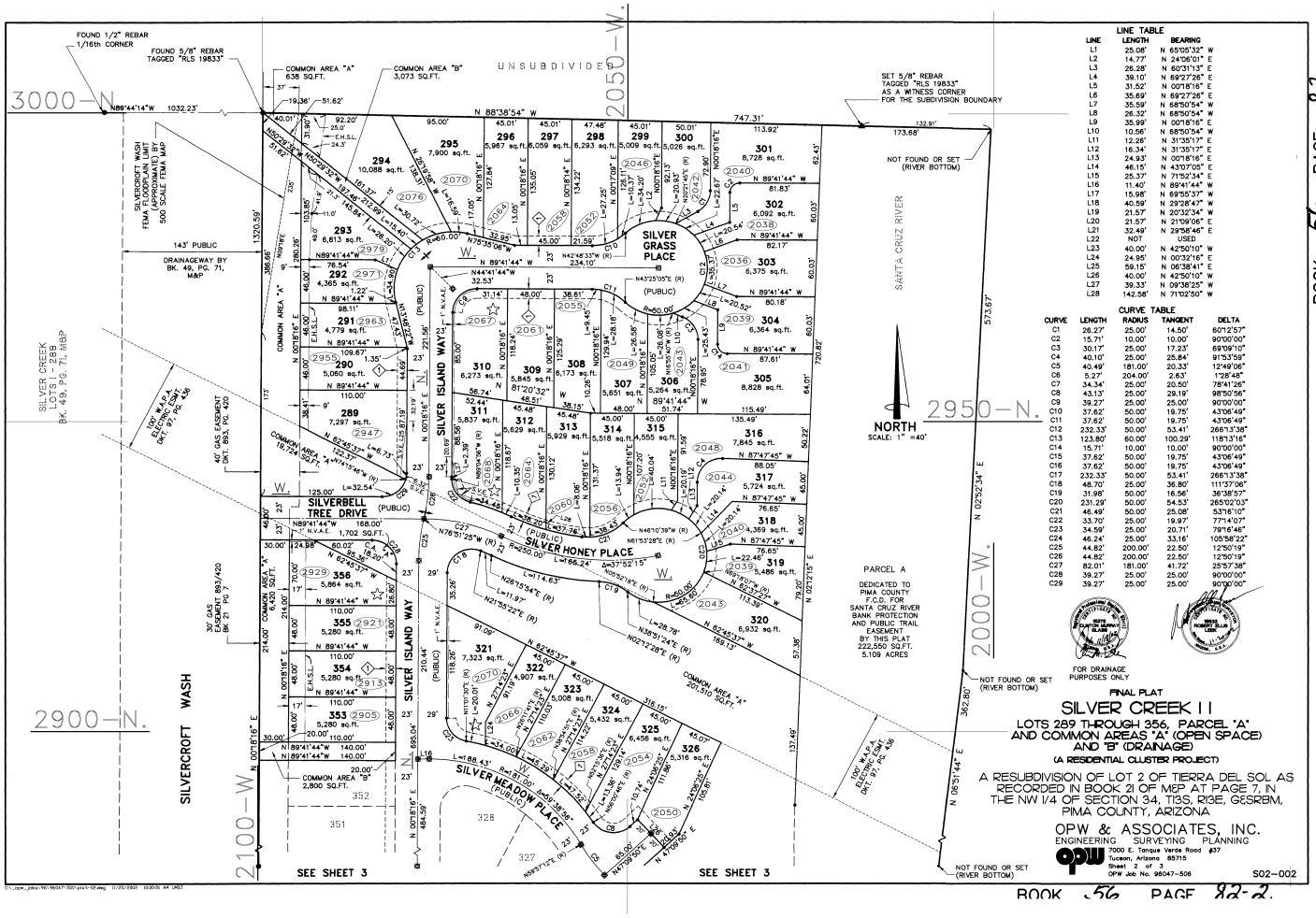

LINE TABLE

LINE	LENGTH	BEARING
L1	25.08'	N 65°05'32" W
L2	14.77'	N 24°06'01" E
L3	26.28'	N 60°31'13" E
L4	39.10'	N 69°27'26" E
L5	31.52'	N 00°18'16" E
L6	35.69'	N 69°27'26" E
L7	35.59'	N 68°50'54" W
L8	26.32'	N 68°50'54" W
L9	35.99'	N 00°18'16" E
L10	10.56'	N 68°50'54" W
L11	12.26'	N 31°35'17" E
L12	16.34'	N 31°35'17" E
L13	24.93'	N 00°18'16" E
L14	46.15'	N 43°07'05" E
L15	25.37'	N 71°52'34" E
L16	11.40'	N 89°41'44" W
L17	15.98'	N 69°55'37" W
L18	40.59'	N 29°28'47" W
L19	21.57'	N 20°32'34" W
L20	21.57'	N 21°09'06" E
L21	32.49'	N 29°58'46" E
L22	NOT USED	
L23	40.00'	N 42°50'10" W
L24	24.95'	N 00°32'16" E
L25	59.15'	N 06°38'41" E
L26	40.00'	N 42°50'10" W
L27	39.33'	N 09°38'25" W
L28	142.58'	N 71°02'50" W

CURVE TABLE

CURVE	LENGTH	RADIUS	TANGENT	DELTA
C1	26.27'	25.00'	14.50'	60°12'57"
C2	15.71'	10.00'	10.00'	90°00'00"
C3	30.17'	25.00'	17.23'	69°09'10"
C4	40.10'	25.00'	25.84'	91°53'59"
C5	40.49'	181.00'	20.33'	12°49'06"
C6	5.27'	204.00'	2.63'	1°28'48"
C7	34.34'	25.00'	20.50'	78°41'26"
C8	43.13'	25.00'	29.19'	98°50'56"
C9	39.27'	25.00'	25.00'	90°00'00"
C10	37.62'	50.00'	19.75'	43°06'49"
C11	37.62'	50.00'	19.75'	43°06'49"
C12	232.33'	50.00'	53.41'	266°13'38"
C13	123.80'	60.00'	100.29'	118°13'16"
C14	15.71'	10.00'	10.00'	90°00'00"
C15	37.62'	50.00'	19.75'	43°06'49"
C16	37.62'	50.00'	19.75'	43°06'49"
C17	232.33'	50.00'	53.41'	266°13'38"
C18	48.70'	25.00'	36.80'	111°37'06"
C19	31.98'	50.00'	16.56'	36°38'57"
C20	231.29'	50.00'	54.53'	265°02'03"
C21	46.49'	50.00'	25.08'	53°16'10"
C22	33.70'	25.00'	19.97'	77°14'07"
C23	34.59'	25.00'	20.71'	79°16'46"
C24	46.24'	25.00'	33.16'	105°58'22"
C25	44.82'	200.00'	22.50'	12°50'19"
C26	44.82'	200.00'	22.50'	12°50'19"
C27	82.01'	181.00'	41.72'	25°57'38"
C28	39.27'	25.00'	25.00'	90°00'00"
C29	39.27'	25.00'	25.00'	90°00'00"

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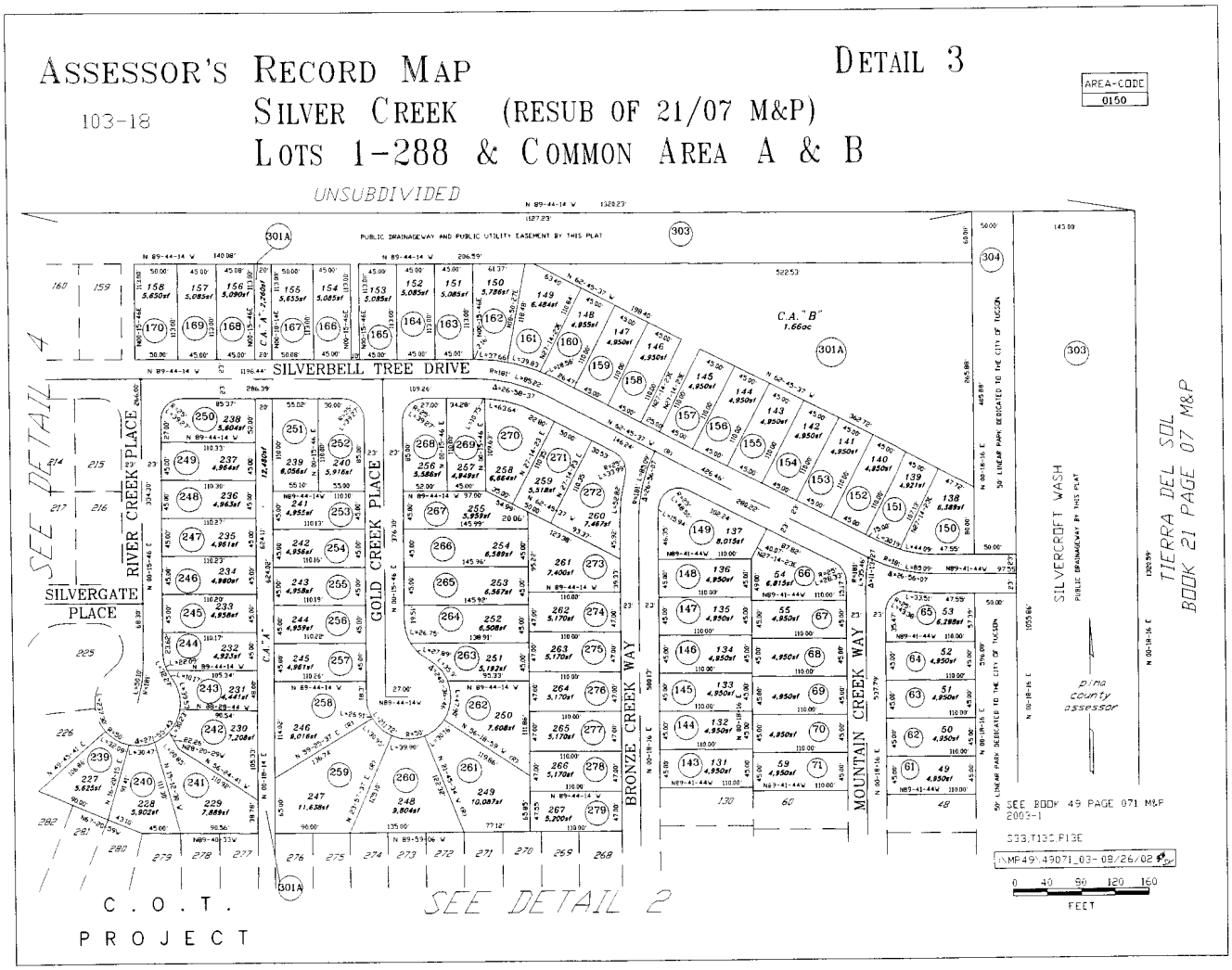
Plat Map of Silver Creek II
Silvercroft Wash
Figure 3

Project No. 014-10022-00



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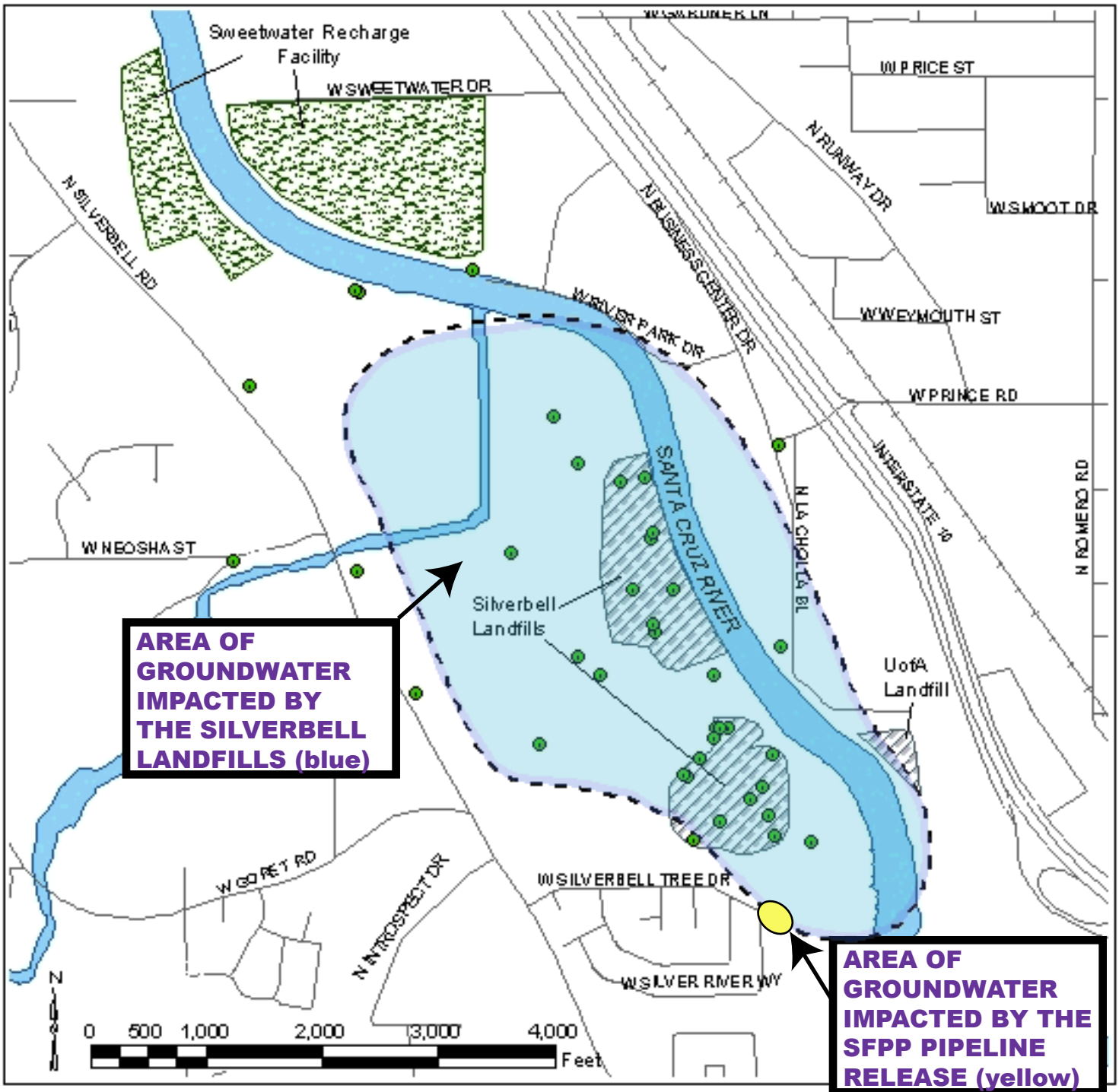
Plat Map of Silver Creek I
Silvercroft Wash
Figure 4

Project No. 014-10022-00



Estimated site boundary - Contour represents area of PCE contamination in groundwater that exceeds the Aquifer Water Quality Standard of 5.0 micrograms per liter.

Dashed line indicates site boundary

Road

Railroad

Well sample location

ADEQ Arizona Department of Environmental Quality

SILVERBELL JAIL ANNEX LANDFILL WQARF SITE

SITE BOUNDARY MAP

JULY 2003

TUCSON, ARIZONA

PREP: LCP REV: MAF	FILE: 100046-00

d:\user_file\lcp\silverbell\silver703.eps

Figure 5

OVERVIEW MAP - 01140217.1r - Levine Fricke Recon, Inc.

- ★ Target Property
- ▲ Sites at elevations higher than or equal to the target property
- ◆ Sites at elevations lower than the target property
- Coal Gasification Sites
- National Priority List Sites
- Landfill Sites
- Dept. Defense Sites
- Oil & Gas pipelines
- 100-year flood zone
- 500-year flood zone
- Federal Wetlands
- DOD Sites: AZ DEQ
- Water Quality Assurance Revolving Fund Areas

Figure 6

TARGET PROPERTY:	KMEP Silvercroft	CUSTOMER:	Levine Fricke Recon, Inc.
ADDRESS:	2897 N. Silver Island Way	CONTACT:	Doug Hulmes
CITY/STATE/ZIP:	Tucson AZ 85745	INQUIRY #:	01140217.1r
LAT/LONG:	32.2594 / 111.0120	DATE:	March 03, 2004 7:56 pm

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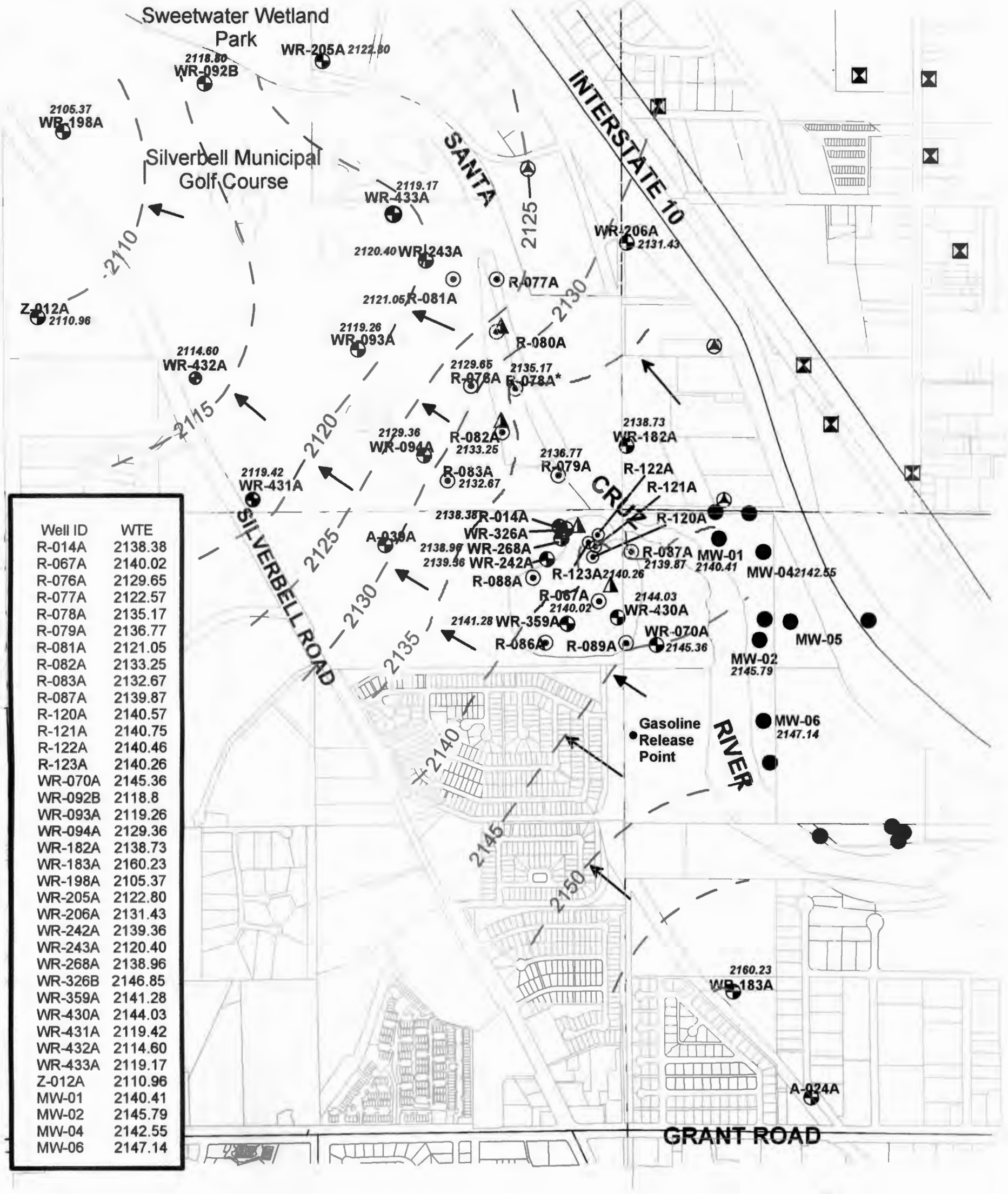
Site Vicinity Aerial Photograph
Showing Well Locations
as of 3/18/2004
Figure 7
Project No. 014-10022-04-001

LFR LEVINE•FRICKE



Well ID	WTE
R-014A	2138.38
R-067A	2140.02
R-076A	2129.65
R-077A	2122.57
R-078A	2135.17
R-079A	2136.77
R-081A	2121.05
R-082A	2133.25
R-083A	2132.67
R-087A	2139.87
R-120A	2140.57
R-121A	2140.75
R-122A	2140.46
R-123A	2140.26
WR-070A	2145.36
WR-092B	2118.8
WR-093A	2119.26
WR-094A	2129.36
WR-182A	2138.73
WR-183A	2160.23
WR-198A	2105.37
WR-205A	2122.80
WR-206A	2131.43
WR-242A	2139.36
WR-243A	2120.40
WR-268A	2138.96
WR-326B	2146.85
WR-359A	2141.28
WR-430A	2144.03
WR-431A	2119.42
WR-432A	2114.60
WR-433A	2119.17
Z-012A	2110.96
MW-01	2140.41
MW-02	2145.79
MW-04	2142.55
MW-06	2147.14

LEGEND

- CITY OF TUCSON GROUNDWATER MONITORING WELL
- CITY OF TUCSON SVE/AI WELL
- CITY OF TUCSON VAPOR MONITORING WELL
- ADEQ MONITORING WELL
- PRIVATE WELL
- U OF A MONITORING WELL
- GENERAL GRADIENT FLOW DIRECTION
- WATER TABLE ELEVATION CONTOUR
- * R-078A IS A PART OF A SOIL VAPOR EXTRACTION SYSTEM. ANOMALOUS GROUNDWATER ELEVATIONS COULD BE RELATED TO THE SYSTEM'S VACUUM CONDITIONS.

N

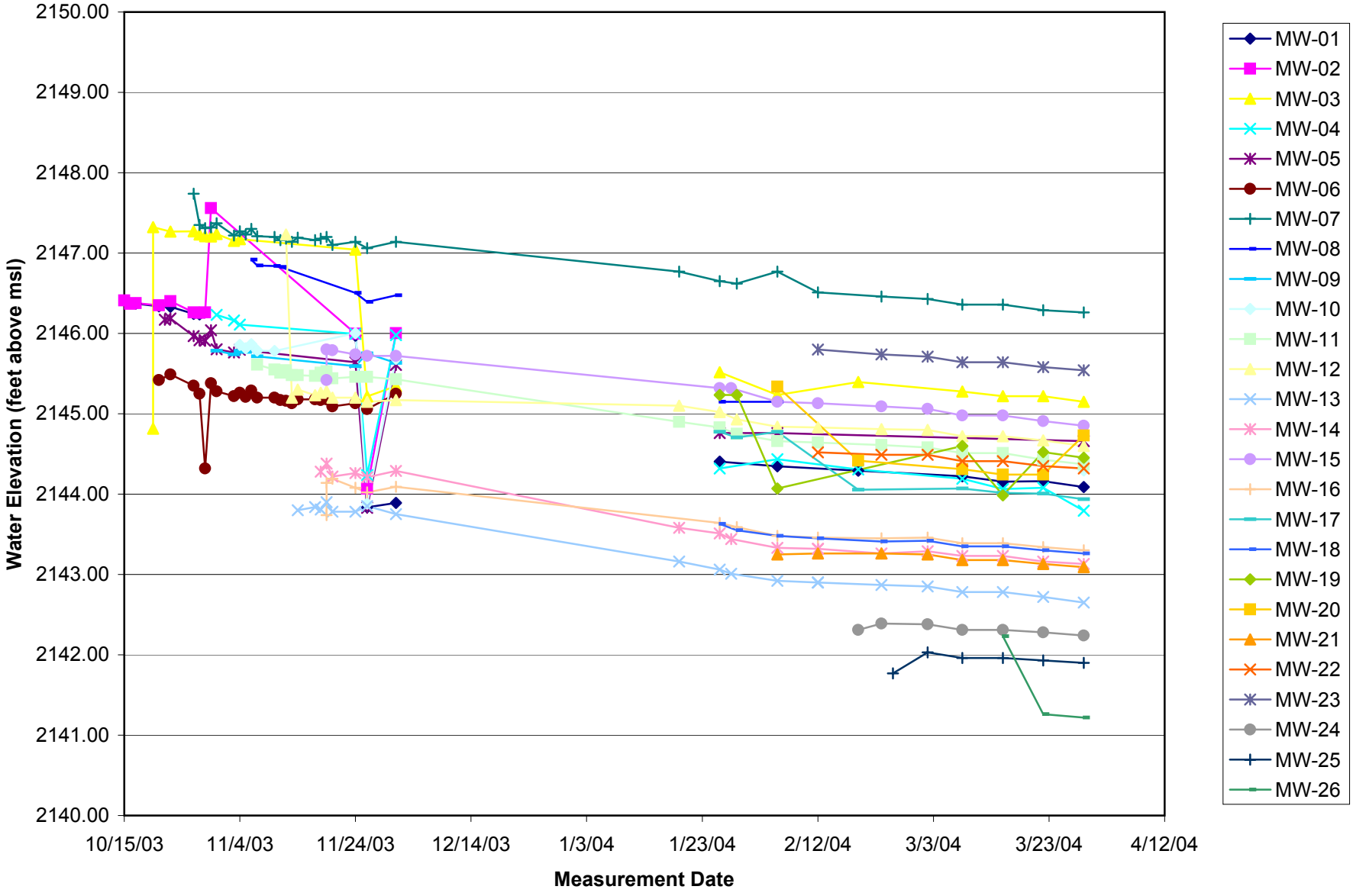
0 800 1600
SCALE IN FEET

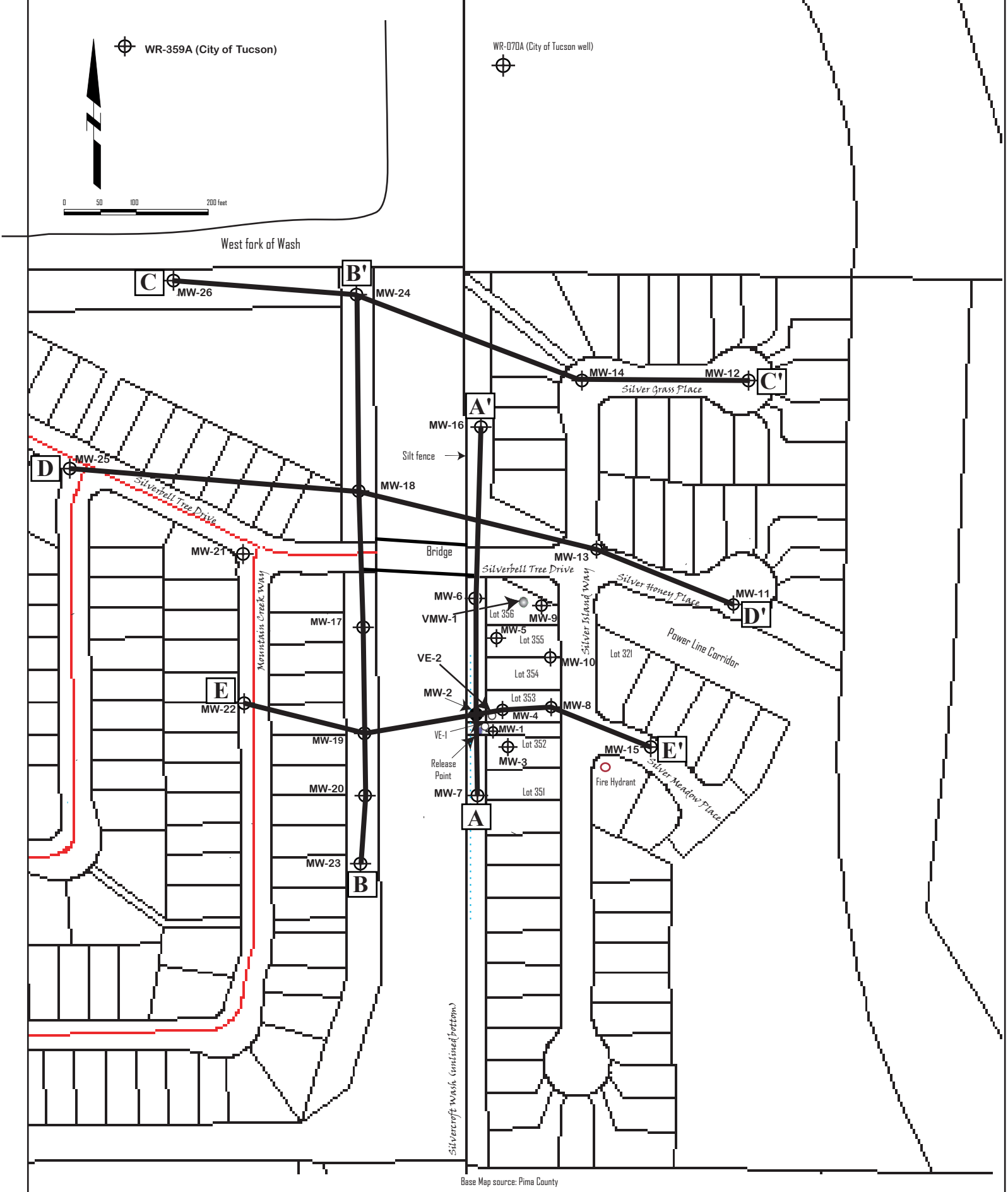
Figure 8

SILVERBELL LANDFILL
OCTOBER 2003

11/03/03 (dk,dw)

Figure 9
Groundwater Hydrographs
SFPP Silvercroft Wash Release Site





Base Map source: Pima County

LFR LEVINE • FRICKE

Soil Vapor Monitoring Well

SVE Well

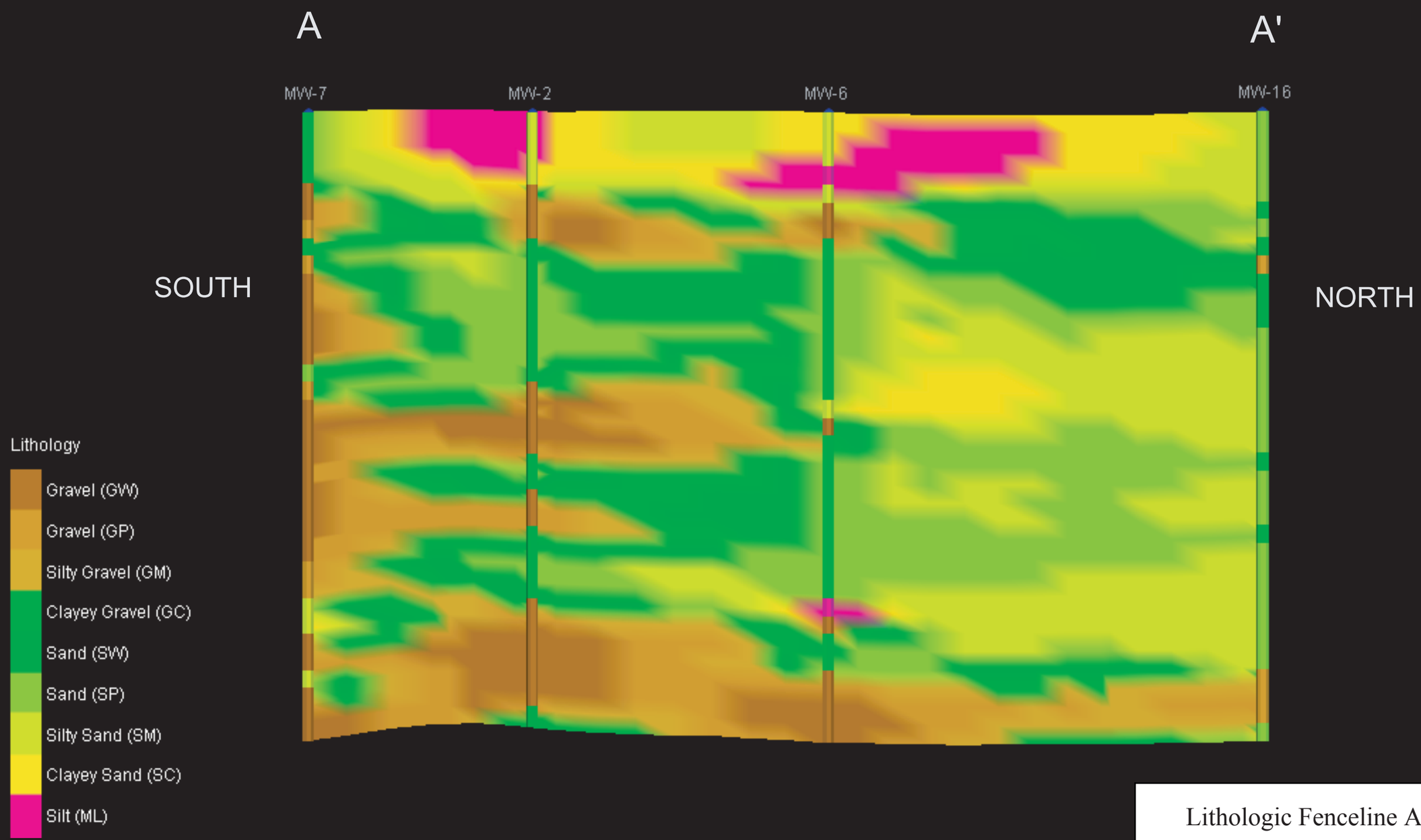
Release Point

Existing Groundwater Well

Site Map Showing Lithologic Fencelines

Figure 10

Project No. 014-10022-02



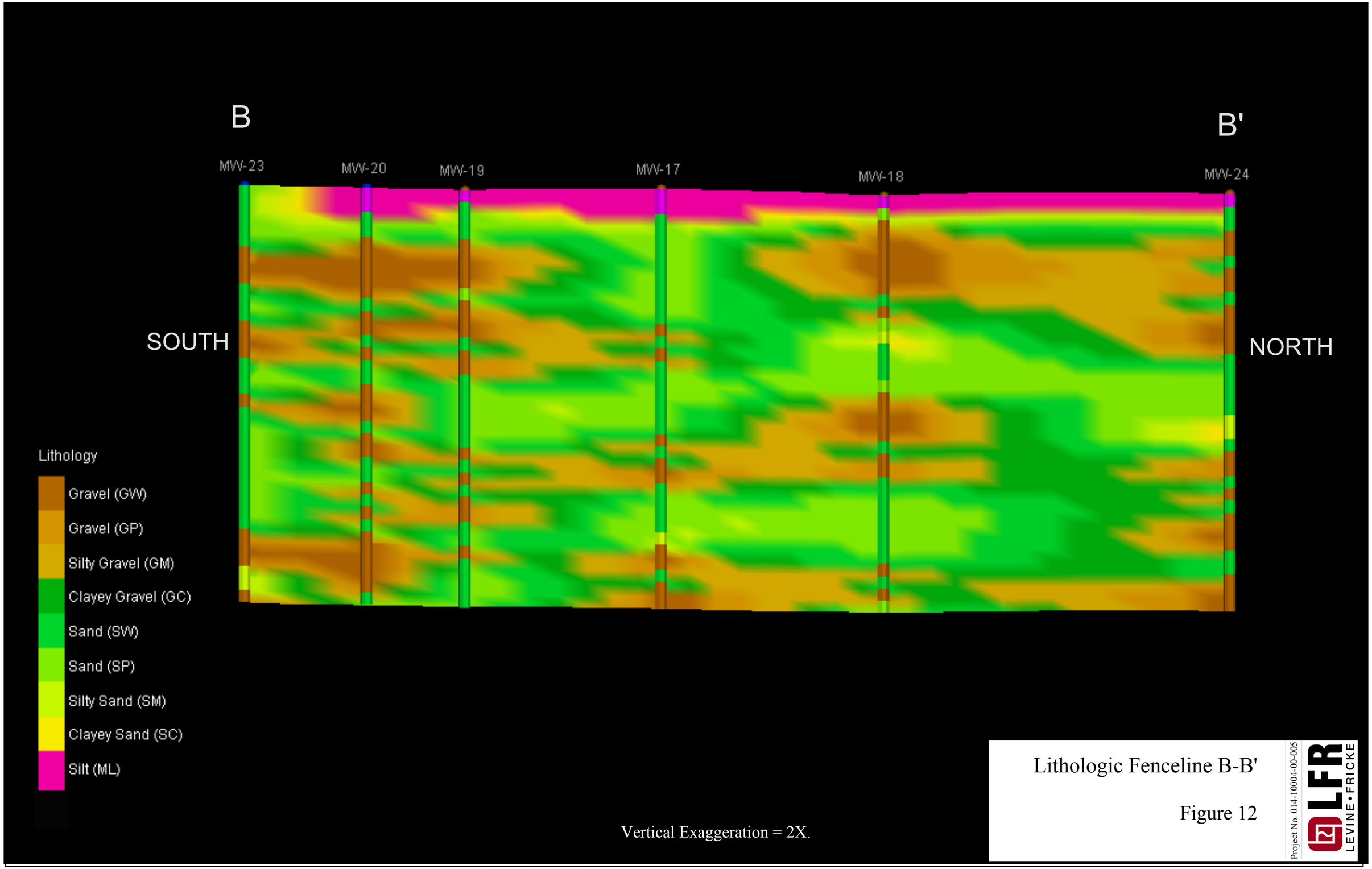
Vertical Exaggeration = 2X.

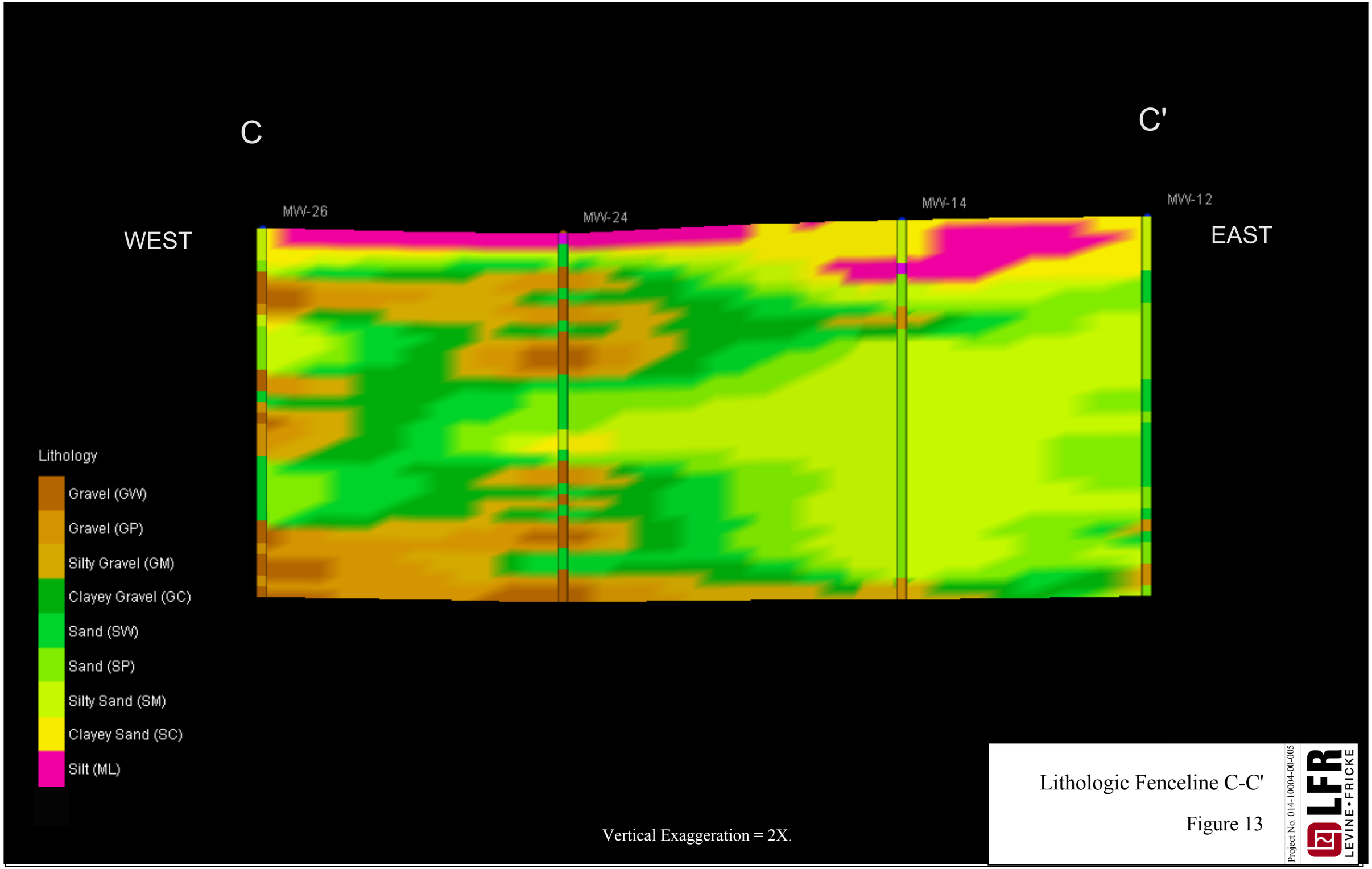
Lithologic Fenceline A-A'

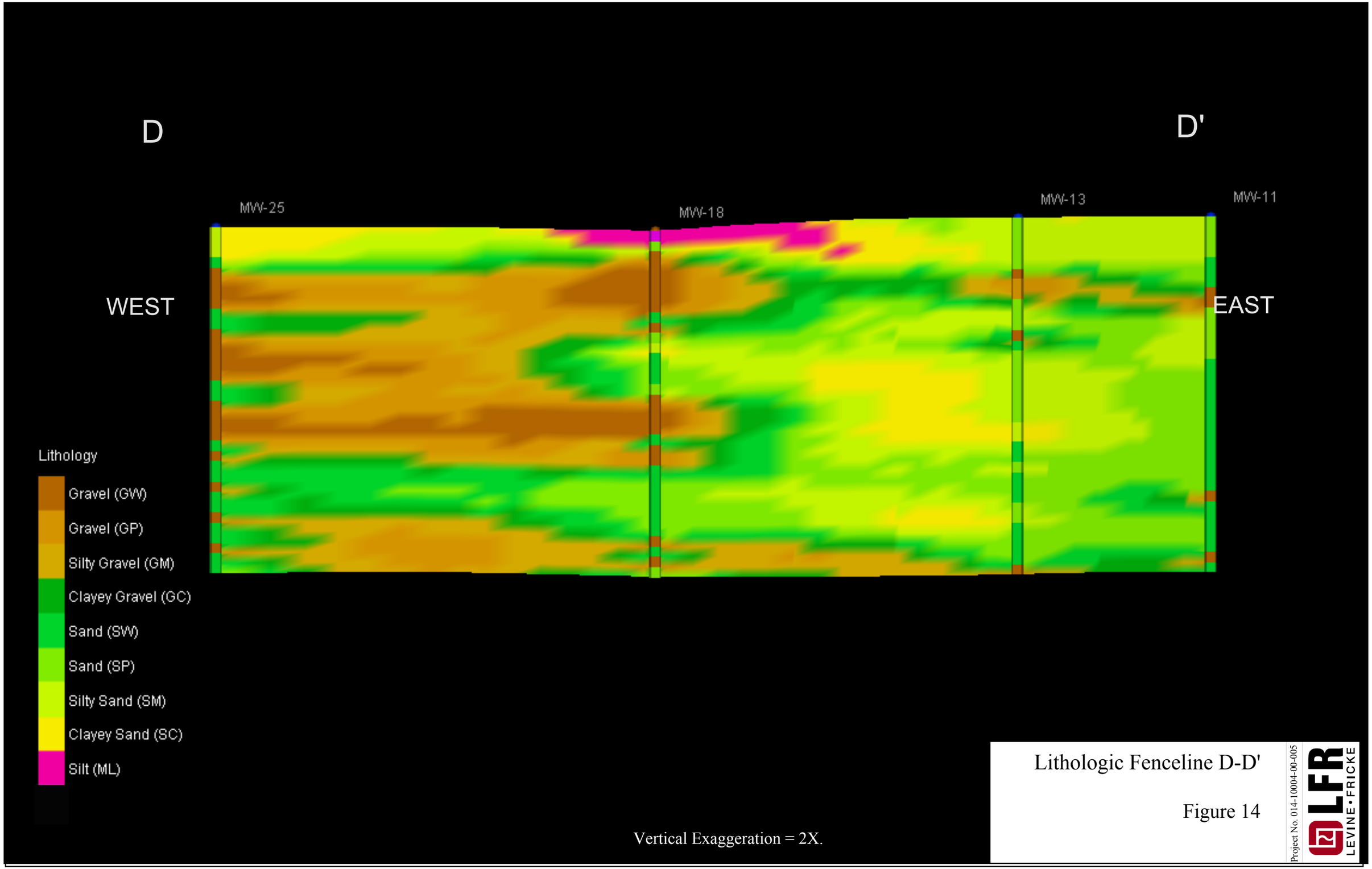
Figure 11

Project No. 014-10004-00-005

LFR LEVINE•FRICKE


B
B'
MW-23
MW-20
MW-19
MW-17
MW-18
MW-24
SOUTH
NORTH
Lithology
Gravel (GW)
Gravel (GP)
Silty Gravel (GM)
Clayey Gravel (GC)
Sand (SW)
Sand (SP)
Silty Sand (SM)
Clayey Sand (SC)
Silt (ML)
Vertical Exaggeration = 2X.
Lithologic Fenceline B-B'
Figure 12
Project No. 014-10004-00-005
LFR
LEVINE•FRICKE


C
C'
WEST
EAST
MW-26
MW-24
MW-14
MW-12
Lithology
Gravel (GW)
Gravel (GP)
Silty Gravel (GM)
Clayey Gravel (GC)
Sand (SW)
Sand (SP)
Silty Sand (SM)
Clayey Sand (SC)
Silt (ML)
Vertical Exaggeration = 2X.
Lithologic Fenceline C-C'
Figure 13
Project No. 014-10004-00-005
LFR
LEVINE•FRICKE

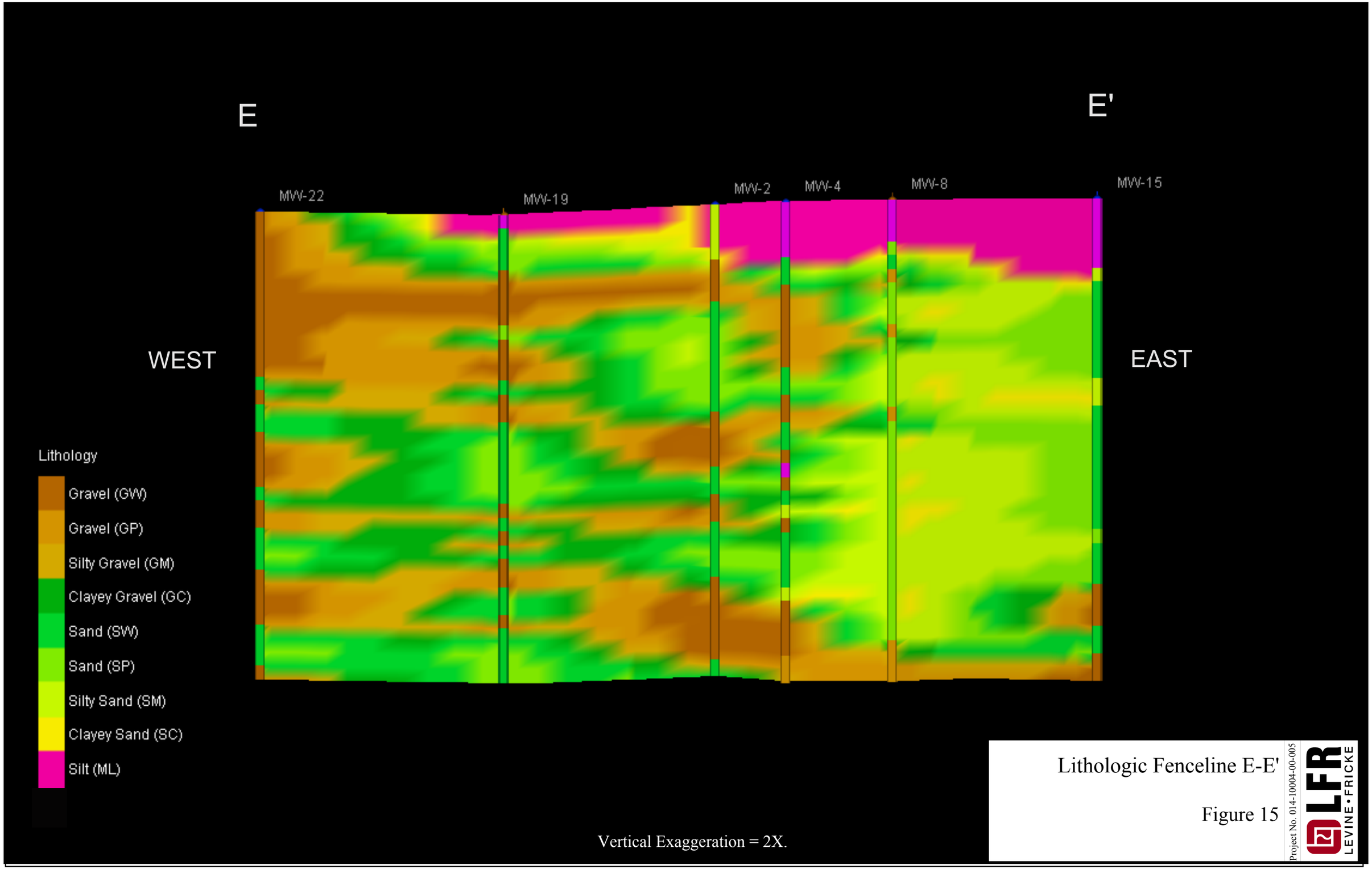


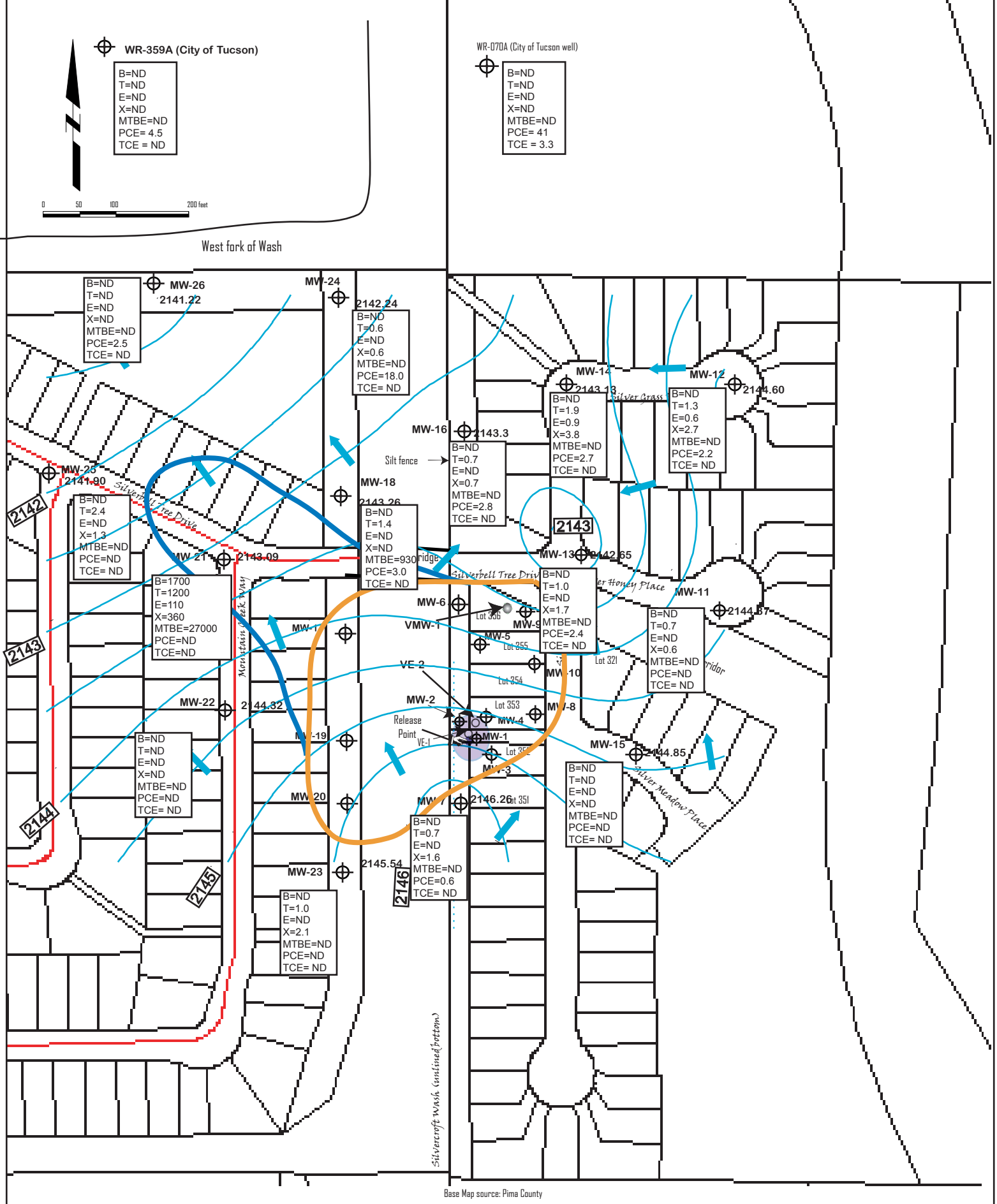
Lithologic Fenceline D-D'

Figure 14

Project No. 014-10004-00-005

LFR LEVINE•FRICKE


E
E'
MW-22
MW-19
MW-2
MW-4
MW-8
MW-15
WEST
EAST
Lithology
Gravel (GW)
Gravel (GP)
Silty Gravel (GM)
Clayey Gravel (GC)
Sand (SW)
Sand (SP)
Silty Sand (SM)
Clayey Sand (SC)
Silt (ML)
Vertical Exaggeration = 2X.
Lithologic Fenceline E-E'
Figure 15
Project No. 014-10004-00-005
LFR
LEVINE•FRICKE



LFR
LEVINE • FRICKE

Soil Vapor Monitoring Well
SVE Well
Release Point
Existing Groundwater Well
Extent of Free Product
Extent of dissolved phase BTEX above AWQS
Approximate Extent of Soil Deeper than 10 feet Exceeding ADEQ Cleanup Levels (All samples within 10 feet of the surface are in compliance)

Groundwater Elevation Map (March 29, 2004) With Free Product and Dissolved Phase Plumes

Figure 16

Project No. 014-10022-02

Figure 17: Apparent Free Product Thickness vs. Time
East Side of Silvercroft Wash

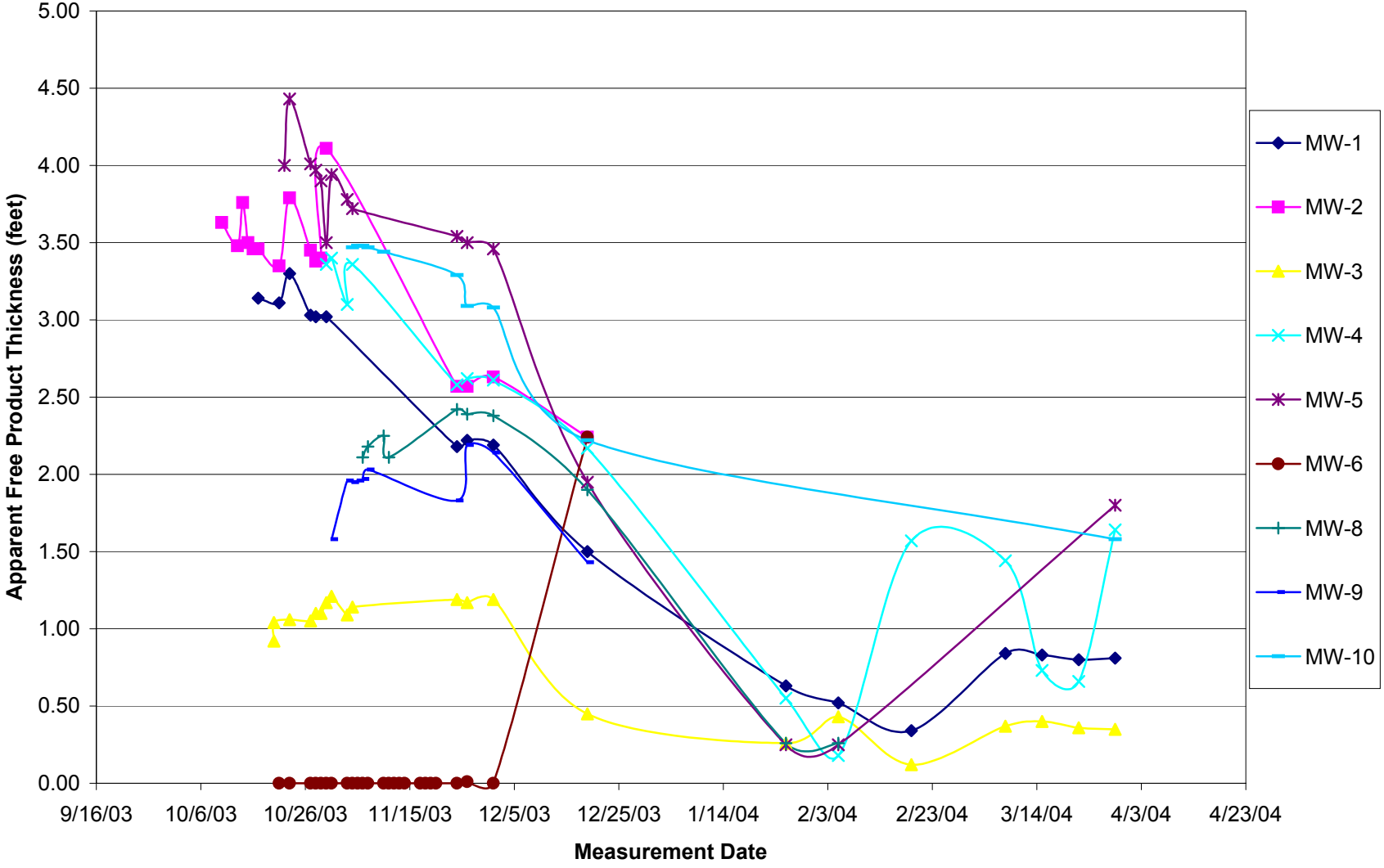
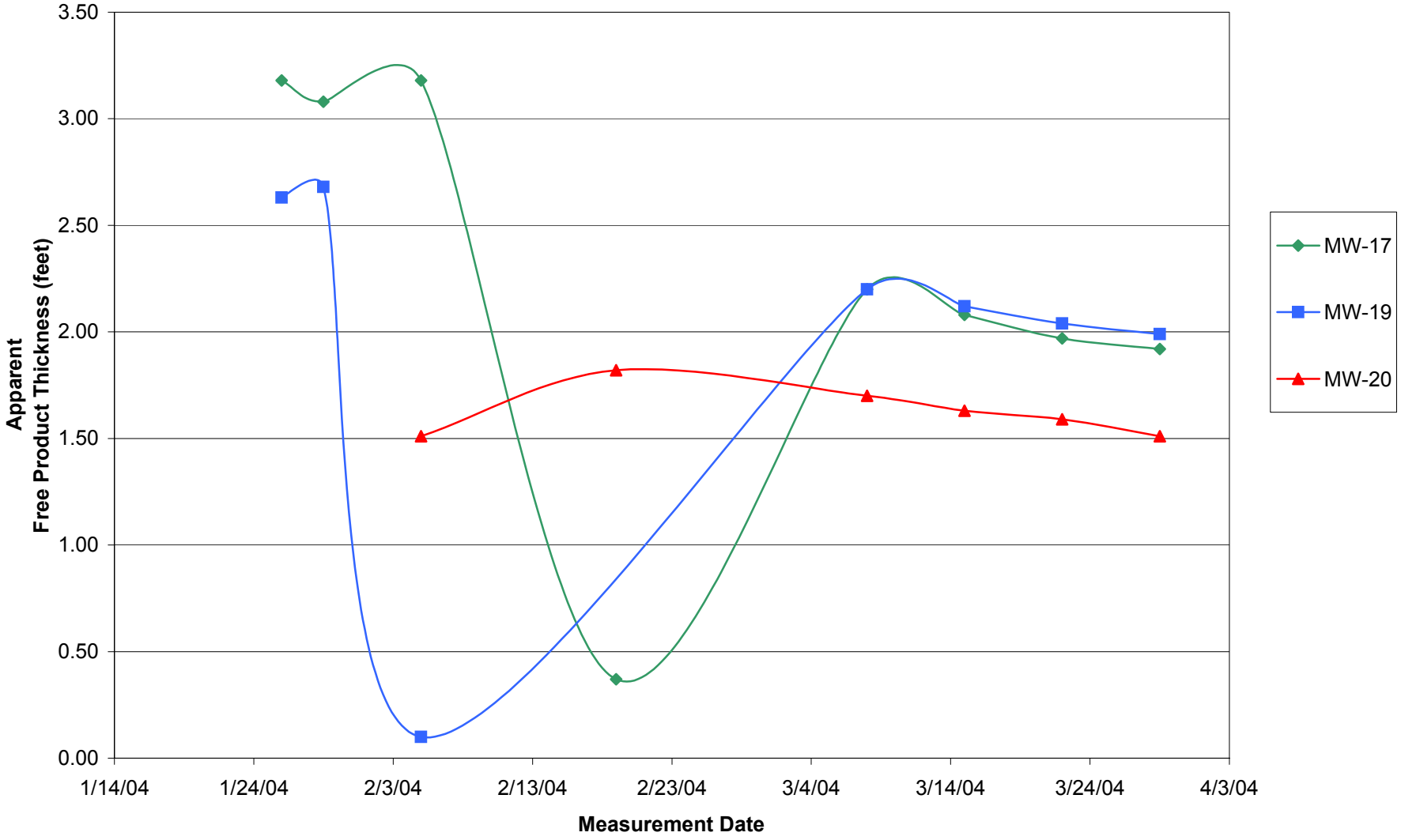
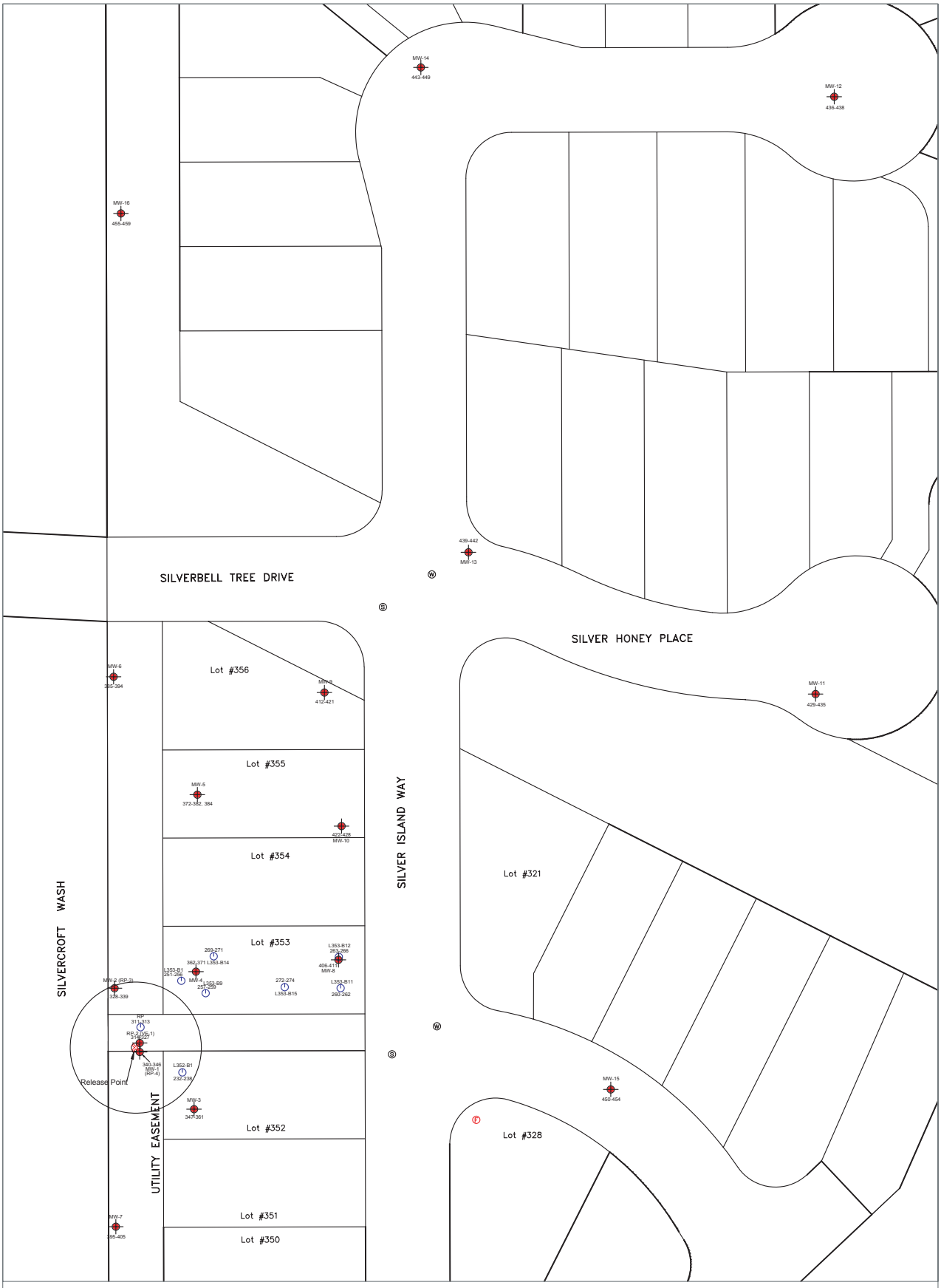


Figure 18: Apparent Free Product Thickness vs. Time
West Side of Silvercroft Wash





LEGEND

◯	Approximate extent of affected soil column >10 feet bgs
312-313	Soil Boring Sample Location
340-352	Monitor Well Soil Sample Location
F	Fire Hydrant
S	Sewer Manhole
W	Water Valve

N

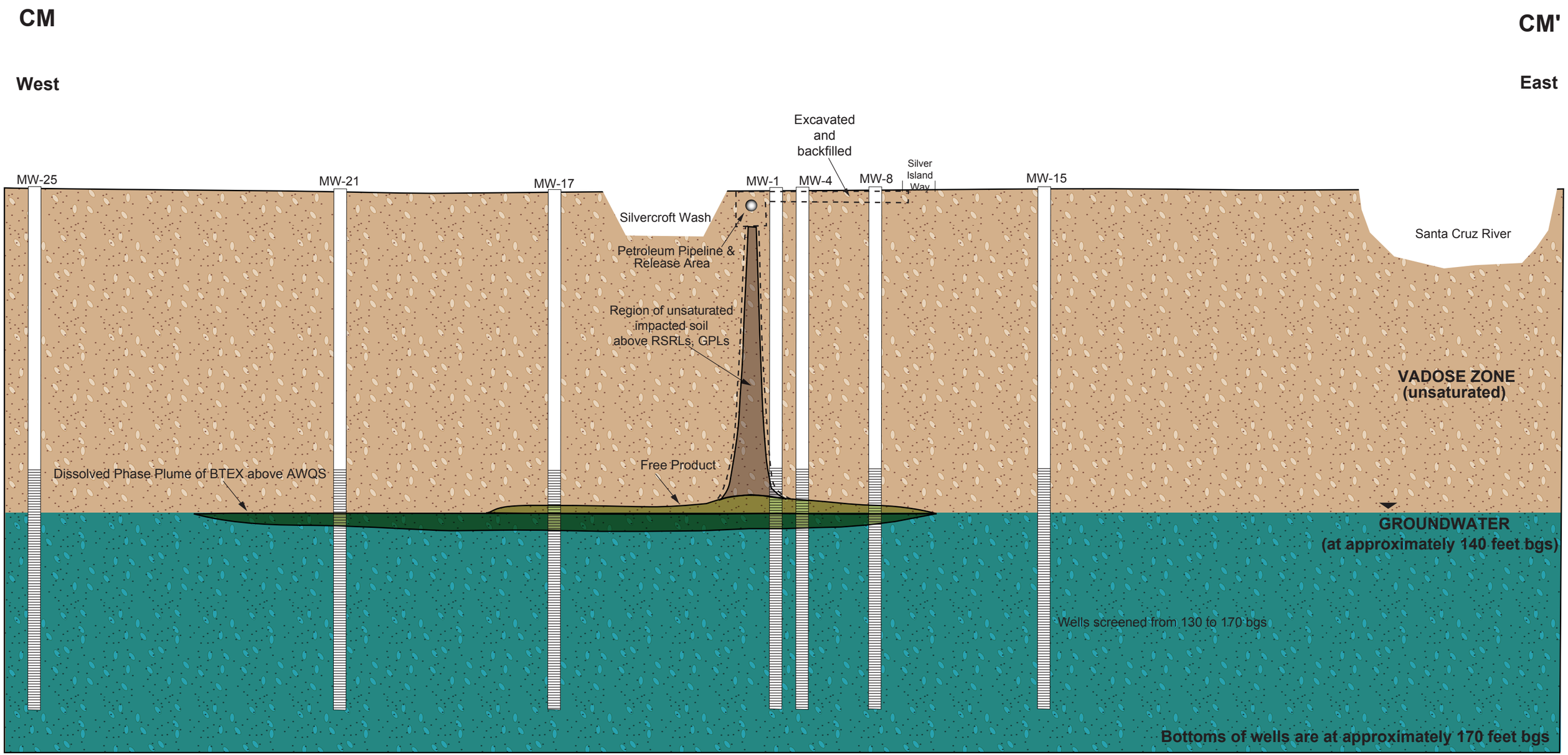
0 25 50 FEET

SFPP L.P. SILVERCROFT WASH
RELEASE SITE

Extent of Affected Soil in Vadose Zone

Figure 19
Project No. 014-10022-00

LFR LEVINE•FRICKE



EXPLANATION

Gravel and Sand

Free Product

Dissolved Phase Plume of BTEX above AWQS

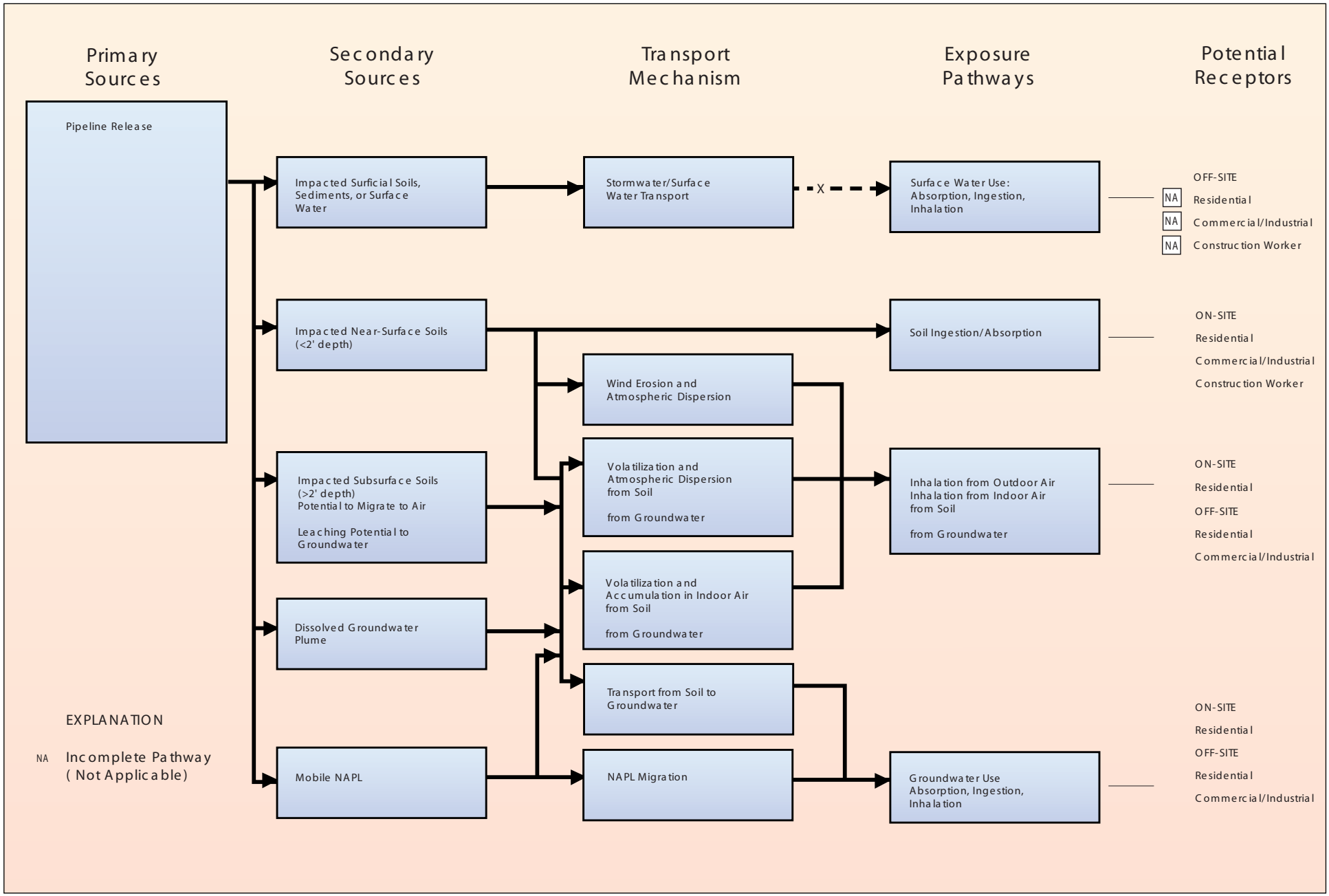
Region of unsaturated impacted soil above RSRLs, GPLs

Site Conceptual Model

Silvercroft Wash Release Site
Kinder Morgan Energy Partners

Figure 20

LFR LEVINE•FRICKE



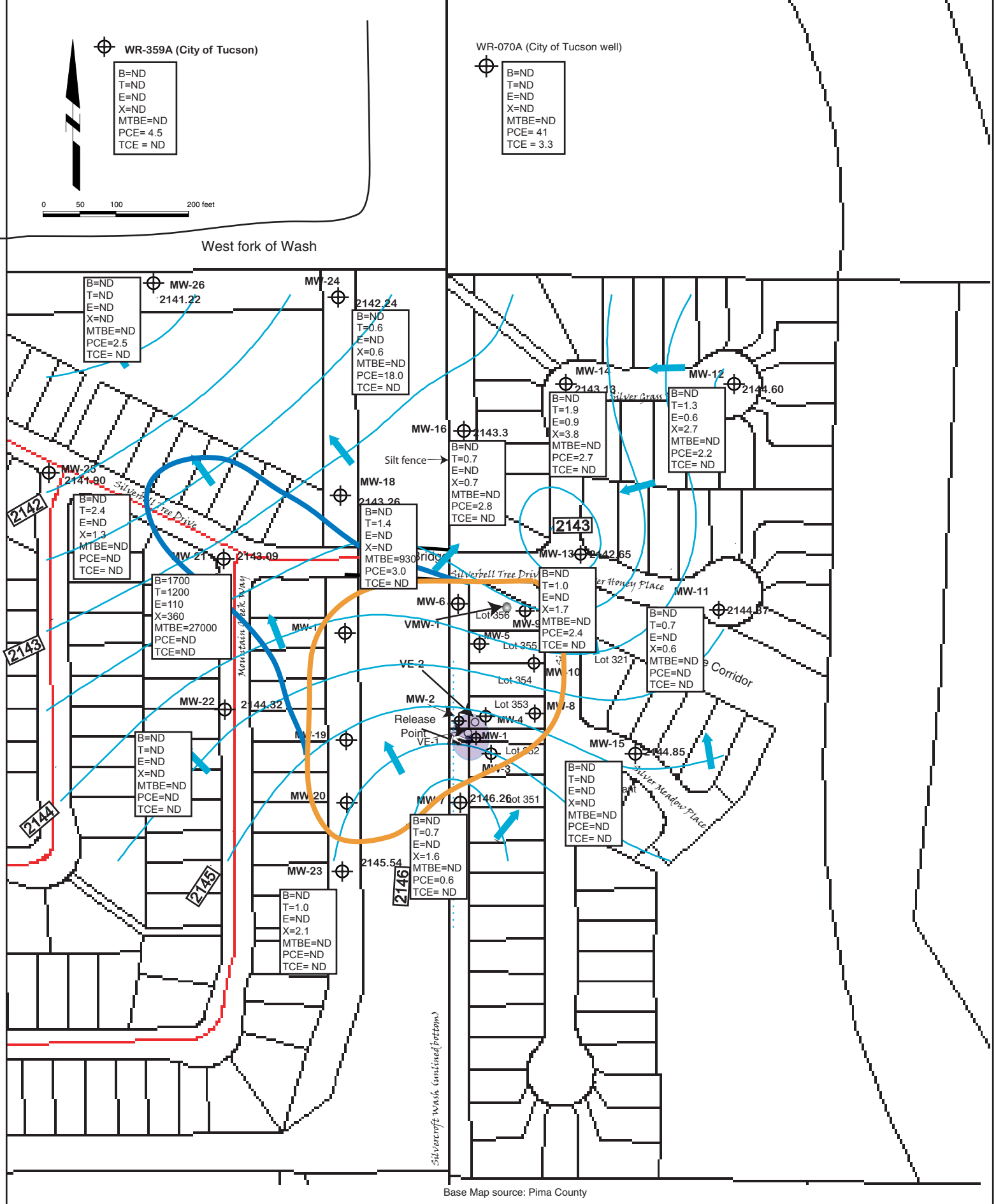
Site Conceptual Exposure Model

LFR LEVINE•FRICKE

SFPP Silvercroft Wash Release Site

Figure 21

Project No. 014-10022



Base Map source: Pima County

LFR LEVINE • FRICKE

Soil Vapor Monitoring Well

SVE Well

Release Point

Existing Groundwater Well

Extent of PSH

Extent of dissolved phase BTEX above AWQS

Approximate Extent of Soil Deeper than 10 feet Exceeding ADEQ Cleanup Levels (All samples within 10 feet of the surface are in compliance)

Map Illustrating Extents of Hydrocarbons in Soil, in the Free Product Plume, and in the Dissolved-phase BTEX Plume

Figure 22

Project No. 014-10022-02

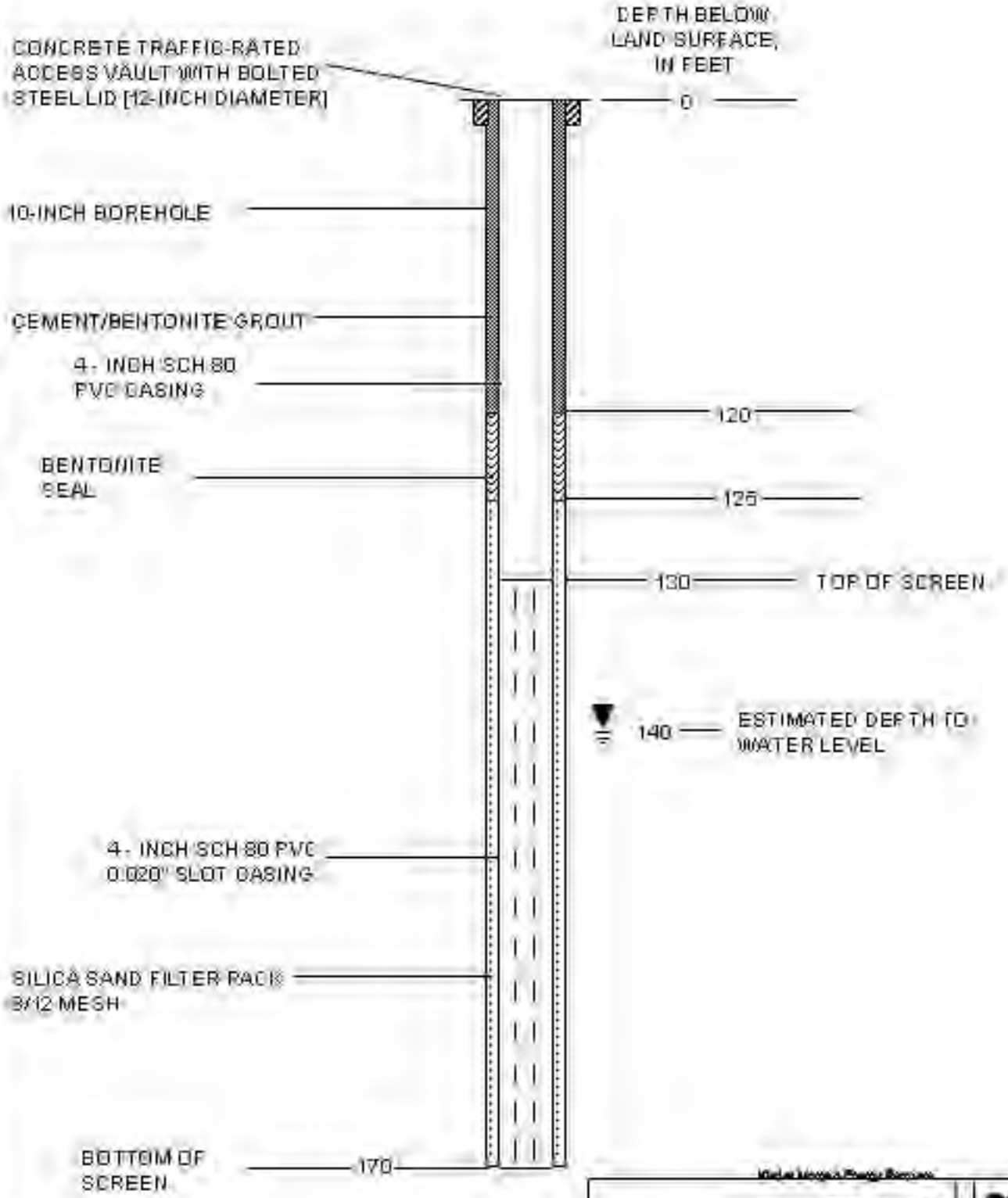
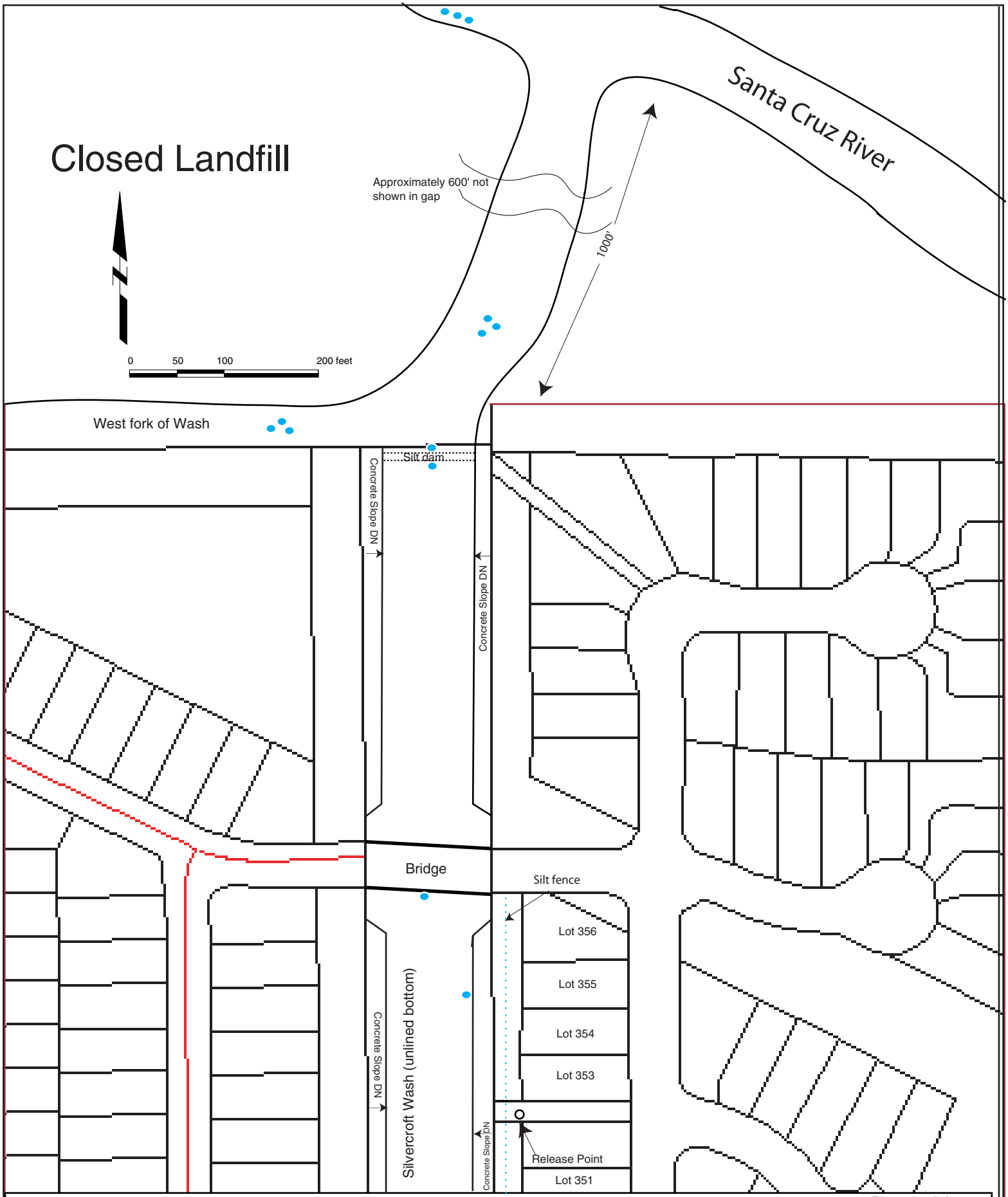


Figure 23
Schematic of Groundwater Well Construction
Project No. 014-10022-00



8329-002 04102000DGH/dgh

Base Map source: Pima County

Phoenix, Arizona

LFR LEVINE • FRICKE

Surface Water Sample Location

Map of Surface Water Sampling Locations

Figure 24

Project No. 014-10022-00

ARCADIS U.S., Inc.
14201 N. 87th Street
Suite 135
Scottsdale
Arizona 85260
Tel 480.905.9311
Fax 480.905.9353
www.arcadis-us.com

ENVIRONMENT

Ms. Nancy Petersen
City of Tucson, Environmental Services
4004 S. Park Ave. Bldg #1
Tucson, AZ 85726-7210

Subject:
Monitoring Well Installation Report
Silvercroft Wash Pipeline Release Site
Tucson, Arizona

Date:
May 15, 2014

Contact:
Robert Forsberg

Phone:
480.905.9311

Email:
Bob.Forsberg
@arcadis-us.com

Our ref:
ST010022.0028

Dear Ms. Petersen:

On behalf of SFPP, L.P. (SFPP), an operating partnership of Kinder Morgan Energy Partners (KMEP), ARCADIS U.S., Inc. (ARCADIS) is pleased to submit this *Monitoring Well Installation Report* for the SFPP Silvercroft Wash Pipeline Release Site in Tucson, Arizona (the Site; Figure 1).

1. Objective

Objectives that were addressed during this drilling and groundwater monitoring well installation included the following:

- Drill, install, and develop two groundwater monitoring wells within 500 feet of the west side of the City of Tucson (COT) Silverbell Landfill;
- Drill, install, and develop three clustered wells within 100 feet of the COT Silverbell Landfill; and
- Drill, install, and develop one groundwater monitoring well within 500 feet of the south side of the COT Silverbell Landfill.

2. Access, Permitting, and Notification

SFPP met all access and permitting requirements for the activities described herein. The following sections describe the access and permitting activities required.

2.1 City of Tucson Access

The Environmental Access Agreement (EAA) between the COT and KMEP was updated to include the drilling and installation of the six new groundwater monitoring wells. The EAA was finalized on October 28, 2013. All work within the COT property limits was conducted in accordance with the approved EAA between the COT and KMEP.

2.2 Drilling Permits

Groundwater monitoring well installation permits (MW-27, MW-28, MW-29S, MW-29M, MW-29D, and MW-30) were obtained from the Arizona Department of Water Resources (ADWR). Copies of the ADWR permits are included in Attachment A.

2.3 Utility Clearance

Numerous underground utilities were present at the Site. These included: water mains, electrical lines, and product lines.

A KMEP line rider and/or inspector reviewed and approved the boring locations with respect to KMEP infrastructure. Arizona BlueStake was notified at least 48-hours prior to the start of intrusive activities to allow for member utility companies to mark underground lines that may conflict with the proposed areas. Each proposed marked location was also cleared by a private underground utility locating company, Safe Site Utility Services, LLC (Safe Site). Safe Site performed electromagnetic and ground penetrating radar surveys around each location to determine if the location was clear of underground utilities.

Each boring location was then cleared by a final step of air-knifing. All six boring locations were air-knifed, a 10- to 12-inch-diameter hole, down to approximately 8 ft bgs.

2.4 Public Notification

A notification letter, dated October 11, 2013, was prepared and placed on homeowner doors within the Silver Creek I and Silver Creek II subdivisions and the COT low-income housing adjacent to the southwestern corner of the COT Silverbell Landfill prior to any field activity. In addition, all homeowner associations were given the notification for posting. A copy of the notification is provided in Attachment B.

3. Groundwater Monitoring Well Drilling

From November 4, 2013 through November 25, 2013, Layne Christensen Drilling Co. (Layne) drilled and installed six groundwater monitoring wells (MW-27, MW-28, MW-29S, MW-29M, MW-29D, and MW-30) at the Site under the supervision of ARCADIS. MW-27 and MW-28 were installed within 500 feet of the west side of the COT Silverbell Landfill. Clustered wells, MW-29S, MW-29M, and MW-29D, are located within 100 feet of the COT Silverbell. MW-30 is located within 500 feet of the south

side of the COT Silverbell Landfill. Figure 2 shows the locations of the newly installed groundwater monitoring wells.

3.1 Air Monitoring

All intrusive activities performed during the drilling and installation of the groundwater monitoring wells were air monitored. A GEM 2000 landfill meter was used to monitor for methane gas and Multi Rae Plus meter was used to monitor for volatile organic compounds (VOCs), lower explosive limits (LEL), carbon dioxide (CO), and hydrogen sulfide (H2S). The air within the drillers breathing zone was monitored approximately every 15 minutes and recorded on air monitoring logs. No methane was encountered during the drilling and installation of the wells. Copies of the air monitoring logs are provided in Attachment D.

3.2 Borehole Logging

Soil borings were drilled by Layne using an AP-1000 (Becker) Percussion Hammer drill rig equipped with a dual wall pipe and under the supervision of ARCADIS. Prior to drilling, each boring was cleared for subsurface features by air-knifing a 10- to 12-inch-diameter hole to a minimum depth of 8 feet as described in section 2.3. Soil grab samples were collected from the drill cuttings for field VOC screening and lithologic logging.

Each borehole was logged by a geologist under the supervision of an Arizona Registered Geologist. Soil samples were classified in accordance with ASTM Designation D 2488-00, Standard Practice for Description and Identification of Soils (Visual-Manual Procedure) and logged in accordance with the Unified Soil Classification System (USCS). Soil encountered during drilling of the groundwater monitoring wells was described on soil boring logs (Appendix D).

3.3 Groundwater Well Installation

Each borehole was converted to a groundwater monitoring well following drilling activities. The total depth for the wells ranged from 189 ft bgs (MW-27) to 259 ft bgs (MW-29D). Well construction as-builts are provided in Attachment E. Well completion information for each well installed during the investigation is presented in Table 1 and described below.

3.4 Decontamination

Prior to mobilization, the drilling rig and associated equipment was thoroughly cleaned to remove oil, grease, mud, and other foreign matter. In addition, before

initiating drilling at a subsequent location, the drill cutting bits, samplers, drill steel, and associated equipment (equipment that will come in contact with soil or groundwater down the hole) were thoroughly cleaned by the contractor at a decontamination area to prevent potential cross-contamination from the previous drilling location. Field personnel visually inspected the equipment after cleaning and prior to initiation of drilling activities.

3.5 Groundwater Monitoring Well Development

Well development activities for groundwater monitoring wells MW-27, MW-28, MW-29S, MW-29M, MW-29D, and MW-30 occurred from November 25, 2013 through December 11, 2013. Well development consisted of surging, bailing, and pumping groundwater with a pump rig. Each well screen was surged in 10-foot sections from the top of the screened interval to the bottom. A bailer was used to remove settled solids that entered the casing during surging. Once the sediment was removed from the well, a submersible pump was lowered to within 5-feet of the bottom of the well. The submersible pump was used to remove the finer grained materials from the filter pack and clarify the water to less than approximately 10 nephelometric turbidity units (NTUs). Pumped water was monitored with a Horiba U-50 water meter and recorded on log sheets. All purged water was containerized in temporary poly tanks and labeled. Well Development logs are provided in Attachment F.

3.6 Well Head Survey

A state-certified land surveyor from AZTEC Engineering was contracted to survey the new wells MW-27, MW-28, MW-29S, MW-29M, MW-29D, and MW-30 installed during the investigations. This land survey was performed in North American Datum 1983 coordinate system and to the nearest one-hundredth of an inch in elevation. Survey elevations for each top of casing are presented in Table 2. The surveyor report is presented in Attachment G.

4. Investigation-Derived Waste (IDW) Management

During the field activities, three types of investigation-derived wastes (IDW) were produced: drill cuttings, purge water, and refuse. Each waste was characterized, handled, and disposed of in accordance with all applicable rules and regulations.

4.1 Drill Cuttings

Drill cuttings were collected and stored on site in labeled roll-bins. Following completion of the drilling and well installation activities, a composite soil sample was

collected from each roll-off bin for waste characterization to profile the cuttings for off-site disposal. The composite sample was submitted to an Arizona-licensed analytical laboratory for the following analyses:

- CARB 435 (PLM) Level A (asbestos)
- EPA Method 8082 (polychlorinated biphenyls)
- SW 9095 (paint filter)
- EPA Method 8081/608 (organochlorine pesticides)
- EPA Method 8141 (organophosphate pesticides)
- EPA Method 8151 (herbicides)
- EPA Method 8260B (volatile organic compounds [VOCs] including methyl tertiary-butyl ether [MTBE], tertiary-butyl alcohol [TBA], and tertiary-amyl methyl ether [TAME])
- EPA Method 8015AZ (C_{10} - C_{32} hydrocarbons)
- EPA Method 6010/7471 (Resource Conservation and Recovery Act [RCRA] 8 metals)
- EPA Method 1010 (flashpoint/ignitability)
- EPA Method 9045B (pH)
- EPA Method 8270C-SIM (Polynuclear Aromatic Hydrocarbons [PAHs])

Analytical results and the completed waste profile sheet are included in Attachment H. The drill cuttings were characterized as nonhazardous and ARCADIS coordinated with KMEP to arrange for the proper disposal. The drill cuttings were removed from the Site by MP and disposed of at Butterfield Regional Landfill in Mobile, Arizona under proper manifest. Waste manifests are included in Attachment I.

4.2 Purge Water

Purge water from the development and decontamination activities was stored temporary poly tanks on site. A sample was collected from each poly tank and submitted to ESC laboratory and analyzed for the following:

- EPA Method 8260B (VOCs including MTBE, TBA, and TAME)
- EPA Method 8015AZ (C_{10} - C_{32} hydrocarbons)
- EPA Method 6010/7471 (RCRA 8 metals)

- EPA Method 1010 (flashpoint/ignitability)
- EPA Method 9045B (pH)

The purge water was characterized as nonhazardous and MP disposed of the purge water at Liquid Environmental Solutions in Phoenix, AZ. A copy of the laboratory analytical results and disposal information is included in Attachment H and waste manifests are included in Attachment I.

4.3 Refuse

Miscellaneous refuse included disposable personal protective equipment, disposable sampling equipment, used labels, food and drink containers, plastic sheeting, and construction-type debris. The majority of this material was classified as solid waste containing no hazardous substances and was disposed of at an approved landfill.

Sincerely,

Robert Forsberg, P.G.
Principal Geologist

Tables:

1 Well Construction Details

Figures:

1 Site Map

2 Well Location Map

Attachments:

A ADWR Permits and Drill Reports

B Public Notification

C Air Monitoring Logs

D Soil Boring Logs

E Well As-Builts

F Well Development Logs

G Surveyor Report

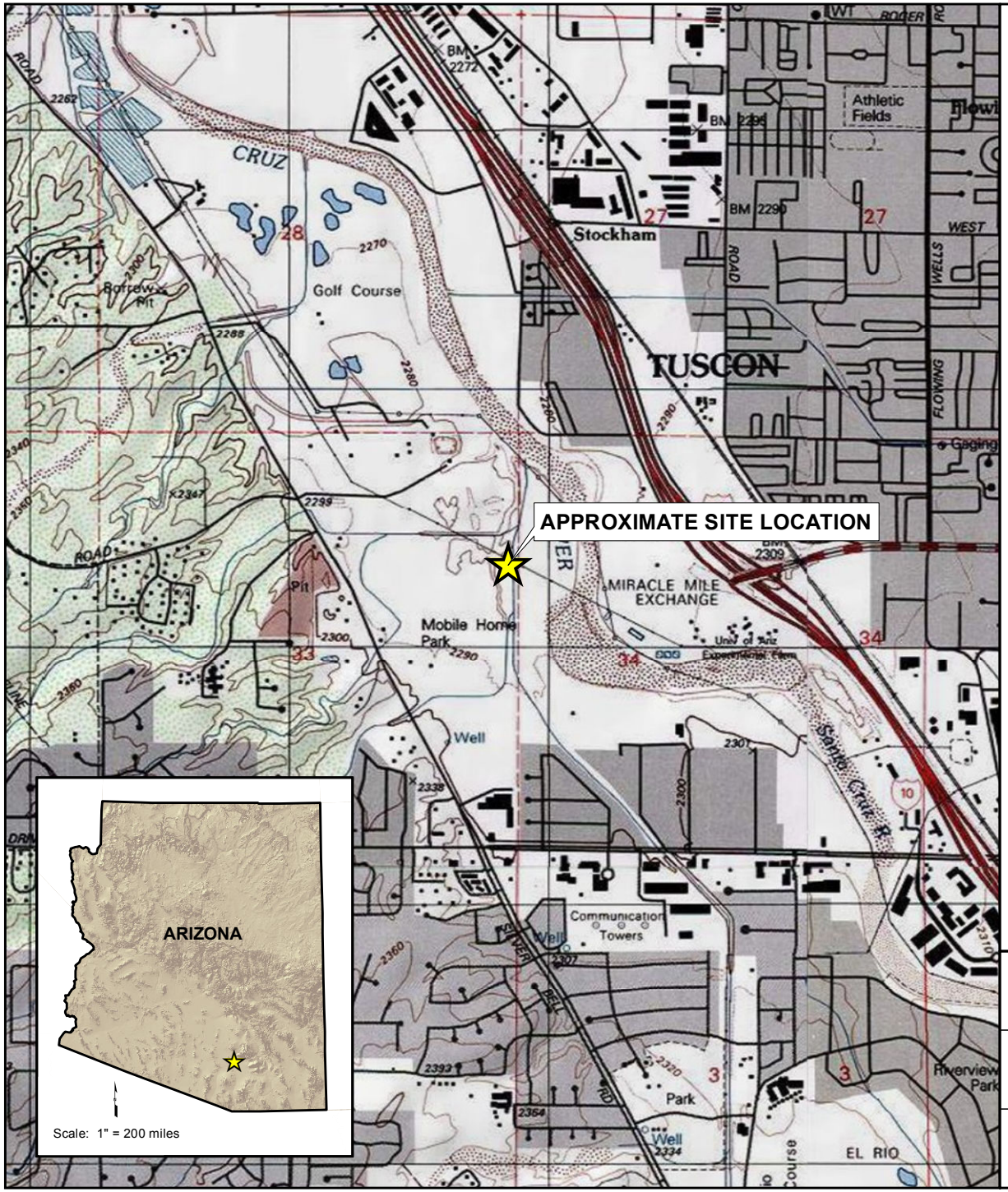
H IDW Laboratory Analytical Reports

I Waste Manifests

Table 1
Well Construction Details
Silvercroft Wash Release Site
Tucson, Arizona

Well Name		**MW-27**	**MW-28**	**MW-29S**	**MW-29M**	**MW-29D**	**MW-30**
ADWR Well Number		55-222708	55-222709	55-222710	55-222711	55-222712	55-222713
Total Borehole Depth (ft bgs)		190	190	190	225	261	205
Screen	Diameter (inches)	4	4	4	4	4	6
	Type	SS Wire Wrap	SS Wire Wrap	SS Wire Wrap	SS Wire Wrap	SS Wire Wrap	SS Wire Wrap
	Slot (inches)	0.02	0.02	0.02	0.02	0.02	0.05
	Interval (ft bgs)	149-189	149-189	149-189	194-224	229-259	145-200
Blank Casing	Type	LC Steel	LC Steel	LC Steel	LC Steel	LC Steel	LC Steel
	Interval (ft bgs)	to 39	to 39	to 39	to 39	to 39	to 40
	Type	Sch 80 PVC	Sch 80 PVC	Sch 80 PVC	Sch 80 PVC	Sch 80 PVC	Sch 80 PVC
	Interval (ft bgs)	39 to 189	39 to 189	39 to 189	39 to 224	39 to 259	40 to 200
Filter Pack	Type	#8-12	#8-12	#8-12	#8-12	#8-12	#8-12
	Interval (ft bgs)	149-190	144-190	144-190	189-225	224-261	140-205
Transition Sand	Type	#60	#60	#60	#60	#60	#60
	Interval (ft bgs)	144-149	139-144	139-144	184-189	219-224	135-140
Neat Cement Seal	Type	Neat Cement	Neat Cement	Neat Cement	Neat Cement	Neat Cement	Neat Cement
	Interval (ft bgs)	0-144	0-139	0-144	0-184	0-219	0-135
Surface Completion	Type	12-inch diameter Monument	12-inch diameter Monument	12-inch diameter Monument	12-inch diameter Monument	12-inch diameter Monument	12-inch diameter Flushmount
	Pad	Concrete	Concrete	Concrete	Concrete	Concrete	Concrete
Development	Surge	x	x	x	x	x	x
	Bail	x	x	x	x	x	x
	Pump	x	x	x	x	x	x

Note:
ADWR = Arizona Department of Water Resources
bgs = below ground surface
LC = low carbon
ft = feet
ss = stainless steel



LEGEND

Approximate site location

NOTES

· Topographic map source: USGS.

Feet
0 1,000 2,000
Scale: 1" = 2,000'

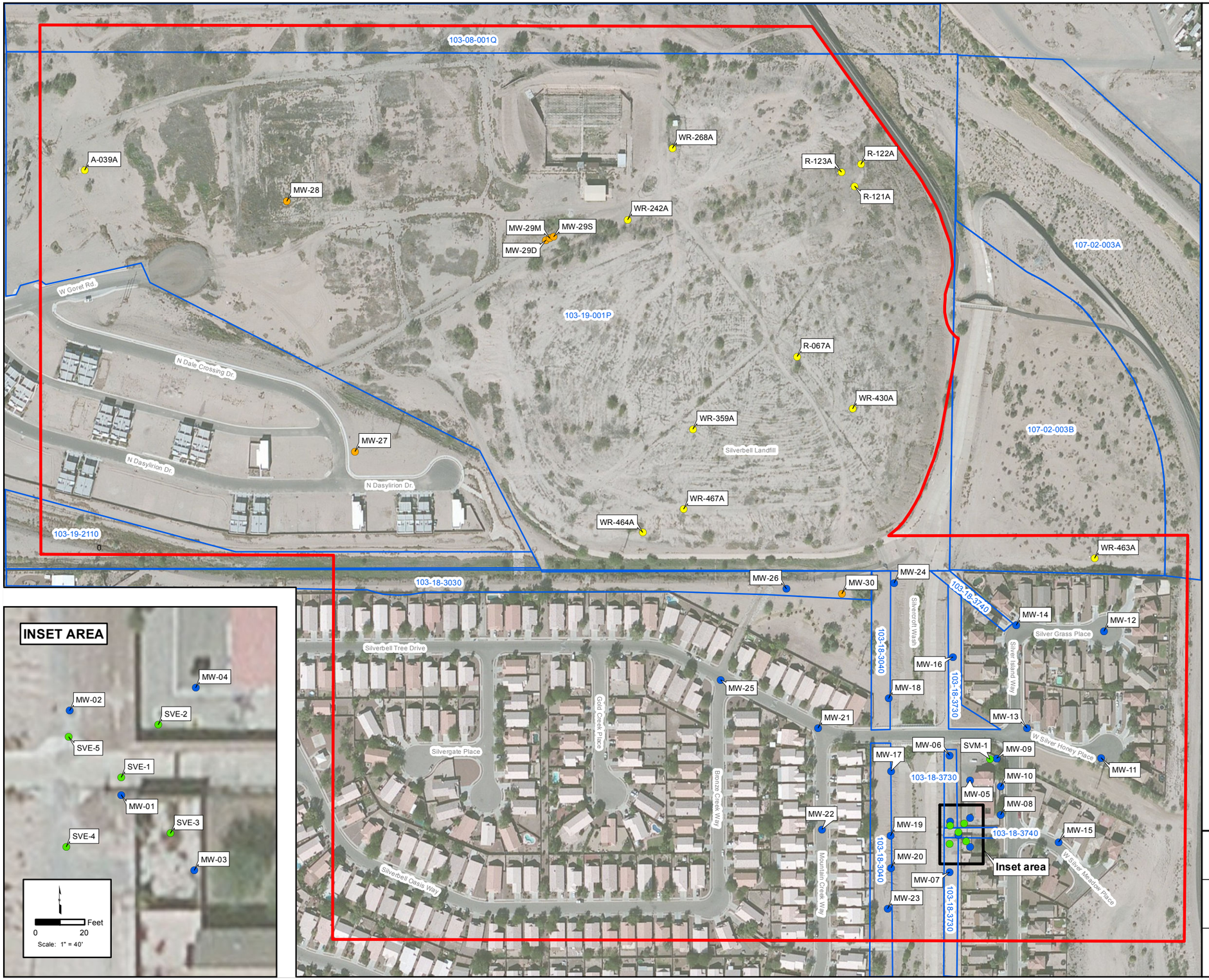
SILVERCROFT WASH RELEASE SITE
TUCSON, ARIZONA
MONITORING WELL INSTALLATION REPORT

SITE VICINITY MAP

ARCADIS

FIGURE
1

G:\Project\KMEP (Kinder Morgan Energy Partners)\10022-Silvercroft Wash\GIS\Projects\Well installation report 05-2014\Figure 1 site vicinity map.mxd 5/12/2014



LEGEND

- Extent of requested access
- Pima County tax parcel
- KMEP groundwater monitor well (previously existing)
- KMEP groundwater monitor well (installed Nov. 2013)
- KMEP soil vapor extraction/soil vapor monitor well
- City of Tucson groundwater monitor well

NOTES

· Aerial photo source: ESRI World Imagery.

N

Feet
0 125 250
Scale: 1" = 250'

SILVERCROFT WASH RELEASE SITE
TUCSON, ARIZONA
MONITORING WELL INSTALLATION REPORT

WELL LOCATION MAP

ARCADIS

FIGURE
2

G:\Project\KMEP (Kinder Morgan Energy Partners)\10022-Silvercroft Wash\GIS\Projects\Well installation report 05-2014\Figure 2 well location map.mxd 5/12/2014

MW-27 1-3-14 BL

Arizona Department of Water Resources
Information Management Unit
PO Box 36020 • Phoenix, Arizona 85067-36020
(602) 771-8527 • 602-771-8500

Well Driller Report and Well Log

THIS REPORT MUST BE FILED WITHIN **30 DAYS** OF COMPLETING THE WELL.

PLEASE PRINT CLEARLY USING BLACK OR BLUE INK

FILE NUMBER	D(13-13) 33 AAC
WELL REGISTRATION NUMBER	55 - 222708
PERMIT NUMBER (IF ISSUED)	

SECTION 1. DRILLING AUTHORIZATION

Drilling Firm

Mail To:

NAME: LAYNE CHRISTENSEN COMPANY	DWR LICENSE NUMBER: 7
ADDRESS: 12030 EAST RIGGS ROAD	TELEPHONE NUMBER: 480-895-9336
CITY / STATE / ZIP: CHANDLER, AZ, 85249-3701	FAX:

DEC 05 2013

SECTION 1. REGISTRY INFORMATION

Well Owner

FULL NAME OF COMPANY, ORGANIZATION, OR INDIVIDUAL: KINDER MORGAN ENERGY PARTNERS LP

MAILING ADDRESS: 1100 TOWN & COUNTRY ROAD

CITY / STATE / ZIP: ORANGE COUNTY, CA, 92868-

CONTACT PERSON NAME AND TITLE:

TELEPHONE NUMBER: 480 203-9968

FAX:

WELL NAME (e.g., MW-1, PZ-3, lot 25 Well, Smith Well, etc.): MW-27

Location of Well

WELL LOCATION ADDRESS (IF ANY):

TOWNSHIP (N/S)	RANGE (E/W)	SECTION	160 ACRE	40 ACRE	10 ACRE
13 S	13 E	33	NE 1/4	NE 1/4	SW 1/4

LATITUDE			LONGITUDE		
32 °	262 '	48 " N	111 °	017 '	30 " W

METHOD OF LATITUDE/LONGITUDE (CHECK ONE): ☐ USGS Quad Map ☐ Conventional Survey ☑ *GPS: Hand-Held ☐ *GPS: Survey-Grade

LAND SURFACE ELEVATION AT WELL: 2284 Feet Above Sea Level

METHOD OF ELEVATION (CHECK ONE): ☐ USGS Quad Map ☐ Conventional Survey ☐ *GPS: Hand-Held ☐ *GPS: Survey-Grade

*IF GPS WAS USED, GEOGRAPHIC COORDINATE DATUM (CHECK ONE): ☐ NAD-83 ☐ Other (please specify)

COUNTY: Pima

ASSESSOR'S PARCEL ID NUMBER (MOST RECENT): BOOK | MAP | PARCEL

SECTION 3. WELL CONSTRUCTION DETAILS

Drilling Method (CHECK ONE)

- ☐ Air Rotary
- ☐ Bored or Augered
- ☐ Cable Tool
- ☐ Dual Rotary
- ☐ Mud Rotary
- ☐ Reverse Circulation
- ☐ Driven
- ☐ Jetted
- ☐ Air Percussion / Odex Tubing
- ☑ Other (please specify) Percussion Hammer

Method of Well Development (CHECK ONE)

- ☐ Airlift
- ☑ Bail
- ☐ Surge Block
- ☑ Surge Pump
- ☐ Other (please specify)

Condition of Well (CHECK ONE)

- ☑ Capped
- ☐ Pump Installed

Method of Sealing at Reduction Points (CHECK ONE)

- ☑ None
- ☐ Packed
- ☐ Swedged
- ☐ Welded
- ☐ Other (please specify)

Construction Dates

DATE WELL CONSTRUCTION STARTED: 11-8-13

DATE WELL CONSTRUCTION COMPLETED: 11-12-13

I state that this notice is filed in compliance with A.R.S. § 45-596 and is complete and correct to the best of my knowledge and belief.

SIGNATURE OF QUALIFYING PARTY:

DATE: 12/4/2013

Well Driller Report and Well Log

WELL REGISTRATION NUMBER
55 - 222708

SECTION 4. WELL CONSTRUCTION DESIGN (AS BUILD) (attach additional page if needed)

Depth

DEPTH OF BORING	DEPTH OF COMPLETED WELL
192 Feet Below Land Surface	189.5 Feet Below Land Surface

Water Level Information

STATIC WATER LEVEL	DATE MEASURED	TIME MEASURED	IF FLOWING WELL, METHOD OF FLOW REGULATION
161' Feet Below Land Surface	11-17	0900	☐ Valve ☐ Other:

Borehole

DEPTH FROM SURFACE FROM (feet)	TO (feet)	BOREHOLE DIAMETER (inches)
0	192	10"

Installed Casing

DEPTH FROM SURFACE FROM (feet)	TO (feet)	OUTER (inches)	MATERIAL TYPE (T): STEEL	PVC	ABS	IF OTHER TYPE, DESCRIBE	PERFORATION TYPE (T): BLANK OR NONE	WIRE WRAP	SHUTTER SCREEN	MILLS KNIFE	SLOTTED	IF OTHER TYPE, DESCRIBE	SLOT SIZE (inches)
189	154	4.5	✓								✓		020
154	19	4.5		✓			✓						
19	0	4.5	✓										

Installed Annular Material

DEPTH FROM SURFACE FROM (feet)	TO (feet)	ANNULAR MATERIAL TYPE (T): NONE	CONCRETE	NEAT CEMENT OR CEMENT GROUT	CEMENT-BENTONITE GROUT	BENTONITE: GROUT	CHIPS	PELLETS	IF OTHER TYPE OF ANNULAR MATERIAL, DESCRIBE	FILTER PACK: SAND	GRAVEL	SIZE
192	149									✓		8X12
149	143									✓		#60
143	2			✓								

Well Driller Report and Well Log

WELL REGISTRATION NUMBER
55 - 222708

SECTION 5. GEOLOGIC LOG OF WELL

DEPTH FROM SURFACE FROM (feet)	TO (feet)	**Description** Describe material, grain size, color, etc.	Check (T) every interval where water was encountered (if known)
0	15	silty sand, caliche	
15	192	Sand, gravel, Small cobbles	T

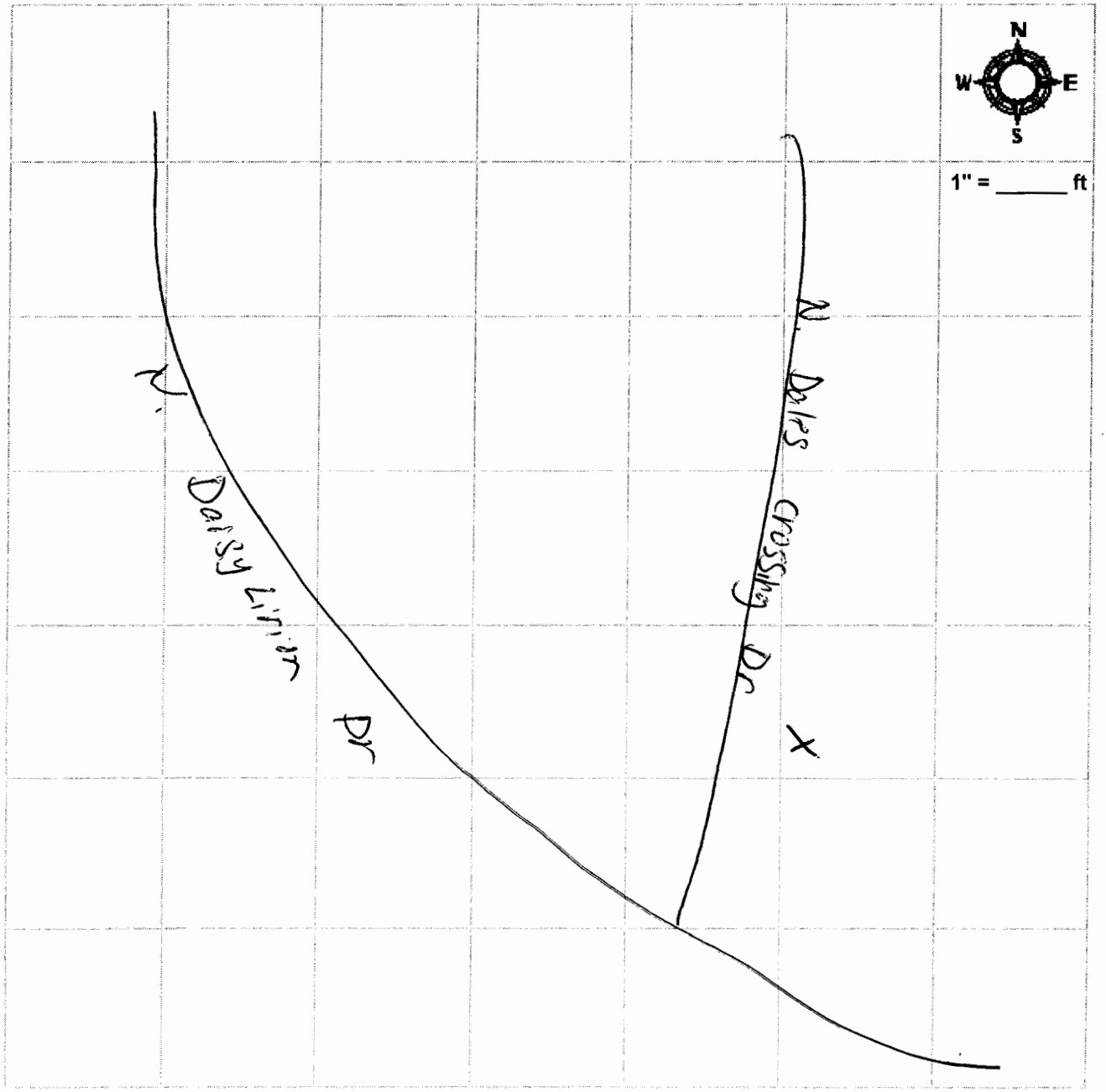
Well Driller Report and Well Log

WELL REGISTRATION NUMBER
55 - 222708

SECTION 6. WELL SITE PLAN

NAME OF WELL OWNER	COUNTY ASSESSOR'S PARCEL ID NUMBER (MOST RECENT)		
	BOOK	MAP	PARCEL
KINDER MORGAN ENERGY PARTNERS LP			

- Please draw the following: (1) the boundaries of property on which the well was located; (2) the well location; (3) the locations of all septic tank systems and sewer systems on the property or within 100 feet of the well location, even if on neighboring properties; and (4) any permanent structures on the property that may aid in locating the well.
- Please indicate the distance between the well location and any septic tank system or sewer system.



Arizona Department of Water Resources
Water Management Division
P.O. Box 36020 Phoenix, Arizona 85067-6020
(602) 771-8500 • (602) 771-8690
· www.azwater.gov ·

Notice of Intent to Drill, Deepen, or Modify a *Monitor / Piezometer / Environmental* Well

$150 FEE

- Review instructions prior to completing form in black or blue ink.
- You must include with your Notice:
  - $150 check or money order for the filing fee.
  - Well construction diagram, labeling all specifications listed in Section 6.
- Authority for fee: A.R.S. § 45-596 and A.A.C. R12-15-104.

** PLEASE PRINT CLEARLY **

AMA / INA	B	SB
TUC AMA	TUC	16
RECEIVED DATE	WS	
10/29/13	09	
ISSUED DATE	WQAR	CERCLA
10/30/13	645	

FILE NUMBER: D(13-13)33AAC
WELL REGISTRATION NUMBER: 55 - 222708

SECTION 1. REGISTRY INFORMATION

Well Type (CHECK ONE)
- x Monitor
- ☐ Piezometer
- ☐ Vadose Zone
- ☐ Air Sparging
- ☐ Soil Vapor Extraction
- ☐ Other (*please specify*):

Proposed Action (CHECK ONE)
- x Drill New Well
- ☐ Deepen
- ☐ Modify

If Deepening or Modifying:
WELL REGISTRATION NUMBER: 55 -

Location of Well
WELL LOCATION ADDRESS (IF ANY): City of Tucson, Former Silverbell Landfill

TOWNSHIP (N/S)	RANGE (E/W)	SECTION	160 ACRE	40 ACRE	10 ACRE
13S	13E	33	NE ¼	NE ¼	SW ¼

COUNTY ASSESSOR'S PARCEL ID NUMBER: BOOK | MAP | PARCEL
COUNTY WHERE WELL IS LOCATED: Pima

SECTION 2. OWNER INFORMATION

Well Owner
FULL NAME OF COMPANY, ORGANIZATION, OR INDIVIDUAL: Kinder Morgan Energy Partners, L.P. #126353
MAILING ADDRESS: 1100 Town & Country Road
CITY / STATE / ZIP CODE: Orange County, CA 92868
CONTACT PERSON NAME AND TITLE: Paul Salcido, Project Manager
TELEPHONE NUMBER: 480-203-9968
FAX: 303-984-3687

RECEIVED
OCT 29 2013
ARIZONA DEPARTMENT OF WATER RESOURCES

Landowner (if different from Well Owner)
FULL NAME OF COMPANY, GOVERNMENT AGENCY, OR INDIVIDUAL: City of Tucson Environmental Management
MAILING ADDRESS: 4004 South Park Ave., Bldg. #1
CITY / STATE / ZIP CODE: Tucson, AZ 85714
CONTACT PERSON NAME AND TITLE: Nancy Peterson, Deputy Director
TELEPHONE NUMBER: 520-791-3175
FAX: 520-791-4155

SECTION 3. DRILLING AUTHORIZATION

Drilling Firm
NAME: Layne Christensen Company
DWR LICENSE NUMBER: #7
ROC LICENSE CATEGORY: A-04
TELEPHONE NUMBER: 480-895-9336
FAX: 480-895-8699
E-MAIL ADDRESS: Aaron.maurer@layne.com

Consultant (if applicable)
CONSULTING FIRM: ARCADIS U.S., Inc.
CONTACT PERSON NAME: Robert Forsberg
TELEPHONE NUMBER: 480-905-9311
FAX: 480-905-9353
E-MAIL ADDRESS: bob.forsberg@arcadis-us.com

SECTION 4.

Questions	Yes	No	Explanation:
1. Are all annular spaces between the casing(s) and the borehole for the placement of grout at least 2 inches?	x		2-inch annular spaces are special standards required for wells located in and near groundwater contamination sites (such as CERCLA, WQARF, DOD, LUST).
2. Is the screened or perforated interval of casing greater than 100 feet in length?		x	100-foot maximum screen intervals are a special standard for wells located in and near groundwater contamination sites (such as CERCLA, WQARF, DOD, LUST).
3. Are you requesting a variance to use thermoplastic casing in lieu of steel casing in the surface seal?		x	The wells must be constructed in a vault as defined in A.A.C. R12-15-801(27).
4. Is there another well name or identification number associated with this well? (e.g., MW-1, PZ2, 06-04, etc.)	x		IF YES, PLEASE STATE **MW-27**
5. Have construction plans been coordinated with the Arizona Department of Environmental Quality?		x	IF YES, PLEASE STATE AGENCY CONTACT & PHONE NUMBER
6. For monitor wells, is dedicated pump equipment to be installed?		x	IF YES, PLEASE STATE DESIGN PUMP CAPACITY Gallons per Minute
7. Is this well a new well located in an Active Management Area **AND** intended to pump water for the purpose of remediating groundwater?		x	IF YES, UNLESS THE WELL IS A REPLACEMENT WELL AND THE TOTAL NUMBER OF OPERABLE WELLS ON THE SITE IS NOT INCREASING, YOU MUST ALSO FILE A SUPPLEMENTAL FORM A.R.S. § 45-454(C) & (F). *(See instructions)*
8. Will the well registration number be stamped on the vault cover or on the upper part of the casing?	x		IF NO, WHERE WILL THE REGISTRATION NUMBER BE PLACED?

Notice of Intent to Drill, Deepen, or Modify a *Monitor / Piezometer / Environmental* Well

WELL REGISTRATION NUMBER
55 - 222708

SECTION 5. WELL CONSTRUCTION DETAILS

Drill Method

CHECK ONE

- ☐ Air Rotary
- ☐ Bored or Augered
- ☐ Cable Tool
- ☐ Dual Rotary
- ☐ Mud Rotary
- ☐ Reverse Circulation
- ☐ Driven
- ☐ Jetted
- ☐ Air Percussion / Odex Tubing
- X Other (*please specify*):

Percussion Hammer/Air

DATE CONSTRUCTION TO BEGIN
October 14, 2013

Method of Well Development

CHECK ONE

- ☐ Airlift
- ☐ Bail
- ☐ Surge Block
- ☐ Surge Pump
- X Other (*please specify*):

Bail-Surge-Pump

Method of Sealing at Reduction Points

CHECK ONE

- X None
- ☐ Welded
- ☐ Swedged
- ☐ Packed
- ☐ Other (*please specify*):

Grout Emplacement Method

CHECK ONE

- ☐ Gravity
- ☐ Pressure Grout
- X Tremie
- ☐ Other (*please specify*):

Surface or Conductor Casing

CHECK ONE

- ☒ Flush Mount in a vault
- ☐ Extend 1' above grade

SECTION 6. PROPOSED WELL CONSTRUCTION PLAN (attach additional page if needed)

Attach a well construction diagram labeling all specifications below.

Borehole

DEPTH FROM SURFACE FROM (feet)	DEPTH FROM SURFACE TO (feet)	BOREHOLE DIAMETER (inches)
0	190	11

Casing

DEPTH FROM SURFACE FROM (feet)	DEPTH FROM SURFACE TO (feet)	OUTER DIAMETER (inches)	MATERIAL TYPE (T) STEEL	PVC	ABS	IF OTHER TYPE, DESCRIBE	PERFORATION TYPE (T) BLANK OR NONE	WIRE WRAP	SHUTTER SCREEN	MILLS KNIFE	SLOTTED	IF OTHER TYPE, DESCRIBE	SLOT SIZE IF ANY (inches)
0	39	4	X				X						
39	154	4		X			X						
154	189	4		Stainless Steel				X					0.02

Annular Material

DEPTH FROM SURFACE FROM (feet)	DEPTH FROM SURFACE TO (feet)	ANNULAR MATERIAL TYPE (T) NONE	CONCRETE	NEAT CEMENT OR CEMENT GROUT	CEMENT-BENTONITE GROUT	BENTONITE GROUT	CHIPS	PELLETS	IF OTHER TYPE OF ANNULAR MATERIAL, DESCRIBE	FILTER PACK SAND	GRAVEL	SIZE
0	144			X								
144	149									X		#60
149	190									X		#8/12

IF THIS WELL HAS NESTED CASINGS, SPECIFY NUMBER OF CASING STRINGS

EXPECTED DEPTH TO WATER 162 Feet Below Ground Surface

SECTION 7. OPTIONAL BY PROPERTY OWNER AND WELL OWNER ONLY

☐ By checking this box, I hereby provide ADWR permission to enter the property for the purpose of taking water level measurements at this well. *(See instructions.)*

SECTION 8. WELL OWNER AND PROPERTY OWNER SIGNATURE

I state that this notice is filed in compliance with A.R.S. § 45-596 and is complete and correct to the best of my knowledge and belief.

TYPE OR PRINT NAME AND TITLE	SIGNATURE OF WELL OWNER	DATE
Paul Salcido/Project Manager	Paul M Salcido	09/23/13
TYPE OR PRINT NAME AND TITLE	SIGNATURE OF LANDOWNER, IF APPLICABLE (SEE INSTRUCTIONS)	DATE
Nancy Petersen, Deputy Director	[signature]	10/24/13

Notice of Intent to Drill, Deepen, or Modify [illegible] Permit or Well

WELL SITE INSPECTION NUMBER

SECTION B: WELL CONSTRUCTION DETAILS

Drill Method	Method of Well Development	Ground Emplacement Method
CHECK ONE ☐ Air Rotary ☐ Cored or Augered ☐ Cable Tool ☐ Dual-Rotary ☐ Mud Rotary ☐ Reverse Circulation ☐ Driven ☐ Jetted ☐ Air Percussion Hammer Air Tubing X Other (please specify) Percussion Hammer Air	CHECK ONE ☐ Air ☐ Jet ☐ Surge ☐ Swab X Other Bail-Swab	CHECK ONE ☐ Gravel ☐ Sheet Pile Cover X Trench ☐ Other (please specify)
DATE CONSTRUCTION ACTIVITY October 14, 2012		

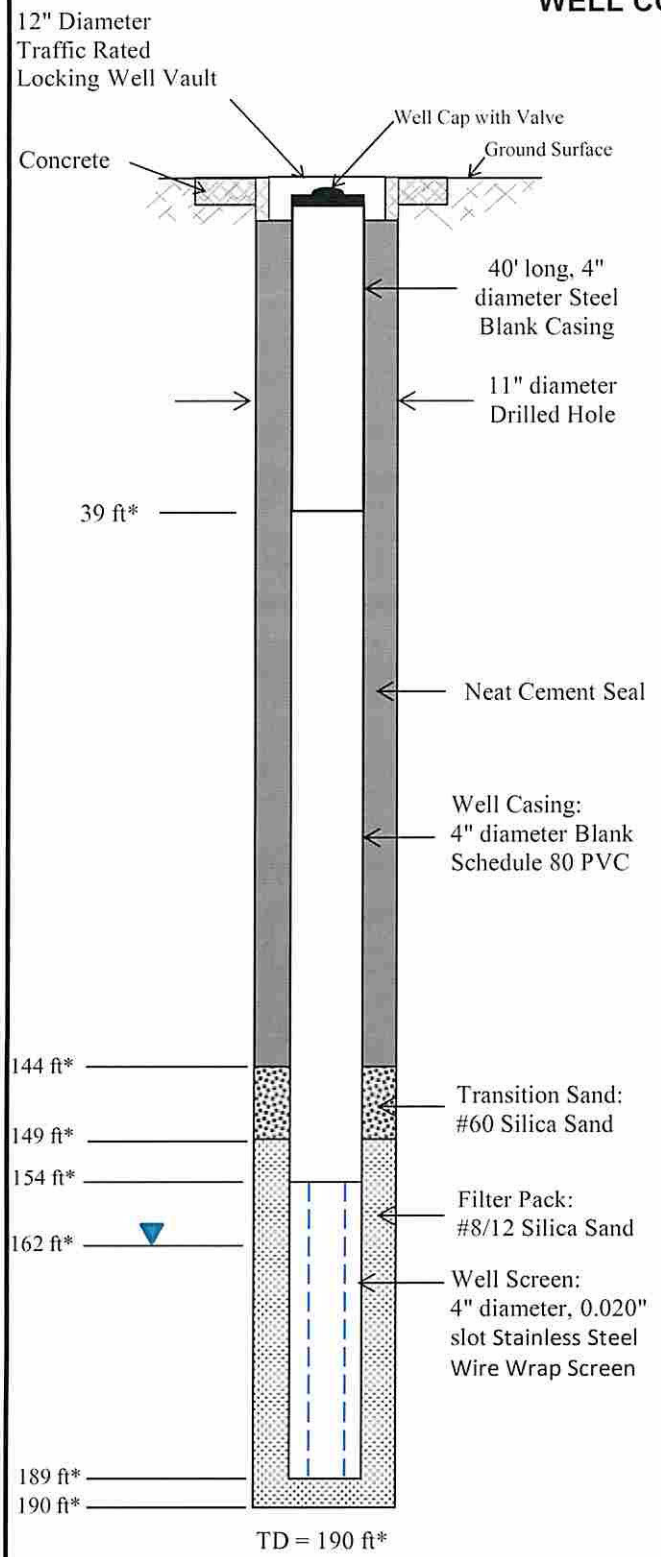
Water Level Measurement Reference Points	Surface Or Casing Protection Points
CHECK ONE X Above ☐ Within ☐ Below ☐ Ground ☐ Other (please specify)	CHECK ONE ☒ Flush Mount in a vault X Extend 1' above grade

SECTION C: PROPOSED CONSTRUCTION DETAILS (Additional page if needed)

Attach a well construction diagram labeling all aspects of the well.

| Borehole | | | | Casing | | | |

PROPOSED
WELL CONSTRUCTION LOG



Measuring Point is Top of Well Casing
Unless Otherwise Noted.

* Depth Below Ground Surface

Project	ST010022	Well	MW-27
Town/City	Tucson		
County	Pima	State	Arizona
Permit No(s).			
Land Surface Elevation	2288 feet	[ ] Surveyed	
Datum	amsl	[X] Estimated	
Coordinates			
Installation Date(s)			
Drilling Method	Air Rotary/Percussion Hammer		
Drilling Contractor			
Drilling Fluid			
Development Technique(s) and Date(s)	N/A		
Fluid Loss During Drilling	gallons		
Water Removed During Development	gallons		
Static Depth to Water	~162 feet below M.P.		
Pumping Depth to Water	N/A feet below M.P.		
Pumping Duration	hours		
Yield	gpm	Date	
Specific Capacity	gpm/ft		
Well Purpose	Monitoring Well		
Remarks			
Prepared by	Thomas Vespalec		

Drawing not to scale

Printed: 10/29/2013 11:09:27 AM

Arizona Department of Water Resources

3550 N Central Ave.
Phoenix AZ 85012

Customer:

ARCADIS
630 PLAZA DRIVE, SUITE 600
HIGHLANDS RANCH, CO 80129

Receipt #: 14-30837
Office: MAIN OFFICE
Receipt Date: 10/29/2013
Sale Type: Mail
Cashier: WRSYM

Item No.	Index	AOBJ	Description	Ref ID	Qty	Unit Price	Ext Price
8505	15245	4439-6F	MONITOR, PIEZOMETER, AIR SPARGING, SOIL VAPOR EXTR	55-222708 thru 55-222713	6	150.00	900.00
						RECEIPT TOTAL:	**900.00**

Payment type: CHECK
Amount Paid: $900.00
Payment Received Date: 10/29/2013

Check #	072662

Notes:

No refund without valid receipt

ARIZONA DEPARTMENT *of* WATER RESOURCES
3550 North Central Avenue, Second Floor
Phoenix, AZ 85012
602-771-8500
azwater.gov

October 30, 2013

KINDER MORGAN ENERGY PARTNERS LP
1100 TOWN & COUNTRY ROAD
ATTN: PAUL SALCIDO, PROJECT MANAGER
ORANGE COUNTY, CA 92868

JANICE K. BREWER
Governor

SANDRA A. FABRITZ-WHITNEY
Director

Registration No. 55- 222708
File Number: D(13-13) 33 AAC

Dear Well Applicant:

Enclosed is a copy of the Notice of Intention to Drill (NOI) a well which you or your driller recently filed with the Department of Water Resources. This letter is to inform you that the Department has approved the NOI and has mailed, or made available for download, a drilling authorization card to your designated well drilling contractor. The driller may not begin drilling until he/she has received the authorization, and must keep it in their possession at the well site during drilling.

Well drilling activities must be completed within one year after the date the NOI was filed with the Department. If drilling is not completed within one year, a new NOI must be filed and authorization from this Department received before proceeding with drilling. If the well cannot be successfully completed as initially intended (dry hole, cave in, lost tools, etc.), the well must be properly abandoned and a Well Abandonment Completion Report must be filed by your driller [as required by A.A.C. R12-15-816(F)].

If you change drillers, you must notify the Department of the new driller's identity on a Request to Change Well Information (form 55-71A). Please ensure that the new driller is licensed by the Department to drill the type of well you require. A new driller may not begin drilling until he/she receives a new drilling authorization card from the Department.

If you find it necessary to change the location of the proposed well(s), you may not proceed with drilling until you file an amended NOI with the Department. An amended drilling authorization card will then be issued to the well drilling contractor, which must be in their possession before drilling begins.

Arizona statute [A.R.S. § 45-600] requires registered well owners to file a Pump Installation Completion Report (form 55-56) with the Department within 30 days after the installation of pumping equipment, if authorized. A blank report is enclosed for your convenience. State statute also requires the driller to file a complete and accurate Well Drillers Report and Well Log (form 55-55) within 30 days after completion of drilling. A blank report form was provided to your driller with the drilling authorization card. You should insist and ensure that all of the required reports are accurately completed and timely filed with the Department.

Please be advised that Arizona statute [A.R.S. § 45-593(C)] requires a registered well owner to notify the Department of a change in ownership of the well and/or information pertaining to the physical characteristics of the well in order to keep this well registration file current and accurate. Any change in well information or a request to change well driller must be filed on a Request to Change Well Information form (form 55-71A) that may be downloaded from the ADWR Internet website at www.azwater.gov.

Sincerely,

Groundwater Permitting and Wells Section

ARIZONA DEPARTMENT OF WATER RESOURCES
3550 North Central Avenue, Second Floor
Phoenix, Arizona 85012

NOTICE! This well is located in or near an area of groundwater contamination (WQARF/CERCLA/DOD or Other). Be advised that **special requirements may apply.**

THIS AUTHORIZATION SHALL BE IN POSSESSION OF THE DRILLER DURING ALL DRILLING OPERATIONS

WELL REGISTRATION NO: **55-222708**

AUTHORIZED DRILLER: **LAYNE CHRISTENSEN COMPANY** LICENSE NO: **7**

NOTICE OF INTENTION TO DRILL MONITOR WELL(S) HAS BEEN FILED WITH THE DEPARTMENT BY:

WELL OWNER: **KINDER MORGAN ENERGY PARTNERS LP 1100 TOWN & COUNTRY ROAD ATTN: PAUL SALCIDO, PROJECT MANAGER ORANGE COUNTY, CA, 92868**

THE WELL(S) IS/ARE TO BE LOCATED IN THE:

SW 1/4 of the **NE** 1/4 of the **NE** 1/4 Section **33** Township **13 SOUTH** Range **13 EAST**

NO. OF WELLS IN THIS PROJECT:

THIS AUTHORIZATION EXPIRES AT MIDNIGHT ON THE DAY OF **October 28, 2014**

GROUNDWATER PERMITTING AND WELLS

THE DRILLER MUST FILE A LOG OF THE WELL WITHIN 30 DAYS OF COMPLETION OF DRILLING.

MW-28 1-6-14 BEW

Arizona Department of Water Resources
Information Management Unit
PO Box 36020 • Phoenix, Arizona 85067-36020
(602) 771-8527 • 602-771-8500

Well Driller Report and Well Log

THIS REPORT MUST BE FILED WITHIN **30 DAYS** OF COMPLETING THE WELL.

PLEASE PRINT CLEARLY USING BLACK OR BLUE INK

FILE NUMBER: D(13-13) 33 AAC
WELL REGISTRATION NUMBER: 55 - 222709
PERMIT NUMBER (IF ISSUED):

SECTION 1. DRILLING AUTHORIZATION

Drilling Firm — Mail To:

NAME: LAYNE CHRISTENSEN COMPANY	DWR LICENSE NUMBER: 7
ADDRESS: 12030 EAST RIGGS ROAD	TELEPHONE NUMBER: 480-895-9336
CITY / STATE / ZIP: CHANDLER, AZ, 85249-3701	FAX: DEC 05 2013

SECTION 1. REGISTRY INFORMATION

Well Owner

FULL NAME OF COMPANY, ORGANIZATION, OR INDIVIDUAL: KINDER MORGAN ENERGY PARTNERS LP

MAILING ADDRESS: 1100 TOWN & COUNTRY ROAD

CITY / STATE / ZIP: ORANGE COUNTY, CA, 92868-

CONTACT PERSON NAME AND TITLE:

TELEPHONE NUMBER: 480 203-9968 FAX:

WELL NAME (e.g., MW-1, PZ-3, lot 25 Well, Smith Well, etc.): MW 28

Location of Well

WELL LOCATION ADDRESS (IF ANY):

TOWNSHIP (N/S)	RANGE (E/W)	SECTION	160 ACRE	40 ACRE	10 ACRE
13S	13E	33	NE 1/4	NE 1/4	SW 1/4

LATITUDE			LONGITUDE		
32°	26.4'	20" N	111°	01.7'	30" W

METHOD OF LATITUDE/LONGITUDE (CHECK ONE): ☐ USGS Quad Map ☐ Conventional Survey ☑ *GPS: Hand-Held ☐ *GPS: Survey-Grade

LAND SURFACE ELEVATION AT WELL: 2283 Feet Above Sea Level

METHOD OF ELEVATION (CHECK ONE): ☐ USGS Quad Map ☐ Conventional Survey ☐ *GPS: Hand-Held ☐ *GPS: Survey-Grade

*IF GPS WAS USED, GEOGRAPHIC COORDINATE DATUM (CHECK ONE): ☐ NAD-83 ☐ Other (please specify)

COUNTY: Pima

ASSESSOR'S PARCEL ID NUMBER (MOST RECENT): BOOK | MAP | PARCEL

SECTION 3. WELL CONSTRUCTION DETAILS

Drilling Method (CHECK ONE)
- ☐ Air Rotary
- ☐ Bored or Augered
- ☐ Cable Tool
- ☐ Dual Rotary
- ☐ Mud Rotary
- ☐ Reverse Circulation
- ☐ Driven
- ☐ Jetted
- ☐ Air Percussion / Odex Tubing
- ☑ Other (please specify): Percussion Hammer

Method of Well Development (CHECK ONE)
- ☐ Airlift
- ☑ Bail
- ☐ Surge Block
- ☑ Surge Pump
- ☐ Other (please specify)

Condition of Well (CHECK ONE)
- ☑ Capped
- ☐ Pump Installed

Method of Sealing at Reduction Points (CHECK ONE)
- ☑ None
- ☐ Packed
- ☐ Swedged
- ☐ Welded
- ☐ Other (please specify)

Construction Dates
- DATE WELL CONSTRUCTION STARTED: 11-4-13
- DATE WELL CONSTRUCTION COMPLETED: 11-7-13

I state that this notice is filed in compliance with A.R.S. § 45-596 and is complete and correct to the best of my knowledge and belief.

SIGNATURE OF QUALIFYING PARTY: [signature] DATE: 12/4/2013

Well Driller Report and Well Log

WELL REGISTRATION NUMBER
55 - 222709

SECTION 4. WELL CONSTRUCTION DESIGN (AS BUILD) (attach additional page if needed)

Depth

DEPTH OF BORING	DEPTH OF COMPLETED WELL
190.6' Feet Below Land Surface	189' Feet Below Land Surface

Water Level Information

STATIC WATER LEVEL	DATE MEASURED	TIME MEASURED	IF FLOWING WELL, METHOD OF FLOW REGULATION
16.3' Feet Below Land Surface	11-6-13	1230	☐ Valve ☐ Other:

Borehole

DEPTH FROM SURFACE FROM (feet)	TO (feet)	BOREHOLE DIAMETER (inches)
0	190.6	10"

Installed Casing

DEPTH FROM SURFACE FROM (feet)	TO (feet)	OUTER (inches)	MATERIAL TYPE (T): STEEL	PVC	ABS	IF OTHER TYPE, DESCRIBE	PERFORATION TYPE (T): BLANK OR NONE	WIRE WRAP	SHUTTER SCREEN	MILLS KNIFE	SLOTTED	IF OTHER TYPE, DESCRIBE	SLOT SIZE (inches)
189	149	4.5	✓								✓		.020
149	39	4.5		✓			✓						
39	0	4.5	✓										

Installed Annular Material

DEPTH FROM SURFACE FROM (feet)	TO (feet)	ANNULAR MATERIAL TYPE (T): NONE	CONCRETE	NEAT CEMENT OR CEMENT GROUT	CEMENT-BENTONITE GROUT	BENTONITE: GROUT	CHIPS	PELLETS	IF OTHER TYPE OF ANNULAR MATERIAL, DESCRIBE	FILTER PACK: SAND	GRAVEL	SIZE
190	144									✓		8X12
144	139									✓		#60
139	2			✓								

Well Driller Report and Well Log

WELL REGISTRATION NUMBER
55 - 222709

SECTION 5. GEOLOGIC LOG OF WELL

DEPTH FROM SURFACE FROM (feet)	TO (feet)	**Description** Describe material, grain size, color, etc.	Check (T) every interval where water was encountered (if known)
0	7	Silty brown Sand	
7	9	Caliche - dry brown	
9	135	silty sand, small gravels	
135	170	Sand, gravel, Small cobbles	T
170	190.5	Flowing Sands w/ small gravels	T

Arizona Department of Water Resources
Water Management Division
P.O. Box 36020 Phoenix, Arizona 85067-6020
(602) 771-8500 • (602) 771-8690
· www.azwater.gov ·

Notice of Intent to Drill, Deepen, or Modify a *Monitor / Piezometer / Environmental* Well

$150 FEE

- Review instructions prior to completing form in black or blue ink.
- You must include with your Notice:
  - $150 check or money order for the filing fee.
  - Well construction diagram, labeling all specifications listed in Section 6.
- Authority for fee: A.R.S. § 45-596 and A.A.C. R12-15-104.

** PLEASE PRINT CLEARLY **

AMA / INA	B	SB
TAMA	TUC	16
RECEIVED DATE	WS	
10/29/13	05	
ISSUED DATE	WQAR	CERCLA
10/30/13	645	

FILE NUMBER: D(13-13)33AAC
WELL REGISTRATION NUMBER: 55 - 222709

SECTION 1. REGISTRY INFORMATION

Well Type — CHECK ONE
- X Monitor
- ☐ Piezometer
- ☐ Vadose Zone
- ☐ Air Sparging
- ☐ Soil Vapor Extraction
- ☐ Other (*please specify*):

Proposed Action — CHECK ONE
- X Drill New Well
- ☐ Deepen
- ☐ Modify

If Deepening or Modifying:
WELL REGISTRATION NUMBER: 55 -

Location of Well

WELL LOCATION ADDRESS (IF ANY): City of Tucson, Former Silverbell Landfill

TOWNSHIP (N/S)	RANGE (E/W)	SECTION	160 ACRE	40 ACRE	10 ACRE
13S	13E	33	NE ¼	NE ¼	SW ¼

COUNTY ASSESSOR'S PARCEL ID NUMBER: BOOK | MAP | PARCEL

COUNTY WHERE WELL IS LOCATED: Pima

SECTION 2. OWNER INFORMATION

Well Owner

FULL NAME OF COMPANY, ORGANIZATION, OR INDIVIDUAL: Kinder Morgan Energy Partners, L.P.
MAILING ADDRESS: 1100 Town & Country Road
CITY / STATE / ZIP CODE: Orange County, CA 92868
CONTACT PERSON NAME AND TITLE: Paul Salcido, Project Manager
TELEPHONE NUMBER: 480-203-9968
FAX: 303-984-3687

RECEIVED
OCT 29 2013
ARIZONA DEPARTMENT OF WATER RESOURCES

Landowner (if different from Well Owner)

FULL NAME OF COMPANY, GOVERNMENT AGENCY, OR INDIVIDUAL: City of Tucson Environmental Management
MAILING ADDRESS: 4004 South Park Ave., Bldg. #1
CITY / STATE / ZIP CODE: Tucson, AZ 85714
CONTACT PERSON NAME AND TITLE: Nancy Peterson, Deputy Director
TELEPHONE NUMBER: 520-791-3175
FAX: 520-791-4155

SECTION 3. DRILLING AUTHORIZATION

Drilling Firm

NAME: Layne Christensen Company
DWR LICENSE NUMBER: #7
ROC LICENSE CATEGORY: A-04
TELEPHONE NUMBER: 480-895-9336
FAX: 480-895-8699
E-MAIL ADDRESS: Aaron.maurer@layne.com

Consultant (if applicable)

CONSULTING FIRM: ARCADIS U.S., Inc.
CONTACT PERSON NAME: Robert Forsberg
TELEPHONE NUMBER: 480-905-9311
FAX: 480-905-9353
E-MAIL ADDRESS: bob.forsberg@arcadis-us.com

SECTION 4.

Questions	Yes	No	Explanation:
1. Are all annular spaces between the casing(s) and the borehole for the placement of grout at least 2 inches?	X		2-inch annular spaces are special standards required for wells located in and near groundwater contamination sites (such as CERCLA, WQARF, DOD, LUST).
2. Is the screened or perforated interval of casing greater than 100 feet in length?		X	100-foot maximum screen intervals are a special standard for wells located in and near groundwater contamination sites (such as CERCLA, WQARF, DOD, LUST).
3. Are you requesting a variance to use thermoplastic casing in lieu of steel casing in the surface seal?		X	The wells must be constructed in a vault as defined in A.A.C. R12-15-801(27).
4. Is there another well name or identification number associated with this well? (e.g., MW-1, PZ2, 06-04, etc.)	X		IF YES, PLEASE STATE **MW-28**
5. Have construction plans been coordinated with the Arizona Department of Environmental Quality?		X	IF YES, PLEASE STATE AGENCY CONTACT & PHONE NUMBER
6. For monitor wells, is dedicated pump equipment to be installed?		X	IF YES, PLEASE STATE DESIGN PUMP CAPACITY Gallons per Minute
7. Is this well a new well located in an Active Management Area **AND** intended to pump water for the purpose of remediating groundwater?		X	IF YES, UNLESS THE WELL IS A REPLACEMENT WELL AND THE TOTAL NUMBER OF OPERABLE WELLS ON THE SITE IS NOT INCREASING, YOU MUST ALSO FILE A SUPPLEMENTAL FORM A.R.S. § 45-454(C) & (F). *(See instructions)*
8. Will the well registration number be stamped on the vault cover or on the upper part of the casing?	X		IF NO, WHERE WILL THE REGISTRATION NUMBER BE PLACED?

Notice of Intent to Drill, Deepen, or Modify a *Monitor / Piezometer / Environmental* Well

WELL REGISTRATION NUMBER
55 - 222709

SECTION 5. WELL CONSTRUCTION DETAILS

Drill Method

CHECK ONE

- ☐ Air Rotary
- ☐ Bored or Augered
- ☐ Cable Tool
- ☐ Dual Rotary
- ☐ Mud Rotary
- ☐ Reverse Circulation
- ☐ Driven
- ☐ Jetted
- ☐ Air Percussion / Odex Tubing
- X Other (*please specify*):

Percussion Hammer/Air

DATE CONSTRUCTION TO BEGIN
October 14, 2013

Method of Well Development

CHECK ONE

- ☐ Airlift
- ☐ Bail
- ☐ Surge Block
- ☐ Surge Pump
- X Other (*please specify*):

Bail-Surge-Pump

Grout Emplacement Method

CHECK ONE

- ☐ Gravity
- ☐ Pressure Grout
- X Tremie
- ☐ Other (*please specify*):

Method of Sealing at Reduction Points

CHECK ONE

- X None
- ☐ Welded
- ☐ Swedged
- ☐ Packed
- ☐ Other (*please specify*):

Surface or Conductor Casing

CHECK ONE

- ☐ Flush Mount in a vault
- X Extend 1' above grade

SECTION 6. PROPOSED WELL CONSTRUCTION PLAN (attach additional page if needed)

Attach a well construction diagram labeling all specifications below.

Borehole / Casing

Borehole: DEPTH FROM SURFACE FROM (feet)	Borehole: DEPTH FROM SURFACE TO (feet)	Borehole: BOREHOLE DIAMETER (inches)	Casing: DEPTH FROM SURFACE FROM (feet)	Casing: DEPTH FROM SURFACE TO (feet)	OUTER DIAMETER (inches)	MATERIAL TYPE (T): STEEL	MATERIAL TYPE (T): PVC	MATERIAL TYPE (T): ABS	MATERIAL TYPE (T): IF OTHER TYPE, DESCRIBE	PERFORATION TYPE (T): BLANK OR NONE	PERFORATION TYPE (T): WIRE WRAP	PERFORATION TYPE (T): SHUTTER SCREEN	PERFORATION TYPE (T): MILLS KNIFE	PERFORATION TYPE (T): SLOTTED	PERFORATION TYPE (T): IF OTHER TYPE, DESCRIBE	SLOT SIZE IF ANY (inches)
0	190	11	0	39	4	X				X						
			39	149	4		X			X						
			149	189	4		Stainless Steel				X					0.02

Annular Material

DEPTH FROM SURFACE FROM (feet)	DEPTH FROM SURFACE TO (feet)	ANNULAR MATERIAL TYPE (T): NONE	CONCRETE	NEAT CEMENT OR CEMENT GROUT	CEMENT-BENTONITE GROUT	BENTONITE: GROUT	BENTONITE: CHIPS	BENTONITE: PELLETS	IF OTHER TYPE OF ANNULAR MATERIAL, DESCRIBE	FILTER PACK: SAND	FILTER PACK: GRAVEL	FILTER PACK: SIZE
0	139			X								
139	144									X		#60
144	190									X		#8/12

IF THIS WELL HAS NESTED CASINGS, SPECIFY NUMBER OF CASING STRINGS

EXPECTED DEPTH TO WATER 160 Feet Below Ground Surface

SECTION 7. OPTIONAL BY PROPERTY OWNER AND WELL OWNER ONLY

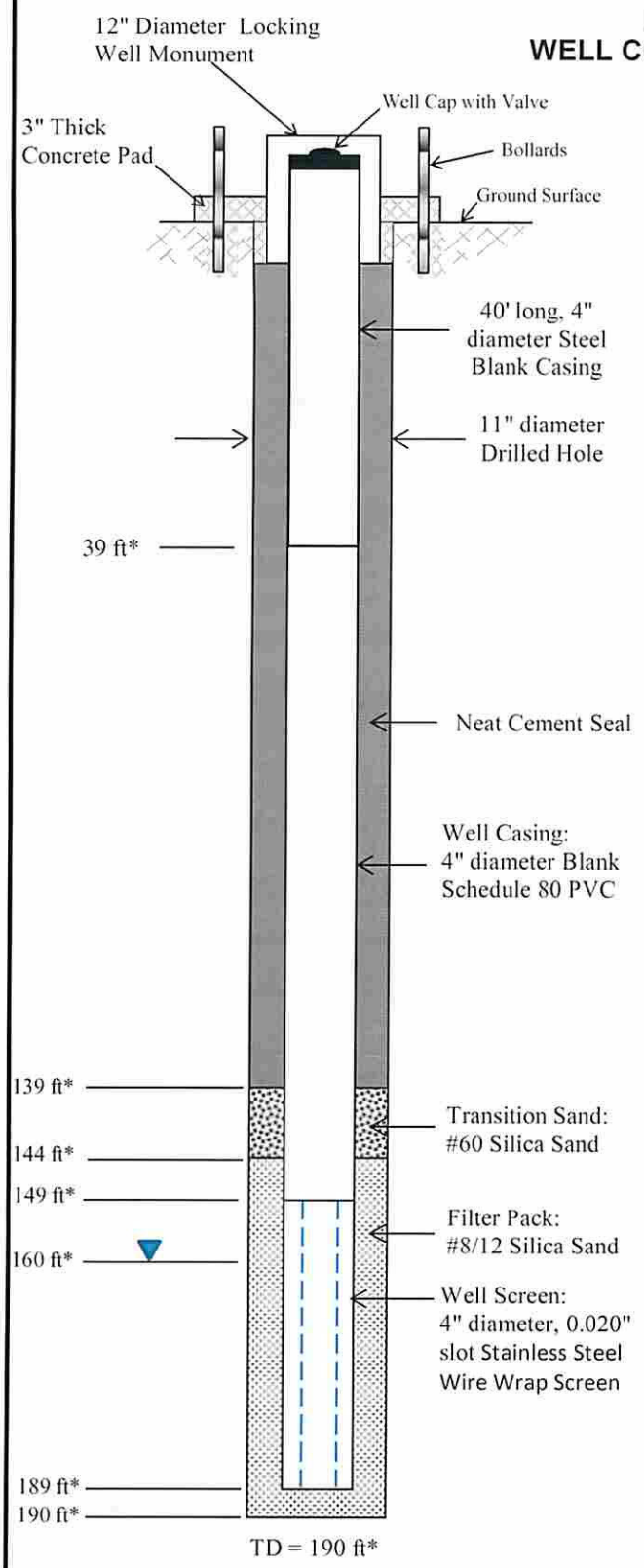
☐ By checking this box, I hereby provide ADWR permission to enter the property for the purpose of taking water level measurements at this well. *(See instructions.)*

SECTION 8. WELL OWNER AND PROPERTY OWNER SIGNATURE

I state that this notice is filed in compliance with A.R.S. § 45-596 and is complete and correct to the best of my knowledge and belief.

TYPE OR PRINT NAME AND TITLE	SIGNATURE OF WELL OWNER	DATE
Paul Salcido/Project Manager	Paul M Salcido	09/23/13
TYPE OR PRINT NAME AND TITLE	SIGNATURE OF LANDOWNER, IF APPLICABLE (SEE INSTRUCTIONS)	DATE
Nancy Petersen, Deputy Director	[signature]	10/24/13

PROPOSED
WELL CONSTRUCTION LOG



Measuring Point is Top of Well Casing Unless Otherwise Noted.

* Depth Below Ground Surface

Project	ST010022	Well	MW-28
Town/City	Tucson		
County	Pima	State	Arizona
Permit No(s).			
Land Surface Elevation	2283 feet	[ ] Surveyed	
Datum	amsl	[X] Estimated	
Coordinates			
Installation Date(s)			
Drilling Method	Air Rotary/Percussion Hammer		
Drilling Contractor			
Drilling Fluid			
Development Technique(s) and Date(s)	N/A		
Fluid Loss During Drilling	gallons		
Water Removed During Development	gallons		
Static Depth to Water	~160 feet below M.P.		
Pumping Depth to Water	N/A feet below M.P.		
Pumping Duration	hours		
Yield	gpm	Date	
Specific Capacity	gpm/ft		
Well Purpose	Monitoring Well		
Remarks			
Prepared by	Thomas Vespalec		

Drawing not to scale

Printed: 10/29/2013 11:09:27 AM

Arizona Department of Water Resources

3550 N Central Ave.
Phoenix AZ 85012

Customer:

ARCADIS
630 PLAZA DRIVE, SUITE 600
HIGHLANDS RANCH, CO 80129

Receipt #: 14-30837
Office: MAIN OFFICE
Receipt Date: 10/29/2013
Sale Type: Mail
Cashier: WRSYM

Item No.	Index	AOBJ	Description	Ref ID	Qty	Unit Price	Ext Price
8505	15245	4439-6F	MONITOR, PIEZOMETER, AIR SPARGING, SOIL VAPOR EXTR	55-222708 thru 55-222713	6	150.00	900.00
						RECEIPT TOTAL:	**900.00**

Payment type: CHECK
Amount Paid: $900.00
Payment Received Date: 10/29/2013

Check #	072662

Notes:

No refund without valid receipt

ARIZONA DEPARTMENT *of* WATER RESOURCES
3550 North Central Avenue, Second Floor
Phoenix, AZ 85012
602-771-8500
azwater.gov

October 30, 2013

KINDER MORGAN ENERGY PARTNERS LP
1100 TOWN & COUNTRY ROAD
ATTN: PAUL SALCIDO, PROJECT MANAGER
ORANGE COUNTY, CA 92868

JANICE K. BREWER
Governor

SANDRA A. FABRITZ-WHITNEY
Director

Registration No. 55- 222709
File Number: D(13-13) 33 AAC

Dear Well Applicant:

Enclosed is a copy of the Notice of Intention to Drill (NOI) a well which you or your driller recently filed with the Department of Water Resources. This letter is to inform you that the Department has approved the NOI and has mailed, or made available for download, a drilling authorization card to your designated well drilling contractor. The driller may not begin drilling until he/she has received the authorization, and must keep it in their possession at the well site during drilling.

Well drilling activities must be completed within one year after the date the NOI was filed with the Department. If drilling is not completed within one year, a new NOI must be filed and authorization from this Department received before proceeding with drilling. If the well cannot be successfully completed as initially intended (dry hole, cave in, lost tools, etc.), the well must be properly abandoned and a Well Abandonment Completion Report must be filed by your driller [as required by A.A.C. R12-15-816(F)].

If you change drillers, you must notify the Department of the new driller's identity on a Request to Change Well Information (form 55-71A). Please ensure that the new driller is licensed by the Department to drill the type of well you require. A new driller may not begin drilling until he/she receives a new drilling authorization card from the Department.

If you find it necessary to change the location of the proposed well(s), you may not proceed with drilling until you file an amended NOI with the Department. An amended drilling authorization card will then be issued to the well drilling contractor, which must be in their possession before drilling begins.

Arizona statute [A.R.S. § 45-600] requires registered well owners to file a Pump Installation Completion Report (form 55-56) with the Department within 30 days after the installation of pumping equipment, if authorized. A blank report is enclosed for your convenience. State statute also requires the driller to file a complete and accurate Well Drillers Report and Well Log (form 55-55) within 30 days after completion of drilling. A blank report form was provided to your driller with the drilling authorization card. You should insist and ensure that all of the required reports are accurately completed and timely filed with the Department.

Please be advised that Arizona statute [A.R.S. § 45-593(C)] requires a registered well owner to notify the Department of a change in ownership of the well and/or information pertaining to the physical characteristics of the well in order to keep this well registration file current and accurate. Any change in well information or a request to change well driller must be filed on a Request to Change Well Information form (form 55-71A) that may be downloaded from the ADWR Internet website at www.azwater.gov.

Sincerely,

Groundwater Permitting and Wells Section

ARIZONA DEPARTMENT OF WATER RESOURCES
3550 North Central Avenue, Second Floor
Phoenix, Arizona 85012

NOTICE! This well is located in or near an area of groundwater contamination (WQARF/CERCLA/DOD or Other). Be advised that **special requirements may apply.**

THIS AUTHORIZATION SHALL BE IN POSSESSION OF THE DRILLER DURING ALL DRILLING OPERATIONS

WELL REGISTRATION NO: **55-222709**

AUTHORIZED DRILLER: **LAYNE CHRISTENSEN COMPANY** LICENSE NO: **7**

NOTICE OF INTENTION TO DRILL MONITOR WELL(S) HAS BEEN FILED WITH THE DEPARTMENT BY:

WELL OWNER: **KINDER MORGAN ENERGY PARTNERS LP 1100 TOWN & COUNTRY ROAD ATTN: PAUL SALCIDO, PROJECT MANAGER ORANGE COUNTY, CA, 92868**

THE WELL(S) IS/ARE TO BE LOCATED IN THE:

SW 1/4 of the **NE** 1/4 of the **NE** 1/4 Section **33** Township **13 SOUTH** Range **13 EAST**

NO. OF WELLS IN THIS PROJECT: **1**

THIS AUTHORIZATION EXPIRES AT MIDNIGHT ON THE DAY OF **October 28, 2014**

GROUNDWATER PERMITTING AND WELLS

THE DRILLER MUST FILE A LOG OF THE WELL WITHIN 30 DAYS OF COMPLETION OF DRILLING.

Run Date: 01/09/2014

AZ DEPARTMENT OF WATER RESOURCES

WELL REGISTRY REPORT - WELLS55

Location D 13.0 13.0 33 A A C

Well Reg.No 55 - 222710

AMA TUCSON AMA

Registered Name KINDER MORGAN ENERGY PARTNERS LP
1100 TOWN & COUNTRY ROAD
ATTN: PAUL SALCIDO, PROJECT MANAGER
ORANGE COUNTY CA 92868

File Type NEW WELLS (INTENTS OR APPLICATIONS)
Application/Issue Date 10/29/2013

Owner OWNER
Driller No. 7
Driller Name LAYNE CHRISTENSEN COMPANY
Driller Phone 480-895-9336
County PIMA

Intended Capacity GPM 0.00

Well Type MONITOR
SubBasin UPPER SANTA CRUZ
Watershed SANTA CRUZ RIVER
Registered Water Uses MONITORING
Registered Well Uses MONITOR
Discharge Method NO DISCHARGE METHOD LISTED
Power NO POWER CODE LISTED

Well Depth	191.00	**Case Diam**	5.00	**Tested Cap**	0.00
Pump Cap.	0.00	**Case Depth**	189.00	**CRT**	
Draw Down	0.00	**Water Level**	0.00	**Log**	X
		Acres Irrig	0.00	**Finish**	PLASTIC OR PVC

Contamination Site: YES - SJ WITH VRP

Tribe: Not in a tribal zone

Comments Former Silverbell Landfill MW-29S
Well Driller Report incomplete. Static Water Level is blank .

Current Action

11/20/2013 755 WELL CONSTRUCTION COMPLETED
Action Comment: bew

Action History

1/6/2014 750 WELL DRILLER REPORT AND WELL LOG RECEIVED
Action Comment: bew

10/30/2013 550 DRILLING AUTHORITY ISSUED
Action Comment: dgc

10/30/2013 555 DRILLER & OWNER PACKETS MAILED
Action Comment: dgc

10/29/2013 155 NOI RECEIVED FOR A NEW NON-PRODUCTION WELL
Action Comment: dgc

Arizona Department of Water Resources
Information Management Unit
PO Box 36020 • Phoenix, Arizona 85067-36020
(602) 771-8527 • 602-771-8500

Well Driller Report and Well Log

THIS REPORT MUST BE FILED WITHIN **30 DAYS** OF COMPLETING THE WELL.

PLEASE PRINT CLEARLY USING BLACK OR BLUE INK

FILE NUMBER: **D(13-13) 33 AAC**
WELL REGISTRATION NUMBER: **55 - 222710**
PERMIT NUMBER (IF ISSUED):

SECTION 1. DRILLING AUTHORIZATION

Drilling Firm — Mail To:

NAME: LAYNE CHRISTENSEN COMPANY	DWR LICENSE NUMBER: 7
ADDRESS: 12030 EAST RIGGS ROAD	TELEPHONE NUMBER: 480-895-9336 DEC 05 2013
CITY / STATE / ZIP: CHANDLER, AZ, 85249-3701	FAX:

SECTION 1. REGISTRY INFORMATION

Well Owner

FULL NAME OF COMPANY, ORGANIZATION, OR INDIVIDUAL: KINDER MORGAN ENERGY PARTNERS LP

MAILING ADDRESS: 1100 TOWN & COUNTRY ROAD

CITY / STATE / ZIP: ORANGE COUNTY, CA, 92868-

CONTACT PERSON NAME AND TITLE:

TELEPHONE NUMBER: 480 203-9968 FAX:

WELL NAME (e.g., MW-1, PZ-3, lot 25 Well, Smith Well, etc.): MW-29S

Location of Well

WELL LOCATION ADDRESS (IF ANY):

TOWNSHIP (N/S): 13S RA

160 ACRE: NE 1/4 40 ACRE: NE 1/4 10 ACRE: SW 1/4

LATITUDE: 32° LONGITUDE: 1° 015' 15" W

NO WATER LEVEL

METHOD OF LATITUDE/L: ☐ USGS Quad Map ☒ *GPS: Hand-Held ☐ *GPS: Survey-Grade

LAND SURFACE ELEVATION: 228' Feet Above Sea Level

METHOD OF ELEVATION (CHECK: ☐ USGS Quad Map ☐ *GPS: Hand-Held ☐ *GPS: Survey-Grade

*IF GPS WAS USED, GEOGRAPHIC COO DATUM (CHECK ONE): ☐ NAD-83 ☐ Other (please specify)

COUNTY: Pima

ASSESSOR'S PARCEL ID NUMBER (MOST RECENT): BOOK MAP PARCEL

SECTION 3. WELL CONSTRUCTION DETAILS

Drilling Method (CHECK ONE)
- ☐ Air Rotary
- ☐ Bored or Augered
- ☐ Cable Tool
- ☐ Dual Rotary
- ☐ Mud Rotary
- ☐ Reverse Circulation
- ☐ Driven
- ☐ Jetted
- ☐ Air Percussion / Odex Tubing
- ☒ Other (please specify): Percussion hammer

Method of Well Development (CHECK ONE)
- ☐ Airlift
- ☒ Bail
- ☐ Surge Block
- ☒ Surge Pump
- ☐ Other (please specify)

Condition of Well (CHECK ONE)
- ☒ Capped
- ☐ Pump Installed

Method of Sealing at Reduction Points (CHECK ONE)
- ☒ None
- ☐ Packed
- ☐ Swedged
- ☐ Welded
- ☐ Other (please specify)

Construction Dates

DATE WELL CONSTRUCTION STARTED: 11-19-13

DATE WELL CONSTRUCTION COMPLETED: 11-20-13

I state that this notice is filed in compliance with A.R.S. § 45-596 and is complete and correct to the best of my knowledge and belief.

SIGNATURE OF QUALIFYING PARTY:

DATE: 12/4/2013

Well Driller Report and Well Log

WELL REGISTRATION NUMBER
55 - 222710

SECTION 4. WELL CONSTRUCTION DESIGN (AS BUILD) (attach additional page if needed)

Depth

DEPTH OF BORING	DEPTH OF COMPLETED WELL
191' Feet Below Land Surface	189' Feet Below Land Surface

Water Level Information

STATIC WATER LEVEL	DATE MEASURED	TIME MEASURED	IF FLOWING WELL, METHOD OF FLOW REGULATION
[redacted] Feet Below Land Surface			☐ Valve ☐ Other:

Borehole / Installed Casing

Borehole: DEPTH FROM SURFACE FROM (feet)	Borehole: DEPTH FROM SURFACE TO (feet)	Borehole: BOREHOLE DIAMETER (inches)	Installed Casing: DEPTH FROM SURFACE FROM (feet)	Installed Casing: DEPTH FROM SURFACE TO (feet)	OUTER (inches)	MATERIAL TYPE (T): STEEL	MATERIAL TYPE (T): PVC	MATERIAL TYPE (T): ABS	MATERIAL TYPE (T): IF OTHER TYPE, DESCRIBE	PERFORATION TYPE (T): BLANK OR NONE	PERFORATION TYPE (T): WIRE WRAP	PERFORATION TYPE (T): SHUTTER SCREEN	PERFORATION TYPE (T): MILLS KNIFE	PERFORATION TYPE (T): SLOTTED	PERFORATION TYPE (T): IF OTHER TYPE, DESCRIBE	SLOT SIZE (inches)
191	0	10"														
			189	149	4.5	✓					✓					020
			149	39	4.5		✓			✓						
			39	+1	4.5	✓				✓						

Installed Annular Material

DEPTH FROM SURFACE FROM (feet)	DEPTH FROM SURFACE TO (feet)	ANNULAR MATERIAL TYPE (T): NONE	CONCRETE	NEAT CEMENT OR CEMENT GROUT	CEMENT-BENTONITE GROUT	BENTONITE: GROUT	BENTONITE: CHIPS	BENTONITE: PELLETS	IF OTHER TYPE OF ANNULAR MATERIAL, DESCRIBE	FILTER PACK: SAND	FILTER PACK: GRAVEL	FILTER PACK: SIZE
191	144									✓		8X12
144	139									✓		#60
139	1			✓								

Well Driller Report and Well Log

WELL REGISTRATION NUMBER
55 - 222710

SECTION 5. GEOLOGIC LOG OF WELL

DEPTH FROM SURFACE FROM (feet)	TO (feet)	**Description** Describe material, grain size, color, etc.	Check (T) every interval where water was encountered (if known)
0	15	silty Sand, caliche	
15	135	Sand, gravel, cobbles	
135	191	Heaving Sands, gravels	T

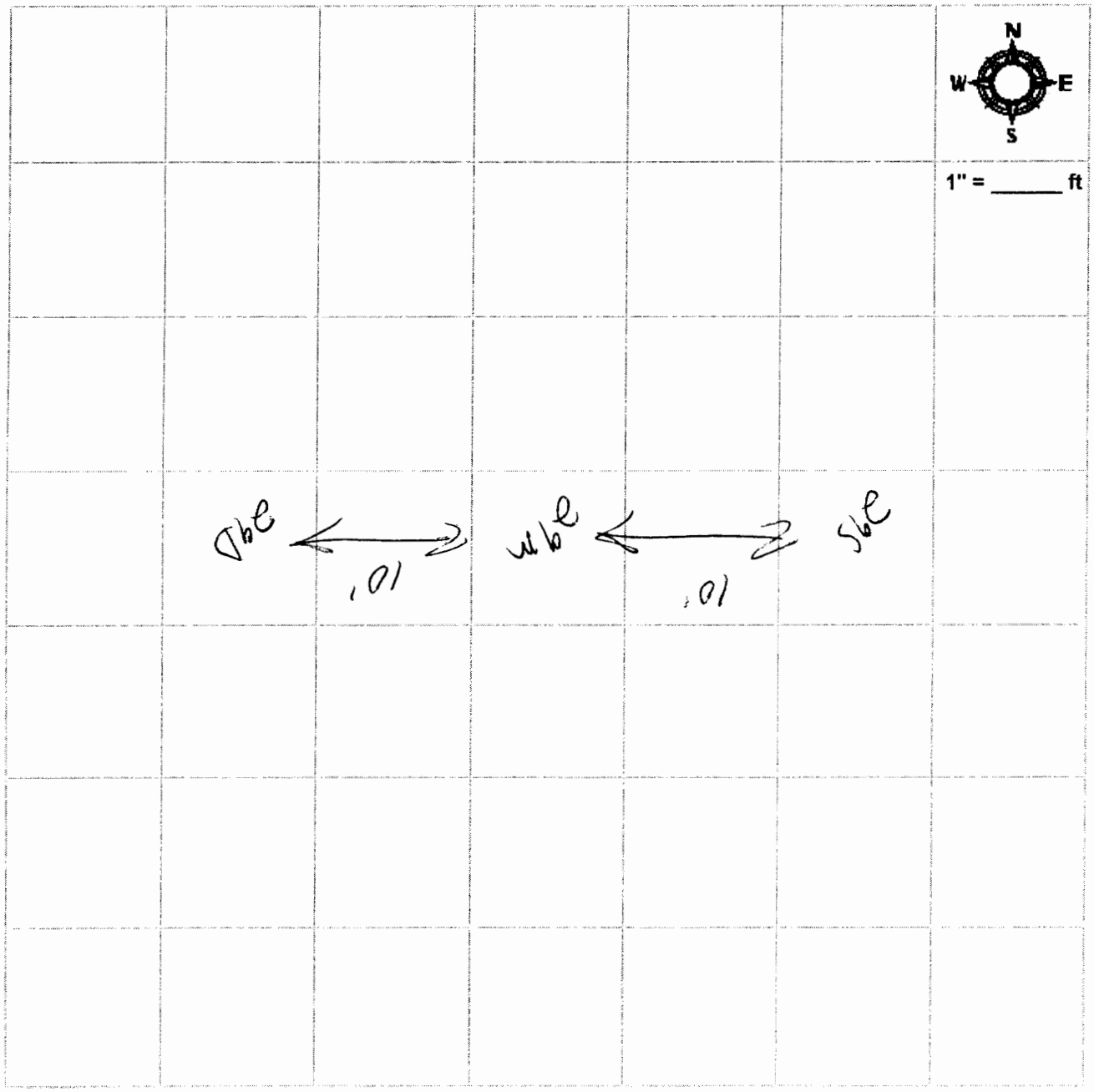
Well Driller Report and Well Log

WELL REGISTRATION NUMBER
55 - 222710

SECTION 6. WELL SITE PLAN

NAME OF WELL OWNER	COUNTY ASSESSOR'S PARCEL ID NUMBER (MOST RECENT)		
	BOOK	MAP	PARCEL
KINDER MORGAN ENERGY PARTNERS LP			

- Please draw the following: (1) the boundaries of property on which the well was located; (2) the well location; (3) the locations of all septic tank systems and sewer systems on the property or within 100 feet of the well location, even if on neighboring properties; and (4) any permanent structures on the property that may aid in locating the well.
- Please indicate the distance between the well location and any septic tank system or sewer system.



Arizona Department of Water Resources
Water Management Division
P.O. Box 36020 Phoenix, Arizona 85067-6020
(602) 771-8500 • (602) 771-8690
· www.azwater.gov ·

Notice of Intent to Drill, Deepen, or Modify a *Monitor / Piezometer / Environmental* Well

$150 FEE

- Review instructions prior to completing form in black or blue ink.
- You must include with your Notice:
  - $150 check or money order for the filing fee.
  - Well construction diagram, labeling all specifications listed in Section 6.
- Authority for fee: A.R.S. § 45-596 and A.A.C. R12-15-104.

** PLEASE PRINT CLEARLY **

AMA / INA	B	SB
TAMA	TUC	16
RECEIVED DATE	WS	
10/29/13	09	
ISSUED DATE	WQAR	CERCLA
10/30/13	645	

FILE NUMBER: DC 13-13 / 33 AAC
WELL REGISTRATION NUMBER: 55 - 222710

SECTION 1. REGISTRY INFORMATION

Well Type (CHECK ONE)
- X Monitor
- ☐ Piezometer
- ☐ Vadose Zone
- ☐ Air Sparging
- ☐ Soil Vapor Extraction
- ☐ Other (*please specify*):

Proposed Action (CHECK ONE)
- X Drill New Well
- ☐ Deepen
- ☐ Modify

If Deepening or Modifying:
WELL REGISTRATION NUMBER: 55 -

Location of Well

WELL LOCATION ADDRESS (IF ANY): City of Tucson, Former Silverbell Landfill

TOWNSHIP (N/S)	RANGE (E/W)	SECTION	160 ACRE	40 ACRE	10 ACRE
13S	13E	33	NE ¼	NE ¼	SW ¼

COUNTY ASSESSOR'S PARCEL ID NUMBER: BOOK | MAP | PARCEL

COUNTY WHERE WELL IS LOCATED: Pima

SECTION 2. OWNER INFORMATION

Well Owner
FULL NAME OF COMPANY, ORGANIZATION, OR INDIVIDUAL: Kinder Morgan Energy Partners, L.P.
MAILING ADDRESS: 1100 Town & Country Road
CITY / STATE / ZIP CODE: Orange County, CA 92868
CONTACT PERSON NAME AND TITLE: Paul Salcido, Project Manager
TELEPHONE NUMBER: 480-203-9968
FAX: 303-984-3687

RECEIVED
OCT 29 2013
ARIZONA DEPARTMENT OF WATER RESOURCES

Landowner (if different from Well Owner)
FULL NAME OF COMPANY, GOVERNMENT AGENCY, OR INDIVIDUAL: City of Tucson Environmental Management
MAILING ADDRESS: 4004 South Park Ave., Bldg. #1
CITY / STATE / ZIP CODE: Tucson, AZ 85714
CONTACT PERSON NAME AND TITLE: Nancy Peterson, Deputy Director
TELEPHONE NUMBER: 520-791-3175
FAX: 520-791-4155

SECTION 3. DRILLING AUTHORIZATION

Drilling Firm
NAME: Layne Christensen Company
DWR LICENSE NUMBER: #7
ROC LICENSE CATEGORY: A-04
TELEPHONE NUMBER: 480-895-9336
FAX: 480-895-8699
E-MAIL ADDRESS: Aaron.maurer@layne.com

Consultant (if applicable)
CONSULTING FIRM: ARCADIS U.S., Inc.
CONTACT PERSON NAME: Robert Forsberg
TELEPHONE NUMBER: 480-905-9311
FAX: 480-905-9353
E-MAIL ADDRESS: bob.forsberg@arcadis-us.com

SECTION 4.

Questions	Yes	No	Explanation:
1. Are all annular spaces between the casing(s) and the borehole for the placement of grout at least 2 inches?	X		2-inch annular spaces are special standards required for wells located in and near groundwater contamination sites (such as CERCLA, WQARF, DOD, LUST).
2. Is the screened or perforated interval of casing greater than 100 feet in length?		X	100-foot maximum screen intervals are a special standard for wells located in and near groundwater contamination sites (such as CERCLA, WQARF, DOD, LUST).
3. Are you requesting a variance to use thermoplastic casing in lieu of steel casing in the surface seal?		X	The wells must be constructed in a vault as defined in A.A.C. R12-15-801(27).
4. Is there another well name or identification number associated with this well? (e.g., MW-1, PZ2, 06-04, etc.)	X		IF YES, PLEASE STATE **MW-29S**
5. Have construction plans been coordinated with the Arizona Department of Environmental Quality?		X	IF YES, PLEASE STATE AGENCY CONTACT & PHONE NUMBER
6. For monitor wells, is dedicated pump equipment to be installed?		X	IF YES, PLEASE STATE DESIGN PUMP CAPACITY Gallons per Minute
7. Is this well a new well located in an Active Management Area **AND** intended to pump water for the purpose of remediating groundwater?		X	IF YES, UNLESS THE WELL IS A REPLACEMENT WELL AND THE TOTAL NUMBER OF OPERABLE WELLS ON THE SITE IS NOT INCREASING, YOU MUST ALSO FILE A SUPPLEMENTAL FORM A.R.S. § 45-454(C) & (F). *(See instructions)*
8. Will the well registration number be stamped on the vault cover or on the upper part of the casing?	X		IF NO, WHERE WILL THE REGISTRATION NUMBER BE PLACED?

Notice of Intent to Drill, Deepen, or Modify a *Monitor / Piezometer / Environmental* Well

WELL REGISTRATION NUMBER
55 - 222710

SECTION 5. WELL CONSTRUCTION DETAILS

Drill Method

CHECK ONE

- ☐ Air Rotary
- ☐ Bored or Augered
- ☐ Cable Tool
- ☐ Dual Rotary
- ☐ Mud Rotary
- ☐ Reverse Circulation
- ☐ Driven
- ☐ Jetted
- ☐ Air Percussion / Odex Tubing
- X Other (*please specify*):

Percussion Hammer/Air

DATE CONSTRUCTION TO BEGIN
October 14, 2013

Method of Well Development

CHECK ONE

- ☐ Airlift
- ☐ Bail
- ☐ Surge Block
- ☐ Surge Pump
- X Other (*please specify*):

Bail-Surge-Pump

Grout Emplacement Method

CHECK ONE

- ☐ Gravity
- ☐ Pressure Grout
- X Tremie
- ☐ Other (*please specify*):

Method of Sealing at Reduction Points

CHECK ONE

- X None
- ☐ Welded
- ☐ Swedged
- ☐ Packed
- ☐ Other (*please specify*):

Surface or Conductor Casing

CHECK ONE

- ☐ Flush Mount in a vault
- X Extend 1' above grade

SECTION 6. PROPOSED WELL CONSTRUCTION PLAN (attach additional page if needed)

Attach a well construction diagram labeling all specifications below.

Borehole			Casing													
DEPTH FROM SURFACE			DEPTH FROM SURFACE			MATERIAL TYPE (T)				PERFORATION TYPE (T)						
FROM (feet)	TO (feet)	BOREHOLE DIAMETER (inches)	FROM (feet)	TO (feet)	OUTER DIAMETER (inches)	STEEL	PVC	ABS	IF OTHER TYPE, DESCRIBE	BLANK OR NONE	WIRE WRAP	SHUTTER SCREEN	MILLS KNIFE	SLOTTED	IF OTHER TYPE, DESCRIBE	SLOT SIZE IF ANY (inches)
0	190	11	0	39	4	X				X						
			39	149	4		X			X						
			149	189	4		Stainless Steel				X					0.02

Annular Material

DEPTH FROM SURFACE		ANNULAR MATERIAL TYPE (T)								FILTER PACK		
						BENTONITE						
FROM (feet)	TO (feet)	NONE	CONCRETE	NEAT CEMENT OR CEMENT GROUT	CEMENT-BENTONITE GROUT	GROUT	CHIPS	PELLETS	IF OTHER TYPE OF ANNULAR MATERIAL, DESCRIBE	SAND	GRAVEL	SIZE
0	139			X								
139	144									X		#60
144	190									X		#8/12

IF THIS WELL HAS NESTED CASINGS, SPECIFY NUMBER OF CASING STRINGS

EXPECTED DEPTH TO WATER 161 Feet Below Ground Surface

SECTION 7. OPTIONAL BY PROPERTY OWNER AND WELL OWNER ONLY

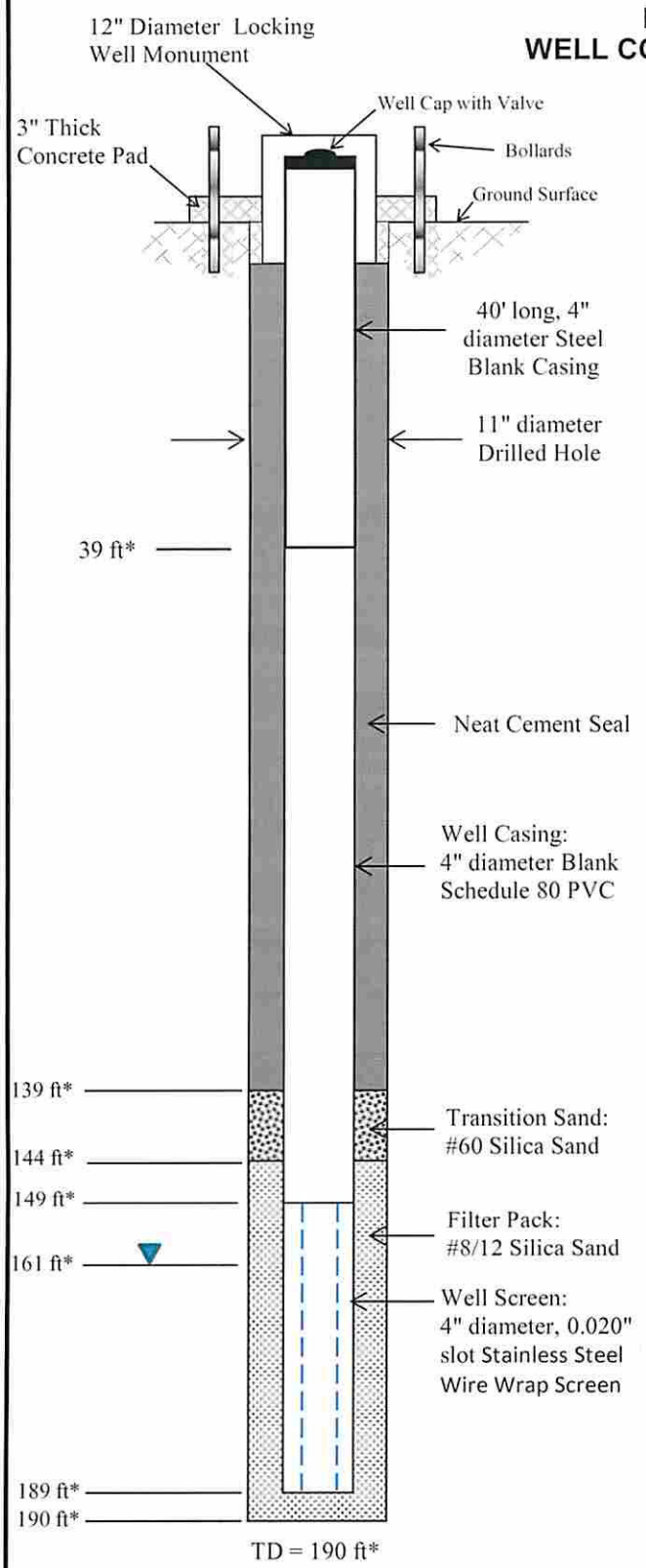
☐ By checking this box, I hereby provide ADWR permission to enter the property for the purpose of taking water level measurements at this well. *(See instructions.)*

SECTION 8. WELL OWNER AND PROPERTY OWNER SIGNATURE

I state that this notice is filed in compliance with A.R.S. § 45-596 and is complete and correct to the best of my knowledge and belief.

TYPE OR PRINT NAME AND TITLE	SIGNATURE OF WELL OWNER	DATE
Paul Salcido/Project Manager	Paul M. Salcido	9/23/13
TYPE OR PRINT NAME AND TITLE	SIGNATURE OF LANDOWNER, IF APPLICABLE (SEE INSTRUCTIONS)	DATE
Nancy Petersen, Deputy Director	Nancy P.	10/24/13

PROPOSED
WELL CONSTRUCTION LOG



Measuring Point is Top of Well Casing Unless Otherwise Noted.

* Depth Below Ground Surface

Project	ST010022	Well	MW-29S
Town/City	Tucson		
County	Pima	State	Arizona
Permit No(s).			
Land Surface Elevation	2287 feet	[ ] Surveyed	
Datum	amsl	[X] Estimated	
Coordinates			
Installation Date(s)			
Drilling Method	Air Rotary/Percussion Hammer		
Drilling Contractor			
Drilling Fluid			
Development Technique(s) and Date(s)	N/A		
Fluid Loss During Drilling	gallons		
Water Removed During Development	gallons		
Static Depth to Water	**~160** feet below M.P.		
Pumping Depth to Water	N/A feet below M.P.		
Pumping Duration	hours		
Yield	gpm	Date	
Specific Capacity	gpm/ft		
Well Purpose	Monitoring Well		
Remarks			
Prepared by	Thomas Vespalec		

Drawing not to scale

Printed: 10/29/2013 11:09:27 AM

Arizona Department of Water Resources

3550 N Central Ave.
Phoenix AZ 85012

Customer:

ARCADIS
630 PLAZA DRIVE, SUITE 600
HIGHLANDS RANCH, CO 80129

Receipt #: 14-30837
Office: MAIN OFFICE
Receipt Date: 10/29/2013
Sale Type: Mail
Cashier: WRSYM

Item No.	Index	AOBJ	Description	Ref ID	Qty	Unit Price	Ext Price
8505	15245	4439-6F	MONITOR, PIEZOMETER, AIR SPARGING, SOIL VAPOR EXTR	55-222708 thru 55-222713	6	150.00	900.00
						RECEIPT TOTAL:	**900.00**

Payment type: CHECK
Amount Paid: $900.00
Payment Received Date: 10/29/2013

Check #	072662

Notes:

No refund without valid receipt

ARIZONA DEPARTMENT *of* WATER RESOURCES
3550 North Central Avenue, Second Floor
Phoenix, AZ 85012
602-771-8500
azwater.gov

October 30, 2013

KINDER MORGAN ENERGY PARTNERS LP
1100 TOWN & COUNTRY ROAD
ATTN: PAUL SALCIDO, PROJECT MANAGER
ORANGE COUNTY, CA 92868

JANICE K. BREWER
Governor

SANDRA A. FABRITZ-WHITNEY
Director

Registration No. 55- 222710
File Number: D(13-13) 33 AAC

Dear Well Applicant:

Enclosed is a copy of the Notice of Intention to Drill (NOI) a well which you or your driller recently filed with the Department of Water Resources. This letter is to inform you that the Department has approved the NOI and has mailed, or made available for download, a drilling authorization card to your designated well drilling contractor. The driller may not begin drilling until he/she has received the authorization, and must keep it in their possession at the well site during drilling.

Well drilling activities must be completed within one year after the date the NOI was filed with the Department. If drilling is not completed within one year, a new NOI must be filed and authorization from this Department received before proceeding with drilling. If the well cannot be successfully completed as initially intended (dry hole, cave in, lost tools, etc.), the well must be properly abandoned and a Well Abandonment Completion Report must be filed by your driller [as required by A.A.C. R12-15-816(F)].

If you change drillers, you must notify the Department of the new driller's identity on a Request to Change Well Information (form 55-71A). Please ensure that the new driller is licensed by the Department to drill the type of well you require. A new driller may not begin drilling until he/she receives a new drilling authorization card from the Department.

If you find it necessary to change the location of the proposed well(s), you may not proceed with drilling until you file an amended NOI with the Department. An amended drilling authorization card will then be issued to the well drilling contractor, which must be in their possession before drilling begins.

Arizona statute [A.R.S. § 45-600] requires registered well owners to file a Pump Installation Completion Report (form 55-56) with the Department within 30 days after the installation of pumping equipment, if authorized. A blank report is enclosed for your convenience. State statute also requires the driller to file a complete and accurate Well Drillers Report and Well Log (form 55-55) within 30 days after completion of drilling. A blank report form was provided to your driller with the drilling authorization card. You should insist and ensure that all of the required reports are accurately completed and timely filed with the Department.

Please be advised that Arizona statute [A.R.S. § 45-593(C)] requires a registered well owner to notify the Department of a change in ownership of the well and/or information pertaining to the physical characteristics of the well in order to keep this well registration file current and accurate. Any change in well information or a request to change well driller must be filed on a Request to Change Well Information form (form 55-71A) that may be downloaded from the ADWR Internet website at www.azwater.gov.

Sincerely,

Groundwater Permitting and Wells Section

ARIZONA DEPARTMENT OF WATER RESOURCES
3550 North Central Avenue, Second Floor
Phoenix, Arizona 85012

NOTICE! This well is located in or near an area of groundwater contamination (WQARF/CERCLA/DOD or Other). Be advised that **special requirements may apply.**

THIS AUTHORIZATION SHALL BE IN POSSESSION OF THE DRILLER DURING ALL DRILLING OPERATIONS

WELL REGISTRATION NO: **55-222710**

AUTHORIZED DRILLER: **LAYNE CHRISTENSEN COMPANY** LICENSE NO: **7**

NOTICE OF INTENTION TO DRILL MONITOR WELL(S) HAS BEEN FILED WITH THE DEPARTMENT BY:

WELL OWNER: **KINDER MORGAN ENERGY PARTNERS LP 1100 TOWN & COUNTRY ROAD ATTN: PAUL SALCIDO, PROJECT MANAGER ORANGE COUNTY, CA, 92868**

THE WELL(S) IS/ARE TO BE LOCATED IN THE:

SW 1/4 of the **NE** 1/4 of the **NE** 1/4 Section **33** Township **13 SOUTH** Range **13 EAST**

NO. OF WELLS IN THIS PROJECT: **1**

THIS AUTHORIZATION EXPIRES AT MIDNIGHT ON THE DAY OF **October 28, 2014**

GROUNDWATER PERMITTING AND WELLS

THE DRILLER MUST FILE A LOG OF THE WELL WITHIN 30 DAYS OF COMPLETION OF DRILLING.

Run Date: 01/09/2014

AZ DEPARTMENT OF WATER RESOURCES

WELL REGISTRY REPORT - WELLS55

Location D 13.0 13.0 33 A A C

Well Reg.No 55 - 222711

AMA TUCSON AMA

Registered Name KINDER MORGAN ENERGY PARTNERS LP
1100 TOWN & COUNTRY ROAD
ATTN: PAUL SALCIDO, PROJECT MANAGER
ORANGE COUNTY CA 92868

File Type NEW WELLS (INTENTS OR APPLICATIONS)
Application/Issue Date 10/29/2013

Owner OWNER
Driller No. 7
Driller Name LAYNE CHRISTENSEN COMPANY
Driller Phone 480-895-9336
County PIMA

Intended Capacity GPM 0.00

Well Type MONITOR
SubBasin UPPER SANTA CRUZ
Watershed SANTA CRUZ RIVER
Registered Water Uses MONITORING
Registered Well Uses MONITOR
Discharge Method NO DISCHARGE METHOD LISTED
Power NO POWER CODE LISTED

Well Depth	226.00	**Case Diam**	5.00	**Tested Cap**	0.00
Pump Cap.	0.00	**Case Depth**	224.00	**CRT**	
Draw Down	0.00	**Water Level**	0.00	**Log**	X
		Acres Irrig	0.00	**Finish**	NO CASING CODE LISTED

Contamination Site: YES - SJ WITH VRP

Tribe: Not in a tribal zone

Comments Former Silverbell Landfill MW-29M
Well Driller Report incomplete. Static Water Level is blank

Current Action

11/19/2013 755 WELL CONSTRUCTION COMPLETED
Action Comment: bew

Action History

1/6/2014 750 WELL DRILLER REPORT AND WELL LOG RECEIVED
Action Comment: bew

10/30/2013 550 DRILLING AUTHORITY ISSUED
Action Comment: dgc

10/30/2013 555 DRILLER & OWNER PACKETS MAILED
Action Comment: dgc

10/29/2013 155 NOI RECEIVED FOR A NEW NON-PRODUCTION WELL
Action Comment: dgc

Arizona Department of Water Resources
Information Management Unit
PO Box 36020 • Phoenix, Arizona 85067-36020
(602) 771-8527 • 602-771-8500

Well Driller Report and Well Log

THIS REPORT MUST BE FILED WITHIN **30 DAYS** OF COMPLETING THE WELL.

PLEASE PRINT CLEARLY USING BLACK OR BLUE INK

FILE NUMBER: **D(13-13) 33 AAC**
WELL REGISTRATION NUMBER: **55 - 222711**
PERMIT NUMBER (IF ISSUED):

SECTION 1. DRILLING AUTHORIZATION

Drilling Firm — Mail To:

NAME: LAYNE CHRISTENSEN COMPANY	DWR LICENSE NUMBER: 7
ADDRESS: 12030 EAST RIGGS ROAD	TELEPHONE NUMBER: 480-895-9336
CITY / STATE / ZIP: CHANDLER, AZ, 85249-3701	FAX:

DEC 05 2013

SECTION 1. REGISTRY INFORMATION

Well Owner

FULL NAME OF COMPANY, ORGANIZATION, OR INDIVIDUAL: KINDER MORGAN ENERGY PARTNERS LP

MAILING ADDRESS: 1100 TOWN & COUNTRY ROAD

CITY / STATE / ZIP: ORANGE COUNTY, CA, 92868-

CONTACT PERSON NAME AND TITLE:

TELEPHONE NUMBER: 480 203-9968 FAX:

WELL NAME (e.g., MW-1, PZ-3, lot 25 Well, Smith Well, etc.): MW-29M

Location of Well

WELL LOCATION ADDRESS (IF ANY):

TOWNSHIP (N/S)	RANGE (E/W)	SECTION	160 ACRE	40 ACRE	10 ACRE
13S	13E	33	NE 1/4	NE 1/4	SW 1/4

LATITUDE			LONGITUDE		
32°	26.3'	94" N	111°	9.15'	15" W

METHOD OF LATITUDE/LONGITUDE (CHECK ONE): ☐ USGS Quad Map ☐ Conventional Survey ☑ *GPS: Hand-Held ☐ *GPS: Survey-Grade

LAND SURFACE ELEVATION AT WELL: 2287 Feet Above Sea Level

METHOD OF ELEVATION (CHECK ONE): ☐ USGS Quad Map ☐ Conventional Survey ☐ *GPS: Hand-Held ☐ *GPS: Survey-Grade

*IF GPS WAS USED, GEOGRAPHIC COORDINATE DATUM (CHECK ONE): ☐ NAD-83 ☐ Other (please specify)

COUNTY: Pima

ASSESSOR'S PARCEL ID NUMBER (MOST RECENT): BOOK | MAP | PARCEL

SECTION 3. WELL CONSTRUCTION DETAILS

Drilling Method — CHECK ONE
- ☐ Air Rotary
- ☐ Bored or Augered
- ☐ Cable Tool
- ☐ Dual Rotary
- ☐ Mud Rotary
- ☐ Reverse Circulation
- ☐ Driven
- ☐ Jetted
- ☐ Air Percussion / Odex Tubing
- ☑ Other (please specify): Percussion Hammer

Method of Well Development — CHECK ONE
- ☐ Airlift
- ☑ Bail
- ☐ Surge Block
- ☑ Surge Pump
- ☐ Other (please specify)

Condition of Well — CHECK ONE
- ☑ Capped
- ☐ Pump Installed

Method of Sealing at Reduction Points — CHECK ONE
- ☑ None
- ☐ Packed
- ☐ Swedged
- ☐ Welded
- ☐ Other (please specify)

Construction Dates
DATE WELL CONSTRUCTION STARTED: 11-15-13
DATE WELL CONSTRUCTION COMPLETED: 11-19-13

I state that this notice is filed in compliance with A.R.S. § 45-596 and is complete and correct to the best of my knowledge and belief.

SIGNATURE OF QUALIFYING PARTY:

DATE: 12/4/2013

Well Driller Report and Well Log

WELL REGISTRATION NUMBER
55 - 222711

SECTION 4. WELL CONSTRUCTION DESIGN (AS BUILD) (attach additional page if needed)

Depth

DEPTH OF BORING	DEPTH OF COMPLETED WELL
226.5 Feet Below Land Surface	224 Feet Below Land Surface

Water Level Information

STATIC WATER LEVEL	DATE MEASURED	TIME MEASURED	IF FLOWING WELL, METHOD OF FLOW REGULATION
[redacted]et Below Land Surface			☐ Valve ☐ Other:

Borehole

DEPTH FROM SURFACE FROM (feet)	TO (feet)	BOREHOLE DIAMETER (inches)
226	0	10"

Installed Casing

DEPTH FROM SURFACE FROM (feet)	TO (feet)	OUTER (inches)	MATERIAL TYPE (T): STEEL	PVC	ABS	IF OTHER TYPE, DESCRIBE	PERFORATION TYPE (T): BLANK OR NONE	WIRE WRAP	SHUTTER SCREEN	MILLS KNIFE	SLOTTED	IF OTHER TYPE, DESCRIBE	SLOT SIZE (inches)
224	194	4.5"	✓					✓					020
194	39	4.5		✓			✓						
39	0	4.5	✓										

Installed Annular Material

DEPTH FROM SURFACE FROM (feet)	TO (feet)	ANNULAR MATERIAL TYPE (T): NONE	CONCRETE	NEAT CEMENT OR CEMENT GROUT	CEMENT-BENTONITE GROUT	BENTONITE: GROUT	CHIPS	PELLETS	IF OTHER TYPE OF ANNULAR MATERIAL, DESCRIBE	FILTER PACK: SAND	GRAVEL	SIZE
226	189									✓		8x12
189	184									✓		#60
184	1			✓								

Well Driller Report and Well Log

WELL REGISTRATION NUMBER
55 - 222711

SECTION 5. GEOLOGIC LOG OF WELL

DEPTH FROM SURFACE FROM (feet)	TO (feet)	**Description** Describe material, grain size, color, etc.	Check (T) every interval where water was encountered (if known)
0	15	silty Sand, caliche	
15	135	Sand, gravel, small cobbles	
135	226.5	Heaving sands, gravels	T

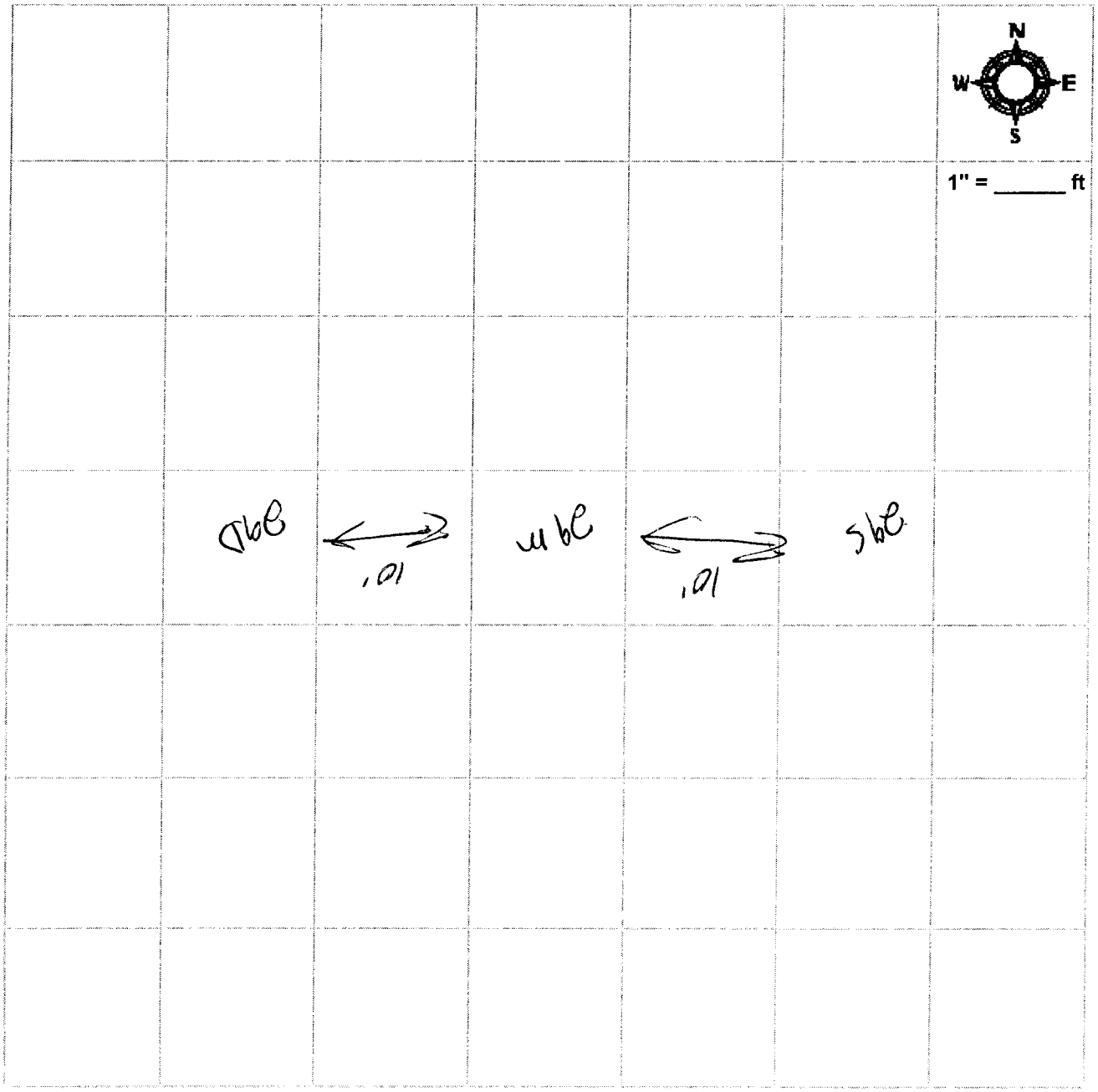
Well Driller Report and Well Log

WELL REGISTRATION NUMBER
55 - 222711

SECTION 6. WELL SITE PLAN

NAME OF WELL OWNER	COUNTY ASSESSOR'S PARCEL ID NUMBER (MOST RECENT)		
	BOOK	MAP	PARCEL
KINDER MORGAN ENERGY PARTNERS LP			

- Please draw the following: (1) the boundaries of property on which the well was located; (2) the well location; (3) the locations of all septic tank systems and sewer systems on the property or within 100 feet of the well location, even if on neighboring properties; and (4) any permanent structures on the property that may aid in locating the well.
- Please indicate the distance between the well location and any septic tank system or sewer system.



Arizona Department of Water Resources
Water Management Division
P.O. Box 36020 Phoenix, Arizona 85067-6020
(602) 771-8500 • (602) 771-8690
· www.azwater.gov ·

Notice of Intent to Drill, Deepen, or Modify a *Monitor / Piezometer / Environmental* Well

$150 FEE

- Review instructions prior to completing form in black or blue ink.
- You must include with your Notice:
  - $150 check or money order for the filing fee.
  - Well construction diagram, labeling all specifications listed in Section 6.
- Authority for fee: A.R.S. § 45-596 and A.A.C. R12-15-104.

** PLEASE PRINT CLEARLY **

AMA / INA	B	SB
TAMA	TUCL6	
RECEIVED DATE	WS	
10/29/13	09	
ISSUED DATE	WQAR	CERCLA
10/30/13		645

FILE NUMBER: D(13-13)33 AAC

WELL REGISTRATION NUMBER: 55 - 222711

SECTION 1. REGISTRY INFORMATION

Well Type (CHECK ONE)

- X Monitor
- ☐ Piezometer
- ☐ Vadose Zone
- ☐ Air Sparging
- ☐ Soil Vapor Extraction
- ☐ Other (*please specify*):

Proposed Action (CHECK ONE)

- X Drill New Well
- ☐ Deepen
- ☐ Modify

If Deepening or Modifying:
WELL REGISTRATION NUMBER: 55 -

Location of Well

WELL LOCATION ADDRESS (IF ANY): City of Tucson, Former Silverbell Landfill

TOWNSHIP (N/S)	RANGE (E/W)	SECTION	160 ACRE	40 ACRE	10 ACRE
13S	13E	33	NE ¼	NE ¼	SW ¼

COUNTY ASSESSOR'S PARCEL ID NUMBER: BOOK | MAP | PARCEL

COUNTY WHERE WELL IS LOCATED: Pima

SECTION 2. OWNER INFORMATION

Well Owner

FULL NAME OF COMPANY, ORGANIZATION, OR INDIVIDUAL: Kinder Morgan Energy Partners, L.P.
MAILING ADDRESS: 1100 Town & Country Road
CITY / STATE / ZIP CODE: Orange County, CA 92868
CONTACT PERSON NAME AND TITLE: Paul Salcido, Project Manager
TELEPHONE NUMBER: 480-203-9968
FAX: 303-984-3687

RECEIVED
OCT 29 2013
ARIZONA DEPARTMENT OF WATER RESOURCES

Landowner (if different from Well Owner)

FULL NAME OF COMPANY, GOVERNMENT AGENCY, OR INDIVIDUAL: City of Tucson Environmental Management
MAILING ADDRESS: 4004 South Park Ave., Bldg. #1
CITY / STATE / ZIP CODE: Tucson, AZ 85714
CONTACT PERSON NAME AND TITLE: Nancy Peterson, Deputy Director
TELEPHONE NUMBER: 520-791-3175
FAX: 520-791-4155

SECTION 3. DRILLING AUTHORIZATION

Drilling Firm

NAME: Layne Christensen Company
DWR LICENSE NUMBER: #7
ROC LICENSE CATEGORY: A-04
TELEPHONE NUMBER: 480-895-9336
FAX: 480-895-8699
E-MAIL ADDRESS: Aaron.maurer@layne.com

Consultant (if applicable)

CONSULTING FIRM: ARCADIS U.S., Inc.
CONTACT PERSON NAME: Robert Forsberg
TELEPHONE NUMBER: 480-905-9311
FAX: 480-905-9353
E-MAIL ADDRESS: bob.forsberg@arcadis-us.com

SECTION 4.

Questions	Yes	No	Explanation:
1. Are all annular spaces between the casing(s) and the borehole for the placement of grout at least 2 inches?	X		2-inch annular spaces are special standards required for wells located in and near groundwater contamination sites (such as CERCLA, WQARF, DOD, LUST).
2. Is the screened or perforated interval of casing greater than 100 feet in length?		X	100-foot maximum screen intervals are a special standard for wells located in and near groundwater contamination sites (such as CERCLA, WQARF, DOD, LUST).
3. Are you requesting a variance to use thermoplastic casing in lieu of steel casing in the surface seal?		X	The wells must be constructed in a vault as defined in A.A.C. R12-15-801(27).
4. Is there another well name or identification number associated with this well? (e.g., MW-1, PZ2, 06-04, etc.)	X		IF YES, PLEASE STATE **MW-29M**
5. Have construction plans been coordinated with the Arizona Department of Environmental Quality?		X	IF YES, PLEASE STATE AGENCY CONTACT & PHONE NUMBER
6. For monitor wells, is dedicated pump equipment to be installed?		X	IF YES, PLEASE STATE DESIGN PUMP CAPACITY Gallons per Minute
7. Is this well a new well located in an Active Management Area **AND** intended to pump water for the purpose of remediating groundwater?		X	IF YES, UNLESS THE WELL IS A REPLACEMENT WELL AND THE TOTAL NUMBER OF OPERABLE WELLS ON THE SITE IS NOT INCREASING, YOU MUST ALSO FILE A SUPPLEMENTAL FORM A.R.S. § 45-454(C) & (F). *(See instructions)*
8. Will the well registration number be stamped on the vault cover or on the upper part of the casing?	X		IF NO, WHERE WILL THE REGISTRATION NUMBER BE PLACED?

Notice of Intent to Drill, Deepen, or Modify a *Monitor / Piezometer / Environmental* Well

WELL REGISTRATION NUMBER
55 - 222711

SECTION 5. WELL CONSTRUCTION DETAILS

Drill Method

CHECK ONE

- ☐ Air Rotary
- ☐ Bored or Augered
- ☐ Cable Tool
- ☐ Dual Rotary
- ☐ Mud Rotary
- ☐ Reverse Circulation
- ☐ Driven
- ☐ Jetted
- ☐ Air Percussion / Odex Tubing
- X Other (*please specify*):

Percussion Hammer/Air

DATE CONSTRUCTION TO BEGIN
October 14, 2013

Method of Well Development

CHECK ONE

- ☐ Airlift
- ☐ Bail
- ☐ Surge Block
- ☐ Surge Pump
- X Other (*please specify*):

Bail-Surge-Pump

Method of Sealing at Reduction Points

CHECK ONE

- X None
- ☐ Welded
- ☐ Swedged
- ☐ Packed
- ☐ Other (*please specify*):

Grout Emplacement Method

CHECK ONE

- ☐ Gravity
- ☐ Pressure Grout
- X Tremie
- ☐ Other (*please specify*):

Surface or Conductor Casing

CHECK ONE

- ☐ Flush Mount in a vault
- X Extend 1' above grade

SECTION 6. PROPOSED WELL CONSTRUCTION PLAN (attach additional page if needed)

Attach a well construction diagram labeling all specifications below.

Borehole			Casing													
DEPTH FROM SURFACE			DEPTH FROM SURFACE			MATERIAL TYPE (T)				PERFORATION TYPE (T)						
FROM (feet)	TO (feet)	BOREHOLE DIAMETER (inches)	FROM (feet)	TO (feet)	OUTER DIAMETER (inches)	STEEL	PVC	ABS	IF OTHER TYPE, DESCRIBE	BLANK OR NONE	WIRE WRAP	SHUTTER SCREEN	MILLS KNIFE	SLOTTED	IF OTHER TYPE, DESCRIBE	SLOT SIZE IF ANY (inches)
0	225	11	0	39	4	X				X						
			39	194	4		X			X						
			194	224	4		Stainless Steel				X					0.02

Annular Material

DEPTH FROM SURFACE		ANNULAR MATERIAL TYPE (T)								FILTER PACK		
						BENTONITE						
FROM (feet)	TO (feet)	NONE	CONCRETE	NEAT CEMENT OR CEMENT GROUT	CEMENT-BENTONITE GROUT	GROUT	CHIPS	PELLETS	IF OTHER TYPE OF ANNULAR MATERIAL, DESCRIBE	SAND	GRAVEL	SIZE
0	184			X								
184	189									X		#60
189	225									X		#8/12

IF THIS WELL HAS NESTED CASINGS, SPECIFY NUMBER OF CASING STRINGS

EXPECTED DEPTH TO WATER 161 Feet Below Ground Surface

SECTION 7. OPTIONAL BY PROPERTY OWNER AND WELL OWNER ONLY

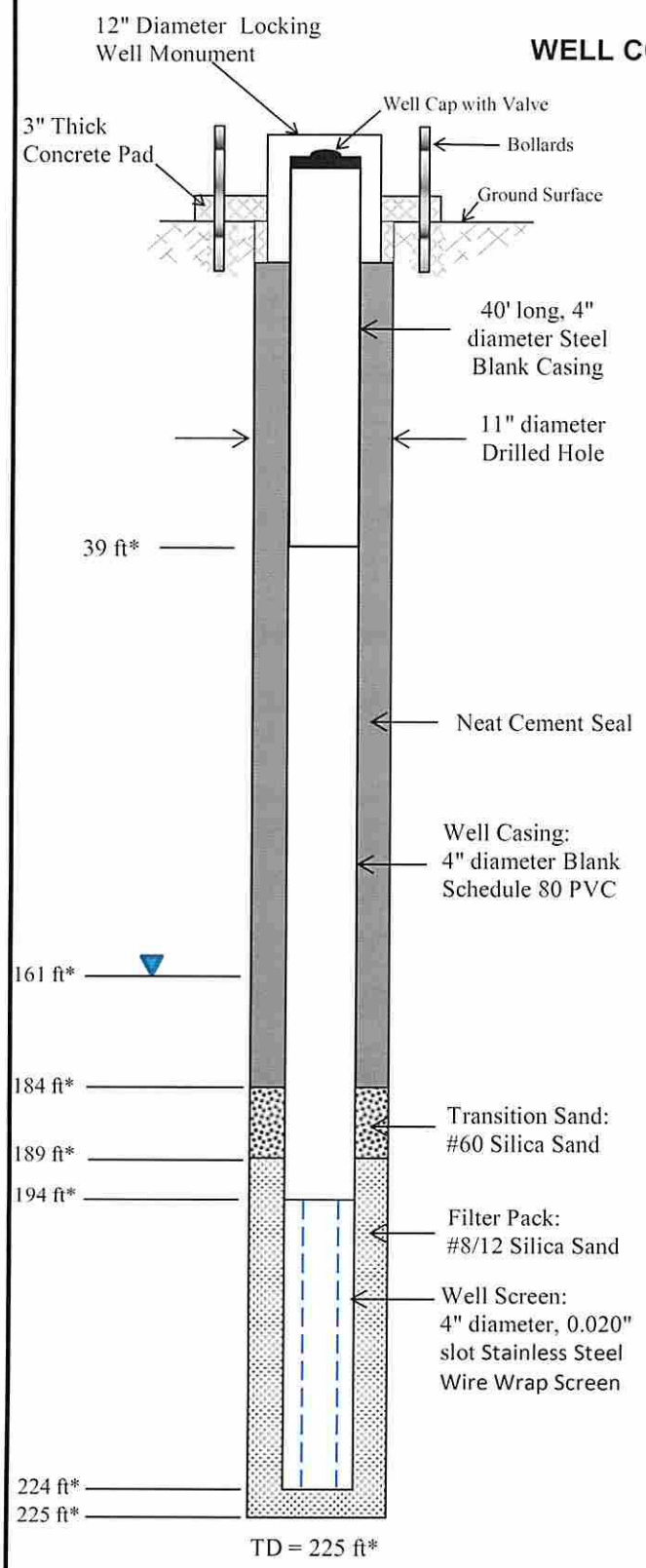
☐ By checking this box, I hereby provide ADWR permission to enter the property for the purpose of taking water level measurements at this well. *(See instructions.)*

SECTION 8. WELL OWNER AND PROPERTY OWNER SIGNATURE

I state that this notice is filed in compliance with A.R.S. § 45-596 and is complete and correct to the best of my knowledge and belief.

TYPE OR PRINT NAME AND TITLE	SIGNATURE OF WELL OWNER	DATE
Paul Salcido/Project Manager	Paul M. Salcido	9/23/13
TYPE OR PRINT NAME AND TITLE	SIGNATURE OF LANDOWNER, IF APPLICABLE (SEE INSTRUCTIONS)	DATE
Nancy Petersen, Deputy Director	[signature]	10/24/13

PROPOSED
WELL CONSTRUCTION LOG



Measuring Point is Top of Well Casing Unless Otherwise Noted.

* Depth Below Ground Surface

Project	ST010022	Well	MW-29M
Town/City	Tucson		
County	Pima	State	Arizona
Permit No(s).			
Land Surface Elevation	2287 feet	[ ] Surveyed	
Datum	amsl	[X] Estimated	
Coordinates			
Installation Date(s)			
Drilling Method	Air Rotary/Percussion Hammer		
Drilling Contractor			
Drilling Fluid			
Development Technique(s) and Date(s)	N/A		
Fluid Loss During Drilling	gallons		
Water Removed During Development	gallons		
Static Depth to Water	~160 feet below M.P.		
Pumping Depth to Water	N/A feet below M.P.		
Pumping Duration	hours		
Yield	gpm	Date	
Specific Capacity	gpm/ft		
Well Purpose	Monitoring Well		
Remarks			
Prepared by	Thomas Vespalec		

Drawing not to scale

Printed: 10/29/2013 11:09:27 AM

Arizona Department of Water Resources

3550 N Central Ave.
Phoenix AZ 85012

Customer:

ARCADIS
630 PLAZA DRIVE, SUITE 600
HIGHLANDS RANCH, CO 80129

Receipt #: 14-30837
Office: MAIN OFFICE
Receipt Date: 10/29/2013
Sale Type: Mail
Cashier: WRSYM

Item No.	Index	AOBJ	Description	Ref ID	Qty	Unit Price	Ext Price
8505	15245	4439-6F	MONITOR, PIEZOMETER, AIR SPARGING, SOIL VAPOR EXTR	55-222708 thru 55-222713	6	150.00	900.00
						RECEIPT TOTAL:	**900.00**

Payment type: CHECK
Amount Paid: $900.00
Payment Received Date: 10/29/2013

Check #	072662

Notes:

No refund without valid receipt

ARIZONA DEPARTMENT *of* WATER RESOURCES
3550 North Central Avenue, Second Floor
Phoenix, AZ 85012
602-771-8500
azwater.gov

October 30, 2013

KINDER MORGAN ENERGY PARTNERS LP
1100 TOWN & COUNTRY ROAD
ATTN: PAUL SALCIDO, PROJECT MANAGER
ORANGE COUNTY, CA 92868

JANICE K. BREWER
Governor

SANDRA A. FABRITZ-WHITNEY
Director

Registration No. 55- 222711
File Number: D(13-13) 33 AAC

Dear Well Applicant:

Enclosed is a copy of the Notice of Intention to Drill (NOI) a well which you or your driller recently filed with the Department of Water Resources. This letter is to inform you that the Department has approved the NOI and has mailed, or made available for download, a drilling authorization card to your designated well drilling contractor. The driller may not begin drilling until he/she has received the authorization, and must keep it in their possession at the well site during drilling.

Well drilling activities must be completed within one year after the date the NOI was filed with the Department. If drilling is not completed within one year, a new NOI must be filed and authorization from this Department received before proceeding with drilling. If the well cannot be successfully completed as initially intended (dry hole, cave in, lost tools, etc.), the well must be properly abandoned and a Well Abandonment Completion Report must be filed by your driller [as required by A.A.C. R12-15-816(F)].

If you change drillers, you must notify the Department of the new driller's identity on a Request to Change Well Information (form 55-71A). Please ensure that the new driller is licensed by the Department to drill the type of well you require. A new driller may not begin drilling until he/she receives a new drilling authorization card from the Department.

If you find it necessary to change the location of the proposed well(s), you may not proceed with drilling until you file an amended NOI with the Department. An amended drilling authorization card will then be issued to the well drilling contractor, which must be in their possession before drilling begins.

Arizona statute [A.R.S. § 45-600] requires registered well owners to file a Pump Installation Completion Report (form 55-56) with the Department within 30 days after the installation of pumping equipment, if authorized. A blank report is enclosed for your convenience. State statute also requires the driller to file a complete and accurate Well Drillers Report and Well Log (form 55-55) within 30 days after completion of drilling. A blank report form was provided to your driller with the drilling authorization card. You should insist and ensure that all of the required reports are accurately completed and timely filed with the Department.

Please be advised that Arizona statute [A.R.S. § 45-593(C)] requires a registered well owner to notify the Department of a change in ownership of the well and/or information pertaining to the physical characteristics of the well in order to keep this well registration file current and accurate. Any change in well information or a request to change well driller must be filed on a Request to Change Well Information form (form 55-71A) that may be downloaded from the ADWR Internet website at www.azwater.gov.

Sincerely,

Groundwater Permitting and Wells Section

ARIZONA DEPARTMENT OF WATER RESOURCES
3550 North Central Avenue, Second Floor
Phoenix, Arizona 85012

NOTICE! This well is located in or near an area of groundwater contamination (WQARF/CERCLA/DOD or Other). Be advised that **special requirements may apply**.

THIS AUTHORIZATION SHALL BE IN POSSESSION OF THE DRILLER DURING ALL DRILLING OPERATIONS

WELL REGISTRATION NO: **55-222711**

AUTHORIZED DRILLER: **LAYNE CHRISTENSEN COMPANY** LICENSE NO: **7**

NOTICE OF INTENTION TO DRILL MONITOR WELL(S) HAS BEEN FILED WITH THE DEPARTMENT BY:

WELL OWNER: **KINDER MORGAN ENERGY PARTNERS LP 1100 TOWN & COUNTRY ROAD ATTN: PAUL SALCIDO, PROJECT MANAGER ORANGE COUNTY, CA, 92868**

THE WELL(S) IS/ARE TO BE LOCATED IN THE:

SW 1/4 of the **NE** 1/4 of the **NE** 1/4 Section **33** Township **13 SOUTH** Range **13 EAST**

NO. OF WELLS IN THIS PROJECT: **1**

THIS AUTHORIZATION EXPIRES AT MIDNIGHT ON THE DAY OF **October 28, 2014**

GROUNDWATER PERMITTING AND WELLS

THE DRILLER MUST FILE A LOG OF THE WELL WITHIN 30 DAYS OF COMPLETION OF DRILLING.

MW-29D 1-6-14 Bew

Arizona Department of Water Resources
Information Management Unit
PO Box 36020 • Phoenix, Arizona 85067-36020
(602) 771-8527 • 602-771-8500

Well Driller Report and Well Log

FILE NUMBER: D(13-13) 33 AAC
WELL REGISTRATION NUMBER: 55 - 222712
PERMIT NUMBER (IF ISSUED):

THIS REPORT MUST BE FILED WITHIN **30 DAYS** OF COMPLETING THE WELL.

PLEASE PRINT CLEARLY USING BLACK OR BLUE INK

RECEIVED DEC 05 2013 ARIZONA DEPARTMENT

SECTION 1. DRILLING AUTHORIZATION

Drilling Firm — Mail To:

NAME: LAYNE CHRISTENSEN COMPANY	DWR LICENSE NUMBER: 7
ADDRESS: 12030 EAST RIGGS ROAD	TELEPHONE NUMBER: 480-895-9336
CITY / STATE / ZIP: CHANDLER, AZ, 85249-3701	FAX:

SECTION 1. REGISTRY INFORMATION

Well Owner

FULL NAME OF COMPANY, ORGANIZATION, OR INDIVIDUAL: KINDER MORGAN ENERGY PARTNERS LP

MAILING ADDRESS: 1100 TOWN & COUNTRY ROAD

CITY / STATE / ZIP: ORANGE COUNTY, CA, 92868-

CONTACT PERSON NAME AND TITLE:

TELEPHONE NUMBER: 480 203-9968 FAX:

WELL NAME (e.g., MW-1, PZ-3, lot 25 Well, Smith Well, etc.): MW-29D

Location of Well

WELL LOCATION ADDRESS (IF ANY):

TOWNSHIP (N/S)	RANGE (E/W)	SECTION	160 ACRE	40 ACRE	10 ACRE
13S	13E	33	NE 1/4	NE 1/4	SW 1/4

LATITUDE			LONGITUDE		
32°	263'	94" N	111°	915'	15" W

METHOD OF LATITUDE/LONGITUDE (CHECK ONE): ☐ USGS Quad Map ☐ Conventional Survey ☑ *GPS: Hand-Held ☐ *GPS: Survey-Grade

LAND SURFACE ELEVATION AT WELL: 2287 Feet Above Sea Level

METHOD OF ELEVATION (CHECK ONE): ☐ USGS Quad Map ☐ Conventional Survey ☐ *GPS: Hand-Held ☐ *GPS: Survey-Grade

*IF GPS WAS USED, GEOGRAPHIC COORDINATE DATUM (CHECK ONE): ☐ NAD-83 ☐ Other (please specify)

COUNTY: Pima

ASSESSOR'S PARCEL ID NUMBER (MOST RECENT): BOOK | MAP | PARCEL

SECTION 3. WELL CONSTRUCTION DETAILS

Drilling Method — CHECK ONE
- ☐ Air Rotary
- ☐ Bored or Augered
- ☐ Cable Tool
- ☐ Dual Rotary
- ☐ Mud Rotary
- ☐ Reverse Circulation
- ☐ Driven
- ☐ Jetted
- ☐ Air Percussion / Odex Tubing
- ☑ Other (please specify): Percussion Hammer

Method of Well Development — CHECK ONE
- ☐ Airlift
- ☑ Bail
- ☐ Surge Block
- ☑ Surge Pump
- ☐ Other (please specify)

Condition of Well — CHECK ONE
- ☑ Capped
- ☐ Pump Installed

Method of Sealing at Reduction Points — CHECK ONE
- ☑ None
- ☐ Packed
- ☐ Swedged
- ☐ Welded
- ☐ Other (please specify)

Construction Dates
- DATE WELL CONSTRUCTION STARTED: 11-13-13
- DATE WELL CONSTRUCTION COMPLETED: 11-15-13

I state that this notice is filed in compliance with A.R.S. § 45-596 and is complete and correct to the best of my knowledge and belief.

SIGNATURE OF QUALIFYING PARTY: [signature] DATE: 12/4/2013

Well Driller Report and Well Log

WELL REGISTRATION NUMBER
55 - 222712

SECTION 4. WELL CONSTRUCTION DESIGN (AS BUILD) (attach additional page if needed)

Depth

DEPTH OF BORING	DEPTH OF COMPLETED WELL
261' Feet Below Land Surface	259.5' Feet Below Land Surface

Water Level Information

STATIC WATER LEVEL	DATE MEASURED	TIME MEASURED	IF FLOWING WELL, METHOD OF FLOW REGULATION
160 Feet Below Land Surface	11-15-13	0920	☐ Valve ☐ Other:

Borehole

DEPTH FROM SURFACE FROM (feet)	TO (feet)	BOREHOLE DIAMETER (inches)
0	261	10"

Installed Casing

DEPTH FROM SURFACE FROM (feet)	TO (feet)	OUTER (inches)	MATERIAL TYPE (T): STEEL	PVC	ABS	IF OTHER TYPE, DESCRIBE	PERFORATION TYPE (T): BLANK OR NONE	WIRE WRAP	SHUTTER SCREEN	MILLS KNIFE	SLOTTED	IF OTHER TYPE, DESCRIBE	SLOT SIZE (inches)
259	229	4.5	✓					✓					020
229	39	4.5		✓			✓						
39	0	4.5	✓										

Installed Annular Material

DEPTH FROM SURFACE FROM (feet)	TO (feet)	ANNULAR MATERIAL TYPE (T): NONE	CONCRETE	NEAT CEMENT OR CEMENT GROUT	CEMENT-BENTONITE GROUT	BENTONITE: GROUT	CHIPS	PELLETS	IF OTHER TYPE OF ANNULAR MATERIAL, DESCRIBE	FILTER PACK: SAND	GRAVEL	SIZE
261	224									✓		8X12
224	219									✓		#60
219	1			✓								

Well Driller Report and Well Log

WELL REGISTRATION NUMBER
55 - 222712

SECTION 5. GEOLOGIC LOG OF WELL

DEPTH FROM SURFACE FROM (feet)	TO (feet)	**Description** Describe material, grain size, color, etc.	Check (T) every interval where water was encountered (if known)
0	15	silty Sand, caliche	
15	135	sand, gravel, small cobbles	
135	180	Sandy, small cobbles	T
180	261	Heaving Sands, cobbles	T

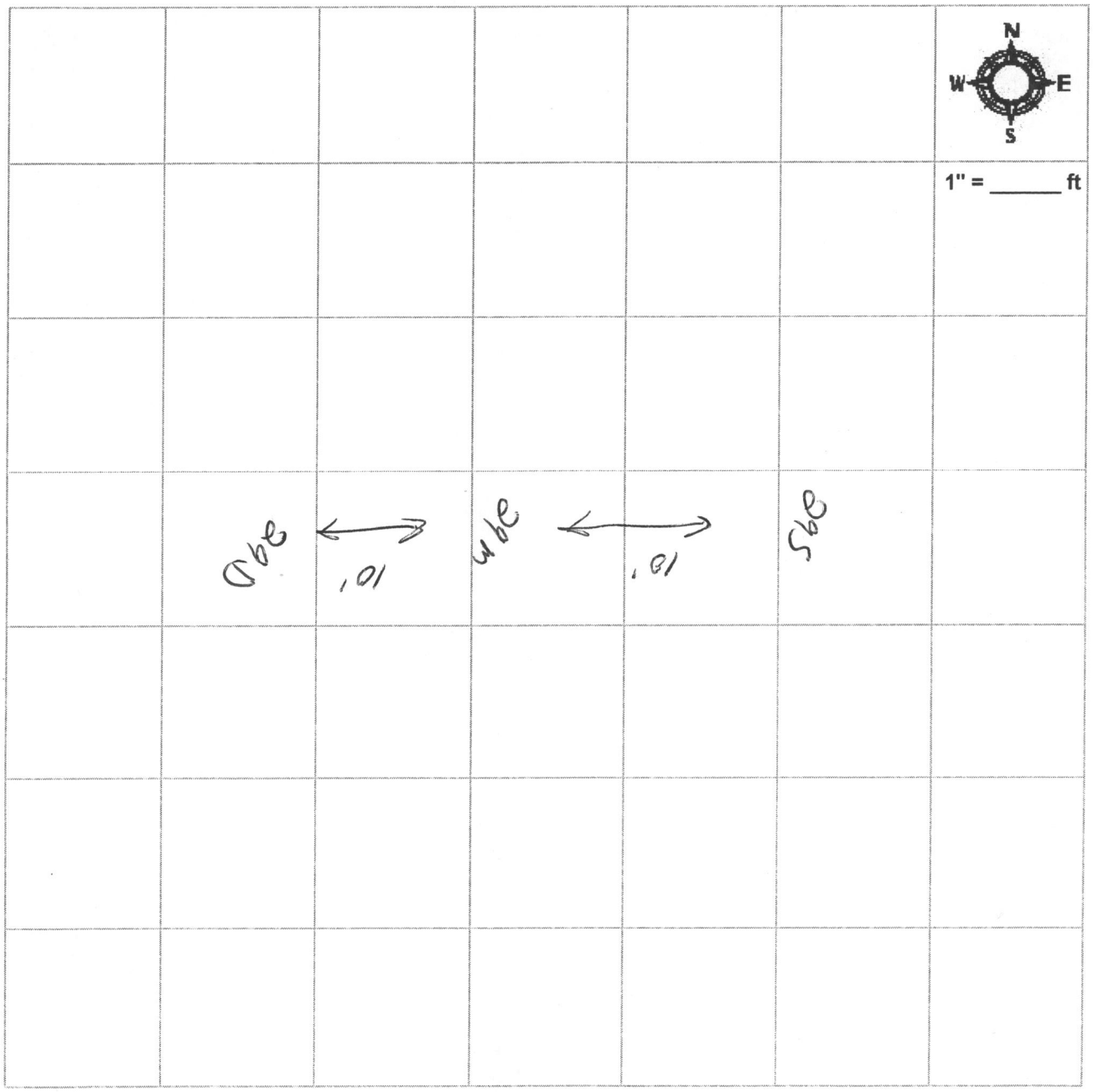
Well Driller Report and Well Log

WELL REGISTRATION NUMBER
55 - 222712

SECTION 6. WELL SITE PLAN

NAME OF WELL OWNER	COUNTY ASSESSOR'S PARCEL ID NUMBER (MOST RECENT)		
	BOOK	MAP	PARCEL
KINDER MORGAN ENERGY PARTNERS LP			

- Please draw the following: (1) the boundaries of property on which the well was located; (2) the well location; (3) the locations of all septic tank systems and sewer systems on the property or within 100 feet of the well location, even if on neighboring properties; and (4) any permanent structures on the property that may aid in locating the well.
- Please indicate the distance between the well location and any septic tank system or sewer system.



Arizona Department of Water Resources
Water Management Division
P.O. Box 36020 Phoenix, Arizona 85067-6020
(602) 771-8500 • (602) 771-8690
· www.azwater.gov ·

Notice of Intent to Drill, Deepen, or Modify a *Monitor / Piezometer / Environmental* Well

$150 FEE

- Review instructions prior to completing form in black or blue ink.
- You must include with your Notice:
  - $150 check or money order for the filing fee.
  - Well construction diagram, labeling all specifications listed in Section 6.
- Authority for fee: A.R.S. § 45-596 and A.A.C. R12-15-104.

** PLEASE PRINT CLEARLY **

AMA / INA	B	SB
TAMA	TUC16	
RECEIVED DATE	WS	
10/29/13	CS	
ISSUED DATE	WQAR	CERCLA
10/30/13	645	

FILE NUMBER D(13-13)33AAC
WELL REGISTRATION NUMBER 55 - 222712

SECTION 1. REGISTRY INFORMATION

Well Type

CHECK ONE

- [x] Monitor
- [ ] Piezometer
- [ ] Vadose Zone
- [ ] Air Sparging
- [ ] Soil Vapor Extraction
- [ ] Other (*please specify*):

Proposed Action

CHECK ONE

- [x] Drill New Well
- [ ] Deepen
- [ ] Modify

If Deepening or Modifying:

WELL REGISTRATION NUMBER
55 -

Location of Well

WELL LOCATION ADDRESS (IF ANY)
City of Tucson, Former Silverbell Landfill

TOWNSHIP (N/S)	RANGE (E/W)	SECTION	160 ACRE	40 ACRE	10 ACRE
13S	13E	33	NE ¼	NE ¼	SW ¼

COUNTY ASSESSOR'S PARCEL ID NUMBER
BOOK | MAP | PARCEL

COUNTY WHERE WELL IS LOCATED
Pima

SECTION 2. OWNER INFORMATION

Well Owner

FULL NAME OF COMPANY, ORGANIZATION, OR INDIVIDUAL
Kinder Morgan Energy Partners, L.P.

MAILING ADDRESS
1100 Town & Country Road

CITY / STATE / ZIP CODE
Orange County, CA 92868

CONTACT PERSON NAME AND TITLE
Paul Salcido, Project Manager

TELEPHONE NUMBER
480-203-9968

FAX
303-984-3687

RECEIVED
OCT 29 2013
ARIZONA DEPARTMENT OF WATER RESOURCES

Landowner (if different from Well Owner)

FULL NAME OF COMPANY, GOVERNMENT AGENCY, OR INDIVIDUAL
City of Tucson Environmental Management

MAILING ADDRESS
4004 South Park Ave., Bldg. #1

CITY / STATE / ZIP CODE
Tucson, AZ 85714

CONTACT PERSON NAME AND TITLE
Nancy Peterson, Deputy Director

TELEPHONE NUMBER
520-791-3175

FAX
520-791-4155

SECTION 3. DRILLING AUTHORIZATION

Drilling Firm

NAME
Layne Christensen Company

DWR LICENSE NUMBER
#7

ROC LICENSE CATEGORY
A-04

TELEPHONE NUMBER
480-895-9336

FAX
480-895-8699

E-MAIL ADDRESS
Aaron.maurer@layne.com

Consultant (if applicable)

CONSULTING FIRM
ARCADIS U.S., Inc.

CONTACT PERSON NAME
Robert Forsberg

TELEPHONE NUMBER
480-905-9311

FAX
480-905-9353

E-MAIL ADDRESS
bob.forsberg@arcadis-us.com

SECTION 4.

Questions	Yes	No	Explanation:
1. Are all annular spaces between the casing(s) and the borehole for the placement of grout at least 2 inches?	X		2-inch annular spaces are special standards required for wells located in and near groundwater contamination sites (such as CERCLA, WQARF, DOD, LUST).
2. Is the screened or perforated interval of casing greater than 100 feet in length?		X	100-foot maximum screen intervals are a special standard for wells located in and near groundwater contamination sites (such as CERCLA, WQARF, DOD, LUST).
3. Are you requesting a variance to use thermoplastic casing in lieu of steel casing in the surface seal?		X	The wells must be constructed in a vault as defined in A.A.C. R12-15-801(27).
4. Is there another well name or identification number associated with this well? (e.g., MW-1, PZ2, 06-04, etc.)	X		IF YES, PLEASE STATE **MW-29D**
5. Have construction plans been coordinated with the Arizona Department of Environmental Quality?		X	IF YES, PLEASE STATE AGENCY CONTACT & PHONE NUMBER
6. For monitor wells, is dedicated pump equipment to be installed?		X	IF YES, PLEASE STATE DESIGN PUMP CAPACITY Gallons per Minute
7. Is this well a new well located in an Active Management Area **AND** intended to pump water for the purpose of remediating groundwater?		X	IF YES, UNLESS THE WELL IS A REPLACEMENT WELL AND THE TOTAL NUMBER OF OPERABLE WELLS ON THE SITE IS NOT INCREASING, YOU MUST ALSO FILE A SUPPLEMENTAL FORM A.R.S. § 45-454(C) & (F). *(See instructions)*
8. Will the well registration number be stamped on the vault cover or on the upper part of the casing?	X		IF NO, WHERE WILL THE REGISTRATION NUMBER BE PLACED?

Notice of Intent to Drill, Deepen, or Modify a *Monitor / Piezometer / Environmental* Well

WELL REGISTRATION NUMBER
55 - 222712

SECTION 5. WELL CONSTRUCTION DETAILS

Drill Method

CHECK ONE

- ☐ Air Rotary
- ☐ Bored or Augered
- ☐ Cable Tool
- ☐ Dual Rotary
- ☐ Mud Rotary
- ☐ Reverse Circulation
- ☐ Driven
- ☐ Jetted
- ☐ Air Percussion / Odex Tubing
- X Other (*please specify*):

Percussion Hammer/Air

DATE CONSTRUCTION TO BEGIN
October 14, 2013

Method of Well Development

CHECK ONE

- ☐ Airlift
- ☐ Bail
- ☐ Surge Block
- ☐ Surge Pump
- X Other (*please specify*):

Bail-Surge-Pump

Method of Sealing at Reduction Points

CHECK ONE

- X None
- ☐ Welded
- ☐ Swedged
- ☐ Packed
- ☐ Other (*please specify*):

Grout Emplacement Method

CHECK ONE

- ☐ Gravity
- ☐ Pressure Grout
- X Tremie
- ☐ Other (*please specify*):

Surface or Conductor Casing

CHECK ONE

- ☐ Flush Mount in a vault
- X Extend 1' above grade

SECTION 6. PROPOSED WELL CONSTRUCTION PLAN (attach additional page if needed)

Attach a well construction diagram labeling all specifications below.

Borehole

DEPTH FROM SURFACE FROM (feet)	TO (feet)	BOREHOLE DIAMETER (inches)
0	260	11

Casing

DEPTH FROM SURFACE FROM (feet)	TO (feet)	OUTER DIAMETER (inches)	MATERIAL TYPE (T) STEEL	PVC	ABS	IF OTHER TYPE, DESCRIBE	PERFORATION TYPE (T) BLANK OR NONE	WIRE WRAP	SHUTTER SCREEN	MILLS KNIFE	SLOTTED	IF OTHER TYPE, DESCRIBE	SLOT SIZE IF ANY (inches)
0	39	4	X				X						
39	229	4		X			X						
229	259	4		Stainless Steel				X					0.02

Annular Material

DEPTH FROM SURFACE FROM (feet)	TO (feet)	ANNULAR MATERIAL TYPE (T) NONE	CONCRETE	NEAT CEMENT OR CEMENT GROUT	CEMENT-BENTONITE GROUT	BENTONITE GROUT	CHIPS	PELLETS	IF OTHER TYPE OF ANNULAR MATERIAL, DESCRIBE	FILTER PACK SAND	GRAVEL	SIZE
0	219			X								
219	224									X		#60
224	260									X		#8/12

IF THIS WELL HAS NESTED CASINGS, SPECIFY NUMBER OF CASING STRINGS

EXPECTED DEPTH TO WATER 161 Feet Below Ground Surface

SECTION 7. OPTIONAL BY PROPERTY OWNER AND WELL OWNER ONLY

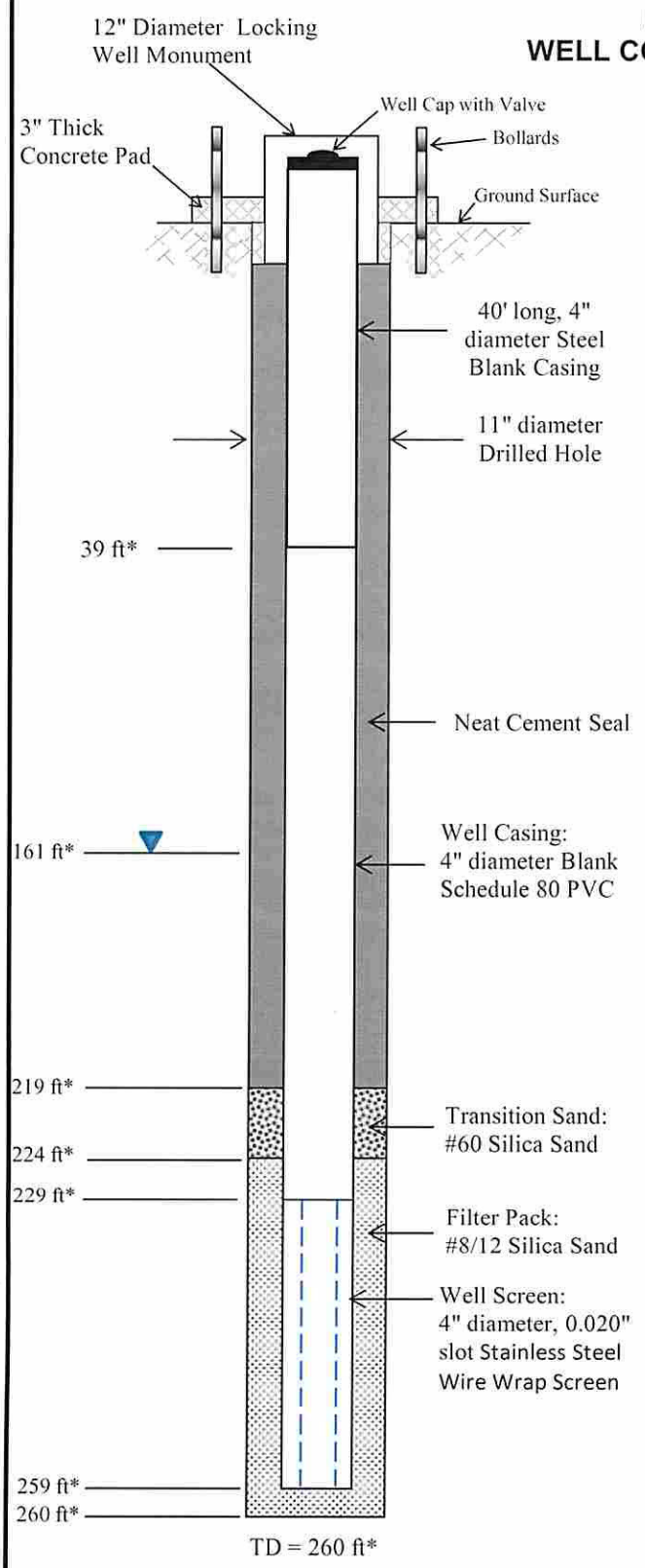
☐ By checking this box, I hereby provide ADWR permission to enter the property for the purpose of taking water level measurements at this well. *(See instructions.)*

SECTION 8. WELL OWNER AND PROPERTY OWNER SIGNATURE

I state that this notice is filed in compliance with A.R.S. § 45-596 and is complete and correct to the best of my knowledge and belief.

TYPE OR PRINT NAME AND TITLE	SIGNATURE OF WELL OWNER	DATE
Paul Salcido/Project Manager	Paul M. Salcido	9/23/13
TYPE OR PRINT NAME AND TITLE	SIGNATURE OF LANDOWNER, IF APPLICABLE (SEE INSTRUCTIONS)	DATE
Nancy Petersen, Deputy Director	[illegible]	10/24/13

PROPOSED
WELL CONSTRUCTION LOG



Measuring Point is Top of Well Casing Unless Otherwise Noted.

* Depth Below Ground Surface

Project	ST010022	Well	MW-29D
Town/City	Tucson		
County	Pima	State	Arizona
Permit No(s).			
Land Surface Elevation	2287 feet	[ ] Surveyed	
Datum	amsl	[X] Estimated	
Coordinates			
Installation Date(s)			
Drilling Method	Air Rotary/Percussion Hammer		
Drilling Contractor			
Drilling Fluid			
Development Technique(s) and Date(s)	N/A		
Fluid Loss During Drilling	gallons		
Water Removed During Development	gallons		
Static Depth to Water	~160 feet below M.P.		
Pumping Depth to Water	N/A feet below M.P.		
Pumping Duration	hours		
Yield	gpm	Date	
Specific Capacity	gpm/ft		
Well Purpose	Monitoring Well		
Remarks			
Prepared by	Thomas Vespalec		

Drawing not to scale

Printed: 10/29/2013 11:09:27 AM

Arizona Department of Water Resources

3550 N Central Ave.
Phoenix AZ 85012

Customer:

ARCADIS
630 PLAZA DRIVE, SUITE 600
HIGHLANDS RANCH, CO 80129

Receipt #: 14-30837
Office: MAIN OFFICE
Receipt Date: 10/29/2013
Sale Type: Mail
Cashier: WRSYM

Item No.	Index	AOBJ	Description	Ref ID	Qty	Unit Price	Ext Price
8505	15245	4439-6F	MONITOR, PIEZOMETER, AIR SPARGING, SOIL VAPOR EXTR	55-222708 thru 55-222713	6	150.00	900.00
						RECEIPT TOTAL:	**900.00**

Payment type: CHECK
Amount Paid: $900.00
Payment Received Date: 10/29/2013

Check #	072662

Notes:

No refund without valid receipt

ARIZONA DEPARTMENT of WATER RESOURCES
3550 North Central Avenue, Second Floor
Phoenix, AZ 85012
602-771-8500
azwater.gov

October 30, 2013

KINDER MORGAN ENERGY PARTNERS LP
1100 TOWN & COUNTRY ROAD
ATTN: PAUL SALCIDO, PROJECT MANAGER
ORANGE COUNTY, CA 92868

JANICE K. BREWER
Governor

SANDRA A. FABRITZ-WHITNEY
Director

Registration No. 55- 222712
File Number: D(13-13) 33 AAC

Dear Well Applicant:

Enclosed is a copy of the Notice of Intention to Drill (NOI) a well which you or your driller recently filed with the Department of Water Resources. This letter is to inform you that the Department has approved the NOI and has mailed, or made available for download, a drilling authorization card to your designated well drilling contractor. The driller may not begin drilling until he/she has received the authorization, and must keep it in their possession at the well site during drilling.

Well drilling activities must be completed within one year after the date the NOI was filed with the Department. If drilling is not completed within one year, a new NOI must be filed and authorization from this Department received before proceeding with drilling. If the well cannot be successfully completed as initially intended (dry hole, cave in, lost tools, etc.), the well must be properly abandoned and a Well Abandonment Completion Report must be filed by your driller [as required by A.A.C. R12-15-816(F)].

If you change drillers, you must notify the Department of the new driller's identity on a Request to Change Well Information (form 55-71A). Please ensure that the new driller is licensed by the Department to drill the type of well you require. A new driller may not begin drilling until he/she receives a new drilling authorization card from the Department.

If you find it necessary to change the location of the proposed well(s), you may not proceed with drilling until you file an amended NOI with the Department. An amended drilling authorization card will then be issued to the well drilling contractor, which must be in their possession before drilling begins.

Arizona statute [A.R.S. § 45-600] requires registered well owners to file a Pump Installation Completion Report (form 55-56) with the Department within 30 days after the installation of pumping equipment, if authorized. A blank report is enclosed for your convenience. State statute also requires the driller to file a complete and accurate Well Drillers Report and Well Log (form 55-55) within 30 days after completion of drilling. A blank report form was provided to your driller with the drilling authorization card. You should insist and ensure that all of the required reports are accurately completed and timely filed with the Department.

Please be advised that Arizona statute [A.R.S. § 45-593(C)] requires a registered well owner to notify the Department of a change in ownership of the well and/or information pertaining to the physical characteristics of the well in order to keep this well registration file current and accurate. Any change in well information or a request to change well driller must be filed on a Request to Change Well Information form (form 55-71A) that may be downloaded from the ADWR Internet website at www.azwater.gov.

Sincerely,

Groundwater Permitting and Wells Section

ARIZONA DEPARTMENT OF WATER RESOURCES
3550 North Central Avenue, Second Floor
Phoenix, Arizona 85012

NOTICE! This well is located in or near an area of groundwater contamination (WQARF/CERCLA/DOD or Other). Be advised that **special requirements may apply**.

THIS AUTHORIZATION SHALL BE IN POSSESSION OF THE DRILLER DURING ALL DRILLING OPERATIONS

WELL REGISTRATION NO: **55-222712**

AUTHORIZED DRILLER: **LAYNE CHRISTENSEN COMPANY** LICENSE NO: **7**

NOTICE OF INTENTION TO DRILL MONITOR WELL(S) HAS BEEN FILED WITH THE DEPARTMENT BY:

WELL OWNER: **KINDER MORGAN ENERGY PARTNERS LP 1100 TOWN & COUNTRY ROAD ATTN: PAUL SALCIDO, PROJECT MANAGER ORANGE COUNTY, CA, 92868**

THE WELL(S) IS/ARE TO BE LOCATED IN THE:

SW 1/4 of the **NE** 1/4 of the **NE** 1/4 Section **33** Township **13 SOUTH** Range **13 EAST**

NO. OF WELLS IN THIS PROJECT: **1**

THIS AUTHORIZATION EXPIRES AT MIDNIGHT ON THE DAY OF **October 28, 2014**

GROUNDWATER PERMITTING AND WELLS

THE DRILLER MUST FILE A LOG OF THE WELL WITHIN 30 DAYS OF COMPLETION OF DRILLING.

1-6-14
Bm

Arizona Department of Water Resources
Information Management Unit
PO Box 36020 • Phoenix, Arizona 85067-36020
(602) 771-8527 • 602-771-8500

Well Driller Report and Well Log

FILE NUMBER: D(13-13) 33 AAC
WELL REGISTRATION NUMBER: 55 - 222713
PERMIT NUMBER (IF ISSUED):

THIS REPORT MUST BE FILED WITHIN **30 DAYS** OF COMPLETING THE WELL.

PLEASE PRINT CLEARLY USING BLACK OR BLUE INK

SECTION 1. DRILLING AUTHORIZATION

Drilling Firm — Mail To:

NAME: LAYNE CHRISTENSEN COMPANY	DWR LICENSE NUMBER: 7
ADDRESS: 12030 EAST RIGGS ROAD	TELEPHONE NUMBER: 480-895-9336
CITY / STATE / ZIP: CHANDLER, AZ, 85249-3701	FAX:

RECEIVED DEC 05 2013

SECTION 1. REGISTRY INFORMATION

Well Owner

FULL NAME OF COMPANY, ORGANIZATION, OR INDIVIDUAL: KINDER MORGAN ENERGY PARTNERS LP

MAILING ADDRESS: 1100 TOWN & COUNTRY ROAD

CITY / STATE / ZIP: ORANGE COUNTY, CA, 92868-

CONTACT PERSON NAME AND TITLE:

TELEPHONE NUMBER: 480 203-9968 FAX:

WELL NAME (e.g., MW-1, PZ-3, lot 25 Well, Smith Well, etc.): MW-30

Location of Well

WELL LOCATION ADDRESS (IF ANY):

TOWNSHIP (N/S)	RANGE (E/W)	SECTION	160 ACRE	40 ACRE	10 ACRE
13 S	13 E	33	NE 1/4	NE 1/4	SW 1/4

LATITUDE			LONGITUDE		
32 °	261 '	43 "N	111 °	012 '	76 "W

METHOD OF LATITUDE/LONGITUDE (CHECK ONE): ☐ USGS Quad Map ☐ Conventional Survey ☑ GPS: Hand-Held ☐ *GPS: Survey-Grade

LAND SURFACE ELEVATION AT WELL: 2286 Feet Above Sea Level

METHOD OF ELEVATION (CHECK ONE): ☐ USGS Quad Map ☐ Conventional Survey ☐ *GPS: Hand-Held ☐ *GPS: Survey-Grade

*IF GPS WAS USED, GEOGRAPHIC COORDINATE DATUM (CHECK ONE): ☐ NAD-83 ☐ Other (please specify)

COUNTY: Pima

ASSESSOR'S PARCEL ID NUMBER (MOST RECENT): BOOK | MAP | PARCEL

SECTION 3. WELL CONSTRUCTION DETAILS

Drilling Method — CHECK ONE
- ☐ Air Rotary
- ☐ Bored or Augered
- ☐ Cable Tool
- ☐ Dual Rotary
- ☐ Mud Rotary
- ☐ Reverse Circulation
- ☐ Driven
- ☐ Jetted
- ☐ Air Percussion / Odex Tubing
- ☑ Other (please specify): percussion hammer

Method of Well Development — CHECK ONE
- ☐ Airlift
- ☑ Bail
- ☐ Surge Block
- ☑ Surge Pump
- ☐ Other (please specify)

Condition of Well — CHECK ONE
- ☑ Capped
- ☐ Pump Installed

Method of Sealing at Reduction Points — CHECK ONE
- ☑ None
- ☐ Packed
- ☐ Swedged
- ☐ Welded
- ☐ Other (please specify)

Construction Dates
- DATE WELL CONSTRUCTION STARTED: 11-21-13
- DATE WELL CONSTRUCTION COMPLETED: 11-26-13

I state that this notice is filed in compliance with A.R.S. § 45-596 and is complete and correct to the best of my knowledge and belief.

SIGNATURE OF QUALIFYING PARTY:

DATE: 12/4/2013

Well Driller Report and Well Log

WELL REGISTRATION NUMBER
55 - 222713

SECTION 4. WELL CONSTRUCTION DESIGN (AS BUILD) (attach additional page if needed)

Depth

DEPTH OF BORING	DEPTH OF COMPLETED WELL
206' Feet Below Land Surface	200' Feet Below Land Surface

Water Level Information

STATIC WATER LEVEL	DATE MEASURED	TIME MEASURED	IF FLOWING WELL, METHOD OF FLOW REGULATION
156' Feet Below Land Surface	11-26	0720	☐ Valve ☐ Other:

Borehole

DEPTH FROM SURFACE FROM (feet)	TO (feet)	BOREHOLE DIAMETER (inches)
206	0	11"

Installed Casing

DEPTH FROM SURFACE FROM (feet)	TO (feet)	OUTER (inches)	MATERIAL TYPE (T): STEEL	PVC	ABS	IF OTHER TYPE, DESCRIBE	PERFORATION TYPE (T): BLANK OR NONE	WIRE WRAP	SHUTTER SCREEN	MILLS KNIFE	SLOTTED	IF OTHER TYPE, DESCRIBE	SLOT SIZE (inches)
200	145	6.5"	✓					✓					050
145	40	6.5"		✓			✓						
40	0	6.5	✓										

Installed Annular Material

DEPTH FROM SURFACE FROM (feet)	TO (feet)	ANNULAR MATERIAL TYPE (T): NONE	CONCRETE	NEAT CEMENT OR CEMENT GROUT	CEMENT-BENTONITE GROUT	BENTONITE: GROUT	CHIPS	PELLETS	IF OTHER TYPE OF ANNULAR MATERIAL, DESCRIBE	FILTER PACK: SAND	GRAVEL	SIZE
206	140									X		8x12
140	135									X		#60
135	2			✓								

Well Driller Report and Well Log

WELL REGISTRATION NUMBER
55 - 222713

SECTION 5. GEOLOGIC LOG OF WELL

DEPTH FROM SURFACE FROM (feet)	TO (feet)	**Description** Describe material, grain size, color, etc.	Check (T) every interval where water was encountered (if known)
0	6	silty sand, caliche	
6	22	Sand, gravel, cobbles	
22	206	Sands, large cobbles, conglomerate rock	T

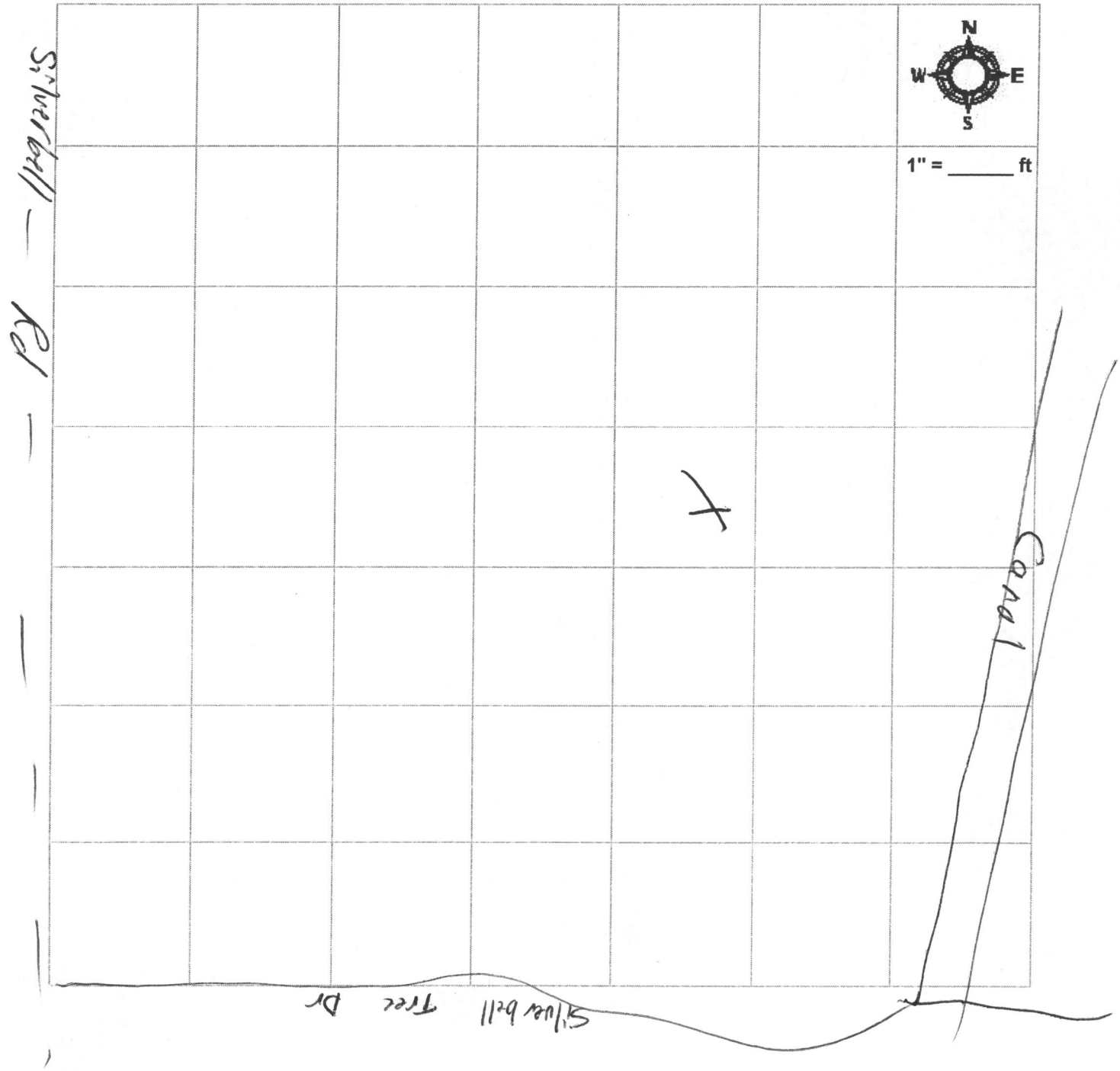
Well Driller Report and Well Log

WELL REGISTRATION NUMBER
55 - 222713

SECTION 6. WELL SITE PLAN

NAME OF WELL OWNER	COUNTY ASSESSOR'S PARCEL ID NUMBER (MOST RECENT)		
	BOOK	MAP	PARCEL
KINDER MORGAN ENERGY PARTNERS LP			

- Please draw the following: (1) the boundaries of property on which the well was located; (2) the well location; (3) the locations of all septic tank systems and sewer systems on the property or within 100 feet of the well location, even if on neighboring properties; and (4) any permanent structures on the property that may aid in locating the well.
- Please indicate the distance between the well location and any septic tank system or sewer system.



Arizona Department of Water Resources
Water Management Division
P.O. Box 36020 Phoenix, Arizona 85067-6020
(602) 771-8500 • (602) 771-8690
· www.azwater.gov ·

Notice of Intent to Drill, Deepen, or Modify a *Monitor / Piezometer / Environmental* Well

$150 FEE

- Review instructions prior to completing form in black or blue ink.
- You must include with your Notice:
  - $150 check or money order for the filing fee.
  - Well construction diagram, labeling all specifications listed in Section 6.
- Authority for fee: A.R.S. § 45-596 and A.A.C. R12-15-104.

** PLEASE PRINT CLEARLY **

AMA / INA	B	SB
TAMA	TUC	16
RECEIVED DATE	WS	
10/29/13	09	
ISSUED DATE	WQAR	CERCLA
10/30/13	645	

FILE NUMBER: D(13-13)33 AAC

WELL REGISTRATION NUMBER: 55 - 222713

SECTION 1. REGISTRY INFORMATION

Well Type (CHECK ONE)

- [X] Monitor
- [ ] Piezometer
- [ ] Vadose Zone
- [ ] Air Sparging
- [ ] Soil Vapor Extraction
- [ ] Other (*please specify*):

Proposed Action (CHECK ONE)

- [X] Drill New Well
- [ ] Deepen
- [ ] Modify

If Deepening or Modifying:
WELL REGISTRATION NUMBER: 55 -

Location of Well

WELL LOCATION ADDRESS (IF ANY): City of Tucson, Former Silverbell Landfill

TOWNSHIP (N/S)	RANGE (E/W)	SECTION	160 ACRE	40 ACRE	10 ACRE
13S	13E	33	NE ¼	NE ¼	SW ¼

COUNTY ASSESSOR'S PARCEL ID NUMBER: BOOK | MAP | PARCEL

COUNTY WHERE WELL IS LOCATED: Pima

SECTION 2. OWNER INFORMATION

Well Owner

FULL NAME OF COMPANY, ORGANIZATION, OR INDIVIDUAL: Kinder Morgan Energy Partners, L.P.
MAILING ADDRESS: 1100 Town & Country Road
CITY / STATE / ZIP CODE: Orange County, CA 92868
CONTACT PERSON NAME AND TITLE: Paul Salcido, Project Manager
TELEPHONE NUMBER: 480-203-9968
FAX: 303-984-3687

RECEIVED
OCT 29 2013
ARIZONA DEPARTMENT OF WATER RESOURCES

Landowner (if different from Well Owner)

FULL NAME OF COMPANY, GOVERNMENT AGENCY, OR INDIVIDUAL: City of Tucson Environmental Management
MAILING ADDRESS: 4004 South Park Ave., Bldg. #1
CITY / STATE / ZIP CODE: Tucson, AZ 85714
CONTACT PERSON NAME AND TITLE: Nancy Peterson, Deputy Director
TELEPHONE NUMBER: 520-791-3175
FAX: 520-791-4155

SECTION 3. DRILLING AUTHORIZATION

Drilling Firm

NAME: Layne Christensen Company
DWR LICENSE NUMBER: #7
ROC LICENSE CATEGORY: A-04
TELEPHONE NUMBER: 480-895-9336
FAX: 480-895-8699
E-MAIL ADDRESS: Aaron.maurer@layne.com

Consultant (if applicable)

CONSULTING FIRM: ARCADIS U.S., Inc.
CONTACT PERSON NAME: Robert Forsberg
TELEPHONE NUMBER: 480-905-9311
FAX: 480-905-9353
E-MAIL ADDRESS: bob.forsberg@arcadis-us.com

SECTION 4.

Questions	Yes	No	Explanation:
1. Are all annular spaces between the casing(s) and the borehole for the placement of grout at least 2 inches?	X		2-inch annular spaces are special standards required for wells located in and near groundwater contamination sites (such as CERCLA, WQARF, DOD, LUST).
2. Is the screened or perforated interval of casing greater than 100 feet in length?		X	100-foot maximum screen intervals are a special standard for wells located in and near groundwater contamination sites (such as CERCLA, WQARF, DOD, LUST).
3. Are you requesting a variance to use thermoplastic casing in lieu of steel casing in the surface seal?		X	The wells must be constructed in a vault as defined in A.A.C. R12-15-801(27).
4. Is there another well name or identification number associated with this well? (e.g., MW-1, PZ2, 06-04, etc.)	X		IF YES, PLEASE STATE **MW-30**
5. Have construction plans been coordinated with the Arizona Department of Environmental Quality?		X	IF YES, PLEASE STATE AGENCY CONTACT & PHONE NUMBER
6. For monitor wells, is dedicated pump equipment to be installed?		X	IF YES, PLEASE STATE DESIGN PUMP CAPACITY Gallons per Minute
7. Is this well a new well located in an Active Management Area **AND** intended to pump water for the purpose of remediating groundwater?		X	IF YES, UNLESS THE WELL IS A REPLACEMENT WELL AND THE TOTAL NUMBER OF OPERABLE WELLS ON THE SITE IS NOT INCREASING, YOU MUST ALSO FILE A SUPPLEMENTAL FORM A.R.S. § 45-454(C) & (F). *(See instructions)*
8. Will the well registration number be stamped on the vault cover or on the upper part of the casing?	X		IF NO, WHERE WILL THE REGISTRATION NUMBER BE PLACED?

Notice of Intent to Drill, Deepen, or Modify a *Monitor / Piezometer / Environmental* Well

WELL REGISTRATION NUMBER
55 - 222713

SECTION 5. WELL CONSTRUCTION DETAILS

Drill Method

CHECK ONE

- ☐ Air Rotary
- ☐ Bored or Augered
- ☐ Cable Tool
- ☐ Dual Rotary
- ☐ Mud Rotary
- ☐ Reverse Circulation
- ☐ Driven
- ☐ Jetted
- ☐ Air Percussion / Odex Tubing
- X Other (*please specify*):

Percussion Hammer/Air

DATE CONSTRUCTION TO BEGIN
October 14, 2013

Method of Well Development

CHECK ONE

- ☐ Airlift
- ☐ Bail
- ☐ Surge Block
- ☐ Surge Pump
- X Other (*please specify*):

Bail-Surge-Pump

Method of Sealing at Reduction Points

CHECK ONE

- X None
- ☐ Welded
- ☐ Swedged
- ☐ Packed
- ☐ Other (*please specify*):

Grout Emplacement Method

CHECK ONE

- ☐ Gravity
- ☐ Pressure Grout
- X Tremie
- ☐ Other (*please specify*):

Surface or Conductor Casing

CHECK ONE

- X Flush Mount in a vault
- ☐ Extend 1' above grade

SECTION 6. PROPOSED WELL CONSTRUCTION PLAN (attach additional page if needed)

Attach a well construction diagram labeling all specifications below.

Borehole

DEPTH FROM SURFACE FROM (feet)	DEPTH FROM SURFACE TO (feet)	BOREHOLE DIAMETER (inches)
0	205	11

Casing

DEPTH FROM SURFACE FROM (feet)	DEPTH FROM SURFACE TO (feet)	OUTER DIAMETER (inches)	MATERIAL TYPE (T) STEEL	PVC	ABS	IF OTHER TYPE, DESCRIBE	PERFORATION TYPE (T) BLANK OR NONE	WIRE WRAP	SHUTTER SCREEN	MILLS KNIFE	SLOTTED	IF OTHER TYPE, DESCRIBE	SLOT SIZE IF ANY (inches)
0	40	6	X				X						
40	145	6		X			X						
145	200	6		Stainless Steel				X					0.02

Annular Material

DEPTH FROM SURFACE FROM (feet)	DEPTH FROM SURFACE TO (feet)	ANNULAR MATERIAL TYPE (T) NONE	CONCRETE	NEAT CEMENT OR CEMENT GROUT	CEMENT-BENTONITE GROUT	BENTONITE GROUT	CHIPS	PELLETS	IF OTHER TYPE OF ANNULAR MATERIAL, DESCRIBE	FILTER PACK SAND	GRAVEL	SIZE
0	135			X								
135	140									X		#60
140	205									X		#8/12

IF THIS WELL HAS NESTED CASINGS, SPECIFY NUMBER OF CASING STRINGS

EXPECTED DEPTH TO WATER 155 Feet Below Ground Surface

SECTION 7. OPTIONAL BY PROPERTY OWNER AND WELL OWNER ONLY

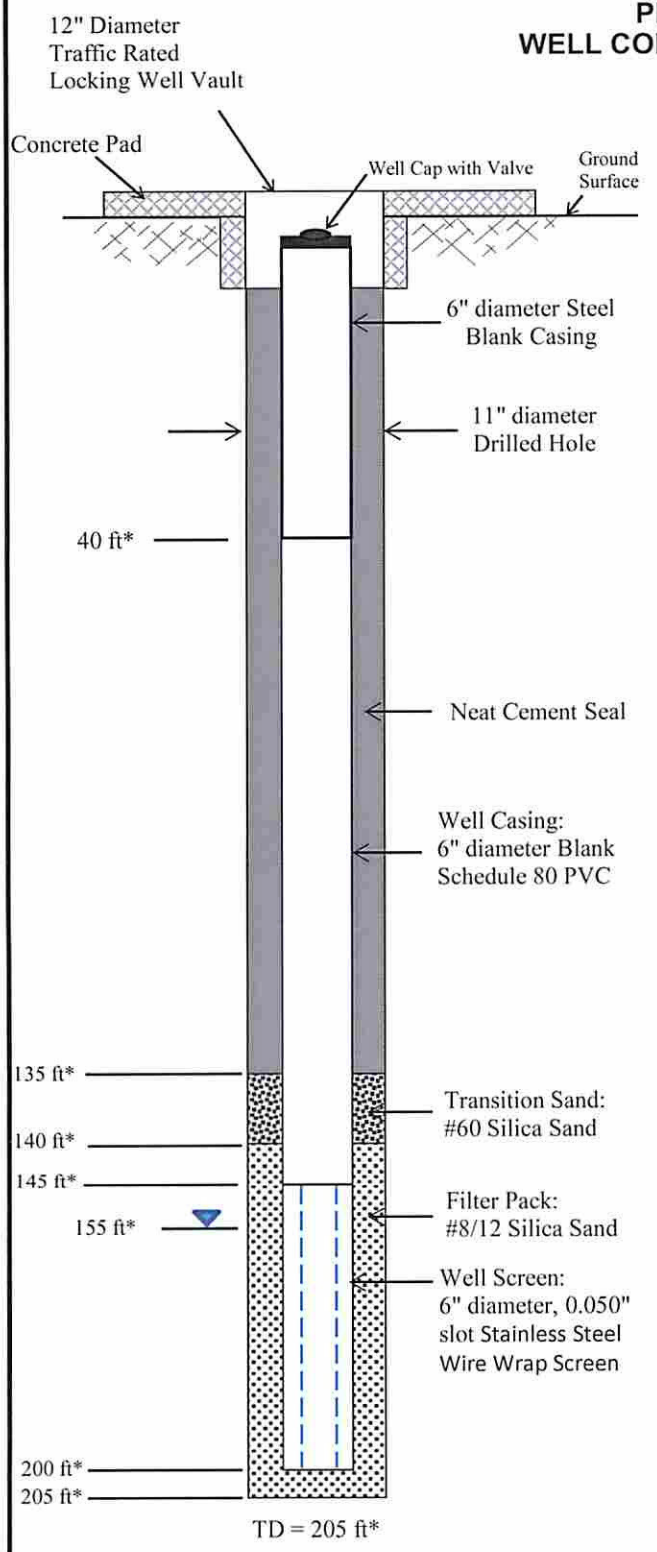
☐ By checking this box, I hereby provide ADWR permission to enter the property for the purpose of taking water level measurements at this well. *(See instructions.)*

SECTION 8. WELL OWNER AND PROPERTY OWNER SIGNATURE

I state that this notice is filed in compliance with A.R.S. § 45-596 and is complete and correct to the best of my knowledge and belief.

TYPE OR PRINT NAME AND TITLE	SIGNATURE OF WELL OWNER	DATE
Paul Salcido/Project Manager	Paul M Salcido	09/23/13
TYPE OR PRINT NAME AND TITLE	SIGNATURE OF LANDOWNER, IF APPLICABLE (SEE INSTRUCTIONS)	DATE
Nancy Petersen, Deputy Director	Nancy P	10/24/13

PROPOSED
WELL CONSTRUCTION LOG



Measuring Point is Top of Well Casing
Unless Otherwise Noted.

* Depth Below Ground Surface

Project	ST010022	Well	MW-30
Town/City	Tucson		
County	Pima	State	Arizona
Permit No(s).			
Land Surface Elevation	2286 feet	[ ] Surveyed	
Datum	amsl	[X] Estimated	
Coordinates			
Installation Date(s)			
Drilling Method	Air Rotary/Percussion Hammer		
Drilling Contractor			
Drilling Fluid			
Development Technique(s) and Date(s)	N/A		
Fluid Loss During Drilling	gallons		
Water Removed During Development	gallons		
Static Depth to Water	~155 feet below M.P.		
Pumping Depth to Water	N/A feet below M.P.		
Pumping Duration	hours		
Yield	gpm	Date	
Specific Capacity	gpm/ft		
Well Purpose	Monitoring Well		
Remarks			
Prepared by	Thomas Vespalec		

Drawing not to scale

Printed: 10/29/2013 11:09:27 AM

Arizona Department of Water Resources

3550 N Central Ave.
Phoenix AZ 85012

Customer:

ARCADIS
630 PLAZA DRIVE, SUITE 600
HIGHLANDS RANCH, CO 80129

Receipt #: 14-30837
Office: MAIN OFFICE
Receipt Date: 10/29/2013
Sale Type: Mail
Cashier: WRSYM

Item No.	Index	AOBJ	Description	Ref ID	Qty	Unit Price	Ext Price
8505	15245	4439-6F	MONITOR, PIEZOMETER, AIR SPARGING, SOIL VAPOR EXTR	55-222708 thru 55-222713	6	150.00	900.00
						RECEIPT TOTAL:	**900.00**

Payment type: CHECK
Amount Paid: $900.00
Payment Received Date: 10/29/2013

Check #	072662

Notes:

No refund without valid receipt

ARIZONA DEPARTMENT *of* WATER RESOURCES
3550 North Central Avenue, Second Floor
Phoenix, AZ 85012
602-771-8500
azwater.gov

October 30, 2013

KINDER MORGAN ENERGY PARTNERS LP
1100 TOWN & COUNTRY ROAD
ATTN: PAUL SALCIDO, PROJECT MANAGER
ORANGE COUNTY, CA 92868

JANICE K. BREWER
Governor

SANDRA A. FABRITZ-WHITNEY
Director

Registration No. 55- 222713
File Number: D(13-13) 33 AAC

Dear Well Applicant:

Enclosed is a copy of the Notice of Intention to Drill (NOI) a well which you or your driller recently filed with the Department of Water Resources. This letter is to inform you that the Department has approved the NOI and has mailed, or made available for download, a drilling authorization card to your designated well drilling contractor. The driller may not begin drilling until he/she has received the authorization, and must keep it in their possession at the well site during drilling.

Well drilling activities must be completed within one year after the date the NOI was filed with the Department. If drilling is not completed within one year, a new NOI must be filed and authorization from this Department received before proceeding with drilling. If the well cannot be successfully completed as initially intended (dry hole, cave in, lost tools, etc.), the well must be properly abandoned and a Well Abandonment Completion Report must be filed by your driller [as required by A.A.C. R12-15-816(F)].

If you change drillers, you must notify the Department of the new driller's identity on a Request to Change Well Information (form 55-71A). Please ensure that the new driller is licensed by the Department to drill the type of well you require. A new driller may not begin drilling until he/she receives a new drilling authorization card from the Department.

If you find it necessary to change the location of the proposed well(s), you may not proceed with drilling until you file an amended NOI with the Department. An amended drilling authorization card will then be issued to the well drilling contractor, which must be in their possession before drilling begins.

Arizona statute [A.R.S. § 45-600] requires registered well owners to file a Pump Installation Completion Report (form 55-56) with the Department within 30 days after the installation of pumping equipment, if authorized. A blank report is enclosed for your convenience. State statute also requires the driller to file a complete and accurate Well Drillers Report and Well Log (form 55-55) within 30 days after completion of drilling. A blank report form was provided to your driller with the drilling authorization card. You should insist and ensure that all of the required reports are accurately completed and timely filed with the Department.

Please be advised that Arizona statute [A.R.S. § 45-593(C)] requires a registered well owner to notify the Department of a change in ownership of the well and/or information pertaining to the physical characteristics of the well in order to keep this well registration file current and accurate. Any change in well information or a request to change well driller must be filed on a Request to Change Well Information form (form 55-71A) that may be downloaded from the ADWR Internet website at www.azwater.gov.

Sincerely,

Groundwater Permitting and Wells Section

ARIZONA DEPARTMENT OF WATER RESOURCES
3550 North Central Avenue, Second Floor
Phoenix, Arizona 85012

NOTICE! This well is located in or near an area of groundwater contamination (WQARF/CERCLA/DOD or Other). Be advised that **special requirements may apply**.

THIS AUTHORIZATION SHALL BE IN POSSESSION OF THE DRILLER DURING ALL DRILLING OPERATIONS

WELL REGISTRATION NO: **55-222713**

AUTHORIZED DRILLER: **LAYNE CHRISTENSEN COMPANY** LICENSE NO: **7**

NOTICE OF INTENTION TO DRILL MONITOR WELL(S) HAS BEEN FILED WITH THE DEPARTMENT BY:

WELL OWNER: **KINDER MORGAN ENERGY PARTNERS LP 1100 TOWN & COUNTRY ROAD ATTN: PAUL SALCIDO, PROJECT MANAGER ORANGE COUNTY, CA, 92868**

THE WELL(S) IS/ARE TO BE LOCATED IN THE:

SW 1/4 of the **NE** 1/4 of the **NE** 1/4 Section **33** Township **13 SOUTH** Range **13 EAST**

NO. OF WELLS IN THIS PROJECT: **1**

THIS AUTHORIZATION EXPIRES AT MIDNIGHT ON THE DAY OF **October 28, 2014**

GROUNDWATER PERMITTING AND WELLS

THE DRILLER MUST FILE A LOG OF THE WELL WITHIN 30 DAYS OF COMPLETION OF DRILLING.

ARCADIS
Infrastructure · Water · Environment · Buildings

ARCADIS U.S., Inc.
14201 N 87th Street
Suite 135
Scottsdale
Arizona 85260
Tel 480 905 9311
Fax 480 905 9353
www.arcadis-us.com

ENVIRONMENT

Silver Creek HOA Manager
c/o Lewis Management Resources, Inc.
180 W. Magee, Ste 134
Tucson, Arizona 85704

Subject:
Notification of Construction Activities

Date:
October 11, 2013

Contact:
Michael Nesky

Phone:
(480) 905-9311

Email:
Michael.nesky@arcadis-us.com

Our ref:
ST010022.0024

To Whom It May Concern:

This letter serves as notification of upcoming construction activities in the Silver Creek neighborhood. ARCADIS on behalf of Kinder Morgan Energy Partners will be drilling new groundwater monitoring wells at locations shown on Exhibit A and excavating trenches as shown on Exhibit B for installation of additional remediation equipment. ARCADIS and our subcontractors will make every effort to minimize inconvenience to the public and to expeditiously complete the construction. The anticipated start date of construction activities is October 21, 2013. If you have any questions or concerns, please feel free to contact me at (480) 905-9311.

Sincerely,

Michael Nesky

Michael Nesky
Principal Environmental Engineer

Copies:
Paul Salcido (Kinder Morgan Energy Partners)

Attachments:
Exhibit A- Proposed Well locations
Exhibit B- Concept Plan

LEGEND

- Extent of requested access
- Pima County tax parcel
- Proposed groundwater monitor well
- Proposed groundwater monitor well (cluster)

NOTES

· Aerial photo source: Bing Maps.

N

0 125 250 Feet

Scale: 1" = 250'

SILVERCROFT WASH RELEASE SITE
TUCSON, ARIZONA
ENVIRONMENTAL ACCESS AGREEMENT

PROPOSED WELL LOCATIONS

ARCADIS

EXHIBIT
A

G:\Project\KMEP (Kinder Morgan Energy Partners)\10022-Silvercroft Wash\GIS\Projects\Access agreement 09-2012\Exhibit A proposed well locations only.mxd 10/11/2013

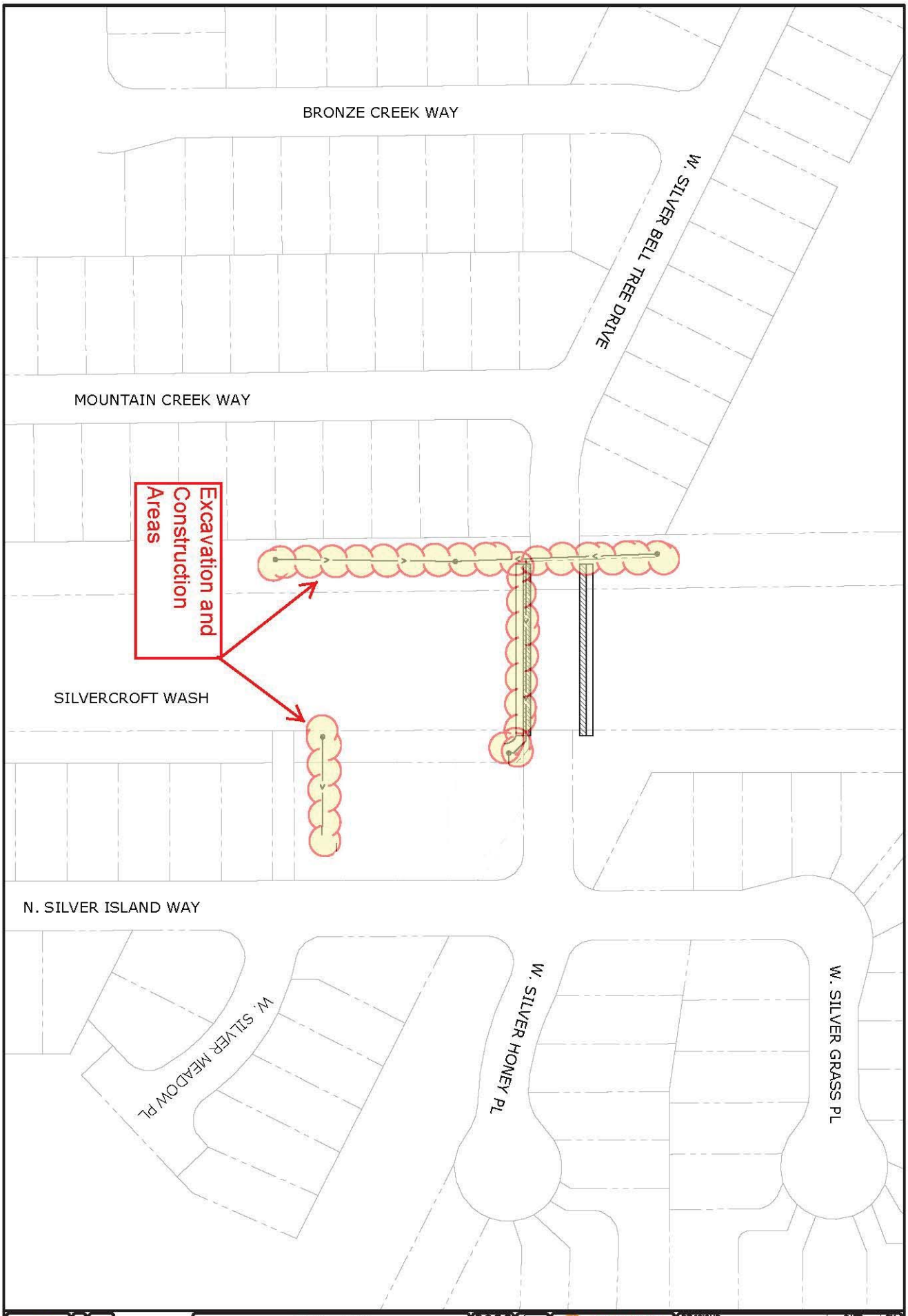


Exhibit B

BASE

JOB NO.

CONCEPT PLAN

PROJECT:
SILVERCROFT
ARIZONA

DESIGNED: RO
DRAWN BY: RJK
CHECKED BY: RO
DATE: 1-xx-12

602-263-1100
1-800-STAKE-IT
(Outside Maricopa County)
www.azbluestake.com

ARCADIS
Design & Consultancy for natural and built assets
14201 N. 87th Street, Suite 135
Scottsdale, AZ 85260
Tel: 480.905.9311
Fax: 480.905.9353
www.arcadis-us.com

REVISIONS:	DATE:	BY:

ARCADIS
Infrastructure · Water · Environment · Buildings

Equipment Calibration Form

Project Name: MEP - Silvercrest

Project No.: 5T0100022.0026

Site Location: COT landfill

Date	Time	Gem 2000 Instrument	Serial Number	Parameter	Units	Calibration Standard	Initial Instrument Reading	Final Calibration Reading	Initials
11/4/13	0900	Landfill meter	GM 1882/10	CH_4 (Methane)	%	Methane, CO_2, N	00.1%	00.1%	SA
11/5/13	0700	Gem 2000	"	"	"	"	00.1%	00.1%	SA
11/6/13	0700	"	"	"	"	"	"	"	SA
11/8/13	0900	"	"	"	"	"	"	"	SA
11/11/13	0800	"	"	"	"	"	"	"	SA
11/13/13	0700	"	"	"	"	"	"	"	SA
11/14/13	0715	"	"	"	"	"	"	"	SA
11/15/13	0705	"	"	"	"	"	"	"	SA
11/18/13	0705	"	"	"	"	"	"	"	SA
11/19/13	0700	"	"	"	"	"	"	"	SA
11/20/	0700	"	"	"	"	"	"	"	SA
11/4/13	0900	Multi Rae Plus	6/150	VOC, LEL, O_2, CO, H_2S		4 gas + VOC	All 0's, O_2 = 19.9	" "	SA
11/5/13	0700	"	"	"		"	" "	" "	SA
11/6/13	0700	"	"	"		"	" "	" "	SA
11/8/13	0700	"	"	"		"	" "	" "	SA
11/11/13	0800	"	"	"		"	" "	" "	SA
11/13/13	0700	"	"	"		"	" "	" "	SA
11/14/13	0715	"	"	"		"	" "	" "	SA
11/15/13	0705	"	"	"		"	" "	" "	SA
11/18/13	0705	"	"	"		"	" "	" "	SA
11/19/13	0700	"	"	"		"	" "	" "	SA
11/20/13	0700	"	"	"		"	" "	" "	

C:\Users\tvespalec\Desktop\Field Forms\Calibration.xls

ARCADIS
Infrastructure, environment, facilities

Air Monitoring Log

Project: KMEP : Silverado

Date: 11/4/13

Monitoring Instruments: Gem 2000, multiRae Plus

Activity: Air knifing

Level of Protection: Level D, ~~Acaving~~

Calibration:

Air Monitor: Methane, H_2S, VOC, O, LEL

Time	Location	Instrument Reading (CH4)	(H_2S)	(VOC)	(LEL)	Comments
1000	MW-28	00.1%	0.0	0.0		
1015						
1030						very slow potholing
1045						
1100						
1415	MW-28	00.1	0.0	0.0		start drilling
1430						
1445						
1500						
1515						
1530						
1545						@80' bgs
1600						

ARCADIS
Infrastructure, environment, facilities

Air Monitoring Log

Project: ST 01002.0026

Date: 11/13/13

Monitoring Instruments: GemTech & MultiRae Plus

Activity: MW-29D

Level of Protection:

Calibration:

Air Monitor: Methane, 4-gas

Time	Location	Instrument Reading: CH_4	H_2S	VOC	LEL	Comments
0715	MW-29D	00.1%	00	0.0	0.0	
0730						
0745						
0800						
"						
"						
"						
0900						
1000						
1100						
12						

OVER

ARCADIS
Infrastructure, environment, facilities

Air Monitoring Log

Project:

Date: 11/5/13

Monitoring Instruments:

Activity:

Level of Protection:

Calibration:

Air Monitor: Methane

Time	Location	Instrument Reading (CH_4 / H_2S / VOC / LEL)	Comments
0700	MW-28	00.1% / 0.0 / 0.0	
15			
30			
45			
0800			
0900			
10000			Break
			Resume
11000			
1200			

ARCADIS
Infrastructure, environment, facilities

Air Monitoring Log

Project:

Date: 11/6/13

Monitoring Instruments:

Activity: Well installation

Level of Protection:

Calibration:

Air Monitor: Methane + 4 gas

Time	Location	Instrument Reading (CH4 / H2S / VOC / LEL)	Comments
1200	MW28	00.1% 00 00	
1300			
1400			

BORING LOG

ARCADIS

Well Number: **MW-27**

Project Name: **KMPE Silvercroft Wash Release Site**

Permit Number: **55-222708**

Soil Boring ☐ Monitoring Well ☒ Injection Well ☐ Project Number: **ST010022** Sheet **1** of **3**

Boring Location: **NE corner of N. Dale Crossing Dr. & N. Daylirion Dr.**		Elevation (feet): **2291.1** Datum:NAVD88NAVD88	East: **978157.4** North: **460371.035**
Drilling Contractor: **Layne**	Driller: **Bo**	Date Started: **11/11/13**	Date Finished: **11/12/13**
Drilling Equipment: **AP1000 (Becker)**	Borehole Diameter: (inch) **10"**	Completed Depth: (feet) **190.0**	Initial / Final Water Depth (feet): **169.34**
Sampling Method: Grab Sample ☐ Shelby Tube ☐ Split Barrel ☐		Type and Diameter of Well Casing: (inch) **Stee/SCH 80 PVC 4**	
Drilling Method: **Air Percussion**	Drilling Fluid: **none**	Type and Diameter of Well Screen: (inch) **Stainless Steel 4**	
Backfill Material:	Well Seal:	Slot Size: (inch) **0.020"**	Filter Material: **#8/12 Silica Sand**
Logged By: **Sasha Arnold**	Checked By: **B. Forsberg**	Development Method: **Bail/Surge/Pump**	

Depth (feet)	Elevation (feet)	USC Soil Type	Description	Blow Counts	Sample No.	Graphic Log: Sample	Graphic Log: Lithology	Graphic Log: Well	PID Readings PPM	Remarks
	2290		Air Knife boring to 8 feet							Well Casing: 4-inch diameter Low Carbon Steel surface casing (0-39 feet)
		GM								
10	2280	GM	(10') SILTY GRAVEL; 10YR 3/3 (Dark Brown); poorly sorted; dry, loose,							
		GM	(15') As above, brown							Neat Cement (1'-144')
20	2270	SM	(20') SILTY SAND; 10YR 7/3 (Tan); well sorted, dry, loose.							Well Casing: 4-inch diameter Sch 80 PVC (39-154 feet)
		SW	(25') GRAVELLY SAND; tan/brown; dry, loose.							
30	2260	SW	(30') As Above							
		GW	(35') GRAVEL; Gray' angular to subrounded, up to 1" diameter, no fines; dry, loose.							
40	2250	GW	(40') GRAVEL w/ coarse-medium SAND; Light Brown (10YR 6/3); loose, dry.							
		GW	(45') GRAVEL; Brown (10YR 4/3); up to 1/2" dia, no sand, no fines.							
50	2240	SW	(50') GRAVELLY SAND; Brown 10YR 4/3); mostly medium-coarse sand, poorly sorted, dry, loose.							

BORING LOG

ARCADIS

Well Number: **MW-27**

Project Name: **KMPE Silvercroft Wash Release Site**

Permit Number: **55-222708**

Soil Boring ☐ Monitoring Well ☒ Injection Well ☐

Project Number: **ST010022**

Sheet **2** of **3**

Depth (feet)	Elevation (feet)	USC Soil Type	Description	Blow Counts	Sample No.	Graphic Log: Sample	Graphic Log: Lithology	Graphic Log: Well	PID Readings PPM	Remarks
60	2230									
70	2220									
80	2210									
90	2200									
100	2190									
110	2180									
120	2170									

BORING LOG

ARCADIS

Well Number: **MW-27**

Project Name: **KMPE Silvercroft Wash Release Site**

Permit Number: **55-222708**

Soil Boring ☐ Monitoring Well ☒ Injection Well ☐

Project Number: **ST010022**

Sheet **3** of **3**

Depth (feet)	Elevation (feet)	USC Soil Type	Description	Blow Counts	Sample No.	Graphic Log: Sample	Graphic Log: Lithology	Graphic Log: Well	PID Readings PPM	Remarks
130	2160									
140	2150									Transition Sand: #60 silica sand (144-149 feet)
150	2140									Filter Pack: #8/12 silica sand (149-154 feet)
160	2130		Encountered Groundwater; samples become moist							
170	2120									Well Screen: 4-inch diameter, 0.020" slot, stainless steel (154-189feet)
180	2110	GW	(180') GRAVELS; 10YR 6/3); subrounded-angular, well sorted, up to 1" dia; traces of coarse sand;							
190			TD = 190'							TD = 190 feet

BORING LOG

ARCADIS

Well Number: **MW-28**

Project Name: **KMPE Silvercroft Wash Release Site**

Permit Number: **55-222709**

Soil Boring ☐ Monitoring Well ☒ Injection Well ☐ Project Number: **ST010022** Sheet **1** of **3**

Boring Location: **~600' NE corner of N. Dale Crossing Dr. & W. Goret Rd.**		Elevation (feet): **2284.4** Datum:NAVD88NAVD88	East: **977982.409** North: **461014.407**
Drilling Contractor: **Layne**	Driller: **Bo**	Date Started: **11/4/13**	Date Finished: **11/5/13**
Drilling Equipment: **AP1000 (Becker)**	Borehole Diameter: (inch) **10"**	Completed Depth: (feet) **190.0**	Initial / Final Water Depth (feet): **158.90**
Sampling Method: Grab Sample ☐ Shelby Tube ☐ Split Barrel ☐		Type and Diameter of Well Casing: (inch) **Stee/SCH 80 PVC 4**	
Drilling Method: **Air Percussion**	Drilling Fluid: **none**	Type and Diameter of Well Screen: (inch) **Stainless Steel 4**	
Backfill Material:	Well Seal:	Slot Size: (inch) **0.020"**	Filter Material: **#8/12 Silica Sand**
Logged By: **Sasha Arnold**	Checked By: **B. Forsberg**	Development Method: **Bail/Surge/Pump**	

Depth (feet)	Elevation (feet)	USC Soil Type	Description	Blow Counts	Sample No.	Graphic Log: Sample	Graphic Log: Lithology	Graphic Log: Well	PID Readings PPM	Remarks
			Air Knife boring to 8 feet							Well Casing: 4-inch diameter Low Carbon Steel surface casing (0-39 feet)
	2280									
		SM	(5') SILTY SAND; 10YR 6/3; dry, loose							
10										
	2270									
		SW	(15') Well Graded SAND; 10YR 6/4; fine to medium, dry, loose.							Neat Cement (1'-139')
20		SW	as above							Well Casing: 4-inch diameter Sch 80 PVC (39-149 feet)
	2260									
		SW	(25') Coarse SAND w/ some GRAVEL; 10YR 6/3; angular-subrounded sand; multi-colored gravel.							
30		SW	(30') as above.							
	2250									
40										
	2240									
50										
	2230									

BORING LOG

ARCADIS

Well Number: **MW-28**

Project Name: **KMPE Silvercroft Wash Release Site**

Permit Number: **55-222709**

Soil Boring ☐ Monitoring Well ☒ Injection Well ☐

Project Number: **ST010022**

Sheet **2** of **3**

Depth (feet)	Elevation (feet)	USC Soil Type	Description	Blow Counts	Sample No.	Graphic Log: Sample	Graphic Log: Lithology	Graphic Log: Well	PID Readings PPM	Remarks
60										
	2220									
70										
	2210									
80										
	2200									
90										
	2190									
100										
	2180									
110										
	2170									
120										
	2160									

BORING LOG

ARCADIS

Well Number: **MW-28**

Project Name: **KMPE Silvercroft Wash Release Site**

Permit Number: **55-222709**

Soil Boring ☐ Monitoring Well ☒ Injection Well ☐

Project Number: **ST010022**

Sheet **3** of **3**

Depth (feet)	Elevation (feet)	USC Soil Type	Description	Blow Counts	Sample No.	Graphic Log: Sample	Graphic Log: Lithology	Graphic Log: Well	PID Readings PPM	Remarks
130										
	2150									
140										
	2140									Transition Sand: #60 silica sand (139-144 feet)
150										
	2130									Filter Pack: #8/12 silica sand (144-149 feet)
160										DTW = 158.60 (11/6/13)
	2120		Encountered groundwate between 165' & 170'							
170										
	2110									Well Screen: 4-inch diameter, 0.020" slot, stainless steel wire wrap (149-189 feet)
180										
	2100									
190			TD = 190'							TD = 190 feet

BORING LOG

ARCADIS

Well Number: **MW-29D**

Project Name: **KMPE Silvercroft Wash Release Site**

Permit Number: **55-222712**

Soil Boring ☐ Monitoring Well ☒ Injection Well ☐ Project Number: **ST010022** Sheet **1** of **4**

Boring Location: **~1000' E corner of N. Dale Crossing Dr. & W. Goret Rd.**		Elevation (feet): **2288.6** Datum:NAVD88NAVD88	East: **978647.351** North: **460913.817**
Drilling Contractor: **Layne**	Driller: **Bo**	Date Started: **11/14/13**	Date Finished: **11/14/13**
Drilling Equipment: **AP1000 (Becker)**	Borehole Diameter: (inch) **10"**	Completed Depth: (feet) **261.0**	Initial / Final Water Depth (feet): **167.19**
Sampling Method: Grab Sample ☐ Shelby Tube ☐ Split Barrel ☐		Type and Diameter of Well Casing: (inch) **Stee/SCH 80 PVC 4**	
Drilling Method: **Air Percussion**	Drilling Fluid: **none**	Type and Diameter of Well Screen: (inch) **Stainless Steel 4**	
Backfill Material:	Well Seal:	Slot Size: (inch) **0.020"**	Filter Material: **#8/12 Silica Sand**
Logged By: **Sasha Arnold**	Checked By: **B. Forsberg**	Development Method: **Bail/Surge/Pump**	

Depth (feet)	Elevation (feet)	USC Soil Type	Description	Blow Counts	Sample No.	Graphic Log: Sample	Graphic Log: Lithology	Graphic Log: Well	PID Readings PPM	Remarks
			Air Knife boring to 8 feet							Well Casing: 4-inch diameter Low Carbon Steel surface casing (0-39 feet)
	2280	SM	(10') SILTY SAND w. GRAVEL; Light Brown/tan (10YR 5/3); dry, loose.							
10		SP	(15') Coarse SAND w/ some GRAVELS (less than 5%); Brown; poorly sorted; dry, loose.							Neat Cement (1'-219')
	2270									
20		SP	(20') Medium SAND; Tan (10YR 7/3); dry, loose.							
		GW	(25') Poorly sorted GRAVELS w/ SAND; Tan (10YR 7/3); coarse/medium, loose, dry.							
	2260									
30		GW	(30') As Above, les med sand							
		GW	(35') Mostly gravel up to 1-inch dia; traces of coarse sand.							
	2250									
40										Well Casing: 4-inch diameter Sch 80 PVC (39-229 feet)
	2240									
50		GW	(50') SANDY GRAVELS							

BORING LOG

ARCADIS

Well Number: **MW-29D**

Project Name: **KMPE Silvercroft Wash Release Site**

Permit Number: **55-222712**

Soil Boring ☐ Monitoring Well ☒ Injection Well ☐

Project Number: **ST010022**

Sheet **2** of **4**

Depth (feet)	Elevation (feet)	USC Soil Type	Description	Blow Counts	Sample No.	Graphic Log: Sample	Graphic Log: Lithology	Graphic Log: Well	PID Readings PPM	Remarks
	2230									
60										
	2220									
70										
	2210									
80										
		GW	(85') As previous							
	2200									
90										
	2190									
100										
	2180									
110										
		GW	(115') Stil Well Graded/Poorly Sorted GRAVELS; traces of coarse sand; Tan/Light Brown (10YR 7/2), dry, loose.							
	2170									
120										

BORING LOG

ARCADIS

Well Number: **MW-29D**

Project Name: **KMPE Silvercroft Wash Release Site**

Permit Number: **55-222712**

Soil Boring ☐ Monitoring Well ☒ Injection Well ☐

Project Number: **ST010022**

Sheet **3** of **4**

Depth (feet)	Elevation (feet)	USC Soil Type	Description	Blow Counts	Sample No.	Graphic Log: Sample	Graphic Log: Lithology	Graphic Log: Well	PID Readings PPM	Remarks
	2160									
130										
	2150									
140		GW	(140') Very little if any coarse sand present.							
		GW	(145') Gravels are angular to sub-rounded, up to 1-inch dia.							
	2140									
150										
	2130									
160			(160') encountered groundwater; samples become wet.							
	2120									
170										
	2110									
180										
	2100									
190										
	2090									

BORING LOG

ARCADIS

Well Number: **MW-29D**

Project Name: **KMPE Silvercroft Wash Release Site**

Permit Number: **55-222712**

Soil Boring ☐ Monitoring Well ☒ Injection Well ☐

Project Number: **ST010022**

Sheet **4** of **4**

Depth (feet)	Elevation (feet)	USC Soil Type	Description	Blow Counts	Sample No.	Graphic Log: Sample	Graphic Log: Lithology	Graphic Log: Well	PID Readings PPM	Remarks
200										
			(205') Samples become very wet							
	2080									
210			(210') Sample is very mud, traces of fine sand.							
	2070									
220										Transition Sand: #60 silica sand (219-224 feet)
	2060									
230										Filter Pack: #8/12 silica sand (225-261 feet)
	2050									
240										Well Screen: 4-inch diameter, 0.020" slot, stainless steel wire wrap (229-259 feet)
	2040									
250										
	2030									
260			TD = 261'							TD = 261 feet

BORING LOG

ARCADIS

Well Number: **MW-29M**

Project Name: **KMPE Silvercroft Wash Release Site**

Permit Number: **55-222711**

Soil Boring ☐ Monitoring Well ☒ Injection Well ☐ Project Number: **ST010022** Sheet **1** of **4**

Boring Location: **~1000' E corner of N. Dale Crossing Dr. & W. Goret Rd.**		Elevation (feet): **2288.3** Datum:NAVD88NAVD88	East: **978657.086** North: **460918.82**
Drilling Contractor: **Layne**	Driller: **Bo**	Date Started: **11/15/13**	Date Finished: **11/16/13**
Drilling Equipment: **AP1000 (Becker)**	Borehole Diameter: (inch) **10"**	Completed Depth: (feet) **225.0**	Initial / Final Water Depth (feet): **167.06**
Sampling Method: Grab Sample ☐ Shelby Tube ☐ Split Barrel ☐		Type and Diameter of Well Casing: (inch) **Stee/SCH 80 PVC 4**	
Drilling Method: **Air Percussion**	Drilling Fluid: **none**	Type and Diameter of Well Screen: (inch) **Stainless Steel 4**	
Backfill Material:	Well Seal:	Slot Size: (inch) **0.020"**	Filter Material: **#8/12 Silica Sand**
Logged By: **Sasha Arnold**	Checked By: **B. Forsberg**	Development Method: **Bail/Surge/Pump**	

Depth (feet)	Elevation (feet)	USC Soil Type	Description	Blow Counts	Sample No.	Graphic Log: Sample	Graphic Log: Lithology	Graphic Log: Well	PID Readings PPM	Remarks
			Air Knife boring to 8 feet							Well Casing: 4-inch diameter Low Carbon Steel surface casing (0-39 feet)
	2280	SM	(10') SILTY SAND w. GRAVEL; Light Brown (10YR 6/3); poorly sorted, dry, loose.							
10		SP	(15') Coarse SAND; Light Brown (10YR 6/3); some medium-fine sand; poorly graded; dry, loose.							Neat Cement (1'-184')
	2270									
20		SP	(20') Medium SAND; Tan (10YR 7/3); dry, loose.							
		GW	(25') Well Graded GRAVELS; Grayish (2.5Y 7/1); up to 2-inch dia; no sand or fines, loose, dry.							
	2260									
30										
		GP	(35') SANDY GRAVELS; Brownish (10YR 6/3); poorly graded; loose, dry.							
	2250									
40										Well Casing: 4-inch diameter Sch 80 PVC (39-194 feet)
	2240									
50										

BORING LOG

ARCADIS

Well Number: **MW-29M**

Project Name: **KMPE Silvercroft Wash Release Site**

Permit Number: **55-222711**

Soil Boring ☐ Monitoring Well ☒ Injection Well ☐

Project Number: **ST010022**

Sheet **2** of **4**

Depth (feet)	Elevation (feet)	USC Soil Type	Description	Blow Counts	Sample No.	Graphic Log: Sample	Graphic Log: Lithology	Graphic Log: Well	PID Readings PPM	Remarks
	2230									
60										
	2220									
70										
	2210									
80										
	2200									
90										
	2190									
100										
	2180									
110										
	2170									
120										

BORING LOG

ARCADIS

Well Number: **MW-29M**

Project Name: **KMPE Silvercroft Wash Release Site**

Permit Number: **55-222711**

Soil Boring ☐ Monitoring Well ☒ Injection Well ☐

Project Number: **ST010022**

Sheet **3** of **4**

Depth (feet)	Elevation (feet)	USC Soil Type	Description	Blow Counts	Sample No.	Graphic Log: Sample	Graphic Log: Lithology	Graphic Log: Well	PID Readings PPM	Remarks
	2160									
130										
	2150									
140										
	2140									
150										
	2130									
160										
	2120									
170			Encountered groundwate between @~170'							
	2110									
180										
	2100									
190		GW	(190') Little to no fines; gravels up to 1" dia. very wet samples.							Transition Sand: #60 silica sand (189-194 feet)
	2090									Filter Pack: #8/12 silica sand (194-225 feet)

BORING LOG

ARCADIS

Well Number: **MW-29M**

Project Name: **KMPE Silvercroft Wash Release Site**

Permit Number: **55-222711**

Soil Boring ☐ Monitoring Well ☒ Injection Well ☐

Project Number: **ST010022**

Sheet **4** of **4**

Depth (feet)	Elevation (feet)	USC Soil Type	Description	Blow Counts	Sample No.	Graphic Log: Sample	Graphic Log: Lithology	Graphic Log: Well	PID Readings PPM	Remarks
200										Well Screen: 4-inch diameter, 0.020" slot, stainless steel wire wrap (194-224 feet)
			(205') No fines, poorly sorted gravels							
	2080									
210										
	2070									
220										
			TD = 225'							TD = 225 feet

BORING LOG

ARCADIS

Well Number: **MW-29S**

Project Name: **KMPE Silvercroft Wash Release Site**

Permit Number: **55-222710**

Soil Boring ☐ Monitoring Well ☒ Injection Well ☐ Project Number: **ST010022** Sheet **1** of **3**

Boring Location: **~1000' E corner of N. Dale Crossing Dr. & W. Goret Rd.**		Elevation (feet): **2289.9** Datum:NAVD88NAVD88	East: **978666.743** North: **460922.824**
Drilling Contractor: **Layne**	Driller: **Bo**	Date Started: **11/19/13**	Date Finished: **11/20/13**
Drilling Equipment: **AP1000 (Becker)**	Borehole Diameter: (inch) **10"**	Completed Depth: (feet) **190.0**	Initial / Final Water Depth (feet): **168.48**
Sampling Method: Grab Sample ☐ Shelby Tube ☐ Split Barrel ☐		Type and Diameter of Well Casing: (inch) **Stee/SCH 80 PVC 4**	
Drilling Method: **Air Percussion**	Drilling Fluid: **none**	Type and Diameter of Well Screen: (inch) **Stainless Steel 4**	
Backfill Material:	Well Seal:	Slot Size: (inch) **0.020"**	Filter Material: **#8/12 Silica Sand**
Logged By: **Sasha Arnold**	Checked By: **B. Forsberg**	Development Method: **Bail/Surge/Pump**	

Depth (feet)	Elevation (feet)	USC Soil Type	Description	Blow Counts	Sample No.	Graphic Log: Sample	Graphic Log: Lithology	Graphic Log: Well	PID Readings PPM	Remarks
			Air Knife boring to 8 feet							Well Casing: 4-inch diameter Low Carbon Steel surface casing (0-39 feet)
		SM	(5') SILTY SAND; dry, loose							
10	2280	SM	(10') SILTY SAND w/ 10% gravel; Light Brown; 10YR 6/3; poorly sorted; dry, loose							Neat Cement (1'-139')
20	2270									Well Casing: 4-inch diameter Sch 80 PVC (39-149 feet)
		GW	(25') Well Graded GRAVEL; Brown/Grayish; medium to coarse sand; gravels up to 1 inch dia; poorly sorted; dry, loose.							
30	2260									
40	2250									
50	2240									

BORING LOG

ARCADIS

Well Number: **MW-29S**

Project Name: **KMPE Silvercroft Wash Release Site**

Permit Number: **55-222710**

Soil Boring ☐ Monitoring Well ☒ Injection Well ☐

Project Number: **ST010022**

Sheet **2** of **3**

Depth (feet)	Elevation (feet)	USC Soil Type	Description	Blow Counts	Sample No.	Graphic Log: Sample	Graphic Log: Lithology	Graphic Log: Well	PID Readings PPM	Remarks
60	2230									
70	2220									
80	2210									
		SW	(85') Well Graded SANDS w/ GRAVEL; Light Brown; 75% medium - coarse sand; 20% gravels up to 1-inch dia, subangular; 5% fine sand, loose.							
90	2200									
100	2190									
110	2180									
120	2170									

BORING LOG

ARCADIS

Well Number: **MW-29S**

Project Name: **KMPE Silvercroft Wash Release Site**

Permit Number: **55-222710**

Soil Boring ☐ Monitoring Well ☒ Injection Well ☐

Project Number: **ST010022**

Sheet **3** of **3**

Depth (feet)	Elevation (feet)	USC Soil Type	Description	Blow Counts	Sample No.	Graphic Log: Sample	Graphic Log: Lithology	Graphic Log: Well	PID Readings PPM	Remarks
130	2160									
140	2150									Transition Sand: #60 silica sand (139-144 feet)
150	2140									Filter Pack: #8/12 silica sand (144-149 feet)
160	2130									
170	2120		Encountered groundwate between @~170'							
		GW	(175') Well Graded GRAVELS; traces of coarse sand. Samples very wet.							Well Screen: 4-inch diameter, 0.020" slot, stainless steel wire wrap (149-189 feet)
180	2110									
190	2100		TD = 190'							TD = 190 feet

BORING LOG

ARCADIS

Well Number: **MW-30**

Project Name: **KMPE Silvercroft Wash Release Site**

Permit Number: **55-222713**

Soil Boring ☐ Monitoring Well ☒ Injection Well ☐

Project Number: **ST010022**

Sheet **1** of **4**

~300' N of Silverbell Tree DR. and ~150 E of Silvercroft Wash. Boring Location:		Elevation (feet): **2283.4** Datum:NAVD88NAVD88	East: **979407.55** North: **460006.871**
Layne Drilling Contractor:	**Bo** Driller:	Date Started: **11/21/13**	Date Finished: **11/25/13**
AP1000 (Becker) Drilling Equipment:	Borehole Diameter: (inch) **11"**	Completed Depth: (feet) **205.0**	Initial / Final Water Depth (feet): **153.50**
Sampling Method:	Grab Sample ☐ Shelby Tube ☐ Split Barrel ☐	Type and Diameter of Well Casing: (inch) **Stee/SCH 80 PVC 6**	
Air Percussion Drilling Method:	**none** Drilling Fluid:	Type and Diameter of Well Screen: (inch) **Stainless Steel 6**	
Backfill Material:	Well Seal:	Slot Size: (inch) **0.050"**	**#8/12 Silica Sand** Filter Material:
Logged By: **Sasha Arnold**	Checked By: **B. Forsberg**	**Bail/Surge/Pump** Development Method:	

Depth (feet)	Elevation (feet)	USC Soil Type	Description	Blow Counts	Sample No.	Graphic Log: Sample	Graphic Log: Lithology	Graphic Log: Well	PID Readings PPM	Remarks
		GW								
	2280									Well Casing: 6-inch diameter Low Carbon Steel surface casing (0-39 feet)
10										
	2270									
										Neat Cement (1'-135')
20										Well Casing: 6-inch diameter Sch 80 PVC (39-145 feet)
	2260									
30										
	2250									
40										
	2240									
50										
	2230									

BORING LOG

ARCADIS

Well Number: **MW-30**

Project Name: **KMPE Silvercroft Wash Release Site**

Permit Number: **55-222713**

Soil Boring ☐ Monitoring Well ☒ Injection Well ☐

Project Number: **ST010022**

Sheet **2** of **4**

Depth (feet)	Elevation (feet)	USC Soil Type	Description	Blow Counts	Sample No.	Graphic Log: Sample	Graphic Log: Lithology	Graphic Log: Well	PID Readings PPM	Remarks
60										
	2220									
70										
	2210									
80										
	2200									
90										
	2190									
100										
	2180									
110										
	2170									
120										
	2160									

BORING LOG

ARCADIS

Well Number: **MW-30**

Project Name: **KMPE Silvercroft Wash Release Site**

Permit Number: **55-222713**

Soil Boring ☐ Monitoring Well ☒ Injection Well ☐

Project Number: **ST010022**

Sheet **3** of **4**

Depth (feet)	Elevation (feet)	USC Soil Type	Description	Blow Counts	Sample No.	Graphic Log: Sample	Graphic Log: Lithology	Graphic Log: Well	PID Readings PPM	Remarks
130										
	2150									Transition Sand: #60 silica sand (135-140 feet)
140		GW	(140') Well Graded GRAVELS w/ SAND; gravels up to 2-inch dia; multi colored (red,gray, white, tan, green); subangular to subrounded (75% gravels); 25% coarse sands; poorly sorted.							
	2140									
150		SP	(150') Poorly Graded GRAVELS, no sand; multi colored; subrounded to subangular; well sorted.							
	2130									Filter Pack: #8/12 silica sand (140-205 feet)
160										
	2120									
		SP	(165') as above							
170		GW	(170') Well Graded GRAVELS w/coarse SAND; wet, poorly sorted; some (5%) fine-medium sand.							
	2110									Well Screen: 6-inch diameter, 0.050" slot, stainless steel wire wrap (145-205 feet)
180										
	2100									
190										
	2090									

BORING LOG

ARCADIS

Well Number: **MW-30**

Project Name: **KMPE Silvercroft Wash Release Site**

Permit Number: **55-222713**

Soil Boring ☐ Monitoring Well ☒ Injection Well ☐

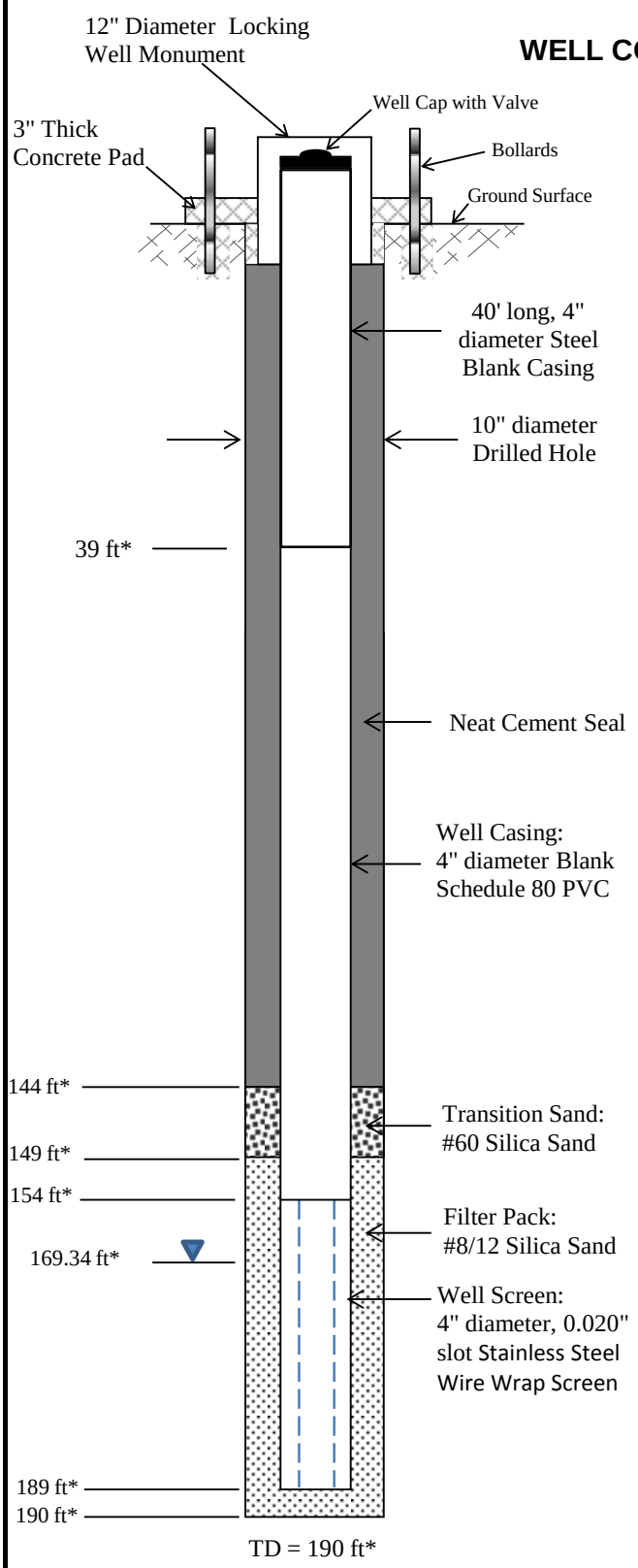
Project Number: **ST010022**

Sheet **4** of **4**

Depth (feet)	Elevation (feet)	USC Soil Type	Description	Blow Counts	Sample No.	Graphic Log: Sample	Graphic Log: Lithology	Graphic Log: Well	PID Readings PPM	Remarks
200	2080									
			TD = 205'							TD = 205 feet

BORING LOG SILVERCROFT.GPJ ARCADIS-TV.GDT 5/11/14

AS-BUILT
WELL CONSTRUCTION LOG



Measuring Point is Top of Well Casing Unless Otherwise Noted.

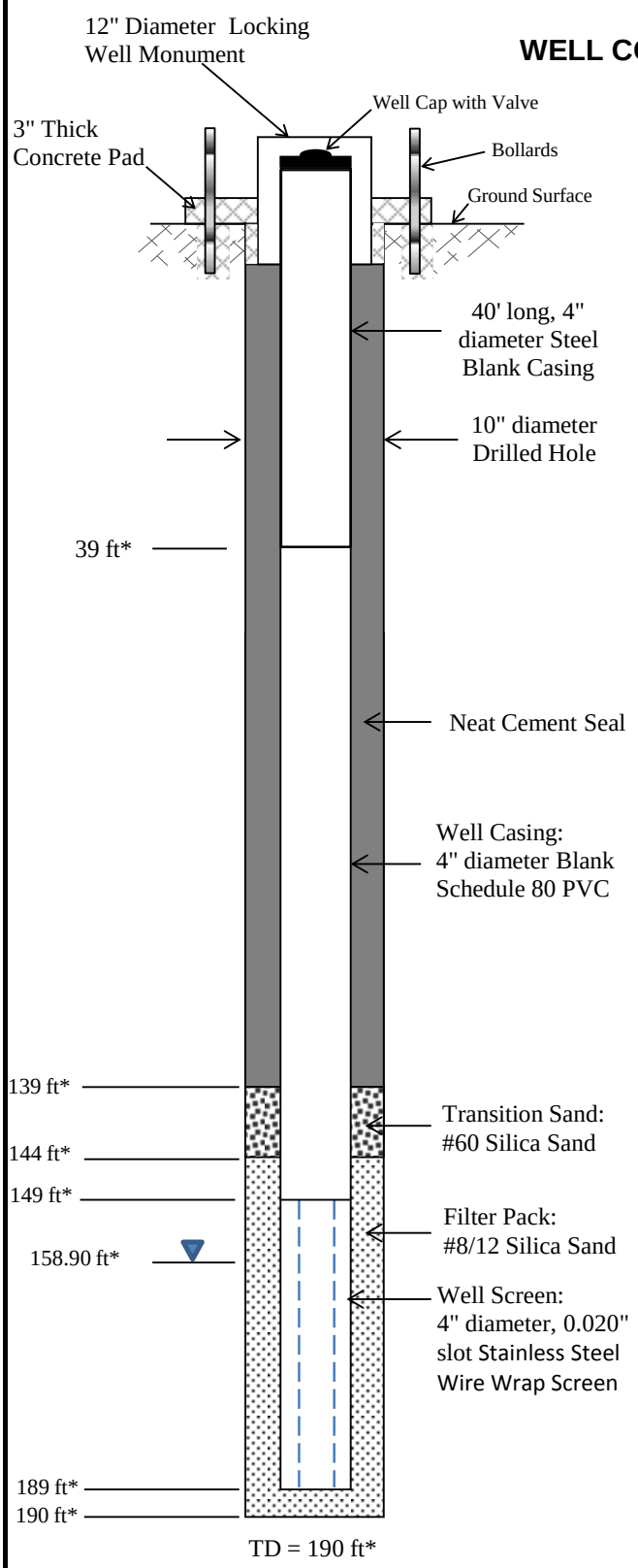
* Depth Below Ground Surface

Project	ST010022	Well	MW-27
Town/City	Tucson		
County	Pima	State	Arizona
Permit No(s).	55-222708		
Top of Casing Elevation	2291.12 feet	[X] Surveyed	
Datum	NAVD88	[ ] Estimated	
Coordinates	North 460371.035, East 978157.400		
Installation Date(s)	11/11/13 - 11/12/13		
Drilling Method	Percussion Hammer		
Drilling Contractor	Layne Christensen		
Drilling Fluid	None		
Development Technique(s) and Date(s)	Surge/Bail/Pump		
Fluid Loss During Drilling	NA gallons		
Water Removed During Development	335 gallons		
Static Depth to Water	**169.34** feet below M.P.		
Pumping Depth to Water	N/A feet below M.P.		
Pumping Duration	1 hours		
Yield	5 gpm	Date	11/25/2013
Specific Capacity	NA gpm/ft		
Well Purpose	Monitoring Well		
Remarks			
Prepared by	Thomas Vespalec		

Drawing not to scale

Our ref: G:\Project\KMEP (Kinder Morgan Energy Partners)\10022-Silvercroft Wash\GW Wells\2013 GW Well Expansion\Well Designs\As-Built Well Designs.xlsx

AS-BUILT
WELL CONSTRUCTION LOG



Measuring Point is Top of Well Casing Unless Otherwise Noted.

* Depth Below Ground Surface

Project	ST010022	Well	MW-28
Town/City	Tucson		
County	Pima	State	Arizona
Permit No(s).	55-222709		
Top of Casing Elevation	2284.4 feet	[X] Surveyed	
Datum	NAVD88	[ ] Estimated	
Coordinates	North 461014.407, East 977982.409		
Installation Date(s)	11/4/13 & 11/5/13		
Drilling Method	Percussion Hammer		
Drilling Contractor	Layne Christensen		
Drilling Fluid	None		
Development Technique(s) and Date(s)	Surge/Bail/Pump		
Fluid Loss During Drilling	NA gallons		
Water Removed During Development	257 gallons		
Static Depth to Water	**~160** feet below M.P.		
Pumping Depth to Water	N/A feet below M.P.		
Pumping Duration	0.82 hours		
Yield	4.5 gpm	Date	11/25/2013
Specific Capacity	NA gpm/ft		
Well Purpose	Monitoring Well		
Remarks			
Prepared by	Thomas Vespalec		

Drawing not to scale

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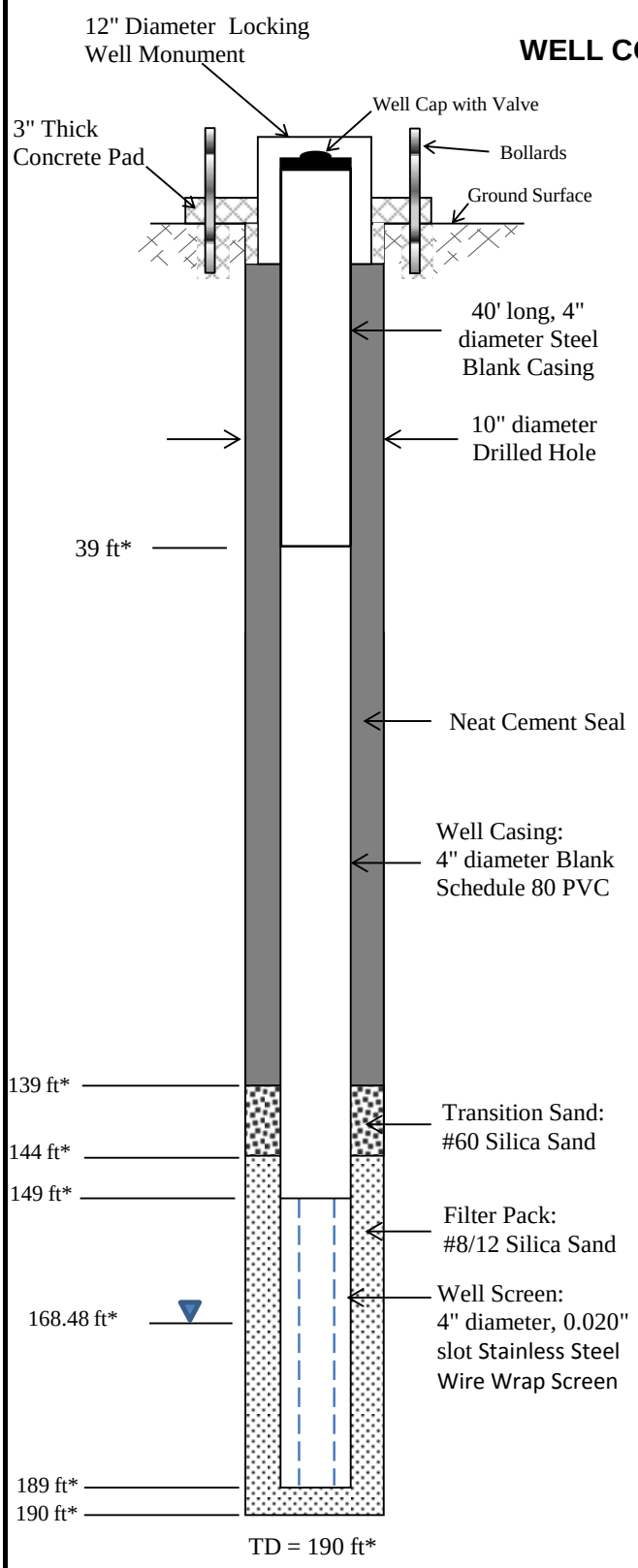
AS-BUILT
WELL CONSTRUCTION LOG



Measuring Point is Top of Well Casing Unless Otherwise Noted.

* Depth Below Ground Surface

Project	ST010022	Well	MW-29S
Town/City	Tucson		
County	Pima	State	Arizona
Permit No(s).	55-222710		
Top of Casing Elevation	2289.85 feet	[X] Surveyed	
Datum	NAVD88	[ ] Estimated	
Coordinates	North 460922.824, East 978666.743		
Installation Date(s)	11/19/13 - 11/20/13		
Drilling Method	Percussion Hammer		
Drilling Contractor	Layne Christensen		
Drilling Fluid	None		
Development Technique(s) and Date(s)	Bail/Surge/Pump		
Fluid Loss During Drilling	NA gallons		
Water Removed During Development	450 gallons		
Static Depth to Water	**168.48** feet below M.P.		
Pumping Depth to Water	N/A feet below M.P.		
Pumping Duration	1.25 hours		
Yield	5.4 gpm	Date	11/27/2013
Specific Capacity	NA gpm/ft		
Well Purpose	Monitoring Well		
Remarks			
Prepared by	Thomas Vespalec		

Drawing not to scale

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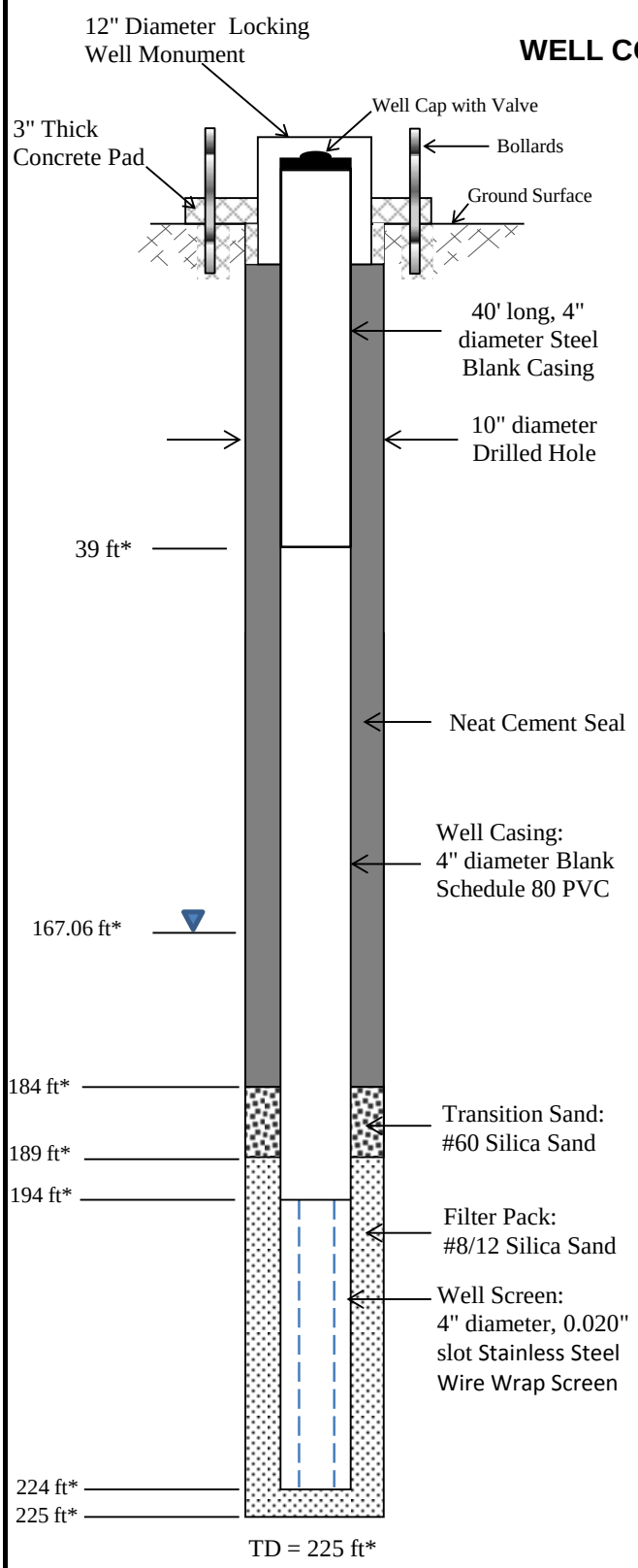
AS-BUILT
WELL CONSTRUCTION LOG



Measuring Point is Top of Well Casing Unless Otherwise Noted.

* Depth Below Ground Surface

Project	ST010022	Well	MW-29M
Town/City	Tucson		
County	Pima	State	Arizona
Permit No(s).	55-222711		
Top of Casing Elevation	2288.33 feet	[X] Surveyed	
Datum	NAVD88	[ ] Estimated	
Coordinates	North 460918.820, East 978657.086		
Installation Date(s)	11/15/13 - 11/16/13		
Drilling Method	Percussion Hammer		
Drilling Contractor	Layne Christensen		
Drilling Fluid	None		
Development Technique(s) and Date(s)	Bail/Surge/Pump		
Fluid Loss During Drilling	NA gallons		
Water Removed During Development	295 gallons		
Static Depth to Water	**167.07** feet below M.P.		
Pumping Depth to Water	N/A feet below M.P.		
Pumping Duration	1 hours		
Yield	NA gpm	Date	11/26/2013
Specific Capacity	gpm/ft		
Well Purpose	Monitoring Well		
Remarks			
Prepared by	Thomas Vespalec		

Drawing not to scale

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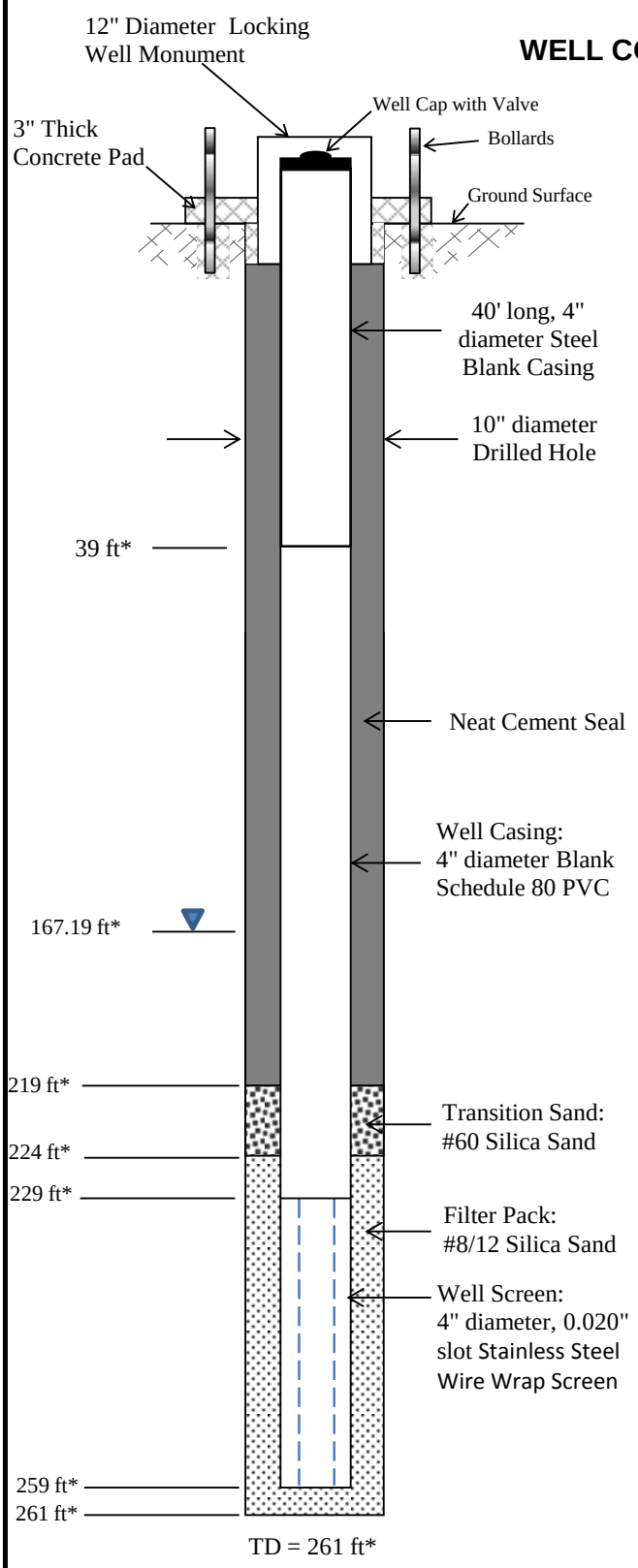
AS-BUILT
WELL CONSTRUCTION LOG



Measuring Point is Top of Well Casing Unless Otherwise Noted.

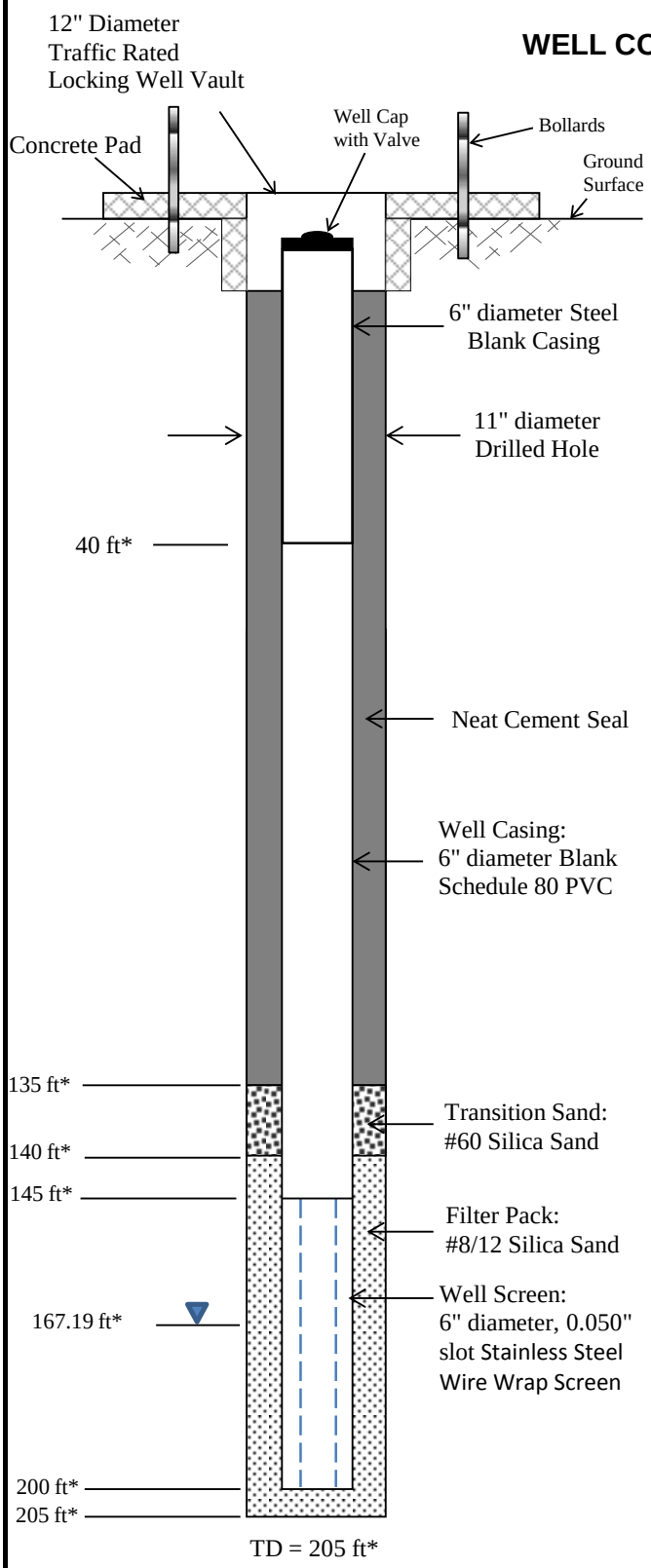
* Depth Below Ground Surface

Project	ST010022	Well	MW-29D
Town/City	Tucson		
County	Pima	State	Arizona
Permit No(s).	55-222712		
Top of Casing Elevation	2288.6 feet	[X] Surveyed	
Datum	NAVD88	[ ] Estimated	
Coordinates	North 460913.817, East 978647.351		
Installation Date(s)	11/14/2013		
Drilling Method	Percussion Hammer		
Drilling Contractor	Layne Christensen		
Drilling Fluid	None		
Development Technique(s) and Date(s)	Bail/Surge/Pump		
Fluid Loss During Drilling	NA gallons		
Water Removed During Development	947 gallons		
Static Depth to Water	**167.19** feet below M.P.		
Pumping Depth to Water	N/A feet below M.P.		
Pumping Duration	3 hours		
Yield	5.6 gpm	Date	11/26/2013
Specific Capacity	gpm/ft		
Well Purpose	Monitoring Well		
Remarks			
Prepared by	Thomas Vespalec		

Drawing not to scale

Our ref: G:\Project\KMEP (Kinder Morgan Energy Partners)\10022-Silvercroft Wash\GW Wells\2013 GW Well Expansion\Well Designs\As-Built Well Designs.xlsx

AS-BUILT
WELL CONSTRUCTION LOG



Measuring Point is Top of Well Casing
Unless Otherwise Noted.

* Depth Below Ground Surface

Project	ST010022	Well	MW-30
Town/City	Tucson		
County	Pima	State	Arizona
Permit No(s).	55-222713		
Top of Casing Elevation	2283.36 feet	[X] Surveyed	
Datum	NAVD88	[ ] Estimated	
Coordinates	North 460006.871, East 979407.550		
Installation Date(s)	11/21/2013, 11/22/13, 11/25/13		
Drilling Method	Percussion Hammer		
Drilling Contractor	Layne Christensen		
Drilling Fluid	None		
Development Technique(s) and Date(s)	Bail/Surge/Pump		
Fluid Loss During Drilling	NA gallons		
Water Removed During Development	4185 gallons		
Static Depth to Water	**153.5** feet below M.P.		
Pumping Depth to Water	N/A 153.52 feet below M.P.		
Pumping Duration	2.75 hours		
Yield	49.4 gpm	Date	12/11/2013
Specific Capacity	6.41 gpm/ft		
Well Purpose	Monitoring Well		
Remarks			
Prepared by	Thomas Vespalec		

Drawing not to scale

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Well Development Log

Site/Well No. MW-29

Project KMEP/SILVERCROFT Project No. ST 10022.0026 Page 1 of 1

Site Location TUCSON Date 11/25/13

Weather CLEAR Development Time: Begin: End

Evacuation Data

Measuring Point TOC

MP Elevation (ft)

Land Surface Elevation (ft)

Sounded Well Depth (ft bmp) ~~189~~ 192.97

Depth to Water (ft bmp) ~~154~~ 169.34

Water-Level Elevation (ft)

Water Column in Well (ft) 23.63

Casing Diameter/Type 4"

Gallons in Well 15.36

Sample Pump Intake Setting (ft bmp) 1.5'

Pumping Rate (gpm) 5 GPM

Evacuation Method 3" GRUNDFOS

Field Parameters

Color

Odor

Appearance

Time	Total Gallons Removed	pH (s.u.)	Conductivity (mS/cm or umhos/cm)	DO (mg/L)	Turbidity (NTU)	Temperature (°F/°C)	Remarks
Initial 14:55	15	6.68	1.22	6.62	0.0	23.93	PUMP AT BOTTOM TO START
14:58	30	6.69	1.21	6.34	550	24.02	
15:10		6.95	1.22	6.12	450	23.77	5' FROM TOP / START @ 14:55
15:13		6.93	1.20	7.41	193	24.06	
15:16		6.91	1.19	5.85	128	23.98	
15:21		6.78	1.19	5.14	75	23.81	10'
15:24		6.76	1.21	5.32	45	23.80	
15:27		6.75	1.22	5.34	30	23.82	
15:27		6.74	1.19	5.32	160	23.91	15'
15:29		6.72	1.21	5.22	25	23.91	
15:31		6.72	1.21	5.27	13.8	23.94	
15:34		6.73	1.19	4.90	620	24.07	2'
15:37		6.71	1.21	5.14	160	24.01	
15:40		6.72	1.21	5.17	70	24.04	
15:43		6.73	1.21	5.17	28	24.08	
15:46		6.73	1.21	5.17	8.2	24.08	

Development Personnel:

Notes: SETTING UP ON WELL @ 13:00. STARTED BAILING 13:15 / FINISHED 14:20.

Well Casing Volumes

Gal./Ft.				
	1-¼" = 0.06	2" = 0.16	3" = 0.33" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = (3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units
°C	Degrees Celsius	mS/cm	Milisiemens per centimeter	PVC	Polyvinyl chloride
ft	feet	msl	mean sea-level	s.u.	Standard units
gpm	Gallons per minute	N/A	Not Applicable	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NM	Not Measured	VOC	Volatile Organic Compounds

Yellow Jacket Drilling	PROJECT NAME: KEMP SILVERCROFT WASH	WELL NUMBER: MW - 27
WELL DEVELOPMENT LOG	JOB NUMBER; 13-1027 A2 / SITE:	PREPARED BY: KATT SANLSTER
METHOD: Pump ✓ / Baller ✓ / Other SURGED	DEVELOPMENT CRITERIA: BAIL, SWABB AND PUMPING	
	Remarks: TD @ 192.97 TOC	

DEVELOPMENT LOG					TOTAL	WATER QUALITY					COMMENTS
DATE	TIME	FLOW RATE (gpm)	DEPTH TO WATER (ft-btoc)	WATER REMOVAL (gal)	WATER REMOVAL (gal)	pH	SPECIFIC Conductivity (mS/cm)	TURBIDITY (NTU)	TEMPERATURE (Degrees C)		
11-25 2013	1:00		169.34								
	1:15										STARTED BAILING TO BOTTOM
	1:23			4.5							STOPPED BAILING
	1:25										SWABBING THE SCREEN
	2:00										STOPPED SWABBING
	2:03										BAILING AGAIN
	2:17			6.5							STOPPED BAILING.
	2:20		PREP THE pump & RUNNING IT TO 191'								
	2:54										PUMP ON @ 5 GPM
	3:55										SHUT THE PUMP OFF

Well Development Log

Site/Well No. MW-28

Project KMEP : SC Project No. ST 10022.0026 Page 1 of 1

Site Location TUCSON Date 11/25/13

Weather CLEAR Development Time: Begin: 08:18 End 11:35

Evacuation Data

Measuring Point	TOC	Sample Pump Intake Setting (ft bmp)	1.5'
MP Elevation (ft)	164.58	Pumping Rate (gpm)	4.5 GPM
Land Surface Elevation (ft)		Evacuation Method	
Sounded Well Depth (ft bmp)	190.00 / 191.54		
Depth to Water (ft bmp)	164.59		
Water-Level Elevation (ft)		**Field Parameters**	
Water Column in Well (ft)	27 (26.95)	Color	
Casing Diameter/Type	4"	Odor	
Gallons in Well	17.55	Appearance	

Time	Total Gallons Removed	pH (s.u.)	Conductivity (mS/cm or umhos/cm)	DO (mg/L)	Turbidity (NTU)	Temperature (°F/°C)	Remarks
Initial 10:41	30	6.72	1.16 mS/cm	6.99	860	23.28	INITIAL / FROM BOTTOM / 4.5 GPM
							RAISING PUMP
11:00	85	6.96	1.14	5.76	0.0	24.26	PUMPING TOP OF WELL
		6.92	1.13	6.19	575	23.92	
11:15	155	6.91	1.13	1.95	185	23.90	LOWERING PUMP / MIX WELL
11:19	170	6.64	1.12	6.16	72	23.86	2/3 DOWN FROM TOP
11:22	185	6.64	1.12	5.93	15.5	23.72	6' FROM BOTTOM
11:25	200	6.60	1.12	6.26	375	23.93	PUMPING / 2' TO INTAKE / BOTTOM
11:28	215	6.59	1.12	6.20	27.2	24.02	
11:31	228	6.59	1.13	6.19	8.9	24.07	
11:34	243	6.59	1.13	6.17	9.5	24.06	STOPPED PUMPING / 11:35

Development Personnel:

Notes: STARTED BAILING 08:18 / 17 GAL TOTAL

TOTAL WATER PUMPED = 243

Well Casing Volumes

Gal./Ft.				
	1-¼" = 0.06	2" = 0.16	3" = 0.33" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = (3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter		NTU	Nephelometric Turbidity Units	
°C	Degrees Celsius	mS/cm	Milisiemens per centimeter		PVC	Polyvinyl chloride	
ft	feet	msl	mean sea-level	1042.3	s.u.	Standard units	
gpm	Gallons per minute	N/A	Not Applicable		umhos/cm	Micromhos per centimeter	
mg/L	Miligrams per liter	NM	Not Measured	1059.3	VOC	Volatile Organic Compounds	

3
27
.65
135
162
17.55

Yellow Jacket Drilling	PROJECT NAME: KEMP SILVERCROFT WASH		WELL NUMBER: MW-28
WELL DEVELOPMENT LOG	JOB NUMBER: 13-1027 AZ	SITE:	PREPARED BY: KATT SAHLSTEN
METHOD: Pump ✓ Bailer ✓ Other SURGE	DEVELOPMENT CRITERIA: BAIL, SWABB, & PUMPING		
	Remarks: TD @ 191.54		

DEVELOPMENT LOG					TOTAL	WATER QUALITY				COMMENTS
DATE	TIME	FLOW RATE (gpm)	DEPTH TO WATER (ft-btoc)	WATER REMOVAL (gal)	WATER REMOVAL (gal)	pH	SPECIFIC Conductivity (mS/cm)	TURBIDITY (NTU)	TEMPERATURE (Degrees C)	
11-25 2013	7:00		ON SITE MET WITH THE CLIENT. WENT OVER THE WORK SCHEDULES. HAD SITE & SAFETY MEETING.							
	8:00		164.59							
	8:18									BAILING TO BOTTOM
	8:35			6						STOPPED BAILING A 40' SCREEN
	8:37									SWABBING THE SCREEN
	9:10									STOPPED SWABBING.
	9:13									BAILING
	9:33			11						STOPPED BAILING
	10:41		STARTED RUNNING THE PUMP TO 191'							
	10:46	4.5		'						PUMP ON
	11:35			240	257					SHUTTING THE PUMP OFF

Well Development Log

Site/Well No. MW-29S

Project KMEP/SILVERCROFT Project No. ST 010022.0026 Page 1 of 1

Site Location TUCSON Date 11/27/13

Weather CLOUDY/CLEAR Development Time: Begin: _____ End _____

Evacuation Data

Measuring Point: TOC

MP Elevation (ft): _____

Land Surface Elevation (ft): _____

Sounded Well Depth (ft bmp): 193.5

Depth to Water (ft bmp): 168.48

Water-Level Elevation (ft): _____

Water Column in Well (ft): 21.52

Casing Diameter/Type: 4"

Gallons in Well: _____

Sample Pump Intake Setting (ft bmp): 1.5'

Pumping Rate (gpm): 5.4 GPM

Evacuation Method: 3" GRUNDFOS

Field Parameters

Color: _____

Odor: _____

Appearance: _____

Time	Total Gallons Removed	pH (s.u.)	Conductivity (mS/cm or umhos/cm)	DO (mg/L)	Turbidity (NTU)	Temperature (°F/°C)	Remarks
8:52 Initial 8:58		5.09	1.73	4.20	63	24.37	182' / START
9:00		5.32	1.71	4.55	48	24.70	
9:10		5.61	1.69	4.25	26	24.82	
9:15		5.72	1.69	4.26	17	24.89	
09:16 — 9:22		5.77	1.68	4.52	2/2	25.02	BOTTOM/ 09:16 LOWERED PUMP
09:25		5.78	1.68	4.48	20	25.05	ORP = 140
09:30		5.80	1.68	4.43	4	25.03	ORP = 127
09:37		5.81	1.67	4.42	0	25.07	
09:42		5.81	1.67	4.44	0	25.10	STOP PUMP 09:45

Development Personnel: _____

Notes: _____

Well Casing Volumes

Gal./Ft.				
	1-¼" = 0.06	2" = 0.16	3" = 0.33" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = (3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units
°C	Degrees Celsius	mS/cm	Milisiemens per centimeter	PVC	Polyvinyl chloride
ft	feet	msl	mean sea-level	s.u.	Standard units
gpm	Gallons per minute	N/A	Not Applicable	umhos/cm	Micromhos per centimeter
mg/L	Miligrams per liter	NM	Not Measured	VOC	Volatile Organic Compounds

Yellow Jacket Drilling	PROJECT NAME: KEMP SILVERCROFT WASH		WELL NUMBER: MW-29 S
WELL DEVELOPMENT LOG	JOB NUMBER; 13-1027 AZ	SITE:	PREPARED BY: KATT SANLISTER
METHOD:	DEVELOPMENT CRITERIA: BAILING, SURGEING, & PUMPING		
Pump ✓			
Bailer ✓	Remarks: TD @ 193.5		
Other SURGE			

DEVELOPMENT LOG					TOTAL	WATER QUALITY					COMMENTS
DATE	TIME	FLOW RATE (gpm)	DEPTH TO WATER (ft-btoc)	WATER REMOVAL (gal)	WATER REMOVAL (gal)	pH	SPECIFIC Conductivity (mS/cm)	TURBIDITY (NTU)	TEMPERATURE (Degrees C)		
11-27 2013	6:30		168.48								
	7:00										
	7:20										STARTED BAILING.
	7:30			10							STOPPED BAILING.
	7:32										SWABBING THE SCREEN
	7:45										STOPPED SWABBING
	7:47										BAILING TO BOTTOM
	7:55			5							STOPPED BAILING.
	7:56				PREP TO START RUNNING THE PUMP TO 193'						
	8:30	5.4									pump on @ 172'
	8:52	5.4			LOWERED THE PUMP 182'						CLEAR
	9:16				LOWERED THE pump TO BOTTOM 193.5						
	9:45				pump CLEAN, SHUTTING THE PUMP						
	9:48				STARTED PULLING THE PUMP						

Well Development Log

Site/Well No. MW-29 M

Project KMEP/SILVERCROFT Project No. ST 010822.0026 Page 1 of 1

Site Location TUCSON Date 11/26/13

Weather CLEAR Development Time: Begin: End

Evacuation Data

Measuring Point TOC

MP Elevation (ft)

Land Surface Elevation (ft)

Sounded Well Depth (ft bmp) 227.65

Depth to Water (ft bmp) 167.06

Water-Level Elevation (ft)

Water Column in Well (ft) 60.59

Casing Diameter/Type 4"

Gallons in Well 39.38

Sample Pump Intake Setting (ft bmp) 1.5'

Pumping Rate (gpm) 5.9 GPM

Evacuation Method 3" GRUNDFOS

Field Parameters

Color

Odor

Appearance

	Time	Total Gallons Removed	pH (s.u.)	Conductivity (mS/cm or umhos/cm)	DO (mg/L)	Turbidity (NTU)	Temperature (°F/°C)	Remarks
	Initial	25	6.46	1.35	3.36	OL	24.63	START PUMP 16:00 / STOP @ 16:07
16:15	16:18	18	5.30	1.61	3.73	OL	24.16	START @ 16:15 / 200'
	16:21	35	5.55	1.57	3.99	980	24.84	
	16:26	65	5.64	1.55	4.57	163	24.79	
	16:31	95	5.68	1.55	4.68	65	24.71	
	16:36	125	5.71	1.55	5.30	33	24.72	
	16:38	137	5.71	1.52	5.11	60	24.73	PUMP @ 210'
	16:43	167	5.70	1.51	5.56	22	24.65	
	16:45	180	5.72	1.53	5.43	7	24.60	STOP PUMP @ 16:48
16:55 –	16:58	18	5.93	1.52	5.48	220	24.43	PUMP ON @ 16:55 / 225
	17:01	36	5.91	1.51	5.45	29	24.61	
	17:07	78	5.91	1.52	5.47	0.6	24.57	
	17:10	96	5.92	1.52	5.49	0	24.56	ORP = 127
	17:13	115	5.92	1.52	5.48	0	24.55	SHUTDOWN @ 17:15

Development Personnel:

Notes:

TOTAL WATER PUMPED = 295 GAL

Well Casing Volumes

Gal./Ft.				
	1-¼" = 0.06	2" = 0.16	3" = 0.33" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = (3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units
°C	Degrees Celsius	mS/cm	Milisiemens per centimeter	PVC	Polyvinyl chloride
ft	feet	msl	mean sea-level	s.u.	Standard units
gpm	Gallons per minute	N/A	Not Applicable	umhos/cm	Micromhos per centimeter
mg/L	Miligrams per liter	NM	Not Measured	VOC	Volatile Organic Compounds

Yellow Jacket Drilling	PROJECT NAME:		WELL NUMBER: MW-29M
WELL DEVELOPMENT LOG	JOB NUMBER;	SITE:	PREPARED BY:
METHOD: Pump ____ Bailer ____ Other	DEVELOPMENT CRITERIA:		
	Remarks: TD @ 227.65 TOC		

DEVELOPMENT LOG					TOTAL	WATER QUALITY					COMMENTS
DATE	TIME	FLOW RATE (gpm)	DEPTH TO WATER (ft-btoc)	WATER REMOVAL (gal)	WATER REMOVAL (gal)	pH	SPECIFIC Conductivity (mS/cm)	TURBIDITY (NTU)	TEMPERATURE (Degrees C)		
~~2:29~~	2:32		167.06								
	2:35										Bailing to Bottom
	2:50										Stopped Bailing
	3:00										Surging the screen
	3:20										Stopped Surging
	3:22										Bailing to Bottom
	3:35										Stopped Bailing (hard Bottom)
	3:40	Ran the pump to Bottom,									
	4:00	pump on pumping @ 5.9 gpm									
	4:08	Shut the pump off to take off 15' of drop pipe.									
		pump is now @ ~~210~~ 200									
	4:38	pump now @ 210									
	4:48	Shut the pump off, added 15'									
	4:55	pump Back on @ 226' @ the Bottom									
	5:15	Shutting the pump off									

Well Development Log

Site/Well No. MW-29D

Project KMEP/SILVERCROFT Project No. ST 010022.0026 Page 1 of 2

Site Location TUCSON Date 11/26/13

Weather CLEAR Development Time: Begin: End

Evacuation Data

Measuring Point TOC

MP Elevation (ft)

Land Surface Elevation (ft)

Sounded Well Depth (ft bmp) 261.95

Depth to Water (ft bmp) 167.19

Water-Level Elevation (ft)

Water Column in Well (ft) 92.81

Casing Diameter/Type 4"

Gallons in Well 60.32

Sample Pump Intake Setting (ft bmp) 1.5'

Pumping Rate (gpm) 5.6

Evacuation Method 3" GRUNDFOS

Field Parameters

Color

Odor

Appearance

	Time	Total Gallons Removed	pH (s.u.)	Conductivity (mS/cm or umhos/cm)	DO (mg/L)	Turbidity (NTU)	Temperature (°F/°C)	Remarks
	Initial/10:02	15	5.79	1.20	2.82	~~100~~ 174	23.77	~~100~~' TOP OF WATER COLUMN
	10:07	28	5.84	—	3.64	OL	24.60	METER FOGGED UP
	10:31	162	6.32	1.82	4.11	1000	24.71	CLOUDY
	10:35	185	6.32	1.82	3.74	615	24.72	ORP = 41 mV
	10:40	213	6.33	1.82	3.77	320	24.78	
	10:45	241	6.35	1.82	3.76	100	24.76	
	10:50	269	6.35	1.82	3.91	37	24.76	
	10:55	297	6.35	1.82	3.94	25	24.76	MOVED PUMP DOWN
*	11:05	353	6.35	1.81	4.5	0.0	24.93	PUMP @ 180' / STOP PUMPING
					4.23	0.0	2	
11:17 —	11:26	50	6.24	1.81	4.23	0.0	24.81	START PUMPING @ 11:17 / ~~185~~ 185'
	11:31	78	6.31	1.81	4.33	0.0	24.87	195'
*	11:36	106	6.32	1.81	4.54	0.0	24.94	200' / PUMP OFF ~~AFTER~~ AFTER READING
11:45 —	11:48	17	6.30	0.004	11.76	95	24.85	START PUMP @ 11:45 / 205'
	11:53	28	6.24	0.004	11.13	93	24.94	ORP = 168
	12:00	67	6.19	0.004	10.26	93	25.00	RECALIBRATE HORIBA
12:17 —	12:20	179	5.76	1.39	4.54	1.7	24.85	RECALIBRATED READINGS
	12:22	190	5.89	1.38	4.51	4.0	24.91	
	12:27	218	5.93	1.38	4.82	1.9	25.04	220' / PUMP OFF

Development Personnel:

Notes: * TOTAL FOR THAT PUMPING SESSION.

Well Casing Volumes

Gal./Ft.				
	1-¼" = 0.06	2" = 0.16	3" = 0.33" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = (3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units
°C	Degrees Celsius	mS/cm	Milisiemens per centimeter	PVC	Polyvinyl chloride
ft	feet	msl	mean sea-level	s.u.	Standard units
gpm	Gallons per minute	N/A	Not Applicable	umhos/cm	Micromhos per centimeter
mg/L	Miligrams per liter	NM	Not Measured	VOC	Volatile Organic Compounds

1090.9

Well Development Log

Site/Well No. MW-29D

Project KMEP/SILVERCROFT Project No. ST 010022.0026 Page 2 of 2

Site Location TUCSON Date 11/26/13

Weather CLEAR Development Time: Begin: End

Evacuation Data

Measuring Point TOC

MP Elevation (ft)

Land Surface Elevation (ft)

Sounded Well Depth (ft bmp) 261.95

Depth to Water (ft bmp) 167.19

Water-Level Elevation (ft)

Water Column in Well (ft) 92.81

Casing Diameter/Type 4"

Gallons in Well 60.32

Sample Pump Intake Setting (ft bmp) 1.5'

Pumping Rate (gpm) 5.6

Evacuation Method 3" GRUNDFOS

Field Parameters

Color

Odor

Appearance

Time	Total Gallons Removed	pH (s.u.)	Conductivity (mS/cm or umhos/cm)	DO (mg/L)	Turbidity (NTU)	Temperature (°F/°C)	Remarks
~~Initial~~ 12:42	28	6.19	1.38	4.34	424	25.12	PUMP START 12:34 / 240'
12:46	50	6.20	1.38	4.85	85	24.99	
12:50	73	6.21	1.38	4.86	18	24.93	
12:55	101	6.18	1.38	4.70	3	25.07	250' / 12:52
* 13:02	140	6.16	1.38	4.58	0	25.10	PUMP STOPPED
13:22	INITIAL	6.29	1.38	4.85	122	24.98	PUMP STARTED @ 13:20 / AT BOTTOM
13:25	17	6.22	1.38	3.75	1000	25.13	CLOUDY
13:30	45	6.21	1.38	4.62	112	25.13	
13:35	73	6.27	1.38	4.57	29	25.17	
13:40	101	6.16	1.38	4.62	14	25.19	
13:42	112	6.19	1.37	4.54	5.6	25.16	
* 13:45	130	6.19	1.37	4.52	0	25.16	PUMP OFF @ 13:47

Development Personnel:

Notes: TOTAL WATER PUMPED = 947 GAL

Well Casing Volumes

Gal./Ft.				
	1-¼" = 0.06	2" = 0.16	3" = 0.33" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = (3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units
°C	Degrees Celsius	mS/cm	Milisiemens per centimeter	PVC	Polyvinyl chloride
ft	feet	msl	mean sea-level	s.u.	Standard units
gpm	Gallons per minute	N/A	Not Applicable	umhos/cm	Micromhos per centimeter
mg/L	Miligrams per liter	NM	Not Measured	VOC	Volatile Organic Compounds

Yellow Jacket Drilling	PROJECT NAME: ICEMP SILVERCROFT		WELL NUMBER: MW-29 D
WELL DEVELOPMENT LOG	JOB NUMBER; 13-1027 A2	SITE:	PREPARED BY: KATT SANDSTER
METHOD:	DEVELOPMENT CRITERIA: BAILING, SWABB & PUMPING		
Pump ✓			
Bailer ✓	Remarks: TD @ 261.95 TOC		
Other SURGED			

DEVELOPMENT LOG					TOTAL	WATER QUALITY					COMMENTS
DATE	TIME	FLOW RATE (gpm)	DEPTH TO WATER (ft-btoc)	WATER REMOVAL (gal)	WATER REMOVAL (gal)	pH	SPECIFIC Conductivity (mS/cm)	TURBIDITY (NTU)	TEMPERATURE (Degrees C)		
11-26 2013	7:00										RIGGING UP CHECKING SWL & TD
	7:30		167.19								
	8:00			WAS UNABLE TO GO PAST 160' WITH A 5' 4" BAILER HAD TO USE A 1.5" BAILER.							
	8:10			STOPPED BAILING, HARDLY ANY MUD.							
	8:12			STARTED SWABBING THE SCREEN.							
	8:45			STOPPED WITH THE SWABBING.							
	8:47			BAILING TO BOTTOM WITH A 1.5" BAILER							
	9:20			STOPPED BAILING, BAILED OUT 20 GALLONS.							
	9:25			PREP TO RUN THE PUMP TO 180'							
	9:55			THE PUMP IS @ 180' WE ARE PURGING THE UPPER COLUMN PIPE THEN WORKING DOWN TO BOTTOM.							
	10:02			PUMP ON PURGING @ 5.6 GPM							
	10:10			RAISED THE PUMP TO 174' RIGHT BELOW SWL							
	11:05			ADDED ANOTHER 21' NOW @ 201'							
	11:16			PUMP BACK ON @ 185'							
	11:20			LOWERED THE PUMP TO 195'							
	11:27			LOWERED THE PUMP TO 201'							
	11:35			ADDED ANOTHER JOINT, NOW @ 221'							
	11:45			PUMP ON AFTER RAISING IT TO 205'							
	12:22			PUMPING @ 221'							
	12:25			Adding ANOTHER JOINT, NOW @ 241'							
	12:30			PUMP BACK ON, THEN OFF TO ADD ANOTHER 15'							
	12:55			PUMP AT 251							
	1:02			SHUT THE PUMP OFF TO Add @ 10'							
	1:20			PUMP ON, PURGING @ THE BOTTOM							
	1:45			SHUT THE PUMP OFF.							

Well Development Log

Site/Well No. MW-30

Project KMEP: Silverbell Project No. ST 0100220026 Page 1 of ____

Site Location Tucson, AZ Date 12/10/13

Weather cloudy, cold Development Time: Begin: 0830 End ____

Evacuation Data

Measuring Point: TOC - Northside

MP Elevation (ft): /

Land Surface Elevation (ft): /

Sounded Well Depth (ft bmp): 195.95

Depth to Water (ft bmp): 153.5

Water-Level Elevation (ft): /

Water Column in Well (ft): 42.45

Casing Diameter/Type: 6" PVC + SS wire wrap

Gallons in Well: 6.40 gallons

Flowmeter

Sample Pump Intake Setting (ft bmp): ____

Pumping Rate (gpm): ____

Evacuation Method: ____

Field Parameters

Color: ____

Odor: ____

Appearance: ____

Time	~~Total Gallons Removed~~	pH (s.u.)	Conductivity (mS/cm or umhos/cm)	DO (mg/L)	Turbidity (NTU)	Temperature (°F/°C)	Remarks
Initial							DTW = 153.45 w/o pump ~~164.7 (SA)~~ pump inlet 170'
							DTW = 154.8 w/ pump
Start 0845	0	6.03	1.57	3.88	676	23.71	
1050	4.25	6.91	1.51	2.88	411	23.97	Q ~ 8.5 gpm
1055	8.5	6.96	~~3.08~~ 1.46	3.08	300	23.97	DTW = 154.4 Q ~ 10 gpm
1100	13.5	7.06	1.46	3.18	274	24.12	
1105	18.5	7.33	1.49	3.47	301	24.5	
1110	23.5	7.36	1.46	3.36	599	24.07	
1115	28.5	7.21	1.48	3.88	758	24.12	water became more cloudy
1120	33.5	6.89	1.51	4.44	889	24.7	increase pump rate, see YSI notes please
1130	~~500~~ YSI notes	7.33	1.49	5.50	975	23.57	Q ~ 42 gpm
1140		6.99	1.50	6.00	210	23.50	
1150		6.99	1.51	6.62	54	23.41	
1155		6.96	1.51	6.60	27	23.47	
1200		6.96	1.51	6.67	9	23.46	shut off pump + lower it

Development Personnel: SxA

Notes: ____

Well Casing Volumes

Gal./Ft.				
	1-¼" = 0.06	2" = 0.16	3" = 0.33" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = (3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliter	NTU	Nephelometric Turbidity Units
°C	Degrees Celsius	mS/cm	Millisiemens per centimeter	PVC	Polyvinyl chloride
ft	feet	msl	mean sea-level	s.u	Standard units
gpm	Gallons per minute	N/A	Not Applicable	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NM	Not Measured	VOC	Volatile Organic Compounds

Well Development Log

Site/Well No. MW-30

Project _____ Project No. _____ Page 2 of 2

Site Location _____ Date _____

Weather _____ Development Time: Begin: _____ End _____

Evacuation Data

Measuring Point _____

MP Elevation (ft) _____

Land Surface Elevation (ft) _____

Sounded Well Depth (ft bmp) _____

Depth to Water (ft bmp) _____

Water-Level Elevation (ft) _____

Water Column in Well (ft) _____

Casing Diameter/Type _____

Gallons in Well _____

Sample Pump Intake Setting (ft bmp) ~ 196

Pumping Rate (gpm) ~ 50

Evacuation Method _____

Field Parameters

Color _____

Odor _____

Appearance _____

Time	Total Gallons Removed	pH (s.u.)	Conductivity (mS/cm or umhos/cm)	DO (mg/L)	Turbidity (NTU)	Temperature (°F/°C)	Remarks
Initial 1230	0						DTW = 153.5 DT pump = 196'
1235	250	6.97	1.52	3.59	430	23.73	Q ~ 50 gpm
1240	500	7.00	1.48	7.81	125	24.05	
1245	750	6.92	1.49	7.38	47	23.89	
1250	1000	6.89	1.48	7.18	33	23.93	clearing up
1255	1250	6.87	1.48	7.08	21	23.99	
1300	1500	6.85	1.48	7.00	12	24.01	
1305	1750	6.85	1.48	6.85	11	23.84	
1310	2000	6.85	1.48	6.85	9.9	23.83	
1315	2250	6.85	1.48	6.88	8.8	23.74	@ 1318 Shut off pump. well turbidity clear
1316	2300	6.84	1.48	6.84	9.1	23.75	and Baker tank at max capacity
1317	2350	6.84	1.49	6.84	8.9	23.75	
1320	Tag	WL	153.53, well	has	almost	fully	recovered

Development Personnel: SA

Notes: _____

Well Casing Volumes

Gal./Ft.				
	1-¼" = 0.06	2" = 0.16	3" = 0.33" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0 3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliter	NTU	Nephelometric Turbidity Units
°C	Degrees Celsius	mS/cm	Milisiemens per centimeter	PVC	Polyvinyl chloride
ft	feet	msl	mean sea-level	s.u.	Standard units
gpm	Gallons per minute	N/A	Not Applicable	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NM	Not Measured	VOC	Volatile Organic Compounds

ARCADIS

INSTRUMENT CALIBRATION FORM

Project: KMEP: Silverscoff
Project No.: ST01000022.0026
Site Location: Tucson, AZ
Date: 12/10/13
Time: 1000
Prepared by: SxA

[ ] Ph Cond Tempmeter Model Oakton 300 Services Serial 121686	[ ] Turbidity Meter Model 2020 Lamotte Serial 3597-3502	[ ] D.O. Meter Model #55/25 FT Serial 00H0611	[ ] ORP Meter Model 00702-70 Serial 55386
[ ] Multiprobe Model YSI 600 XL Serial 02J0183A1	[ ] Turbidity Meter Model 2020 Lamotte Serial	[ ] D.O. Meter Model Serial	[ ] ORP Meter Model Serial
[ ] PID Model Photovac 2020 Serial ED HF 358	[ ] PID Model Photovac 2020 Serial	[ ] pH Cond Temp Model Oakton 300 Series Serial 197765	[X] Rental Model Serial Horiba U-52

Check appropriate box for equipment calibrated. If two similar items are calibrated, please note two checks under calibration successful

Parameter PID (ppmv)	Value	Calibration Successful
Zero		
Span		
	N/A	

ph (si Units)	Value	Calibration Successful
4.00	4.09	✓
7.00		
10.00		

Conductivity (umhos)	Value	Calibration Successful
84 umhos		
1413 uhmos		
mg/L Other	4.75	✓

Turbidity (NTU)	Value	Calibration Successful
1.0 NTU	0.5	✓
10 NTU		
40 NTU		
Other		

Parameter D.O.	Calibration Successful
100% Saturated Air	
Barometer Adjustment	
Elevation Adjustment mg/L → 13.57	✓

* ORP (Mv)	Calibration Successful
Hydroquinone (240) (Black)	
Zobel Solution (237) (yellow)	
Temperature Based Chart Calibration	
* Adjusted N/A	

. used the supplied Auto-Cal solution

* No adjustment on some meters just a probe check, others are adjustable

ARCADIS

Daily Field Report

Project Name: KMEP: Silvercroft

Page 1 of 1

Project Number: ST010822.0026

Date 12/10/13

Site Location: Tucson, AZ

ARCADIS Personnel: SxA

Subcontractor(s): Yellow Jacket (Dale

Equipment on-site: Field truck, Yellow jacket (rig, support truck, equipment trailer)

Weather/Unusual Conditions: Cold, Sunny, ~60's

Scope of Work: well development of MW-30

Time	Description of Activities
0900	on-site, Meet & discuss scope of well development. Baker tank is too far away. Yellow Jacket off site to buy more hose
0915	MPE onsite to respot soil roll-off bin from MW-30 to inside of KMEP compound. (PHOTO)
0930	Calibrate equipment, place white "analysis pending" label on Baker tank. Secondary containment at Baker tank is very close to edge. Notify Tom & Mike. Wesley says it's ok in current location.
1100	YJ returns & conduct H&S meeting. Set up at MW-30. Refer to well development log for detailed notes
1140	Start bailing well, 3.6" bailer
1230	Bailed 21 gallons (water & silt/sand)
1245	Start swabbing/surging
1315	Start tripping in pump & pipe. Set pump inlet @ 163'
1445/1500	YJ has pump issues. They need to pull pump & replace motor from 1 phase to 3 phase. They will bill us from 11am - 3pm today
1545	Trip out pump & pipe
1730	Secure site
1800	Lock up site, off site

Signature:

ARCADIS

Project Name: KMEP : Silvercraft **Page** 1 of 1

12/11/13 Well Development of MW-30

Time	Description of Activities
0800	On-site, warm up equipment
0815	Set YSI rig up @ MW-30, Conduct H+S meeting discuss today's tasks
0825	DTW=153.50, DTB=201.55
0830	Assemble pump/motor + begin tripping in along w/ 1" sounding tube

Signature: _____

6" well

1.469 Gals per foot

Yellow Jacket Drilling	PROJECT NAME: Arcadis Kinder Morgan	WELL NUMBER:	
WELL DEVELOPMENT LOG	JOB NUMBER; 13-1027A2	SITE: Silver Island	PREPARED BY: Dale Smith
METHOD: Pump / Baller / Other	DEVELOPMENT CRITERIA: Bail swab bail pump purge well until turbidity below 10		
	Remarks: 1 Casing volume = Approx 70.876 Gals st. 153.5 tot toc 201.75		

DEVELOPMENT LOG

DATE	TIME	FLOW RATE (gpm)	DEPTH TO WATER (ft-btoc)	WATER REMOVAL (gal)	TOTAL WATER REMOVAL (gal)	WATER QUALITY pH	SPECIFIC Conductivity (mS/cm)	TURBIDITY (NTU)	TEMPERATURE (Degrees C)		COMMENTS
12/10/13	11:30		153.5								Bail well
	12:00			21							Finish bailing
	12:15										swab well
	12:45		152.99	13	34						Finish swabbing
	12:50										Bail well
	1:10										Finish bailing
	2:45		153.4								start pump
	2:50										Shut off pump
12/11/13	10:43		153.45								start pump
	1:16	12.3									
	2:00	12.5									Bail well
	2:15			5	39						Finish Bailing
				4185	4,224						Pump Purged
											total purge (approx)

Intake 164.7

13-1027 A2

Date: 12-11-13 MW-30 Sheet 2 of 2

Time	Elapsed Time	Totalizer Meter (x~~0~~)	RATE GPM	Pumping Water Level	Drawdown	Specific Capacity	Discharge Pressure (PSI)	
10:43	1	00086600		153.45			~~0~~	start pump
10:46	3	00086640	13.3	154.5	1.05	12.66	130	
10:50	4	00086690	12.5	154.4	.95	13.15	130	
10:55	5	00086730	8	154.4	.95	8.42	130	
11:01	6	00086785	9.16	154.42	.97	9.44	130	
11:05	4	00086815	7.5	154.4	.95	7.89	130	
11:10	5	00086850	9	154.42	.97	9.2	130	
11:15	5	00086895	9	154.4	.95	9.47	130	
11:23	8	00086965	8.75	154.46	1.01	8.66	130	
11:30	7	00087215	42.8	159.35	5.9	7.25	50	
11:41	11	00087730	46.8	159.45	6	7.8	50	
11:50	9	00088150	46.6	159.5	6.05	7.7	50	
12:00	10	00088690	54	159.5	6.05	8.92	50	Shut off pump
12:32	~~0~~			153.5				start pump
12:35	3	00088765	25	159.4	5.9	4.23	30	
12:40	5	00089013	49.6	159.9	6.4	7.75	30	
12:45	5	00089260	49.4	160	6.5	7.6	30	
12:50	5	00089523	52.6	160.05	6.55	8.03	30	
1:00	10	00090008	48.5	160.08	6.58	7.37	30	
1:10	10	00090505	49.7	160.15	6.65	7.47	30	
1:15	5	00090752	49.4	161.2	7.7	6.41	30	Shut off pump
1:30	15	00090785		153.52				recovery

Intake 170

Flow ↑

Intake 196

pxd 461 50073 line=8.0579 scale=499.3099 offset=1.4277

DAILY DRILL REPORT

YELLOW JACKET DRILLING SERVICES

CLIENT: Arcadis

DRILLING LOCATION: Kinder Morgan Silver Bell tree

YJD JOB NO: 13-1027 A2

PAGE 1 OF 1

DATE: 12-10-13

RIG #: 124

FROM	TO	DESCRIPTION OF ACTIVITIES
6:00	6:30	Load & tie down
6:30	9:00	Mob to site
9:00	9:30	Set up site and rig
9:30	10:30	Go to vendor Get lay flat hose
		Frac tank Farther from well than
		expected.
10:30	11:00	lunch
11:00	3:00	Rig-up sand well, bail fill from well
		(Approx 6') swab well screen thoroughly re-bail
		well, Install pump, start pump, Generator
		too small for single phase 5hp.
3:00	5:00	Pull pump clean site load all tooling
5:00	5:30	stage rig & trailer at lay down yard
5:30	7:30	drive back to phoenix shop.
		Date only drive time to shop

HOLE #				
FOOTAGE DRILLED FROM				
FOOTAGE DRILLED TO				
SAMPLES TAKEN THIS DATE				
SURFACE CONDITION (CIRCLE ONE)		DIRT ASPHALT CONCRETE	DIRT ASPHALT CONCRETE	DIRT ASPHALT CONCRETE
CEMENT GROUT	FROM			
	TO			
BENT. GROUT	FROM			
	TO			
BENT. SEAL	FROM			
	TO			
SAND PACK	FROM			
	TO			
BLANK CASING	FROM			
	TO			
SCREEN	FROM			
	TO			
SUMP	FROM			
	TO			
GPS COORDINATES	LAT.			
	LONG.			
	ELEV.			
FORMATION	FROM TO			
	FROM TO			
	FROM TO			
	FROM TO			

QTY	CONSTRUCTION SUPPLIES
	____" X ____' Steel Well Prot.
	____" x ____' Steel Guard Posts
	Flush Traffic Vault: Size ____
	Bags: Asphalt
	Bags: Concrete Mix
	Bags: Quickcrete
	Bags: Portland Type II Cement
	Bags: Bentonite Grout
	Bags: Bentonite Chips-Size ____
	Pails: Bentonite Pellets-Size ____
	Bags: Sand-Grade ____
	Bags: Sand-Grade ____
	____" x 5' Casing: PVC/SS ____
	____" x 10' Casing: PVC/SS ____
	____" x 5' Screen-Slot Size: ____
	____" x 10' Screen-Slot Size: ____
	Bottom Caps
	Slip Cap - Size ____
	J. Plug - Size ____
	Bags: Bentonite Gel Powder
	55 Gal. Drums - 17H Rated
	____" ____ Sample Liners
	Visqueen Tarps 6 mil.
	Sono Tube
1	splice kit
3	rolls pipe wrap
1	25' 2" lay flat
1	25' 2" layflat spare

PERSONNEL EMPLOYED	EMPLOYEE'S NAME	HOURS	PER DIEM	INITIALS
	DRILLER: Dale Smith	13	YES OR NO yes	DS
	HELPER: Shea Nielsen	11	YES OR NO No	
	HELPER:		YES OR NO	
	HELPER:		YES OR NO	

EQUIPMENT	DESCRIPTION	UNIT NO.
	DRILL RIG:	124
	PIPE TRUCK:	
	CREW TRUCK:	360
	STEAM CLEANER	
	COMPRESSOR:	
	BOBCAT/FORKLIFT:	
	BACKHOE:	
	trailer	417

CLIENT APPROVAL:

AZTEC
TYPSA Group www.aztec.us
www.typsa.es

SURVEY REPORT
SILVERCROFT WASH RELEASE SITE
TUCSON, ARIZONA
MONITOR WELLS

This report details the results of a survey conducted by AZTEC on January 7, 2014. The survey was performed using GPS procedures to derive the horizontal and differential levels to derive the vertical values shown.

All coordinates listed in the table below are NAD83(2007 EPOCH) State Plane coordinates, Arizona Central Zone based on the City of Tucson Geodetic Control Network. The elevations are on the NAVD88 vertical datum based on the City of Tucson Geodetic Control Network. All well measurements were taken on the north side of the inside PVC pipe.

DATA TABLE

WELL	Latitude	Longitude	Grid Northing	Grid Easting	Elev	Desc
MW-2	32°15'35.25890" N	111°00'42.74292" W	459421.814	979684.560	2290.25	PVC
MW-4	32°15'35.34701" N	111°00'42.13956" W	459431.155	979736.294	2295.26	PVC
MW-6	32°15'36.93834" N	111°00'42.74360" W	459591.531	979683.070	2289.63	PVC
MW-17	32°15'36.55506" N	111°00'44.49139" W	459551.533	979533.318	2286.73	PVC
MW-18	32°15'38.40026" N	111°00'44.55557" W	459737.954	979526.236	2286.08	PVC
MW-19	32°15'34.91519" N	111°00'44.52797" W	459385.788	979531.573	2286.34	PVC
MW-24	32°15'41.33367" N	111°00'44.35542" W	460034.536	979540.924	2283.85	PVC
MW-26	32°15'41.20707" N	111°00'47.58458" W	460019.408	979263.756	2286.29	PVC
MW-27	32°15'44.77834" N	111°01'00.43394" W	460371.035	978157.400	2291.12	PVC
MW-28	32°15'51.15891" N	111°01'02.40897" W	461014.407	977982.409	2284.40	PVC
MW-29D	32°15'50.10839" N	111°00'54.67523" W	460913.817	978647.351	2288.60	PVC
MW-29M	32°15'50.15709" N	111°00'54.56136" W	460918.820	978657.086	2288.33	PVC
MW-29S	32°15'50.19590" N	111°00'54.44851" W	460922.824	978666.743	2289.85	PVC
MW-30	32°15'41.07104" N	111°00'45.91130" W	460006.871	979407.550	2283.36	PVC

AZTEC
TYPSA Group www.aztec.us
www.typsa.es

The following City of Tucson Control points were used to perform this survey.

CONTROL POINT TABLE

Point No.	Grid Northing	Grid Easting	Elevation	Desc
X13	458750.368	979459.836	2287.76	Rebar
V11	461390.246	977041.552	2281.75	Pipe
X11	458728.922	977049.872	2340.24	Pipe

I, Chad Huber, do hereby certify that the data shown hereon is correct and accurate to the best of my knowledge and belief.

REGISTERED LAND SURVEYOR
CERTIFICATE NO.
35316
CHAD
HUBER
Date Signed 1/8/14
ARIZONA, U.S.A.

EXPIRES: 9/30/15

12065 Lebanon Rd
Mt. Juliet, TN 37122
(615) 758-5858
(800) 767-5859
Fax (615) 758-5859
Tax I.D 62-0814289
Est. 1970

Quality Control Summary
SDG: L671404

For: Kinder Morgan - Rocklin, CA-AZ Work
KMEP: Silvercroft

L671404

Lab SampleID.	Client ID
L671404-01	RB-R29616
L671404-02	RB-R29622
L671404-03	RB-6014
L671404-04	RB-6249

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Quality Control Summary
SDG: L671404

For: Kinder Morgan - Rocklin, CA-AZ Work
Project: KMEP: Silvercroft
December 10, 2013

Sample Receiving and Handling

All sample aliquots were received at the correct temperature, in the proper containers, and with the appropriate preservatives. All method specified holding times were met.

pH by Method 9045D

Laboratory Control Sample

Samples L671404-01, -02, -03, and -04 were analyzed in analytical batch WG695180. The laboratory control sample associated with these samples was within the laboratory control limits for all target analytes reported from this batch. The relative percent difference was within laboratory limits for all target analytes reported from this batch.

Sample Duplicate Analysis

For analytical batch WG695180 sample duplicate analysis was performed on sample L671251-09. The relative percent differences were within the method limits for target analytes reported from this batch.

For analytical batch WG695180 sample duplicate analysis was performed on sample L671251-10. The relative percent differences were within the method limits for target analytes reported from this batch.

Matrix Spike/Matrix Spike Duplicate

Precision for batch WG695180 was evaluated using the LCS/LCSD. The RPDs were within method limits.

Ignitability by Method D93/1010A

Laboratory Control Sample

Samples L671404-01, -02, -03, and -04 were analyzed in analytical batch WG695779. The laboratory control sample associated with these samples was within the laboratory control limits for all target analytes reported from this batch. The relative percent difference was within laboratory limits for all target analytes reported from this batch.

Sample Duplicate Analysis

For analytical batch WG695779 sample duplicate analysis was performed on sample L671365-03. The relative percent differences were within the method limits for target analytes reported from this batch.

For analytical batch WG695779 sample duplicate analysis was performed on sample L671365-07. The relative percent differences were within the method limits for target analytes reported from this batch.

Matrix Spike/Matrix Spike Duplicate

Precision for batch WG695779 was evaluated using the LCS/LCSD. The RPDs were within method limits.

Paint Filter by Method 9095B

Sample Duplicate Analysis

For analytical batch WG696164 sample duplicate analysis was performed on sample L671404-02. The relative percent difference exceeded the method limits for Paint Filter Test.

Matrix Spike/Matrix Spike Duplicate

Precision for batch WG696164 was evaluated using the DUP. The RPDs were within method limits.

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Quality Control Summary
SDG: L671404
For: Kinder Morgan - Rocklin, CA-AZ Work
Project: KMEP: Silvercroft
December 10, 2013

Mercury by Method 7471

Laboratory Control Sample

Samples L671404-01, -02, -03, and -04 were analyzed in analytical batch WG695103. The laboratory control sample associated with these samples was within the laboratory control limits for all target analytes reported from this batch.

Sample Duplicate Analysis

For analytical batch WG695103 sample duplicate analysis was performed on sample L671368-01. The relative percent differences were within the method limits for target analytes reported from this batch.

Matrix Spike/Matrix Spike Duplicate

For analytical batch WG695103 matrix spike/matrix spike duplicate analysis was performed on sample L671368-01. The matrix spike recoveries were above laboratory control limits for Mercury. The relative percent difference was within laboratory limits for all target analytes reported from this batch. Mercury did not meet the method limit criteria for the post digest spike.

Blank Analysis

The method blank, the initial, and all continuing calibration blanks contained no analytes at concentrations above the method reporting limit.

Trace Metals by Method 6010B

Laboratory Control Sample

Samples L671404-01, -02, -03, and -04 were analyzed in analytical batch WG695094. The laboratory control sample associated with these samples was within the laboratory control limits for all target analytes reported from this batch.

Sample Duplicate Analysis

For analytical batch WG695094 sample duplicate analysis was performed on sample L671402-02. The relative percent difference exceeded the method limits for Barium and Lead.

Matrix Spike/Matrix Spike Duplicate

For analytical batch WG695094 matrix spike/matrix spike duplicate analysis was performed on sample L671402-02. The matrix spike recoveries and relative percent differences were within laboratory control limits for all target analytes reported from this batch. Arsenic, Barium, Chromium, and Lead did not meet the method limit criteria for the serial dilution.

Blank Analysis

The method blank, the initial, and all continuing calibration blanks contained no analytes at concentrations above the method reporting limit.

Volatile Organic Compounds by Method 8260B

Laboratory Control Sample

Samples L671404-01, -02, -03, and -04 were analyzed in analytical batch WG695026. The laboratory control sample associated with these samples had all target analytes within method limits except for 4-Methyl-2-pentanone (MIBK), Acrylonitrile, and Bromomethane. The relative percent difference exceeded laboratory limits for 2-Butanone (MEK) and Acetone

Samples L671404-01, -02, -03, and -04 were analyzed in analytical batch WG695588. The laboratory control sample associated with these samples was within the laboratory control limits for all target analytes reported from this batch. The relative percent difference was within laboratory limits for all target analytes reported from this batch.

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SDG: L671404
For: Kinder Morgan - Rocklin, CA-AZ Work
Project: KMEP: Silvercroft
December 10, 2013

Matrix Spike/Matrix Spike Duplicate
For analytical batch WG695026 matrix spike/matrix spike duplicate analysis was performed on sample L671363-01. The matrix spike recoveries and relative percent differences were within laboratory control limits for all target analytes reported from this batch.

For analytical batch WG695588 matrix spike/matrix spike duplicate analysis was performed on sample L671745-01. The matrix spike recoveries and relative percent differences were within laboratory control limits for all target analytes reported from this batch.

Blank Analysis
The method blank, the initial, and all continuing calibration blanks contained no analytes at concentrations above the method reporting limit.

Polychlorinated Biphenyls by Method 8082
Laboratory Control Sample
Samples L671404-01, -02, -03, and -04 were analyzed in analytical batch WG695049. The laboratory control sample associated with these samples was within the laboratory control limits for all target analytes reported from this batch. The relative percent difference was within laboratory limits for all target analytes reported from this batch.

Matrix Spike/Matrix Spike Duplicate
For analytical batch WG695049 matrix spike/matrix spike duplicate analysis was performed on sample L671406-13. The matrix spike recoveries and relative percent differences were within laboratory control limits for all target analytes reported from this batch.

Blank Analysis
The method blank, the initial, and all continuing calibration blanks contained no analytes at concentrations above the method reporting limit.

Pesticides by Method 8081A
Laboratory Control Sample
Samples L671404-01, -02, -03, and -04 were analyzed in analytical batch WG695114. The laboratory control sample associated with these samples was within the laboratory control limits for all target analytes reported from this batch. The relative percent difference was within laboratory limits for all target analytes reported from this batch.

Matrix Spike/Matrix Spike Duplicate
For analytical batch WG695114 matrix spike/matrix spike duplicate analysis was performed on sample L671209-01. The matrix spike recoveries and relative percent differences were within laboratory control limits for all target analytes reported from this batch.

Blank Analysis
The method blank, the initial, and all continuing calibration blanks contained no analytes at concentrations above the method reporting limit.

TPH by Method 8015D/DRO_AZ
Laboratory Control Sample
Samples L671404-01, -02, -03, and -04 were analyzed in analytical batch WG694927. The laboratory control sample associated with these samples was within the laboratory control limits for all target analytes reported from this batch. The

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Quality Control Summary
SDG: L671404
For: Kinder Morgan - Rocklin, CA-AZ Work
Project: KMEP: Silvercroft
December 10, 2013

relative percent difference was within laboratory limits for all target analytes reported from this batch.

Matrix Spike/Matrix Spike Duplicate
Precision for batch WG694927 was evaluated using the LCS/LCSD. The RPDs were within method limits.

Blank Analysis
The method blank, the initial, and all continuing calibration blanks contained no analytes at concentrations above the method reporting limit.

Herbicides by Method 8151
Laboratory Control Sample
Samples L671404-01, -02, -03, and -04 were analyzed in analytical batch WG695229. The laboratory control sample associated with these samples was within the laboratory control limits for all target analytes reported from this batch. The relative percent difference was within laboratory limits for all target analytes reported from this batch.

Matrix Spike/Matrix Spike Duplicate
For analytical batch WG695229 matrix spike/matrix spike duplicate analysis was performed on sample L671196-01. The matrix spike recoveries were above laboratory control limits for 2,4-D and MCPP. The matrix spike recoveries were below laboratory control limits for 2,4-DB. The spike recoveries were within limits for the remaining target compounds reported from this batch. The relative percent difference exceeded laboratory limits for 2,4-DB, Dichloroprop, and MCPA.

Blank Analysis
The method blank, the initial, and all continuing calibration blanks contained no analytes at concentrations above the method reporting limit.

OP Pesticides by Method 8141
Laboratory Control Sample
Samples L671404-01, -02, -03, and -04 were analyzed in analytical batch WG695054. The laboratory control sample associated with these samples was within the laboratory control limits for all target analytes reported from this batch. The relative percent difference exceeded laboratory limits for Bolstar (Sulprofos), Chlorpyrifos, Demeton,-O and -S, Diazinon, Disulfoton, Ethoprop, Ethyl Parathion, Fenthion, Malathion, Merphos, Methyl parathion, Naled, Phorate, Ronnel, Stirophos, Tokuthion (Prothothiofos), and Trichloronate.

Matrix Spike/Matrix Spike Duplicate
For analytical batch WG695054 matrix spike/matrix spike duplicate analysis was performed on sample L671404-04. The matrix spike recoveries were within laboratory control limits for all target analytes reported from this batch. The relative percent difference exceeded laboratory limits for Dimethoate and TEPP.

Blank Analysis
The method blank, the initial, and all continuing calibration blanks contained no analytes at concentrations above the method reporting limit.

Nancy F. McLain
ESC Representative
ESC Lab Sciences

12065 Lebanon Rd.
Mt. Juliet, TN 37122
(615) 758-5858
1-800-767-5859
Fax (615) 758-5859

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Est. 1970

Bob Forsberg / Sasha Arnold
ARCADIS
14201 N. 87th Street, Suite 135
Scottsdale, AZ 85260

Report Summary

Monday December 09, 2013

Report Number: L671404
Samples Received: 11/30/13
Client Project: ST010022.0026

Description: KMEP Silvercroft Wash

The analytical results in this report are based upon information supplied by you, the client, and are for your exclusive use. If you have any questions regarding this data package, please do not hesitate to call.

Entire Report Reviewed By: Jarred Willis

Jarred Willis , ESC Representative

Laboratory Certification Numbers

A2LA - 1461-01, AIHA - 100789, AL - 40660, CA - 01157CA, CT - PH-0197, FL - E87487, GA - 923, IN - C-TN-01, KY - 90010, KYUST - 0016, NC - ENV375/DW21704/BIO041, ND - R-140. NJ - TN002, NJ NELAP - TN002, SC - 84004, TN - 2006, VA - 460132, WV - 233, AZ - 0612, MN - 047-999-395, NY - 11742, WI - 998093910, NV - TN000032011-1, TX - T104704245-11-3, OK - 9915, PA - 68-02979, IA Lab #364, EPA - TN002

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Note: The use of the preparatory EPA Method 3511 is not approved or endorsed by the CA ELAP.

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(800) 767-5859
Fax (615) 758-5859
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Quality Control Summary
SDG: L671404

For: Kinder Morgan - Rocklin, CA-AZ Work
KMEP: Silvercroft

L671404

Lab SampleID.	Client ID
L671404-01	RB-R29616
L671404-02	RB-R29622
L671404-03	RB-6014
L671404-04	RB-6249

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SAMPLE NUMBER
RB-R29616

Customer :	Kinder Morgan - Rocklin, CA-AZ Work	Project :	ST010022.0026
Source :	SILVER CRAFT	Date Sampled :	11/27/2013 10:30 AM
Location :	KMEP: Silvercroft	Sampled By :	SA
Lab Sample ID :	**L671404-01**	Date Received :	11/30/2013

D93/1010A

Analytic Batch: WG695779 | Analysis Date: 12/6/2013 | Analysis Time: 3:00 PM
Instrument: KOEHLER | Analyst: 596 | Preparation Date: 12/6/2013 2:27
Method: D93/1010A | Dilution: 1

CAS NO	Analyte	RL Deg. F	RESULTS Deg. F	FLAG
	Ignitability		**SEE FOOTNOTE**	

9045D

Analytic Batch: WG695180 | Analysis Date: 12/3/2013 | Analysis Time: 10:42
Instrument: AB15+ ACCU | Analyst: 586 | Preparation Date: 12/3/2013 9:33
Method: 9045D | Dilution: 1

CAS NO	Analyte	RL su	RESULTS su	FLAG
00010-29-7	pH		**9.2**	

9095B

Analytic Batch: WG696164 | Analysis Date: 12/9/2013 | Analysis Time: 11:20
Instrument: NONE | Analyst: 596 | Preparation Date: 12/9/2013 11:19
Method: 9095B | Dilution: 1

CAS NO	Analyte	RL %	RESULTS %	FLAG
	Paint Filter Test		**SEE FOOTNOTE**	

Comments:
1) Sample results are reported as rounded values.
2) These results are applicable only to the items tested.

ESC LAB SCIENCES
YOUR LAB OF CHOICE

12065 Lebanon Rd
Mt. Juliet, TN 37122
(615) 758-5858
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Tax I.D 62-0814289
Est. 1970

SAMPLE NUMBER
RB-R29616

Customer :	Kinder Morgan - Rocklin, CA-AZ Work	Project :	ST010022.0026
Source :	SILVER CRAFT	Date Sampled :	11/27/2013 10:30 AM
Location :	KMEP: Silvercroft	Sampled By :	SA
Lab Sample ID :	**L671404-01**	Date Received :	11/30/2013

7471

Analytic Batch: WG695103 | Analysis Date: 12/3/2013 | Analysis Time: 11:29
Instrument: CVAA4 | Analyst: 572 | Preparation Date: 12/2/2013 4:07
Method: 7471 | Dilution: 1

CAS NO	Analyte	RL mg/kg	RESULTS mg/kg	FLAG
7439-97-6	Mercury	0.020	< 0.020	

6010B

Analytic Batch: WG695094 | Analysis Date: 12/3/2013 | Analysis Time: 3:33
Instrument: ICP6 | Analyst: 167 | Preparation Date: 12/2/2013 9:22
Method: 6010B | Dilution: 1

CAS NO	Analyte	RL mg/kg	RESULTS mg/kg	FLAG
7440-38-2	Arsenic	1.0	**4.2**	
7440-39-3	Barium	0.25	**96**	
7440-43-9	Cadmium	0.25	< 0.25	
7440-47-3	Chromium	0.50	**3.8**	
7439-92-1	Lead	0.25	**10**	
7782-49-2	Selenium	1.0	< 1.0	
7440-22-4	Silver	0.50	< 0.50	

8260B

Analytic Batch: WG695026 | Analysis Date: 12/4/2013 | Analysis Time: 5:09
Instrument: VOCMS20 | Analyst: 611 | Preparation Date: 11/30/2013 2:00
Method: 8260B | Dilution: 25

CAS NO	Analyte	RL mg/kg	RESULTS mg/kg	FLAG
67-64-1	Acetone	1.2	< 1.2	R7
107-13-1	Acrylonitrile	0.25	< 0.25	L1
71-43-2	Benzene	0.025	< 0.025	
108-86-1	Bromobenzene	0.025	< 0.025	
75-27-4	Bromodichloromethane	0.025	< 0.025	
75-25-2	Bromoform	0.025	< 0.025	
74-83-9	Bromomethane	0.12	< 0.12	L1
106-99-0	1,3-Butadiene	0.050	< 0.050	
104-51-8	n-Butylbenzene	0.025	< 0.025	
135-98-8	sec-Butylbenzene	0.025	< 0.025	

Comments: 1) Sample results are reported as rounded values.
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Location :	KMEP: Silvercroft	Sampled By :	SA
Lab Sample ID :	**L671404-01**	Date Received :	11/30/2013

8260B

Analytic Batch: WG695026 | Analysis Date: 12/4/2013 | Analysis Time: 5:09
Instrument: VOCMS20 | Analyst: 611 | Preparation Date: 11/30/2013 2:00
Method: 8260B | Dilution: 25

CAS NO	Analyte	RL mg/kg	RESULTS mg/kg	FLAG
98-06-6	tert-Butylbenzene	0.025	< 0.025	
75-15-0	Carbon disulfide	0.025	< 0.025	
56-23-5	Carbon tetrachloride	0.025	< 0.025	
108-90-7	Chlorobenzene	0.025	< 0.025	
124-48-1	Chlorodibromomethane	0.025	< 0.025	
75-00-3	Chloroethane	0.12	< 0.12	
67-66-3	Chloroform	0.12	< 0.12	
74-87-3	Chloromethane	0.062	< 0.062	
95-49-8	2-Chlorotoluene	0.025	< 0.025	
106-43-4	4-Chlorotoluene	0.025	< 0.025	
110-82-7	Cyclohexane	0.025	< 0.025	
96-12-8	1,2-Dibromo-3-Chloropropane	0.12	< 0.12	
106-93-4	1,2-Dibromoethane	0.025	< 0.025	
74-95-3	Dibromomethane	0.025	< 0.025	
95-50-1	1,2-Dichlorobenzene	0.025	< 0.025	
541-73-1	1,3-Dichlorobenzene	0.025	< 0.025	
106-46-7	1,4-Dichlorobenzene	0.025	< 0.025	
75-71-8	Dichlorodifluoromethane	0.12	< 0.12	
75-34-3	1,1-Dichloroethane	0.025	< 0.025	
107-06-2	1,2-Dichloroethane	0.025	< 0.025	
75-35-4	1,1-Dichloroethene	0.025	< 0.025	
156-59-2	cis-1,2-Dichloroethene	0.025	< 0.025	
156-60-5	trans-1,2-Dichloroethene	0.025	< 0.025	
78-87-5	1,2-Dichloropropane	0.025	< 0.025	
563-58-6	1,1-Dichloropropene	0.025	< 0.025	
142-28-9	1,3-Dichloropropane	0.025	< 0.025	
10061-01-5	cis-1,3-Dichloropropene	0.025	< 0.025	
10061-02-6	trans-1,3-Dichloropropene	0.025	< 0.025	
594-20-7	2,2-Dichloropropane	0.025	< 0.025	
77-73-6	Dicyclopentadiene	0.025	< 0.025	
108-20-3	Di-isopropyl ether	0.025	< 0.025	
100-41-4	Ethylbenzene	0.025	< 0.025	
622-96-8	4-Ethyltoluene	0.025	< 0.025	

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SAMPLE NUMBER
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Source :	SILVER CRAFT	Date Sampled :	11/27/2013 10:30 AM
Location :	KMEP: Silvercroft	Sampled By :	SA
Lab Sample ID :	**L671404-01**	Date Received :	11/30/2013

8260B

Analytic Batch: WG695026 | Analysis Date: 12/4/2013 | Analysis Time: 5:09
Instrument: VOCMS20 | Analyst: 611 | Preparation Date: 11/30/2013 2:00
Method: 8260B | Dilution: 25

CAS NO	Analyte	RL mg/kg	RESULTS mg/kg	FLAG
87-68-3	Hexachloro-1,3-butadiene	0.025	< 0.025	
110-54-3	n-Hexane	0.25	< 0.25	
98-82-8	Isopropylbenzene	0.025	< 0.025	
99-87-6	p-Isopropyltoluene	0.025	< 0.025	
78-93-3	2-Butanone (MEK)	0.25	< 0.25	R7
75-09-2	Methylene Chloride	0.12	< 0.12	
108-10-1	4-Methyl-2-pentanone (MIBK)	0.25	< 0.25	L1
1634-04-4	Methyl tert-butyl ether	0.025	< 0.025	
108-87-2	Methyl Cyclohexane	0.025	< 0.025	
91-20-3	Naphthalene	0.12	< 0.12	
115-07-1	Propene	0.062	< 0.062	
103-65-1	n-Propylbenzene	0.025	< 0.025	
100-42-5	Styrene	0.025	< 0.025	
630-20-6	1,1,1,2-Tetrachloroethane	0.025	< 0.025	
79-34-5	1,1,2,2-Tetrachloroethane	0.025	< 0.025	
76-13-1	1,1,2-Trichlorotrifluoroethane	0.025	< 0.025	
127-18-4	Tetrachloroethene	0.025	< 0.025	
108-88-3	Toluene	0.12	< 0.12	
87-61-6	1,2,3-Trichlorobenzene	0.025	< 0.025	
120-82-1	1,2,4-Trichlorobenzene	0.025	< 0.025	
71-55-6	1,1,1-Trichloroethane	0.025	< 0.025	
79-00-5	1,1,2-Trichloroethane	0.025	< 0.025	
79-01-6	Trichloroethene	0.025	< 0.025	
75-69-4	Trichlorofluoromethane	0.12	< 0.12	
96-18-4	1,2,3-Trichloropropane	0.062	< 0.062	
95-63-6	1,2,4-Trimethylbenzene	0.025	< 0.025	
526-73-8	1,2,3-Trimethylbenzene	0.025	< 0.025	
108-67-8	1,3,5-Trimethylbenzene	0.025	< 0.025	
75-01-4	Vinyl chloride	0.025	< 0.025	
1330-20-7	Xylenes, Total	0.075	< 0.075	
75-65-0	tert-Butyl alcohol	0.12	< 0.12	
994-05-8	tert-Amyl Methyl Ether	0.025	< 0.025	
	Toluene-d8 **104**			

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SAMPLE NUMBER
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Customer :	Kinder Morgan - Rocklin, CA-AZ Work	Project :	ST010022.0026
Source :	SILVER CRAFT	Date Sampled :	11/27/2013 10:30 AM
Location :	KMEP: Silvercroft	Sampled By :	SA
Lab Sample ID :	**L671404-01**	Date Received :	11/30/2013

Surrogates

Analyte	PERCENT RECOVERY	QUALIFIERS	FLAG
Dibromofluoromethane	**103**		
4-Bromofluorobenzene	**104**		

8015D/DRO_AZ

Analytic Batch: WG694927 Analysis Date: 12/2/2013 Analysis Time: 7:55 PM
Instrument: SVGC2 Analyst: 187 Preparation Date: 12/2/2013 6:49
Method: 8015D/DRO_AZ Dilution: 1

CAS NO	Analyte	RL mg/kg	RESULTS mg/kg	FLAG
	C10-C22 Hydrocarbons	30	< 30	
	C22-C32 Hydrocarbons	50	< 50	

Surrogates

Analyte	PERCENT RECOVERY	QUALIFIERS	FLAG
o-Terphenyl	**77.8**		

8082

Analytic Batch: WG695049 Analysis Date: 12/3/2013 Analysis Time: 12:24
Instrument: SVGC20 Analyst: 164 Preparation Date: 12/2/2013 3:54
Method: 8082 Dilution: 1

CAS NO	Analyte	RL mg/kg	RESULTS mg/kg	FLAG
12674-11-2	PCB 1016	0.017	< 0.017	
11104-28-2	PCB 1221	0.017	< 0.017	
11141-16-5	PCB 1232	0.017	< 0.017	
53469-21-9	PCB 1242	0.017	< 0.017	
12672-29-6	PCB 1248	0.017	< 0.017	
11097-69-1	PCB 1254	0.017	< 0.017	
11096-82-5	PCB 1260	0.017	< 0.017	

Surrogates

Analyte	PERCENT RECOVERY	QUALIFIERS	FLAG
Decachlorobiphenyl	**95.5**		

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Source :	SILVER CRAFT	Date Sampled :	11/27/2013 10:30 AM
Location :	KMEP: Silvercroft	Sampled By :	SA
Lab Sample ID :	**L671404-01**	Date Received :	11/30/2013

Surrogates

Analyte	PERCENT RECOVERY	QUALIFIERS	FLAG
Tetrachloro-m-xylene	**103**		

8081A

Analytic Batch: WG695114 Analysis Date: 12/3/2013 Analysis Time: 1:22 PM
Instrument: SVGC24 Analyst: 297 Preparation Date: 12/2/2013 10:54
Method: 8081A Dilution: 1

CAS NO	Analyte	RL mg/kg	RESULTS mg/kg	FLAG
309-00-2	Aldrin	0.020	< 0.020	
319-84-6	Alpha BHC	0.020	< 0.020	
319-85-7	Beta BHC	0.020	< 0.020	
319-86-8	Delta BHC	0.020	< 0.020	
58-89-9	Gamma BHC	0.020	< 0.020	
57-74-9	Chlordane	0.20	< 0.20	
72-54-8	4,4-DDD	0.020	< 0.020	
72-55-9	4,4-DDE	0.020	< 0.020	
50-29-3	4,4-DDT	0.020	< 0.020	
60-57-1	Dieldrin	0.020	< 0.020	
959-98-8	Endosulfan I	0.020	< 0.020	
33213-65-9	Endosulfan II	0.020	< 0.020	
1031-07-8	Endosulfan sulfate	0.020	< 0.020	
72-20-8	Endrin	0.020	< 0.020	
7421-93-4	Endrin aldehyde	0.020	< 0.020	
53494-70-5	Endrin ketone	0.020	< 0.020	
118-74-1	Hexachlorobenzene	0.020	< 0.020	
76-44-8	Heptachlor	0.020	< 0.020	
1024-57-3	Heptachlor epoxide	0.020	< 0.020	
72-43-5	Methoxychlor	0.020	< 0.020	
8001-35-2	Toxaphene	0.40	< 0.40	

Surrogates

Analyte	PERCENT RECOVERY	QUALIFIERS	FLAG
Decachlorobiphenyl	**108**		
Tetrachloro-m-xylene	**89.0**		

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Source :	SILVER CRAFT	Date Sampled :	11/27/2013 10:30 AM
Location :	KMEP: Silvercroft	Sampled By :	SA
Lab Sample ID :	**L671404-01**	Date Received :	11/30/2013

8151

Analytic Batch: WG695229 | Analysis Date: 12/4/2013 | Analysis Time: 6:14 PM
Instrument: SVGC11 | Analyst: 267 | Preparation Date: 12/3/2013 9:40
Method: 8151 | Dilution: 1

CAS NO	Analyte	RL mg/kg	RESULTS mg/kg	FLAG
94-75-7	2,4-D	0.070	< 0.070	
75-99-0	Dalapon	0.80	< 0.80	
94-82-6	2,4-DB	0.070	< 0.070	
1918-00-9	Dicamba	0.070	< 0.070	
120-36-5	Dichloroprop	0.070	< 0.070	
88-85-7	Dinoseb	0.070	< 0.070	
94-74-6	MCPA	6.5	< 6.5	
93-65-2	MCPP	6.5	< 6.5	
93-76-5	2,4,5-T	0.070	< 0.070	
93-72-1	2,4,5-TP (Silvex)	0.070	< 0.070	

Surrogates

Analyte	PERCENT RECOVERY	QUALIFIERS	FLAG
2,4-Dichlorophenyl Acetic Acid	**80.0**		

8141

Analytic Batch: WG695054 | Analysis Date: 12/3/2013 | Analysis Time: 11:40
Instrument: SVGC12 | Analyst: 386 | Preparation Date: 12/3/2013 10:33
Method: 8141 | Dilution: 1

CAS NO	Analyte	RL mg/kg	RESULTS mg/kg	FLAG
86-50-0	Azinphos-Methyl	0.10	< 0.10	
35400-43-2	Bolstar (Sulprofos)	0.10	< 0.10	R7
2921-88-2	Chlorpyrifos	0.10	< 0.10	R7
56-72-4	Coumaphos	0.10	< 0.10	
8065-48-3	Demeton,-O and -S	0.070	< 0.070	R7
333-41-5	Diazinon	0.10	< 0.10	R7
62-73-7	Dichlorvos	0.10	< 0.10	
60-51-5	Dimethoate	0.10	< 0.10	
298-04-4	Disulfoton	0.10	< 0.10	R7
2104-64-5	EPN	0.10	< 0.10	

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RB-R29616

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Source :	SILVER CRAFT	Date Sampled :	11/27/2013 10:30 AM
Location :	KMEP: Silvercroft	Sampled By :	SA
Lab Sample ID :	**L671404-01**	Date Received :	11/30/2013

8141

Analytic Batch: WG695054 | Analysis Date: 12/3/2013 | Analysis Time: 11:40
Instrument: SVGC12 | Analyst: 386 | Preparation Date: 12/3/2013 10:33
Method: 8141 | Dilution: 1

CAS NO	Analyte	RL mg/kg	RESULTS mg/kg	FLAG
13194-48-4	Ethoprop	0.10	< 0.10	R7
56-38-2	Ethyl Parathion	0.10	< 0.10	R7
115-90-2	Fensulfothion	0.10	< 0.10	
55-38-9	Fenthion	0.10	< 0.10	R7
121-75-5	Malathion	0.10	< 0.10	R7
150-50-5	Merphos	0.10	< 0.10	R7
298-00-0	Methyl parathion	0.10	< 0.10	R7
7786-34-7	Mevinphos	0.10	< 0.10	
300-76-5	Naled	0.10	< 0.10	R7
298-02-2	Phorate	0.10	< 0.10	R7
299-84-3	Ronnel	0.10	< 0.10	R7
22248-79-9	Stirophos	0.10	< 0.10	R7
3689-24-5	Sulfotep	0.10	< 0.10	
21646-99-1	TEPP	0.10	< 0.10	
34643-46-4	Tokuthion (Prothothiofos)	0.10	< 0.10	R7
327-98-0	Trichloronate	0.10	< 0.10	R7

Surrogates

Analyte	PERCENT RECOVERY	QUALIFIERS	FLAG
Tributyl Phosphate	**82.0**		
Triphenyl Phosphate	**86.2**		

LEGEND

RL - Reporting Limit
Did Not Ignite @ 170 F
Contains No Free Liquid
9.2@20.6c

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Source :	SILVER CRAFT	Date Sampled :	11/27/2013 10:30 AM
Location :	KMEP: Silvercroft	Sampled By :	SA
Lab Sample ID :	**L671404-01**	Date Received :	11/30/2013

QUALIFIERS

R7 -	LFB/LFBD RPD exceeded the laboratory acceptance limit. Recovery met acceptance criteria.
L1 -	The associated blank spike recovery was above laboratory acceptance limits.

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SAMPLE NUMBER
RB-R29622

Customer :	Kinder Morgan - Rocklin, CA-AZ Work	Project :	ST010022.0026
Source :	SILVER CRAFT	Date Sampled :	11/27/2013 11:00 AM
Location :	KMEP: Silvercroft	Sampled By :	SA
Lab Sample ID :	**L671404-02**	Date Received :	11/30/2013

D93/1010A

Analytic Batch: WG695779 | Analysis Date: 12/6/2013 | Analysis Time: 3:00 PM
Instrument: KOEHLER | Analyst: 596 | Preparation Date: 12/6/2013 2:27
Method: D93/1010A | Dilution: 1

CAS NO	Analyte	RL Deg. F	RESULTS Deg. F	FLAG
	Ignitability		**SEE FOOTNOTE**	

9045D

Analytic Batch: WG695180 | Analysis Date: 12/3/2013 | Analysis Time: 10:42
Instrument: AB15+ ACCU | Analyst: 586 | Preparation Date: 12/3/2013 9:33
Method: 9045D | Dilution: 1

CAS NO	Analyte	RL su	RESULTS su	FLAG
00010-29-7	pH		**8.7**	

9095B

Analytic Batch: WG696164 | Analysis Date: 12/9/2013 | Analysis Time: 11:20
Instrument: NONE | Analyst: 596 | Preparation Date: 12/9/2013 11:19
Method: 9095B | Dilution: 1

CAS NO	Analyte	RL %	RESULTS %	FLAG
	Paint Filter Test		**SEE FOOTNOTE**	Q9

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SAMPLE NUMBER
RB-R29622

Customer :	Kinder Morgan - Rocklin, CA-AZ Work	Project :	ST010022.0026
Source :	SILVER CRAFT	Date Sampled :	11/27/2013 11:00 AM
Location :	KMEP: Silvercroft	Sampled By :	SA
Lab Sample ID :	**L671404-02**	Date Received :	11/30/2013

7471

Analytic Batch: WG695103 | Analysis Date: 12/3/2013 | Analysis Time: 11:32
Instrument: CVAA4 | Analyst: 572 | Preparation Date: 12/2/2013 4:07
Method: 7471 | Dilution: 1

CAS NO	Analyte	RL mg/kg	RESULTS mg/kg	FLAG
7439-97-6	Mercury	0.020	< 0.020	

6010B

Analytic Batch: WG695094 | Analysis Date: 12/3/2013 | Analysis Time: 3:37
Instrument: ICP6 | Analyst: 167 | Preparation Date: 12/2/2013 9:22
Method: 6010B | Dilution: 1

CAS NO	Analyte	RL mg/kg	RESULTS mg/kg	FLAG
7440-38-2	Arsenic	1.0	**5.8**	
7440-39-3	Barium	0.25	**120**	
7440-43-9	Cadmium	0.25	< 0.25	
7440-47-3	Chromium	0.50	**5.4**	
7439-92-1	Lead	0.25	**9.5**	
7782-49-2	Selenium	1.0	< 1.0	
7440-22-4	Silver	0.50	< 0.50	

8260B

Analytic Batch: WG695026 | Analysis Date: 12/4/2013 | Analysis Time: 5:27
Instrument: VOCMS20 | Analyst: 611 | Preparation Date: 11/30/2013 2:00
Method: 8260B | Dilution: 24.50

CAS NO	Analyte	RL mg/kg	RESULTS mg/kg	FLAG
67-64-1	Acetone	1.2	< 1.2	R7
107-13-1	Acrylonitrile	0.24	< 0.24	L1
71-43-2	Benzene	0.024	< 0.024	
108-86-1	Bromobenzene	0.024	< 0.024	
75-27-4	Bromodichloromethane	0.024	< 0.024	
75-25-2	Bromoform	0.024	< 0.024	
74-83-9	Bromomethane	0.12	< 0.12	L1
106-99-0	1,3-Butadiene	0.049	< 0.049	
104-51-8	n-Butylbenzene	0.024	< 0.024	
135-98-8	sec-Butylbenzene	0.024	< 0.024	

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SAMPLE NUMBER
RB-R29622

Customer :	Kinder Morgan - Rocklin, CA-AZ Work	Project :	ST010022.0026
Source :	SILVER CRAFT	Date Sampled :	11/27/2013 11:00 AM
Location :	KMEP: Silvercroft	Sampled By :	SA
Lab Sample ID :	**L671404-02**	Date Received :	11/30/2013

8260B

Analytic Batch: WG695026 | Analysis Date: 12/4/2013 | Analysis Time: 5:27
Instrument: VOCMS20 | Analyst: 611 | Preparation Date: 11/30/2013 2:00
Method: 8260B | Dilution: 24.50

CAS NO	Analyte	RL mg/kg	RESULTS mg/kg	FLAG
98-06-6	tert-Butylbenzene	0.024	< 0.024	
75-15-0	Carbon disulfide	0.024	< 0.024	
56-23-5	Carbon tetrachloride	0.024	< 0.024	
108-90-7	Chlorobenzene	0.024	< 0.024	
124-48-1	Chlorodibromomethane	0.024	< 0.024	
75-00-3	Chloroethane	0.12	< 0.12	
67-66-3	Chloroform	0.12	< 0.12	
74-87-3	Chloromethane	0.061	< 0.061	
95-49-8	2-Chlorotoluene	0.024	< 0.024	
106-43-4	4-Chlorotoluene	0.024	< 0.024	
110-82-7	Cyclohexane	0.024	< 0.024	
96-12-8	1,2-Dibromo-3-Chloropropane	0.12	< 0.12	
106-93-4	1,2-Dibromoethane	0.024	< 0.024	
74-95-3	Dibromomethane	0.024	< 0.024	
95-50-1	1,2-Dichlorobenzene	0.024	< 0.024	
541-73-1	1,3-Dichlorobenzene	0.024	< 0.024	
106-46-7	1,4-Dichlorobenzene	0.024	< 0.024	
75-71-8	Dichlorodifluoromethane	0.12	< 0.12	
75-34-3	1,1-Dichloroethane	0.024	< 0.024	
107-06-2	1,2-Dichloroethane	0.024	< 0.024	
75-35-4	1,1-Dichloroethene	0.024	< 0.024	
156-59-2	cis-1,2-Dichloroethene	0.024	< 0.024	
156-60-5	trans-1,2-Dichloroethene	0.024	< 0.024	
78-87-5	1,2-Dichloropropane	0.024	< 0.024	
563-58-6	1,1-Dichloropropene	0.024	< 0.024	
142-28-9	1,3-Dichloropropane	0.024	< 0.024	
10061-01-5	cis-1,3-Dichloropropene	0.024	< 0.024	
10061-02-6	trans-1,3-Dichloropropene	0.024	< 0.024	
594-20-7	2,2-Dichloropropane	0.024	< 0.024	
77-73-6	Dicyclopentadiene	0.024	< 0.024	
108-20-3	Di-isopropyl ether	0.024	< 0.024	
100-41-4	Ethylbenzene	0.024	< 0.024	
622-96-8	4-Ethyltoluene	0.024	< 0.024	

Comments: 1) Sample results are reported as rounded values.
2) These results are applicable only to the items tested.

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SAMPLE NUMBER
RB-R29622

Customer :	Kinder Morgan - Rocklin, CA-AZ Work	Project :	ST010022.0026
Source :	SILVER CRAFT	Date Sampled :	11/27/2013 11:00 AM
Location :	KMEP: Silvercroft	Sampled By :	SA
Lab Sample ID :	**L671404-02**	Date Received :	11/30/2013

8260B

Analytic Batch: WG695026 | Analysis Date: 12/4/2013 | Analysis Time: 5:27
Instrument: VOCMS20 | Analyst: 611 | Preparation Date: 11/30/2013 2:00
Method: 8260B | Dilution: 24.50

CAS NO	Analyte	RL mg/kg	RESULTS mg/kg	FLAG
87-68-3	Hexachloro-1,3-butadiene	0.024	< 0.024	
110-54-3	n-Hexane	0.24	< 0.24	
98-82-8	Isopropylbenzene	0.024	< 0.024	
99-87-6	p-Isopropyltoluene	0.024	< 0.024	
78-93-3	2-Butanone (MEK)	0.24	< 0.24	R7
75-09-2	Methylene Chloride	0.12	< 0.12	
108-10-1	4-Methyl-2-pentanone (MIBK)	0.24	< 0.24	L1
1634-04-4	Methyl tert-butyl ether	0.024	< 0.024	
108-87-2	Methyl Cyclohexane	0.024	< 0.024	
91-20-3	Naphthalene	0.12	< 0.12	
115-07-1	Propene	0.061	< 0.061	
103-65-1	n-Propylbenzene	0.024	< 0.024	
100-42-5	Styrene	0.024	< 0.024	
630-20-6	1,1,1,2-Tetrachloroethane	0.024	< 0.024	
79-34-5	1,1,2,2-Tetrachloroethane	0.024	< 0.024	
76-13-1	1,1,2-Trichlorotrifluoroethane	0.024	< 0.024	
127-18-4	Tetrachloroethene	0.024	< 0.024	
108-88-3	Toluene	0.12	< 0.12	
87-61-6	1,2,3-Trichlorobenzene	0.024	< 0.024	
120-82-1	1,2,4-Trichlorobenzene	0.024	< 0.024	
71-55-6	1,1,1-Trichloroethane	0.024	< 0.024	
79-00-5	1,1,2-Trichloroethane	0.024	< 0.024	
79-01-6	Trichloroethene	0.024	< 0.024	
75-69-4	Trichlorofluoromethane	0.12	< 0.12	
96-18-4	1,2,3-Trichloropropane	0.061	< 0.061	
95-63-6	1,2,4-Trimethylbenzene	0.024	< 0.024	
526-73-8	1,2,3-Trimethylbenzene	0.024	< 0.024	
108-67-8	1,3,5-Trimethylbenzene	0.024	< 0.024	
75-01-4	Vinyl chloride	0.024	< 0.024	
1330-20-7	Xylenes, Total	0.074	< 0.074	
75-65-0	tert-Butyl alcohol	0.12	< 0.12	
994-05-8	tert-Amyl Methyl Ether	0.024	< 0.024	
	Toluene-d8 **101**			

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SAMPLE NUMBER
RB-R29622

Customer :	Kinder Morgan - Rocklin, CA-AZ Work	Project :	ST010022.0026
Source :	SILVER CRAFT	Date Sampled :	11/27/2013 11:00 AM
Location :	KMEP: Silvercroft	Sampled By :	SA
Lab Sample ID :	**L671404-02**	Date Received :	11/30/2013

Surrogates

Analyte	PERCENT RECOVERY	QUALIFIERS	FLAG
Dibromofluoromethane	**100**		
4-Bromofluorobenzene	**103**		

8015D/DRO_AZ

Analytic Batch: WG694927 Analysis Date: 12/2/2013 Analysis Time: 8:09 PM
Instrument: SVGC2 Analyst: 187 Preparation Date: 12/2/2013 6:49
Method: 8015D/DRO_AZ Dilution: 1

CAS NO	Analyte	RL mg/kg	RESULTS mg/kg	FLAG
	C10-C22 Hydrocarbons	30	< 30	
	C22-C32 Hydrocarbons	50	< 50	

Surrogates

Analyte	PERCENT RECOVERY	QUALIFIERS	FLAG
o-Terphenyl	**80.8**		

8082

Analytic Batch: WG695049 Analysis Date: 12/3/2013 Analysis Time: 12:36
Instrument: SVGC20 Analyst: 164 Preparation Date: 12/2/2013 3:54
Method: 8082 Dilution: 1

CAS NO	Analyte	RL mg/kg	RESULTS mg/kg	FLAG
12674-11-2	PCB 1016	0.017	< 0.017	
11104-28-2	PCB 1221	0.017	< 0.017	
11141-16-5	PCB 1232	0.017	< 0.017	
53469-21-9	PCB 1242	0.017	< 0.017	
12672-29-6	PCB 1248	0.017	< 0.017	
11097-69-1	PCB 1254	0.017	< 0.017	
11096-82-5	PCB 1260	0.017	< 0.017	

Surrogates

Analyte	PERCENT RECOVERY	QUALIFIERS	FLAG
Decachlorobiphenyl	**89.3**		

Comments: 1) Sample results are reported as rounded values.
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SAMPLE NUMBER
RB-R29622

Customer :	Kinder Morgan - Rocklin, CA-AZ Work	Project :	ST010022.0026
Source :	SILVER CRAFT	Date Sampled :	11/27/2013 11:00 AM
Location :	KMEP: Silvercroft	Sampled By :	SA
Lab Sample ID :	**L671404-02**	Date Received :	11/30/2013

Surrogates

Analyte	PERCENT RECOVERY	QUALIFIERS	FLAG
Tetrachloro-m-xylene	**107**		

8081A

Analytic Batch: WG695114 Analysis Date: 12/3/2013 Analysis Time: 1:36 PM
Instrument: SVGC24 Analyst: 297 Preparation Date: 12/2/2013 10:54
Method: 8081A Dilution: 1

CAS NO	Analyte	RL mg/kg	RESULTS mg/kg	FLAG
309-00-2	Aldrin	0.020	< 0.020	
319-84-6	Alpha BHC	0.020	< 0.020	
319-85-7	Beta BHC	0.020	< 0.020	
319-86-8	Delta BHC	0.020	< 0.020	
58-89-9	Gamma BHC	0.020	< 0.020	
57-74-9	Chlordane	0.20	< 0.20	
72-54-8	4,4-DDD	0.020	< 0.020	
72-55-9	4,4-DDE	0.020	< 0.020	
50-29-3	4,4-DDT	0.020	< 0.020	
60-57-1	Dieldrin	0.020	< 0.020	
959-98-8	Endosulfan I	0.020	< 0.020	
33213-65-9	Endosulfan II	0.020	< 0.020	
1031-07-8	Endosulfan sulfate	0.020	< 0.020	
72-20-8	Endrin	0.020	< 0.020	
7421-93-4	Endrin aldehyde	0.020	< 0.020	
53494-70-5	Endrin ketone	0.020	< 0.020	
118-74-1	Hexachlorobenzene	0.020	< 0.020	
76-44-8	Heptachlor	0.020	< 0.020	
1024-57-3	Heptachlor epoxide	0.020	< 0.020	
72-43-5	Methoxychlor	0.020	< 0.020	
8001-35-2	Toxaphene	0.40	< 0.40	

Surrogates

Analyte	PERCENT RECOVERY	QUALIFIERS	FLAG
Decachlorobiphenyl	**123**		
Tetrachloro-m-xylene	**99.0**		

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SAMPLE NUMBER
RB-R29622

Customer :	Kinder Morgan - Rocklin, CA-AZ Work	Project :	ST010022.0026
Source :	SILVER CRAFT	Date Sampled :	11/27/2013 11:00 AM
Location :	KMEP: Silvercroft	Sampled By :	SA
Lab Sample ID :	**L671404-02**	Date Received :	11/30/2013

8151

Analytic Batch: WG695229 | Analysis Date: 12/4/2013 | Analysis Time: 6:28 PM
Instrument: SVGC11 | Analyst: 267 | Preparation Date: 12/3/2013 9:40
Method: 8151 | Dilution: 1

CAS NO	Analyte	RL mg/kg	RESULTS mg/kg	FLAG
94-75-7	2,4-D	0.070	< 0.070	
75-99-0	Dalapon	0.80	< 0.80	
94-82-6	2,4-DB	0.070	< 0.070	
1918-00-9	Dicamba	0.070	< 0.070	
120-36-5	Dichloroprop	0.070	< 0.070	
88-85-7	Dinoseb	0.070	< 0.070	
94-74-6	MCPA	6.5	< 6.5	
93-65-2	MCPP	6.5	< 6.5	
93-76-5	2,4,5-T	0.070	< 0.070	
93-72-1	2,4,5-TP (Silvex)	0.070	< 0.070	

Surrogates

Analyte	PERCENT RECOVERY	QUALIFIERS	FLAG
2,4-Dichlorophenyl Acetic Acid	**86.8**		

8141

Analytic Batch: WG695054 | Analysis Date: 12/4/2013 | Analysis Time: 12:12
Instrument: SVGC12 | Analyst: 386 | Preparation Date: 12/3/2013 10:33
Method: 8141 | Dilution: 1

CAS NO	Analyte	RL mg/kg	RESULTS mg/kg	FLAG
86-50-0	Azinphos-Methyl	0.10	< 0.10	
35400-43-2	Bolstar (Sulprofos)	0.10	< 0.10	R7
2921-88-2	Chlorpyrifos	0.10	< 0.10	R7
56-72-4	Coumaphos	0.10	< 0.10	
8065-48-3	Demeton,-O and -S	0.070	< 0.070	R7
333-41-5	Diazinon	0.10	< 0.10	R7
62-73-7	Dichlorvos	0.10	< 0.10	
60-51-5	Dimethoate	0.10	< 0.10	
298-04-4	Disulfoton	0.10	< 0.10	R7
2104-64-5	EPN	0.10	< 0.10	

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SAMPLE NUMBER
RB-R29622

Customer :	Kinder Morgan - Rocklin, CA-AZ Work	Project :	ST010022.0026
Source :	SILVER CRAFT	Date Sampled :	11/27/2013 11:00 AM
Location :	KMEP: Silvercroft	Sampled By :	SA
Lab Sample ID :	**L671404-02**	Date Received :	11/30/2013

8141

Analytic Batch: WG695054 | Analysis Date: 12/4/2013 | Analysis Time: 12:12
Instrument: SVGC12 | Analyst: 386 | Preparation Date: 12/3/2013 10:33
Method: 8141 | Dilution: 1

CAS NO	Analyte	RL mg/kg	RESULTS mg/kg	FLAG
13194-48-4	Ethoprop	0.10	< 0.10	R7
56-38-2	Ethyl Parathion	0.10	< 0.10	R7
115-90-2	Fensulfothion	0.10	< 0.10	
55-38-9	Fenthion	0.10	< 0.10	R7
121-75-5	Malathion	0.10	< 0.10	R7
150-50-5	Merphos	0.10	< 0.10	R7
298-00-0	Methyl parathion	0.10	< 0.10	R7
7786-34-7	Mevinphos	0.10	< 0.10	
300-76-5	Naled	0.10	< 0.10	R7
298-02-2	Phorate	0.10	< 0.10	R7
299-84-3	Ronnel	0.10	< 0.10	R7
22248-79-9	Stirophos	0.10	< 0.10	R7
3689-24-5	Sulfotep	0.10	< 0.10	
21646-99-1	TEPP	0.10	< 0.10	
34643-46-4	Tokuthion (Prothothiofos)	0.10	< 0.10	R7
327-98-0	Trichloronate	0.10	< 0.10	R7

Surrogates

Analyte	PERCENT RECOVERY	QUALIFIERS	FLAG
Tributyl Phosphate	**83.5**		
Triphenyl Phosphate	**84.7**		

LEGEND

RL - Reporting Limit
8.7@20.6c
Did Not Ignite @ 170 F
Contains No Free Liquid

Comments: 1) Sample results are reported as rounded values.
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SAMPLE NUMBER
RB-R29622

Customer :	Kinder Morgan - Rocklin, CA-AZ Work	Project :	ST010022.0026
Source :	SILVER CRAFT	Date Sampled :	11/27/2013 11:00 AM
Location :	KMEP: Silvercroft	Sampled By :	SA
Lab Sample ID :	**L671404-02**	Date Received :	11/30/2013

QUALIFIERS

Q9 -	Insufficient sample received to meed method QC requirements
R7 -	LFB/LFBD RPD exceeded the laboratory acceptance limit. Recovery met acceptance criteria.
L1 -	The associated blank spike recovery was above laboratory acceptance limits.

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SAMPLE NUMBER
RB-6014

Customer :	Kinder Morgan - Rocklin, CA-AZ Work	Project :	ST010022.0026
Source :	SILVER CRAFT	Date Sampled :	11/27/2013 11:30 AM
Location :	KMEP: Silvercroft	Sampled By :	SA
Lab Sample ID :	**L671404-03**	Date Received :	11/30/2013

D93/1010A

Analytic Batch: WG695779 | Analysis Date: 12/6/2013 | Analysis Time: 3:00 PM
Instrument: KOEHLER | Analyst: 596 | Preparation Date: 12/6/2013 2:27
Method: D93/1010A | Dilution: 1

CAS NO	Analyte	RL Deg. F	RESULTS Deg. F	FLAG
	Ignitability		**SEE FOOTNOTE**	

9045D

Analytic Batch: WG695180 | Analysis Date: 12/3/2013 | Analysis Time: 10:42
Instrument: AB15+ ACCU | Analyst: 586 | Preparation Date: 12/3/2013 9:33
Method: 9045D | Dilution: 1

CAS NO	Analyte	RL su	RESULTS su	FLAG
00010-29-7	pH		**8.7**	

9095B

Analytic Batch: WG696164 | Analysis Date: 12/9/2013 | Analysis Time: 11:20
Instrument: NONE | Analyst: 596 | Preparation Date: 12/9/2013 11:19
Method: 9095B | Dilution: 1

CAS NO	Analyte	RL %	RESULTS %	FLAG
	Paint Filter Test		**SEE FOOTNOTE**	

Comments:
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SAMPLE NUMBER
RB-6014

Customer :	Kinder Morgan - Rocklin, CA-AZ Work	Project :	ST010022.0026
Source :	SILVER CRAFT	Date Sampled :	11/27/2013 11:30 AM
Location :	KMEP: Silvercroft	Sampled By :	SA
Lab Sample ID :	**L671404-03**	Date Received :	11/30/2013

7471

Analytic Batch: WG695103 | Analysis Date: 12/3/2013 | Analysis Time: 11:35
Instrument: CVAA4 | Analyst: 572 | Preparation Date: 12/2/2013 4:07
Method: 7471 | Dilution: 1

CAS NO	Analyte	RL mg/kg	RESULTS mg/kg	FLAG
7439-97-6	Mercury	0.020	< 0.020	

6010B

Analytic Batch: WG695094 | Analysis Date: 12/3/2013 | Analysis Time: 3:42
Instrument: ICP6 | Analyst: 167 | Preparation Date: 12/2/2013 9:22
Method: 6010B | Dilution: 1

CAS NO	Analyte	RL mg/kg	RESULTS mg/kg	FLAG
7440-38-2	Arsenic	1.0	**4.9**	
7440-39-3	Barium	0.25	**220**	
7440-43-9	Cadmium	0.25	< 0.25	
7440-47-3	Chromium	0.50	**4.8**	
7439-92-1	Lead	0.25	**8.1**	
7782-49-2	Selenium	1.0	< 1.0	
7440-22-4	Silver	0.50	< 0.50	

8260B

Analytic Batch: WG695026 | Analysis Date: 12/4/2013 | Analysis Time: 5:45
Instrument: VOCMS20 | Analyst: 611 | Preparation Date: 11/30/2013 2:00
Method: 8260B | Dilution: 20

CAS NO	Analyte	RL mg/kg	RESULTS mg/kg	FLAG
67-64-1	Acetone	1.0	< 1.0	R7
107-13-1	Acrylonitrile	0.20	< 0.20	L1
71-43-2	Benzene	0.020	< 0.020	
108-86-1	Bromobenzene	0.020	< 0.020	
75-27-4	Bromodichloromethane	0.020	< 0.020	
75-25-2	Bromoform	0.020	< 0.020	
74-83-9	Bromomethane	0.10	< 0.10	L1
106-99-0	1,3-Butadiene	0.040	< 0.040	
104-51-8	n-Butylbenzene	0.020	< 0.020	
135-98-8	sec-Butylbenzene	0.020	< 0.020	

Comments: 1) Sample results are reported as rounded values.
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SAMPLE NUMBER
RB-6014

Customer :	Kinder Morgan - Rocklin, CA-AZ Work	Project :	ST010022.0026
Source :	SILVER CRAFT	Date Sampled :	11/27/2013 11:30 AM
Location :	KMEP: Silvercroft	Sampled By :	SA
Lab Sample ID :	**L671404-03**	Date Received :	11/30/2013

8260B

Analytic Batch: WG695026 | Analysis Date: 12/4/2013 | Analysis Time: 5:45
Instrument: VOCMS20 | Analyst: 611 | Preparation Date: 11/30/2013 2:00
Method: 8260B | Dilution: 20

CAS NO	Analyte	RL mg/kg	RESULTS mg/kg	FLAG
98-06-6	tert-Butylbenzene	0.020	< 0.020	
75-15-0	Carbon disulfide	0.020	< 0.020	
56-23-5	Carbon tetrachloride	0.020	< 0.020	
108-90-7	Chlorobenzene	0.020	< 0.020	
124-48-1	Chlorodibromomethane	0.020	< 0.020	
75-00-3	Chloroethane	0.10	< 0.10	
67-66-3	Chloroform	0.10	< 0.10	
74-87-3	Chloromethane	0.050	< 0.050	
95-49-8	2-Chlorotoluene	0.020	< 0.020	
106-43-4	4-Chlorotoluene	0.020	< 0.020	
110-82-7	Cyclohexane	0.020	< 0.020	
96-12-8	1,2-Dibromo-3-Chloropropane	0.10	< 0.10	
106-93-4	1,2-Dibromoethane	0.020	< 0.020	
74-95-3	Dibromomethane	0.020	< 0.020	
95-50-1	1,2-Dichlorobenzene	0.020	< 0.020	
541-73-1	1,3-Dichlorobenzene	0.020	< 0.020	
106-46-7	1,4-Dichlorobenzene	0.020	< 0.020	
75-71-8	Dichlorodifluoromethane	0.10	< 0.10	
75-34-3	1,1-Dichloroethane	0.020	< 0.020	
107-06-2	1,2-Dichloroethane	0.020	< 0.020	
75-35-4	1,1-Dichloroethene	0.020	< 0.020	
156-59-2	cis-1,2-Dichloroethene	0.020	< 0.020	
156-60-5	trans-1,2-Dichloroethene	0.020	< 0.020	
78-87-5	1,2-Dichloropropane	0.020	< 0.020	
563-58-6	1,1-Dichloropropene	0.020	< 0.020	
142-28-9	1,3-Dichloropropane	0.020	< 0.020	
10061-01-5	cis-1,3-Dichloropropene	0.020	< 0.020	
10061-02-6	trans-1,3-Dichloropropene	0.020	< 0.020	
594-20-7	2,2-Dichloropropane	0.020	< 0.020	
77-73-6	Dicyclopentadiene	0.020	< 0.020	
108-20-3	Di-isopropyl ether	0.020	< 0.020	
100-41-4	Ethylbenzene	0.020	< 0.020	
622-96-8	4-Ethyltoluene	0.020	< 0.020	

Comments: 1) Sample results are reported as rounded values.
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SAMPLE NUMBER
RB-6014

Customer :	Kinder Morgan - Rocklin, CA-AZ Work	Project :	ST010022.0026
Source :	SILVER CRAFT	Date Sampled :	11/27/2013 11:30 AM
Location :	KMEP: Silvercroft	Sampled By :	SA
Lab Sample ID :	**L671404-03**	Date Received :	11/30/2013

8260B

Analytic Batch: WG695026 | Analysis Date: 12/4/2013 | Analysis Time: 5:45
Instrument: VOCMS20 | Analyst: 611 | Preparation Date: 11/30/2013 2:00
Method: 8260B | Dilution: 20

CAS NO	Analyte	RL mg/kg	RESULTS mg/kg	FLAG
87-68-3	Hexachloro-1,3-butadiene	0.020	< 0.020	
110-54-3	n-Hexane	0.20	< 0.20	
98-82-8	Isopropylbenzene	0.020	< 0.020	
99-87-6	p-Isopropyltoluene	0.020	< 0.020	
78-93-3	2-Butanone (MEK)	0.20	< 0.20	R7
75-09-2	Methylene Chloride	0.10	< 0.10	
108-10-1	4-Methyl-2-pentanone (MIBK)	0.20	< 0.20	L1
1634-04-4	Methyl tert-butyl ether	0.020	< 0.020	
108-87-2	Methyl Cyclohexane	0.020	< 0.020	
91-20-3	Naphthalene	0.10	< 0.10	
115-07-1	Propene	0.050	< 0.050	
103-65-1	n-Propylbenzene	0.020	< 0.020	
100-42-5	Styrene	0.020	< 0.020	
630-20-6	1,1,1,2-Tetrachloroethane	0.020	< 0.020	
79-34-5	1,1,2,2-Tetrachloroethane	0.020	< 0.020	
76-13-1	1,1,2-Trichlorotrifluoroethane	0.020	< 0.020	
127-18-4	Tetrachloroethene	0.020	< 0.020	
108-88-3	Toluene	0.10	< 0.10	
87-61-6	1,2,3-Trichlorobenzene	0.020	< 0.020	
120-82-1	1,2,4-Trichlorobenzene	0.020	< 0.020	
71-55-6	1,1,1-Trichloroethane	0.020	< 0.020	
79-00-5	1,1,2-Trichloroethane	0.020	< 0.020	
79-01-6	Trichloroethene	0.020	< 0.020	
75-69-4	Trichlorofluoromethane	0.10	< 0.10	
96-18-4	1,2,3-Trichloropropane	0.050	< 0.050	
95-63-6	1,2,4-Trimethylbenzene	0.020	< 0.020	
526-73-8	1,2,3-Trimethylbenzene	0.020	< 0.020	
108-67-8	1,3,5-Trimethylbenzene	0.020	< 0.020	
75-01-4	Vinyl chloride	0.020	< 0.020	
1330-20-7	Xylenes, Total	0.060	< 0.060	
75-65-0	tert-Butyl alcohol	0.10	< 0.10	
994-05-8	tert-Amyl Methyl Ether	0.020	< 0.020	
	Toluene-d8 **103**			

Comments: 1) Sample results are reported as rounded values.
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SAMPLE NUMBER
RB-6014

Customer :	Kinder Morgan - Rocklin, CA-AZ Work	Project :	ST010022.0026
Source :	SILVER CRAFT	Date Sampled :	11/27/2013 11:30 AM
Location :	KMEP: Silvercroft	Sampled By :	SA
Lab Sample ID :	**L671404-03**	Date Received :	11/30/2013

Surrogates

Analyte	PERCENT RECOVERY	QUALIFIERS	FLAG
Dibromofluoromethane	**101**		
4-Bromofluorobenzene	**106**		

8015D/DRO_AZ

Analytic Batch: WG694927 Analysis Date: 12/2/2013 Analysis Time: 8:22 PM
Instrument: SVGC2 Analyst: 187 Preparation Date: 12/2/2013 6:49
Method: 8015D/DRO_AZ Dilution: 1

CAS NO	Analyte	RL mg/kg	RESULTS mg/kg	FLAG
	C10-C22 Hydrocarbons	30	< 30	
	C22-C32 Hydrocarbons	50	< 50	

Surrogates

Analyte	PERCENT RECOVERY	QUALIFIERS	FLAG
o-Terphenyl	**79.9**		

8082

Analytic Batch: WG695049 Analysis Date: 12/3/2013 Analysis Time: 12:47
Instrument: SVGC20 Analyst: 164 Preparation Date: 12/2/2013 3:54
Method: 8082 Dilution: 1

CAS NO	Analyte	RL mg/kg	RESULTS mg/kg	FLAG
12674-11-2	PCB 1016	0.017	< 0.017	
11104-28-2	PCB 1221	0.017	< 0.017	
11141-16-5	PCB 1232	0.017	< 0.017	
53469-21-9	PCB 1242	0.017	< 0.017	
12672-29-6	PCB 1248	0.017	< 0.017	
11097-69-1	PCB 1254	0.017	< 0.017	
11096-82-5	PCB 1260	0.017	< 0.017	

Surrogates

Analyte	PERCENT RECOVERY	QUALIFIERS	FLAG
Decachlorobiphenyl	**76.3**		

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SAMPLE NUMBER
RB-6014

Customer :	Kinder Morgan - Rocklin, CA-AZ Work	Project :	ST010022.0026
Source :	SILVER CRAFT	Date Sampled :	11/27/2013 11:30 AM
Location :	KMEP: Silvercroft	Sampled By :	SA
Lab Sample ID :	**L671404-03**	Date Received :	11/30/2013

Surrogates

Analyte	PERCENT RECOVERY	QUALIFIERS	FLAG
Tetrachloro-m-xylene	**98.1**		

8081A

Analytic Batch: WG695114 Analysis Date: 12/3/2013 Analysis Time: 1:51 PM
Instrument: SVGC24 Analyst: 297 Preparation Date: 12/2/2013 10:54
Method: 8081A Dilution: 1

CAS NO	Analyte	RL mg/kg	RESULTS mg/kg	FLAG
309-00-2	Aldrin	0.020	< 0.020	
319-84-6	Alpha BHC	0.020	< 0.020	
319-85-7	Beta BHC	0.020	< 0.020	
319-86-8	Delta BHC	0.020	< 0.020	
58-89-9	Gamma BHC	0.020	< 0.020	
57-74-9	Chlordane	0.20	< 0.20	
72-54-8	4,4-DDD	0.020	< 0.020	
72-55-9	4,4-DDE	0.020	< 0.020	
50-29-3	4,4-DDT	0.020	< 0.020	
60-57-1	Dieldrin	0.020	< 0.020	
959-98-8	Endosulfan I	0.020	< 0.020	
33213-65-9	Endosulfan II	0.020	< 0.020	
1031-07-8	Endosulfan sulfate	0.020	< 0.020	
72-20-8	Endrin	0.020	< 0.020	
7421-93-4	Endrin aldehyde	0.020	< 0.020	
53494-70-5	Endrin ketone	0.020	< 0.020	
118-74-1	Hexachlorobenzene	0.020	< 0.020	
76-44-8	Heptachlor	0.020	< 0.020	
1024-57-3	Heptachlor epoxide	0.020	< 0.020	
72-43-5	Methoxychlor	0.020	< 0.020	
8001-35-2	Toxaphene	0.40	< 0.40	

Surrogates

Analyte	PERCENT RECOVERY	QUALIFIERS	FLAG
Decachlorobiphenyl	**114**		
Tetrachloro-m-xylene	**93.4**		

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SAMPLE NUMBER
RB-6014

Customer :	Kinder Morgan - Rocklin, CA-AZ Work	Project :	ST010022.0026
Source :	SILVER CRAFT	Date Sampled :	11/27/2013 11:30 AM
Location :	KMEP: Silvercroft	Sampled By :	SA
Lab Sample ID :	**L671404-03**	Date Received :	11/30/2013

8151

Analytic Batch: WG695229 | Analysis Date: 12/4/2013 | Analysis Time: 6:41 PM
Instrument: SVGC11 | Analyst: 267 | Preparation Date: 12/3/2013 9:40
Method: 8151 | Dilution: 1

CAS NO	Analyte	RL mg/kg	RESULTS mg/kg	FLAG
94-75-7	2,4-D	0.070	< 0.070	
75-99-0	Dalapon	0.80	< 0.80	
94-82-6	2,4-DB	0.070	< 0.070	
1918-00-9	Dicamba	0.070	< 0.070	
120-36-5	Dichloroprop	0.070	< 0.070	
88-85-7	Dinoseb	0.070	< 0.070	
94-74-6	MCPA	6.5	< 6.5	
93-65-2	MCPP	6.5	< 6.5	
93-76-5	2,4,5-T	0.070	< 0.070	
93-72-1	2,4,5-TP (Silvex)	0.070	< 0.070	

Surrogates

Analyte	PERCENT RECOVERY	QUALIFIERS	FLAG
2,4-Dichlorophenyl Acetic Acid	**78.2**		

8141

Analytic Batch: WG695054 | Analysis Date: 12/4/2013 | Analysis Time: 12:44
Instrument: SVGC12 | Analyst: 386 | Preparation Date: 12/3/2013 10:33
Method: 8141 | Dilution: 1

CAS NO	Analyte	RL mg/kg	RESULTS mg/kg	FLAG
86-50-0	Azinphos-Methyl	0.10	< 0.10	
35400-43-2	Bolstar (Sulprofos)	0.10	< 0.10	R7
2921-88-2	Chlorpyrifos	0.10	< 0.10	R7
56-72-4	Coumaphos	0.10	< 0.10	
8065-48-3	Demeton,-O and -S	0.070	< 0.070	R7
333-41-5	Diazinon	0.10	< 0.10	R7
62-73-7	Dichlorvos	0.10	< 0.10	
60-51-5	Dimethoate	0.10	< 0.10	
298-04-4	Disulfoton	0.10	< 0.10	R7
2104-64-5	EPN	0.10	< 0.10	

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SAMPLE NUMBER
RB-6014

Customer :	Kinder Morgan - Rocklin, CA-AZ Work	Project :	ST010022.0026
Source :	SILVER CRAFT	Date Sampled :	11/27/2013 11:30 AM
Location :	KMEP: Silvercroft	Sampled By :	SA
Lab Sample ID :	**L671404-03**	Date Received :	11/30/2013

8141

Analytic Batch: WG695054 | Analysis Date: 12/4/2013 | Analysis Time: 12:44
Instrument: SVGC12 | Analyst: 386 | Preparation Date: 12/3/2013 10:33
Method: 8141 | Dilution: 1

CAS NO	Analyte	RL mg/kg	RESULTS mg/kg	FLAG
13194-48-4	Ethoprop	0.10	< 0.10	R7
56-38-2	Ethyl Parathion	0.10	< 0.10	R7
115-90-2	Fensulfothion	0.10	< 0.10	
55-38-9	Fenthion	0.10	< 0.10	R7
121-75-5	Malathion	0.10	< 0.10	R7
150-50-5	Merphos	0.10	< 0.10	R7
298-00-0	Methyl parathion	0.10	< 0.10	R7
7786-34-7	Mevinphos	0.10	< 0.10	
300-76-5	Naled	0.10	< 0.10	R7
298-02-2	Phorate	0.10	< 0.10	R7
299-84-3	Ronnel	0.10	< 0.10	R7
22248-79-9	Stirophos	0.10	< 0.10	R7
3689-24-5	Sulfotep	0.10	< 0.10	
21646-99-1	TEPP	0.10	< 0.10	
34643-46-4	Tokuthion (Prothothiofos)	0.10	< 0.10	R7
327-98-0	Trichloronate	0.10	< 0.10	R7

Surrogates

Analyte	PERCENT RECOVERY	QUALIFIERS	FLAG
Tributyl Phosphate	**83.4**		
Triphenyl Phosphate	**85.0**		

LEGEND

RL - Reporting Limit
Did Not Ignite @ 170 F
Contains No Free Liquid
8.7@20.5c

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SAMPLE NUMBER
RB-6014

Customer :	Kinder Morgan - Rocklin, CA-AZ Work	Project :	ST010022.0026
Source :	SILVER CRAFT	Date Sampled :	11/27/2013 11:30 AM
Location :	KMEP: Silvercroft	Sampled By :	SA
Lab Sample ID :	**L671404-03**	Date Received :	11/30/2013

QUALIFIERS

R7 -	LFB/LFBD RPD exceeded the laboratory acceptance limit. Recovery met acceptance criteria.
L1 -	The associated blank spike recovery was above laboratory acceptance limits.

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SAMPLE NUMBER
RB-6249

Customer :	Kinder Morgan - Rocklin, CA-AZ Work	Project :	ST010022.0026
Source :	SILVER CRAFT	Date Sampled :	11/27/2013 12:00 PM
Location :	KMEP: Silvercroft	Sampled By :	SA
Lab Sample ID :	**L671404-04**	Date Received :	11/30/2013

D93/1010A

Analytic Batch: WG695779 | Analysis Date: 12/6/2013 | Analysis Time: 3:00 PM
Instrument: KOEHLER | Analyst: 596 | Preparation Date: 12/6/2013 2:27
Method: D93/1010A | Dilution: 1

CAS NO	Analyte	RL Deg. F	RESULTS Deg. F	FLAG
	Ignitability		**SEE FOOTNOTE**	

9045D

Analytic Batch: WG695180 | Analysis Date: 12/3/2013 | Analysis Time: 10:42
Instrument: AB15+ ACCU | Analyst: 586 | Preparation Date: 12/3/2013 9:33
Method: 9045D | Dilution: 1

CAS NO	Analyte	RL su	RESULTS su	FLAG
00010-29-7	pH		**9.3**	

9095B

Analytic Batch: WG696164 | Analysis Date: 12/9/2013 | Analysis Time: 11:20
Instrument: NONE | Analyst: 596 | Preparation Date: 12/9/2013 11:19
Method: 9095B | Dilution: 1

CAS NO	Analyte	RL %	RESULTS %	FLAG
	Paint Filter Test		**SEE FOOTNOTE**	

Comments:
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SAMPLE NUMBER
RB-6249

Customer :	Kinder Morgan - Rocklin, CA-AZ Work	Project :	ST010022.0026
Source :	SILVER CRAFT	Date Sampled :	11/27/2013 12:00 PM
Location :	KMEP: Silvercroft	Sampled By :	SA
Lab Sample ID :	**L671404-04**	Date Received :	11/30/2013

7471

Analytic Batch: WG695103 | Analysis Date: 12/3/2013 | Analysis Time: 11:38
Instrument: CVAA4 | Analyst: 572 | Preparation Date: 12/2/2013 4:07
Method: 7471 | Dilution: 1

CAS NO	Analyte	RL mg/kg	RESULTS mg/kg	FLAG
7439-97-6	Mercury	0.020	< 0.020	

6010B

Analytic Batch: WG695094 | Analysis Date: 12/3/2013 | Analysis Time: 3:46
Instrument: ICP6 | Analyst: 167 | Preparation Date: 12/2/2013 9:22
Method: 6010B | Dilution: 1

CAS NO	Analyte	RL mg/kg	RESULTS mg/kg	FLAG
7440-38-2	Arsenic	1.0	**3.6**	
7440-39-3	Barium	0.25	**190**	
7440-43-9	Cadmium	0.25	< 0.25	
7440-47-3	Chromium	0.50	**2.9**	
7439-92-1	Lead	0.25	**8.0**	
7782-49-2	Selenium	1.0	< 1.0	
7440-22-4	Silver	0.50	< 0.50	

8260B

Analytic Batch: WG695026 | Analysis Date: 12/4/2013 | Analysis Time: 6:03
Instrument: VOCMS20 | Analyst: 611 | Preparation Date: 11/30/2013 2:00
Method: 8260B | Dilution: 23

CAS NO	Analyte	RL mg/kg	RESULTS mg/kg	FLAG
67-64-1	Acetone	1.2	< 1.2	R7
107-13-1	Acrylonitrile	0.23	< 0.23	L1
71-43-2	Benzene	0.023	< 0.023	
108-86-1	Bromobenzene	0.023	< 0.023	
75-27-4	Bromodichloromethane	0.023	< 0.023	
75-25-2	Bromoform	0.023	< 0.023	
74-83-9	Bromomethane	0.12	< 0.12	L1
106-99-0	1,3-Butadiene	0.046	< 0.046	
104-51-8	n-Butylbenzene	0.023	< 0.023	
135-98-8	sec-Butylbenzene	0.023	< 0.023	

Comments: 1) Sample results are reported as rounded values.
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SAMPLE NUMBER
RB-6249

Customer :	Kinder Morgan - Rocklin, CA-AZ Work	Project :	ST010022.0026
Source :	SILVER CRAFT	Date Sampled :	11/27/2013 12:00 PM
Location :	KMEP: Silvercroft	Sampled By :	SA
Lab Sample ID :	**L671404-04**	Date Received :	11/30/2013

8260B

Analytic Batch: WG695026 | Analysis Date: 12/4/2013 | Analysis Time: 6:03
Instrument: VOCMS20 | Analyst: 611 | Preparation Date: 11/30/2013 2:00
Method: 8260B | Dilution: 23

CAS NO	Analyte	RL mg/kg	RESULTS mg/kg	FLAG
98-06-6	tert-Butylbenzene	0.023	< 0.023	
75-15-0	Carbon disulfide	0.023	< 0.023	
56-23-5	Carbon tetrachloride	0.023	< 0.023	
108-90-7	Chlorobenzene	0.023	< 0.023	
124-48-1	Chlorodibromomethane	0.023	< 0.023	
75-00-3	Chloroethane	0.12	< 0.12	
67-66-3	Chloroform	0.12	< 0.12	
74-87-3	Chloromethane	0.058	< 0.058	
95-49-8	2-Chlorotoluene	0.023	< 0.023	
106-43-4	4-Chlorotoluene	0.023	< 0.023	
110-82-7	Cyclohexane	0.023	< 0.023	
96-12-8	1,2-Dibromo-3-Chloropropane	0.12	< 0.12	
106-93-4	1,2-Dibromoethane	0.023	< 0.023	
74-95-3	Dibromomethane	0.023	< 0.023	
95-50-1	1,2-Dichlorobenzene	0.023	< 0.023	
541-73-1	1,3-Dichlorobenzene	0.023	< 0.023	
106-46-7	1,4-Dichlorobenzene	0.023	< 0.023	
75-71-8	Dichlorodifluoromethane	0.12	< 0.12	
75-34-3	1,1-Dichloroethane	0.023	< 0.023	
107-06-2	1,2-Dichloroethane	0.023	< 0.023	
75-35-4	1,1-Dichloroethene	0.023	< 0.023	
156-59-2	cis-1,2-Dichloroethene	0.023	< 0.023	
156-60-5	trans-1,2-Dichloroethene	0.023	< 0.023	
78-87-5	1,2-Dichloropropane	0.023	< 0.023	
563-58-6	1,1-Dichloropropene	0.023	< 0.023	
142-28-9	1,3-Dichloropropane	0.023	< 0.023	
10061-01-5	cis-1,3-Dichloropropene	0.023	< 0.023	
10061-02-6	trans-1,3-Dichloropropene	0.023	< 0.023	
594-20-7	2,2-Dichloropropane	0.023	< 0.023	
77-73-6	Dicyclopentadiene	0.023	< 0.023	
108-20-3	Di-isopropyl ether	0.023	< 0.023	
100-41-4	Ethylbenzene	0.023	< 0.023	
622-96-8	4-Ethyltoluene	0.023	< 0.023	

Comments: 1) Sample results are reported as rounded values.
2) These results are applicable only to the items tested.

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SAMPLE NUMBER
RB-6249

Customer :	Kinder Morgan - Rocklin, CA-AZ Work	Project :	ST010022.0026
Source :	SILVER CRAFT	Date Sampled :	11/27/2013 12:00 PM
Location :	KMEP: Silvercroft	Sampled By :	SA
Lab Sample ID :	**L671404-04**	Date Received :	11/30/2013

8260B

Analytic Batch: WG695026 | Analysis Date: 12/4/2013 | Analysis Time: 6:03
Instrument: VOCMS20 | Analyst: 611 | Preparation Date: 11/30/2013 2:00
Method: 8260B | Dilution: 23

CAS NO	Analyte	RL mg/kg	RESULTS mg/kg	FLAG
87-68-3	Hexachloro-1,3-butadiene	0.023	< 0.023	
110-54-3	n-Hexane	0.23	< 0.23	
98-82-8	Isopropylbenzene	0.023	< 0.023	
99-87-6	p-Isopropyltoluene	0.023	< 0.023	
78-93-3	2-Butanone (MEK)	0.23	< 0.23	R7
75-09-2	Methylene Chloride	0.12	< 0.12	
108-10-1	4-Methyl-2-pentanone (MIBK)	0.23	< 0.23	L1
1634-04-4	Methyl tert-butyl ether	0.023	< 0.023	
108-87-2	Methyl Cyclohexane	0.023	< 0.023	
91-20-3	Naphthalene	0.12	< 0.12	
115-07-1	Propene	0.058	< 0.058	
103-65-1	n-Propylbenzene	0.023	< 0.023	
100-42-5	Styrene	0.023	< 0.023	
630-20-6	1,1,1,2-Tetrachloroethane	0.023	< 0.023	
79-34-5	1,1,2,2-Tetrachloroethane	0.023	< 0.023	
76-13-1	1,1,2-Trichlorotrifluoroethane	0.023	< 0.023	
127-18-4	Tetrachloroethene	0.023	< 0.023	
108-88-3	Toluene	0.12	< 0.12	
87-61-6	1,2,3-Trichlorobenzene	0.023	< 0.023	
120-82-1	1,2,4-Trichlorobenzene	0.023	< 0.023	
71-55-6	1,1,1-Trichloroethane	0.023	< 0.023	
79-00-5	1,1,2-Trichloroethane	0.023	< 0.023	
79-01-6	Trichloroethene	0.023	< 0.023	
75-69-4	Trichlorofluoromethane	0.12	< 0.12	
96-18-4	1,2,3-Trichloropropane	0.058	< 0.058	
95-63-6	1,2,4-Trimethylbenzene	0.023	< 0.023	
526-73-8	1,2,3-Trimethylbenzene	0.023	< 0.023	
108-67-8	1,3,5-Trimethylbenzene	0.023	< 0.023	
75-01-4	Vinyl chloride	0.023	< 0.023	
1330-20-7	Xylenes, Total	0.069	< 0.069	
75-65-0	tert-Butyl alcohol	0.12	< 0.12	
994-05-8	tert-Amyl Methyl Ether	0.023	< 0.023	
	Toluene-d8 **105**			

Comments: 1) Sample results are reported as rounded values.
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SAMPLE NUMBER
RB-6249

Customer :	Kinder Morgan - Rocklin, CA-AZ Work	Project :	ST010022.0026
Source :	SILVER CRAFT	Date Sampled :	11/27/2013 12:00 PM
Location :	KMEP: Silvercroft	Sampled By :	SA
Lab Sample ID :	**L671404-04**	Date Received :	11/30/2013

Surrogates

Analyte	PERCENT RECOVERY	QUALIFIERS	FLAG
Dibromofluoromethane	**103**		
4-Bromofluorobenzene	**107**		

8015D/DRO_AZ

Analytic Batch: WG694927 | Analysis Date: 12/2/2013 | Analysis Time: 8:36 PM
Instrument: SVGC2 | Analyst: 187 | Preparation Date: 12/2/2013 6:49
Method: 8015D/DRO_AZ | Dilution: 1

CAS NO	Analyte	RL mg/kg	RESULTS mg/kg	FLAG
	C10-C22 Hydrocarbons	30	< 30	
	C22-C32 Hydrocarbons	50	< 50	

Surrogates

Analyte	PERCENT RECOVERY	QUALIFIERS	FLAG
o-Terphenyl	**80.2**		

8082

Analytic Batch: WG695049 | Analysis Date: 12/3/2013 | Analysis Time: 12:59
Instrument: SVGC20 | Analyst: 164 | Preparation Date: 12/2/2013 3:54
Method: 8082 | Dilution: 1

CAS NO	Analyte	RL mg/kg	RESULTS mg/kg	FLAG
12674-11-2	PCB 1016	0.017	< 0.017	
11104-28-2	PCB 1221	0.017	< 0.017	
11141-16-5	PCB 1232	0.017	< 0.017	
53469-21-9	PCB 1242	0.017	< 0.017	
12672-29-6	PCB 1248	0.017	< 0.017	
11097-69-1	PCB 1254	0.017	< 0.017	
11096-82-5	PCB 1260	0.017	< 0.017	

Surrogates

Analyte	PERCENT RECOVERY	QUALIFIERS	FLAG
Decachlorobiphenyl	**81.7**		

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SAMPLE NUMBER
RB-6249

Customer :	Kinder Morgan - Rocklin, CA-AZ Work	Project :	ST010022.0026
Source :	SILVER CRAFT	Date Sampled :	11/27/2013 12:00 PM
Location :	KMEP: Silvercroft	Sampled By :	SA
Lab Sample ID :	**L671404-04**	Date Received :	11/30/2013

Surrogates

Analyte	PERCENT RECOVERY	QUALIFIERS	FLAG
Tetrachloro-m-xylene	**103**		

8081A

Analytic Batch: WG695114 Analysis Date: 12/3/2013 Analysis Time: 2:05 PM
Instrument: SVGC24 Analyst: 297 Preparation Date: 12/2/2013 10:54
Method: 8081A Dilution: 1

CAS NO	Analyte	RL mg/kg	RESULTS mg/kg	FLAG
309-00-2	Aldrin	0.020	< 0.020	
319-84-6	Alpha BHC	0.020	< 0.020	
319-85-7	Beta BHC	0.020	< 0.020	
319-86-8	Delta BHC	0.020	< 0.020	
58-89-9	Gamma BHC	0.020	< 0.020	
57-74-9	Chlordane	0.20	< 0.20	
72-54-8	4,4-DDD	0.020	< 0.020	
72-55-9	4,4-DDE	0.020	< 0.020	
50-29-3	4,4-DDT	0.020	< 0.020	
60-57-1	Dieldrin	0.020	< 0.020	
959-98-8	Endosulfan I	0.020	< 0.020	
33213-65-9	Endosulfan II	0.020	< 0.020	
1031-07-8	Endosulfan sulfate	0.020	< 0.020	
72-20-8	Endrin	0.020	< 0.020	
7421-93-4	Endrin aldehyde	0.020	< 0.020	
53494-70-5	Endrin ketone	0.020	< 0.020	
118-74-1	Hexachlorobenzene	0.020	< 0.020	
76-44-8	Heptachlor	0.020	< 0.020	
1024-57-3	Heptachlor epoxide	0.020	< 0.020	
72-43-5	Methoxychlor	0.020	< 0.020	
8001-35-2	Toxaphene	0.40	< 0.40	

Surrogates

Analyte	PERCENT RECOVERY	QUALIFIERS	FLAG
Decachlorobiphenyl	**149**	S4	
Tetrachloro-m-xylene	**94.5**		

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SAMPLE NUMBER
RB-6249

Customer :	Kinder Morgan - Rocklin, CA-AZ Work	Project :	ST010022.0026
Source :	SILVER CRAFT	Date Sampled :	11/27/2013 12:00 PM
Location :	KMEP: Silvercroft	Sampled By :	SA
Lab Sample ID :	**L671404-04**	Date Received :	11/30/2013

8151

Analytic Batch: WG695229 | Analysis Date: 12/4/2013 | Analysis Time: 6:55 PM
Instrument: SVGC11 | Analyst: 267 | Preparation Date: 12/3/2013 9:40
Method: 8151 | Dilution: 1

CAS NO	Analyte	RL mg/kg	RESULTS mg/kg	FLAG
94-75-7	2,4-D	0.070	< 0.070	
75-99-0	Dalapon	0.80	< 0.80	
94-82-6	2,4-DB	0.070	< 0.070	
1918-00-9	Dicamba	0.070	< 0.070	
120-36-5	Dichloroprop	0.070	< 0.070	
88-85-7	Dinoseb	0.070	< 0.070	
94-74-6	MCPA	6.5	< 6.5	
93-65-2	MCPP	6.5	< 6.5	
93-76-5	2,4,5-T	0.070	< 0.070	
93-72-1	2,4,5-TP (Silvex)	0.070	< 0.070	

Surrogates

Analyte	PERCENT RECOVERY	QUALIFIERS	FLAG
2,4-Dichlorophenyl Acetic Acid	**84.7**		

8141

Analytic Batch: WG695054 | Analysis Date: 12/4/2013 | Analysis Time: 1:16
Instrument: SVGC12 | Analyst: 386 | Preparation Date: 12/3/2013 10:33
Method: 8141 | Dilution: 1

CAS NO	Analyte	RL mg/kg	RESULTS mg/kg	FLAG
86-50-0	Azinphos-Methyl	0.10	< 0.10	
35400-43-2	Bolstar (Sulprofos)	0.10	< 0.10	
2921-88-2	Chlorpyrifos	0.10	< 0.10	
56-72-4	Coumaphos	0.10	< 0.10	
8065-48-3	Demeton,-O and -S	0.070	< 0.070	
333-41-5	Diazinon	0.10	< 0.10	
62-73-7	Dichlorvos	0.10	< 0.10	
60-51-5	Dimethoate	0.10	< 0.10	R5
298-04-4	Disulfoton	0.10	< 0.10	
2104-64-5	EPN	0.10	< 0.10	

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SAMPLE NUMBER
RB-6249

Customer :	Kinder Morgan - Rocklin, CA-AZ Work	Project :	ST010022.0026
Source :	SILVER CRAFT	Date Sampled :	11/27/2013 12:00 PM
Location :	KMEP: Silvercroft	Sampled By :	SA
Lab Sample ID :	**L671404-04**	Date Received :	11/30/2013

8141

Analytic Batch: WG695054 | Analysis Date: 12/4/2013 | Analysis Time: 1:16
Instrument: SVGC12 | Analyst: 386 | Preparation Date: 12/3/2013 10:33
Method: 8141 | Dilution: 1

CAS NO	Analyte	RL mg/kg	RESULTS mg/kg	FLAG
13194-48-4	Ethoprop	0.10	< 0.10	
56-38-2	Ethyl Parathion	0.10	< 0.10	
115-90-2	Fensulfothion	0.10	< 0.10	
55-38-9	Fenthion	0.10	< 0.10	
121-75-5	Malathion	0.10	< 0.10	
150-50-5	Merphos	0.10	< 0.10	
298-00-0	Methyl parathion	0.10	< 0.10	
7786-34-7	Mevinphos	0.10	< 0.10	
300-76-5	Naled	0.10	< 0.10	
298-02-2	Phorate	0.10	< 0.10	
299-84-3	Ronnel	0.10	< 0.10	
22248-79-9	Stirophos	0.10	< 0.10	
3689-24-5	Sulfotep	0.10	< 0.10	
21646-99-1	TEPP	0.10	< 0.10	R5
34643-46-4	Tokuthion (Prothothiofos)	0.10	< 0.10	
327-98-0	Trichloronate	0.10	< 0.10	

Surrogates

Analyte	PERCENT RECOVERY	QUALIFIERS	FLAG
Tributyl Phosphate	**92.2**		
Triphenyl Phosphate	**92.7**		

LEGEND

RL - Reporting Limit
Did Not Ignite @ 170 F
Contains No Free Liquid
9.3@20.4c

Comments: 1) Sample results are reported as rounded values.
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SAMPLE NUMBER
RB-6249

Customer :	Kinder Morgan - Rocklin, CA-AZ Work	Project :	ST010022.0026
Source :	SILVER CRAFT	Date Sampled :	11/27/2013 12:00 PM
Location :	KMEP: Silvercroft	Sampled By :	SA
Lab Sample ID :	**L671404-04**	Date Received :	11/30/2013

QUALIFIERS

R7 -	LFB/LFBD RPD exceeded the laboratory acceptance limit. Recovery met acceptance criteria.
L1 -	The associated blank spike recovery was above laboratory acceptance limits.
S4 -	Surrogate recovery was above laboratory and method acceptance limits. No target analytes detected in the sample.
R5 -	MS/MSD RPD exceeded the laboratory acceptance limit. Recovery met acceptance criteria.

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Quality Control Summary
SDG: L671404
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Ignitability by Method D93/1010A		
Project No:	ST010022.0026	Matrix:	Soil - mg/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	11/27/2013	**Analytic Batch:**	**WG695779**
Analysis Date:	12/6/2013 3:00:00 PM	Analyst:	596
Instrument ID:	KOEHLER		
Sample Numbers:	L671404-01, -02, -03, -04		

Laboratory Control Sample (LCS)

Analyte	Dil	True Value	Found	% Rec	Control Limits	Qual
Ignitability	1	82	83	101	93 - 107	

Laboratory Control Sample Duplicate (LCSD)

Analyte	Dil	True Value	Found	% Rec	Control Limits	Qual
Ignitability	1	82	83	101	93 - 107	

Laboratory Control Sample / Laboratory Control Sample Duplicate

Analyte	Dil	Spike	LCS	% Rec	LCSD	% Rec	Control Limits	% Rec Qual	% RPD	Control Limits	RPD Qual
Ignitability	1	82	83	101	83	101	93 - 107		0	20	

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L671404
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Ignitability by Method D93/1010A		
Project No:	ST010022.0026	Matrix:	Soil - mg/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	11/27/2013	**Analytic Batch:**	**WG695779**
Analysis Date:	12/6/2013 3:00:00 PM	Analyst:	596
Instrument ID:	KOEHLER		
Sample Numbers:	L671404-01, -02, -03, -04		

Sample Duplicate

L671365-03

Analyte	Dil	Sample Result	DUP Result	% RPD	Limit	Qualifier
Ignitability	1	0.0	0.0	0	10	

Sample Duplicate

L671365-07

Analyte	Dil	Sample Result	DUP Result	% RPD	Limit	Qualifier
Ignitability	1	0.0	0.0	0	10	

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L671404
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Paint Filter by Method 9095B		
Project No:	ST010022.0026	Matrix:	Soil - mg/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	11/27/2013	**Analytic Batch:**	**WG696164**
Analysis Date:	12/9/2013 11:20:00 AM	Analyst:	596
Instrument ID:	NONE		
Sample Numbers:	L671404-01, -02, -03, -04		

Sample Duplicate

L671404-02

Analyte	Dil	Sample Result	DUP Result	% RPD	Limit	Qualifier
Paint Filter Test	1	0.0	0.0	0	20	

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L671404
Kinder Morgan - Rocklin, CA-AZ Work

Test:	pH by Method 9045D		
Project No:	ST010022.0026	Matrix:	Soil - mg/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	11/27/2013	**Analytic Batch:**	**WG695180**
Analysis Date:	12/3/2013 10:42:00 AM	Analyst:	586
Instrument ID:	AB15+ ACCU	Prep Date:	12/2/2013
Sample Numbers:	L671404-01, -02, -03, -04		

Laboratory Control Sample (LCS)

Analyte	Dil	True Value	Found	% Rec	Control Limits	Qual
pH	1	5.93	6	101	98.3 - 101.7	

Laboratory Control Sample Duplicate (LCSD)

Analyte	Dil	True Value	Found	% Rec	Control Limits	Qual
pH	1	5.93	6	101	98.3 - 101.7	

Laboratory Control Sample / Laboratory Control Sample Duplicate

Analyte	Dil	Spike	LCS	% Rec	LCSD	% Rec	Control Limits	% Rec Qual	% RPD	Control Limits	RPD Qual
pH	1	5.93	6	101	6	101	98.3 - 101.7		0	20	

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L671404
Kinder Morgan - Rocklin, CA-AZ Work

Test:	pH by Method 9045D		
Project No:	ST010022.0026	Matrix:	Soil - mg/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	11/27/2013	**Analytic Batch:**	**WG695180**
Analysis Date:	12/3/2013 10:42:00 AM	Analyst:	586
Instrument ID:	AB15+ ACCU	Prep Date:	12/2/2013
Sample Numbers:	L671404-01, -02, -03, -04		

Sample Duplicate

L671251-09

Analyte	Dil	Sample Result	DUP Result	% RPD	Limit	Qualifier
pH	1	8.6	8.56	0.47	1	

Sample Duplicate

L671251-10

Analyte	Dil	Sample Result	DUP Result	% RPD	Limit	Qualifier
pH	1	9	9.04	0.44	1	

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L671404
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Mercury by Method 7471		
Project No:	ST010022.0026	Matrix:	Soil - mg/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	11/27/2013	**Analytic Batch:**	**WG695103**
Analysis Date:	12/3/2013 11:29:00 AM	Analyst:	572
Instrument ID:	CVAA4	Prep Date:	12/2/2013
Sample Numbers:	L671404-01, -02, -03, -04		

Method Blank

Analyte	CAS	RDL	Qualifier
Mercury	7439-97-6	< 0.0200	

Laboratory Control Sample (LCS)

Analyte	Dil	True Value	Found	% Rec	Control Limits	Qual
Mercury	50	12.4	14.527	117	71.6 - 128	

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L671404
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Mercury by Method 7471		
Project No:	ST010022.0026	Matrix:	Soil - mg/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	11/27/2013	**Analytic Batch:**	**WG695103**
Analysis Date:	12/3/2013 11:29:00 AM	Analyst:	572
Instrument ID:	CVAA4	Prep Date:	12/2/2013
Sample Numbers:	L671404-01, -02, -03, -04		

Sample Duplicate

L671368-01

Analyte	Dil	Sample Result	DUP Result	% RPD	Limit	Qualifier
Mercury	2	0.3779	0.3633	4	20	

Serial Dilution

L671368-01

Analyte	Dil	Sample Result	SD Result	% RPD	Limit	Qualifier
Mercury	10	0.3779	0.3592	5	10	

Matrix Spike / Matrix Spike Duplicate

L671368-01

Analyte	Dil	Spike Value	Sample	MS	% Rec	MSD	% Rec	Control Limits	% Rec Qual	RPD	Control Limits	RPD Qual
Mercury	2	0.125	0.3779	0.6871	124	0.7953	167	80 - 120	M1	15	20	

Post Digest Spike

L671368-01

Analyte	Dil	Spike Value	Sample	Result	% Rec	Control Limits	Qualifier
Mercury	2	0.15	0.3779	0.8254	149	85-115	O1

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L671404
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Trace Metals by Method 6010B		
Project No:	ST010022.0026	Matrix:	Soil - mg/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	11/27/2013	**Analytic Batch:**	**WG695094**
Analysis Date:	12/3/2013 3:33:00 AM	Analyst:	167
Instrument ID:	ICP6	Prep Date:	12/2/2013
Sample Numbers:	L671404-01, -02, -03, -04		

Method Blank

Analyte	CAS	RDL	Qualifier
Arsenic	7440-38-2	< 1.00	
Barium	7440-39-3	< 0.250	
Cadmium	7440-43-9	< 0.250	
Chromium	7440-47-3	< 0.500	
Lead	7439-92-1	< 0.250	
Selenium	7782-49-2	< 1.00	
Silver	7440-22-4	< 0.500	

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L671404
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Trace Metals by Method 6010B		
Project No:	ST010022.0026	Matrix:	Soil - mg/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	11/27/2013	**Analytic Batch:**	**WG695094**
Analysis Date:	12/3/2013 3:33:00 AM	Analyst:	167
Instrument ID:	ICP6	Prep Date:	12/2/2013
Sample Numbers:	L671404-01, -02, -03, -04		

Laboratory Control Sample (LCS)

Analyte	Dil	True Value	Found	% Rec	Control Limits	Qual
Arsenic	1	237	216.29	91	83.1 - 117	
Barium	1	252	235.11	93	84.1 - 116	
Cadmium	1	191	170.34	89	83.2 - 117	
Chromium	1	128	118.16	92	81.3 - 118	
Lead	1	103	92.431	90	83.1 - 117	
Selenium	1	110	101.83	93	78.7 - 122	
Silver	1	47.3	41.695	88	66.2 - 134	

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L671404
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Trace Metals by Method 6010B		
Project No:	ST010022.0026	Matrix:	Soil - mg/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	11/27/2013	**Analytic Batch:**	**WG695094**
Analysis Date:	12/3/2013 3:33:00 AM	Analyst:	167
Instrument ID:	ICP6	Prep Date:	12/2/2013
Sample Numbers:	L671404-01, -02, -03, -04		

Sample Duplicate

L671402-02

Analyte	Dil	Sample Result	DUP Result	% RPD	Limit	Qualifier
Arsenic	1	4.7023	4.4595	5	20	
Barium	1	47.307	70.360	39	20	R8
Cadmium	1	<0.25	<0.25		20	
Chromium	1	8.3581	7.5218	11	20	
Lead	1	4.4068	3.1410	34	20	R8
Selenium	1	<1	<1		20	
Silver	1	<0.5	<0.5		20	

Serial Dilution

L671402-02

Analyte	Dil	Sample Result	SD Result	% RPD	Limit	Qualifier
Arsenic	5	4.7023	5.5736	19	10	O1
Barium	5	47.307	53.886	14	10	O1
Cadmium	5	<0.25	<1.25		10	
Chromium	5	8.3581	9.7222	16	10	O1
Lead	5	4.4068	5.0750	15	10	O1
Selenium	5	<1	<5		10	
Silver	5	<0.5	<2.5		10	

Matrix Spike / Matrix Spike Duplicate

L671402-02

Analyte	Dil	Spike Value	Sample	MS	% Rec	MSD	% Rec	Control Limits	% Rec Qual	RPD	Control Limits	RPD Qual
Arsenic	1	50	4.7023	54.544	100	51.068	93	75 - 125		7	20	
Barium	1	50	47.307	101.92	109	85.027	75	75 - 125		18	20	
Cadmium	1	50	0.1384	49.762	99	45.897	92	75 - 125		8	20	
Chromium	1	50	8.3581	59.016	101	52.760	89	75 - 125		11	20	
Lead	1	50	4.4068	54.661	101	50.710	93	75 - 125		7	20	
Selenium	1	50	0.8713	50.428	99	46.553	91	75 - 125		8	20	
Silver	1	50	-0.111	48.873	98	44.634	89	75 - 125		9	20	

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L671404
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Trace Metals by Method 6010B		
Project No:	ST010022.0026	Matrix:	Soil - mg/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	11/27/2013	**Analytic Batch:**	**WG695094**
Analysis Date:	12/3/2013 3:33:00 AM	Analyst:	167
Instrument ID:	ICP6	Prep Date:	12/2/2013
Sample Numbers:	L671404-01, -02, -03, -04		

Post Digest Spike

L671402-02

Analyte	Dil	Spike Value	Sample	Result	% Rec	Control Limits	Qualifier
Arsenic	1	49.5	4.7023	53.108	98	75-125	
Barium	1	49.5	47.307	96.674	100	75-125	
Cadmium	1	49.5	0.1384	48.164	97	75-125	
Chromium	1	49.5	8.3581	56.389	97	75-125	
Lead	1	49.5	4.4068	52.950	98	75-125	
Selenium	1	49.5	0.8713	49.235	98	75-125	
Silver	1	49.5	-0.111	47.179	95	75-125	

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L671404
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Volatile Organic Compounds by Method 8260B		
Project No:	ST010022.0026	Matrix:	Soil - mg/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	11/27/2013	**Analytic Batch:**	**WG695026**
Analysis Date:	12/4/2013 5:09:00 AM	Analyst:	611
Instrument ID:	VOCMS20		
Sample Numbers:	L671404-01, -02, -03, -04		

Method Blank

Analyte	CAS	RDL	Qualifier
1,1,1,2-Tetrachloroethane	630-20-6	< 0.00100	
1,1,1-Trichloroethane	71-55-6	< 0.00100	
1,1,2,2-Tetrachloroethane	79-34-5	< 0.00100	
1,1,2-Trichloroethane	79-00-5	< 0.00100	
1,1,2-Trichlorotrifluoroethane	76-13-1	< 0.00100	
1,1-Dichloroethane	75-34-3	< 0.00100	
1,1-Dichloroethene	75-35-4	< 0.00100	
1,1-Dichloropropene	563-58-6	< 0.00100	
1,2,3-Trichlorobenzene	87-61-6	< 0.00100	
1,2,3-Trichloropropane	96-18-4	< 0.00250	
1,2,3-Trimethylbenzene	526-73-8	< 0.00100	
1,2,4-Trichlorobenzene	120-82-1	< 0.00100	
1,2,4-Trimethylbenzene	95-63-6	< 0.00100	
1,2-Dibromo-3-Chloropropane	96-12-8	< 0.00500	
1,2-Dibromoethane	106-93-4	< 0.00100	
1,2-Dichlorobenzene	95-50-1	< 0.00100	
1,2-Dichloroethane	107-06-2	< 0.00100	
1,2-Dichloropropane	78-87-5	< 0.00100	
1,3,5-Trimethylbenzene	108-67-8	< 0.00100	
1,3-Butadiene	106-99-0	< 0.00200	
1,3-Dichlorobenzene	541-73-1	< 0.00100	
1,3-Dichloropropane	142-28-9	< 0.00100	
1,4-Dichlorobenzene	106-46-7	< 0.00100	
2,2-Dichloropropane	594-20-7	< 0.00100	
2-Butanone (MEK)	78-93-3	< 0.0100	
2-Chlorotoluene	95-49-8	< 0.00100	
4-Chlorotoluene	106-43-4	< 0.00100	
4-Ethyltoluene	622-96-8	< 0.00100	
4-Methyl-2-pentanone (MIBK)	108-10-1	< 0.0100	
Acetone	67-64-1	< 0.0500	
Acrylonitrile	107-13-1	< 0.0100	
Benzene	71-43-2	< 0.00100	
Bromobenzene	108-86-1	< 0.00100	
Bromodichloromethane	75-27-4	< 0.00100	
Bromoform	75-25-2	< 0.00100	
Bromomethane	74-83-9	< 0.00500	
Carbon disulfide	75-15-0	< 0.00100	

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L671404
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Volatile Organic Compounds by Method 8260B		
Project No:	ST010022.0026	Matrix:	Soil - mg/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	11/27/2013	**Analytic Batch:**	**WG695026**
Analysis Date:	12/4/2013 5:09:00 AM	Analyst:	611
Instrument ID:	VOCMS20		
Sample Numbers:	L671404-01, -02, -03, -04		

Method Blank

Analyte	CAS	RDL	Qualifier
Carbon tetrachloride	56-23-5	< 0.00100	
Chlorobenzene	108-90-7	< 0.00100	
Chlorodibromomethane	124-48-1	< 0.00100	
Chloroethane	75-00-3	< 0.00500	
Chloroform	67-66-3	< 0.00500	
Chloromethane	74-87-3	< 0.00250	
cis-1,2-Dichloroethene	156-59-2	< 0.00100	
cis-1,3-Dichloropropene	10061-01-5	< 0.00100	
Cyclohexane	110-82-7	< 0.00100	
Dibromomethane	74-95-3	< 0.00100	
Dichlorodifluoromethane	75-71-8	< 0.00500	
Dicyclopentadiene	77-73-6	< 0.00100	
Di-isopropyl ether	108-20-3	< 0.00100	
Ethylbenzene	100-41-4	< 0.00100	
Hexachloro-1,3-butadiene	87-68-3	< 0.00100	
Isopropylbenzene	98-82-8	< 0.00100	
Methyl Cyclohexane	108-87-2	< 0.00100	
Methyl tert-butyl ether	1634-04-4	< 0.00100	
Methylene Chloride	75-09-2	< 0.00500	
Naphthalene	91-20-3	< 0.00500	
n-Butylbenzene	104-51-8	< 0.00100	
n-Hexane	110-54-3	< 0.0100	
n-Propylbenzene	103-65-1	< 0.00100	
p-Isopropyltoluene	99-87-6	< 0.00100	
Propene	115-07-1	< 0.00250	
sec-Butylbenzene	135-98-8	< 0.00100	
Styrene	100-42-5	< 0.00100	
tert-Butylbenzene	98-06-6	< 0.00100	
Tetrachloroethene	127-18-4	< 0.00100	
Toluene	108-88-3	< 0.00500	
trans-1,2-Dichloroethene	156-60-5	< 0.00100	
trans-1,3-Dichloropropene	10061-02-6	< 0.00100	
Trichloroethene	79-01-6	< 0.00100	
Trichlorofluoromethane	75-69-4	< 0.00500	
Vinyl chloride	75-01-4	< 0.00100	
Xylenes, Total	1330-20-7	< 0.00300	

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L671404
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Volatile Organic Compounds by Method 8260B		
Project No:	ST010022.0026	Matrix:	Soil - mg/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	11/27/2013	**Analytic Batch:**	**WG695588**
Analysis Date:	12/5/2013 5:37:00 AM	Analyst:	611
Instrument ID:	VOCMS14		
Sample Numbers:	L671404-01, -02, -03, -04		

Method Blank

Analyte	CAS	RDL	Qualifier
1,1,1,2-Tetrachloroethane	630-20-6	< 0.00100	
1,1,1-Trichloroethane	71-55-6	< 0.00100	
1,1,2,2-Tetrachloroethane	79-34-5	< 0.00100	
1,1,2-Trichloroethane	79-00-5	< 0.00100	
1,1,2-Trichlorotrifluoroethane	76-13-1	< 0.00100	
1,1-Dichloroethane	75-34-3	< 0.00100	
1,1-Dichloroethene	75-35-4	< 0.00100	
1,1-Dichloropropene	563-58-6	< 0.00100	
1,2,3-Trichlorobenzene	87-61-6	< 0.00100	
1,2,3-Trichloropropane	96-18-4	< 0.00250	
1,2,3-Trimethylbenzene	526-73-8	< 0.00100	
1,2,4-Trichlorobenzene	120-82-1	< 0.00100	
1,2,4-Trimethylbenzene	95-63-6	< 0.00100	
1,2-Dibromo-3-Chloropropane	96-12-8	< 0.00500	
1,2-Dibromoethane	106-93-4	< 0.00100	
1,2-Dichlorobenzene	95-50-1	< 0.00100	
1,2-Dichloroethane	107-06-2	< 0.00100	
1,2-Dichloropropane	78-87-5	< 0.00100	
1,3,5-Trimethylbenzene	108-67-8	< 0.00100	
1,3-Butadiene	106-99-0	< 0.00200	
1,3-Dichlorobenzene	541-73-1	< 0.00100	
1,3-Dichloropropane	142-28-9	< 0.00100	
1,4-Dichlorobenzene	106-46-7	< 0.00100	
2,2-Dichloropropane	594-20-7	< 0.00100	
2-Butanone (MEK)	78-93-3	< 0.0100	
2-Chlorotoluene	95-49-8	< 0.00100	
4-Chlorotoluene	106-43-4	< 0.00100	
4-Ethyltoluene	622-96-8	< 0.00100	
4-Methyl-2-pentanone (MIBK)	108-10-1	< 0.0100	
Acetone	67-64-1	< 0.0500	
Acrylonitrile	107-13-1	< 0.0100	
Benzene	71-43-2	< 0.00100	
Bromobenzene	108-86-1	< 0.00100	
Bromodichloromethane	75-27-4	< 0.00100	
Bromoform	75-25-2	< 0.00100	
Bromomethane	74-83-9	< 0.00500	
Carbon disulfide	75-15-0	< 0.00100	

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L671404
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Volatile Organic Compounds by Method 8260B		
Project No:	ST010022.0026	Matrix:	Soil - mg/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	11/27/2013	**Analytic Batch:**	**WG695588**
Analysis Date:	12/5/2013 5:37:00 AM	Analyst:	611
Instrument ID:	VOCMS14		
Sample Numbers:	L671404-01, -02, -03, -04		

Method Blank

Analyte	CAS	RDL	Qualifier
Carbon tetrachloride	56-23-5	< 0.00100	
Chlorobenzene	108-90-7	< 0.00100	
Chlorodibromomethane	124-48-1	< 0.00100	
Chloroethane	75-00-3	< 0.00500	
Chloroform	67-66-3	< 0.00500	
Chloromethane	74-87-3	< 0.00250	
cis-1,2-Dichloroethene	156-59-2	< 0.00100	
cis-1,3-Dichloropropene	10061-01-5	< 0.00100	
Cyclohexane	110-82-7	< 0.00100	
Dibromomethane	74-95-3	< 0.00100	
Dichlorodifluoromethane	75-71-8	< 0.00500	
Dicyclopentadiene	77-73-6	< 0.00100	
Di-isopropyl ether	108-20-3	< 0.00100	
Ethylbenzene	100-41-4	< 0.00100	
Hexachloro-1,3-butadiene	87-68-3	< 0.00100	
Isopropylbenzene	98-82-8	< 0.00100	
Methyl Cyclohexane	108-87-2	< 0.00100	
Methyl tert-butyl ether	1634-04-4	< 0.00100	
Methylene Chloride	75-09-2	< 0.00500	
Naphthalene	91-20-3	< 0.00500	
n-Butylbenzene	104-51-8	< 0.00100	
n-Hexane	110-54-3	< 0.0100	
n-Propylbenzene	103-65-1	< 0.00100	
p-Isopropyltoluene	99-87-6	< 0.00100	
Propene	115-07-1	< 0.00250	
sec-Butylbenzene	135-98-8	< 0.00100	
Styrene	100-42-5	< 0.00100	
tert-Butylbenzene	98-06-6	< 0.00100	
Tetrachloroethene	127-18-4	< 0.00100	
Toluene	108-88-3	< 0.00500	
trans-1,2-Dichloroethene	156-60-5	< 0.00100	
trans-1,3-Dichloropropene	10061-02-6	< 0.00100	
Trichloroethene	79-01-6	< 0.00100	
Trichlorofluoromethane	75-69-4	< 0.00500	
Vinyl chloride	75-01-4	< 0.00100	
Xylenes, Total	1330-20-7	< 0.00300	

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L671404
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Volatile Organic Compounds by Method 8260B		
Project No:	ST010022.0026	Matrix:	Soil - mg/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	11/27/2013	**Analytic Batch:**	**WG695026**
Analysis Date:	12/4/2013 5:09:00 AM	Analyst:	611
Instrument ID:	VOCMS20		
Sample Numbers:	L671404-01, -02, -03, -04		

Laboratory Control Sample (LCS)

Analyte	Dil	True Value	Found	% Rec	Control Limits	Qual
1,1,1,2-Tetrachloroethane	1	0.025	0.0267	107	72.9 - 124	
1,1,1-Trichloroethane	1	0.025	0.0287	115	73.7 - 124	
1,1,2,2-Tetrachloroethane	1	0.025	0.0269	108	69.4 - 122	
1,1,2-Trichloroethane	1	0.025	0.0261	104	79.1 - 118	
1,1,2-Trichlorotrifluoroethane	1	0.025	0.0308	123	70 - 146	
1,1-Dichloroethane	1	0.025	0.0304	122	75 - 124	
1,1-Dichloroethene	1	0.025	0.0303	121	70.4 - 129	
1,1-Dichloropropene	1	0.025	0.0280	112	74.9 - 124	
1,2,3-Trichlorobenzene	1	0.025	0.0272	109	69.3 - 131	
1,2,3-Trichloropropane	1	0.025	0.0263	105	71.4 - 123	
1,2,3-Trimethylbenzene	1	0.025	0.0245	98	73.6 - 113	
1,2,4-Trichlorobenzene	1	0.025	0.0280	112	71.9 - 137	
1,2,4-Trimethylbenzene	1	0.025	0.0265	106	75.5 - 122	
1,2-Dibromo-3-Chloropropane	1	0.025	0.0283	113	62.8 - 133	
1,2-Dibromoethane	1	0.025	0.0232	93	78.6 - 120	
1,2-Dichlorobenzene	1	0.025	0.0251	100	78.3 - 118	
1,2-Dichloroethane	1	0.025	0.0280	112	70.1 - 124	
1,2-Dichloropropane	1	0.025	0.0296	118	77.9 - 119	
1,3,5-Trimethylbenzene	1	0.025	0.0274	110	75.9 - 124	
1,3-Butadiene	1	0.025	0.0274	110	53.2 - 141	
1,3-Dichlorobenzene	1	0.025	0.0240	95.8	72 - 126	
1,3-Dichloropropane	1	0.025	0.0242	96.8	79.1 - 117	
1,4-Dichlorobenzene	1	0.025	0.0251	100	78.3 - 117	
2,2-Dichloropropane	1	0.025	0.0302	121	61.3 - 136	
2-Butanone (MEK)	1	0.125	0.1167	93.4	53.7 - 153	
2-Chlorotoluene	1	0.025	0.0262	105	75.6 - 121	
4-Chlorotoluene	1	0.025	0.0259	104	77.3 - 120	
4-Ethyltoluene	1	0.025	0.0264	106	76.5 - 130	
4-Methyl-2-pentanone (MIBK)	1	0.125	0.1567	125	70.4 - 137	
Acetone	1	0.125	0.0934	74.8	35.1 - 175	
Acrylonitrile	1	0.125	0.1513	121	56.4 - 128	
Benzene	1	0.025	0.0283	113	77.1 - 121	
Bromobenzene	1	0.025	0.0258	103	78.2 - 115	
Bromodichloromethane	1	0.025	0.0264	106	74.9 - 115	
Bromoform	1	0.025	0.0250	99.9	65.9 - 132	
Bromomethane	1	0.025	0.0419	168	48.7 - 165	L1

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Quality Control Summary
SDG: L671404
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Volatile Organic Compounds by Method 8260B		
Project No:	ST010022.0026	Matrix:	Soil - mg/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	11/27/2013	**Analytic Batch:**	**WG695026**
Analysis Date:	12/4/2013 5:09:00 AM	Analyst:	611
Instrument ID:	VOCMS20		
Sample Numbers:	L671404-01, -02, -03, -04		

Laboratory Control Sample (LCS)

Analyte	Dil	True Value	Found	% Rec	Control Limits	Qual
Carbon disulfide	1	0.025	0.0323	129	66.9 - 145	
Carbon tetrachloride	1	0.025	0.0283	113	70 - 124	
Chlorobenzene	1	0.025	0.0245	98.1	79.1 - 119	
Chlorodibromomethane	1	0.025	0.0242	96.6	73.5 - 121	
Chloroethane	1	0.025	0.0324	130	66.2 - 132	
Chloroform	1	0.025	0.0299	120	76.7 - 122	
Chloromethane	1	0.025	0.0291	117	63.4 - 131	
cis-1,2-Dichloroethene	1	0.025	0.0296	119	78.2 - 119	
cis-1,3-Dichloropropene	1	0.025	0.0268	107	79.6 - 120	
Dibromomethane	1	0.025	0.0277	111	79.4 - 120	
Dichlorodifluoromethane	1	0.025	0.0287	115	57.1 - 137	
Dicyclopentadiene	1	0.025	0.0296	118	72.7 - 137	
Di-isopropyl ether	1	0.025	0.0318	127	70.4 - 133	
Ethylbenzene	1	0.025	0.0257	103	79.7 - 122	
Hexachloro-1,3-butadiene	1	0.025	0.0245	98	68.2 - 123	
Isopropylbenzene	1	0.025	0.0297	119	80 - 135	
Methyl tert-butyl ether	1	0.025	0.0299	120	73 - 129	
Methylene Chloride	1	0.025	0.0291	116	72.6 - 120	
Naphthalene	1	0.025	0.0284	113	69.8 - 128	
n-Butylbenzene	1	0.025	0.0279	112	77.5 - 126	
n-Hexane	1	0.025	0.0276	110	68.4 - 132	
n-Propylbenzene	1	0.025	0.0258	103	77.9 - 123	
p-Isopropyltoluene	1	0.025	0.0273	109	75.8 - 129	
Propene	1	0.025	0.0294	118	16.3 - 187	
sec-Butylbenzene	1	0.025	0.0268	107	75.8 - 126	
Styrene	1	0.025	0.0273	109	82.4 - 126	
tert-Butylbenzene	1	0.025	0.0267	107	76.4 - 126	
Tetrachloroethene	1	0.025	0.0232	92.7	73.9 - 125	
Toluene	1	0.025	0.0264	105	79.7 - 118	
trans-1,2-Dichloroethene	1	0.025	0.0293	117	73.8 - 122	
trans-1,3-Dichloropropene	1	0.025	0.0258	103	75.9 - 124	
Trichloroethene	1	0.025	0.0258	103	77.9 - 118	
Trichlorofluoromethane	1	0.025	0.0285	114	67.7 - 131	
Vinyl chloride	1	0.025	0.0291	116	66.7 - 130	
Xylenes, Total	1	0.075	0.0795	106	78.8 - 121	

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L671404
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Volatile Organic Compounds by Method 8260B		
Project No:	ST010022.0026	Matrix:	Soil - mg/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	11/27/2013	**Analytic Batch:**	**WG695026**
Analysis Date:	12/4/2013 5:09:00 AM	Analyst:	611
Instrument ID:	VOCMS20		
Sample Numbers:	L671404-01, -02, -03, -04		

Laboratory Control Sample Duplicate (LCSD)

Analyte	Dil	True Value	Found	% Rec	Control Limits	Qual
1,1,1,2-Tetrachloroethane	1	0.025	0.0261	104	72.9 - 124	
1,1,1-Trichloroethane	1	0.025	0.0277	111	73.7 - 124	
1,1,2,2-Tetrachloroethane	1	0.025	0.0294	118	69.4 - 122	
1,1,2-Trichloroethane	1	0.025	0.0267	107	79.1 - 118	
1,1,2-Trichlorotrifluoroethane	1	0.025	0.0273	109	70 - 146	
1,1-Dichloroethane	1	0.025	0.0291	116	75 - 124	
1,1-Dichloroethene	1	0.025	0.0288	115	70.4 - 129	
1,1-Dichloropropene	1	0.025	0.0278	111	74.9 - 124	
1,2,3-Trichlorobenzene	1	0.025	0.0282	113	69.3 - 131	
1,2,3-Trichloropropane	1	0.025	0.0292	117	71.4 - 123	
1,2,3-Trimethylbenzene	1	0.025	0.0245	98.1	73.6 - 113	
1,2,4-Trichlorobenzene	1	0.025	0.0276	110	71.9 - 137	
1,2,4-Trimethylbenzene	1	0.025	0.0254	102	75.5 - 122	
1,2-Dibromo-3-Chloropropane	1	0.025	0.0319	128	62.8 - 133	
1,2-Dibromoethane	1	0.025	0.0255	102	78.6 - 120	
1,2-Dichlorobenzene	1	0.025	0.0255	102	78.3 - 118	
1,2-Dichloroethane	1	0.025	0.0283	113	70.1 - 124	
1,2-Dichloropropane	1	0.025	0.0291	117	77.9 - 119	
1,3,5-Trimethylbenzene	1	0.025	0.0263	105	75.9 - 124	
1,3-Butadiene	1	0.025	0.0279	111	53.2 - 141	
1,3-Dichlorobenzene	1	0.025	0.0236	94.3	72 - 126	
1,3-Dichloropropane	1	0.025	0.0257	103	79.1 - 117	
1,4-Dichlorobenzene	1	0.025	0.0253	101	78.3 - 117	
2,2-Dichloropropane	1	0.025	0.0286	115	61.3 - 136	
2-Butanone (MEK)	1	0.125	0.1540	123	53.7 - 153	
2-Chlorotoluene	1	0.025	0.0250	99.9	75.6 - 121	
4-Chlorotoluene	1	0.025	0.0251	100	77.3 - 120	
4-Ethyltoluene	1	0.025	0.0255	102	76.5 - 130	
4-Methyl-2-pentanone (MIBK)	1	0.125	0.1785	143	70.4 - 137	L1
Acetone	1	0.125	0.1364	109	35.1 - 175	
Acrylonitrile	1	0.125	0.1732	139	56.4 - 128	L1
Benzene	1	0.025	0.0274	110	77.1 - 121	
Bromobenzene	1	0.025	0.0257	103	78.2 - 115	
Bromodichloromethane	1	0.025	0.0269	107	74.9 - 115	
Bromoform	1	0.025	0.0262	105	65.9 - 132	
Bromomethane	1	0.025	0.0382	153	48.7 - 165	

Parameters in bold text are reported in this SDG

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Mt. Juliet, TN 37122
(615) 758-5858
(800) 767-5859
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Est. 1970

Quality Control Summary
SDG: L671404
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Volatile Organic Compounds by Method 8260B		
Project No:	ST010022.0026	Matrix:	Soil - mg/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	11/27/2013	**Analytic Batch:**	**WG695026**
Analysis Date:	12/4/2013 5:09:00 AM	Analyst:	611
Instrument ID:	VOCMS20		
Sample Numbers:	L671404-01, -02, -03, -04		

Laboratory Control Sample Duplicate (LCSD)

Analyte	Dil	True Value	Found	% Rec	Control Limits	Qual
Carbon disulfide	1	0.025	0.0307	123	66.9 - 145	
Carbon tetrachloride	1	0.025	0.0265	106	70 - 124	
Chlorobenzene	1	0.025	0.0239	95.4	79.1 - 119	
Chlorodibromomethane	1	0.025	0.0251	100	73.5 - 121	
Chloroethane	1	0.025	0.0306	123	66.2 - 132	
Chloroform	1	0.025	0.0288	115	76.7 - 122	
Chloromethane	1	0.025	0.0281	113	63.4 - 131	
cis-1,2-Dichloroethene	1	0.025	0.0287	115	78.2 - 119	
cis-1,3-Dichloropropene	1	0.025	0.0273	109	79.6 - 120	
Dibromomethane	1	0.025	0.0288	115	79.4 - 120	
Dichlorodifluoromethane	1	0.025	0.0270	108	57.1 - 137	
Dicyclopentadiene	1	0.025	0.0281	112	72.7 - 137	
Di-isopropyl ether	1	0.025	0.0310	124	70.4 - 133	
Ethylbenzene	1	0.025	0.0241	96.2	79.7 - 122	
Hexachloro-1,3-butadiene	1	0.025	0.0260	104	68.2 - 123	
Isopropylbenzene	1	0.025	0.0283	113	80 - 135	
Methyl tert-butyl ether	1	0.025	0.0306	122	73 - 129	
Methylene Chloride	1	0.025	0.0275	110	72.6 - 120	
Naphthalene	1	0.025	0.0311	124	69.8 - 128	
n-Butylbenzene	1	0.025	0.0279	112	77.5 - 126	
n-Hexane	1	0.025	0.0276	111	68.4 - 132	
n-Propylbenzene	1	0.025	0.0247	98.6	77.9 - 123	
p-Isopropyltoluene	1	0.025	0.0263	105	75.8 - 129	
Propene	1	0.025	0.0285	114	16.3 - 187	
sec-Butylbenzene	1	0.025	0.0261	104	75.8 - 126	
Styrene	1	0.025	0.0270	108	82.4 - 126	
tert-Butylbenzene	1	0.025	0.0253	101	76.4 - 126	
Tetrachloroethene	1	0.025	0.0221	88.4	73.9 - 125	
Toluene	1	0.025	0.0261	105	79.7 - 118	
trans-1,2-Dichloroethene	1	0.025	0.0284	114	73.8 - 122	
trans-1,3-Dichloropropene	1	0.025	0.0267	107	75.9 - 124	
Trichloroethene	1	0.025	0.0251	100	77.9 - 118	
Trichlorofluoromethane	1	0.025	0.0267	107	67.7 - 131	
Vinyl chloride	1	0.025	0.0281	112	66.7 - 130	
Xylenes, Total	1	0.075	0.0759	101	78.8 - 121	

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L671404
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Volatile Organic Compounds by Method 8260B		
Project No:	ST010022.0026	Matrix:	Soil - mg/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	11/27/2013	**Analytic Batch:**	**WG695026**
Analysis Date:	12/4/2013 5:09:00 AM	Analyst:	611
Instrument ID:	VOCMS20		
Sample Numbers:	L671404-01, -02, -03, -04		

Laboratory Control Sample / Laboratory Control Sample Duplicate

Analyte	Dil	Spike	LCS	% Rec	LCSD	% Rec	Control Limits	% Rec Qual	% RPD	Control Limits	RPD Qual
1,1,1,2-Tetrachloroethane	1	0.025	0.0267	107	0.0261	104	72.9 - 124		2.24	20	
1,1,1-Trichloroethane	1	0.025	0.0287	115	0.0277	111	73.7 - 124		3.81	20	
1,1,2,2-Tetrachloroethane	1	0.025	0.0269	108	0.0294	118	69.4 - 122		8.88	20	
1,1,2-Trichloroethane	1	0.025	0.0261	104	0.0267	107	79.1 - 118		2.49	20	
1,1,2-Trichlorotrifluoroethane	1	0.025	0.0308	123	0.0273	109	70 - 146		12.2	20	
1,1-Dichloroethane	1	0.025	0.0304	122	0.0291	116	75 - 124		4.5	20	
1,1-Dichloroethene	1	0.025	0.0303	121	0.0288	115	70.4 - 129		5.14	20	
1,1-Dichloropropene	1	0.025	0.0280	112	0.0278	111	74.9 - 124		0.83	20	
1,2,3-Trichlorobenzene	1	0.025	0.0272	109	0.0282	113	69.3 - 131		3.4	20	
1,2,3-Trichloropropane	1	0.025	0.0263	105	0.0292	117	71.4 - 123		10.3	20	
1,2,3-Trimethylbenzene	1	0.025	0.0245	98	0.0245	98.1	73.6 - 113		0.04	20	
1,2,4-Trichlorobenzene	1	0.025	0.0280	112	0.0276	110	71.9 - 137		1.64	20	
1,2,4-Trimethylbenzene	1	0.025	0.0265	106	0.0254	102	75.5 - 122		4.2	20	
1,2-Dibromo-3-Chloropropane	1	0.025	0.0283	113	0.0319	128	62.8 - 133		12.1	20	
1,2-Dibromoethane	1	0.025	0.0232	93	0.0255	102	78.6 - 120		9.19	20	
1,2-Dichlorobenzene	1	0.025	0.0251	100	0.0255	102	78.3 - 118		1.62	20	
1,2-Dichloroethane	1	0.025	0.0280	112	0.0283	113	70.1 - 124		0.77	20	
1,2-Dichloropropane	1	0.025	0.0296	118	0.0291	117	77.9 - 119		1.43	20	
1,3,5-Trimethylbenzene	1	0.025	0.0274	110	0.0263	105	75.9 - 124		4.14	20	
1,3-Butadiene	1	0.025	0.0274	110	0.0279	111	53.2 - 141		1.48	20	
1,3-Dichlorobenzene	1	0.025	0.0240	95.8	0.0236	94.3	72 - 126		1.64	20	
1,3-Dichloropropane	1	0.025	0.0242	96.8	0.0257	103	79.1 - 117		5.89	20	
1,4-Dichlorobenzene	1	0.025	0.0251	100	0.0253	101	78.3 - 117		1.04	20	
2,2-Dichloropropane	1	0.025	0.0302	121	0.0286	115	61.3 - 136		5.17	20	
2-Butanone (MEK)	1	0.125	0.1167	93.4	0.1540	123	53.7 - 153		27.5	21.2	R7
2-Chlorotoluene	1	0.025	0.0262	105	0.0250	99.9	75.6 - 121		4.72	20	
4-Chlorotoluene	1	0.025	0.0259	104	0.0251	100	77.3 - 120		3.33	20	
4-Ethyltoluene	1	0.025	0.0264	106	0.0255	102	76.5 - 130		3.52	20	
4-Methyl-2-pentanone (MIBK)	1	0.125	0.1567	125	0.1785	143	70.4 - 137	L1	13	20	
Acetone	1	0.125	0.0934	74.8	0.1364	109	35.1 - 175		37.4	26.1	R7
Acrylonitrile	1	0.125	0.1513	121	0.1732	139	56.4 - 128	L1	13.5	20	
Benzene	1	0.025	0.0283	113	0.0274	110	77.1 - 121		3.16	20	
Bromobenzene	1	0.025	0.0258	103	0.0257	103	78.2 - 115		0.35	20	
Bromodichloromethane	1	0.025	0.0264	106	0.0269	107	74.9 - 115		1.59	20	
Bromoform	1	0.025	0.0250	99.9	0.0262	105	65.9 - 132		4.76	20	
Bromomethane	1	0.025	0.0419	168	0.0382	153	48.7 - 165	L1	9.37	20	

Parameters in bold text are reported in this SDG

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(800) 767-5859
Fax (615) 758-5859
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Quality Control Summary
SDG: L671404
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Volatile Organic Compounds by Method 8260B		
Project No:	ST010022.0026	Matrix:	Soil - mg/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	11/27/2013	**Analytic Batch:**	**WG695026**
Analysis Date:	12/4/2013 5:09:00 AM	Analyst:	611
Instrument ID:	VOCMS20		
Sample Numbers:	L671404-01, -02, -03, -04		

Laboratory Control Sample / Laboratory Control Sample Duplicate

Analyte	Dil	Spike	LCS	% Rec	LCSD	% Rec	Control Limits	% Rec Qual	% RPD	Control Limits	RPD Qual
Carbon disulfide	1	0.025	0.0323	129	0.0307	123	66.9 - 145		4.87	20	
Carbon tetrachloride	1	0.025	0.0283	113	0.0265	106	70 - 124		6.34	20	
Chlorobenzene	1	0.025	0.0245	98.1	0.0239	95.4	79.1 - 119		2.78	20	
Chlorodibromomethane	1	0.025	0.0242	96.6	0.0251	100	73.5 - 121		3.83	20	
Chloroethane	1	0.025	0.0324	130	0.0306	123	66.2 - 132		5.7	20	
Chloroform	1	0.025	0.0299	120	0.0288	115	76.7 - 122		3.94	20	
Chloromethane	1	0.025	0.0291	117	0.0281	113	63.4 - 131		3.48	20	
cis-1,2-Dichloroethene	1	0.025	0.0296	119	0.0287	115	78.2 - 119		3.34	20	
cis-1,3-Dichloropropene	1	0.025	0.0268	107	0.0273	109	79.6 - 120		1.69	20	
Dibromomethane	1	0.025	0.0277	111	0.0288	115	79.4 - 120		3.88	20	
Dichlorodifluoromethane	1	0.025	0.0287	115	0.0270	108	57.1 - 137		6.1	20	
Dicyclopentadiene	1	0.025	0.0296	118	0.0281	112	72.7 - 137		5.15	20	
Di-isopropyl ether	1	0.025	0.0318	127	0.0310	124	70.4 - 133		2.41	20	
Ethylbenzene	1	0.025	0.0257	103	0.0241	96.2	79.7 - 122		6.6	20	
Hexachloro-1,3-butadiene	1	0.025	0.0245	98	0.0260	104	68.2 - 123		6.01	20	
Isopropylbenzene	1	0.025	0.0297	119	0.0283	113	80 - 135		4.79	20	
Methyl tert-butyl ether	1	0.025	0.0299	120	0.0306	122	73 - 129		2.22	20	
Methylene Chloride	1	0.025	0.0291	116	0.0275	110	72.6 - 120		5.63	20	
Naphthalene	1	0.025	0.0284	113	0.0311	124	69.8 - 128		9.05	20	
n-Butylbenzene	1	0.025	0.0279	112	0.0279	112	77.5 - 126		0.07	20	
n-Hexane	1	0.025	0.0276	110	0.0276	111	68.4 - 132		0.13	20	
n-Propylbenzene	1	0.025	0.0258	103	0.0247	98.6	77.9 - 123		4.45	20	
p-Isopropyltoluene	1	0.025	0.0273	109	0.0263	105	75.8 - 129		3.55	20	
Propene	1	0.025	0.0294	118	0.0285	114	16.3 - 187		3.02	20	
sec-Butylbenzene	1	0.025	0.0268	107	0.0261	104	75.8 - 126		2.76	20	
Styrene	1	0.025	0.0273	109	0.0270	108	82.4 - 126		1.19	20	
tert-Butylbenzene	1	0.025	0.0267	107	0.0253	101	76.4 - 126		5.57	20	
Tetrachloroethene	1	0.025	0.0232	92.7	0.0221	88.4	73.9 - 125		4.75	20	
Toluene	1	0.025	0.0264	105	0.0261	105	79.7 - 118		0.88	20	
trans-1,2-Dichloroethene	1	0.025	0.0293	117	0.0284	114	73.8 - 122		3.03	20	
trans-1,3-Dichloropropene	1	0.025	0.0258	103	0.0267	107	75.9 - 124		3.43	20	
Trichloroethene	1	0.025	0.0258	103	0.0251	100	77.9 - 118		2.91	20	
Trichlorofluoromethane	1	0.025	0.0285	114	0.0267	107	67.7 - 131		6.58	20	
Vinyl chloride	1	0.025	0.0291	116	0.0281	112	66.7 - 130		3.44	20	
Xylenes, Total	1	0.075	0.0795	106	0.0759	101	78.8 - 121		4.66	20	

Parameters in bold text are reported in this SDG

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(800) 767-5859
Fax (615) 758-5859
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Quality Control Summary
SDG: L671404
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Volatile Organic Compounds by Method 8260B		
Project No:	ST010022.0026	Matrix:	Soil - mg/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	11/27/2013	**Analytic Batch:**	**WG695588**
Analysis Date:	12/5/2013 5:37:00 AM	Analyst:	611
Instrument ID:	VOCMS14		
Sample Numbers:	L671404-01, -02, -03, -04		

Laboratory Control Sample (LCS)

Analyte	Dil	True Value	Found	% Rec	Control Limits	Qual
1,1,1,2-Tetrachloroethane	1	0.025	0.0206	82.3	72.9 - 124	
1,1,1-Trichloroethane	1	0.025	0.0201	80.4	73.7 - 124	
1,1,2,2-Tetrachloroethane	1	0.025	0.0228	91.3	69.4 - 122	
1,1,2-Trichloroethane	1	0.025	0.0243	97.1	79.1 - 118	
1,1,2-Trichlorotrifluoroethane	1	0.025	0.0219	87.6	70 - 146	
1,1-Dichloroethane	1	0.025	0.0213	85.1	75 - 124	
1,1-Dichloroethene	1	0.025	0.0200	80.2	70.4 - 129	
1,1-Dichloropropene	1	0.025	0.0211	84.4	74.9 - 124	
1,2,3-Trichlorobenzene	1	0.025	0.0229	91.4	69.3 - 131	
1,2,3-Trichloropropane	1	0.025	0.0231	92.2	71.4 - 123	
1,2,3-Trimethylbenzene	1	0.025	0.0204	81.6	73.6 - 113	
1,2,4-Trichlorobenzene	1	0.025	0.0238	95.1	71.9 - 137	
1,2,4-Trimethylbenzene	1	0.025	0.0229	91.5	75.5 - 122	
1,2-Dibromo-3-Chloropropane	1	0.025	0.0193	77.1	62.8 - 133	
1,2-Dibromoethane	1	0.025	0.0221	88.5	78.6 - 120	
1,2-Dichlorobenzene	1	0.025	0.0229	91.8	78.3 - 118	
1,2-Dichloroethane	1	0.025	0.0202	80.7	70.1 - 124	
1,2-Dichloropropane	1	0.025	0.0235	94	77.9 - 119	
1,3,5-Trimethylbenzene	1	0.025	0.0241	96.3	75.9 - 124	
1,3-Butadiene	1	0.025	0.0190	76	53.2 - 141	
1,3-Dichlorobenzene	1	0.025	0.0235	94.1	72 - 126	
1,3-Dichloropropane	1	0.025	0.0237	94.8	79.1 - 117	
1,4-Dichlorobenzene	1	0.025	0.0228	91.3	78.3 - 117	
2,2-Dichloropropane	1	0.025	0.0193	77	61.3 - 136	
2-Butanone (MEK)	1	0.125	0.1359	109	53.7 - 153	
2-Chlorotoluene	1	0.025	0.0231	92.4	75.6 - 121	
4-Chlorotoluene	1	0.025	0.0229	91.4	77.3 - 120	
4-Ethyltoluene	1	0.025	0.0234	93.5	76.5 - 130	
4-Methyl-2-pentanone (MIBK)	1	0.125	0.1148	91.8	70.4 - 137	
Acetone	1	0.125	0.1113	89.1	35.1 - 175	
Acrylonitrile	1	0.125	0.1157	92.6	56.4 - 128	
Benzene	1	0.025	0.0224	89.5	77.1 - 121	
Bromobenzene	1	0.025	0.0221	88.6	78.2 - 115	
Bromodichloromethane	1	0.025	0.0196	78.5	74.9 - 115	
Bromoform	1	0.025	0.0215	86.2	65.9 - 132	
Bromomethane	1	0.025	0.0245	98	48.7 - 165	

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L671404
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Volatile Organic Compounds by Method 8260B		
Project No:	ST010022.0026	Matrix:	Soil - mg/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	11/27/2013	**Analytic Batch:**	**WG695588**
Analysis Date:	12/5/2013 5:37:00 AM	Analyst:	611
Instrument ID:	VOCMS14		
Sample Numbers:	L671404-01, -02, -03, -04		

Laboratory Control Sample (LCS)

Analyte	Dil	True Value	Found	% Rec	Control Limits	Qual
Carbon disulfide	1	0.025	0.0196	78.4	66.9 - 145	
Carbon tetrachloride	1	0.025	0.0201	80.3	70 - 124	
Chlorobenzene	1	0.025	0.0242	96.9	79.1 - 119	
Chlorodibromomethane	1	0.025	0.0209	83.6	73.5 - 121	
Chloroethane	1	0.025	0.0252	101	66.2 - 132	
Chloroform	1	0.025	0.0221	88.2	76.7 - 122	
Chloromethane	1	0.025	0.0207	82.6	63.4 - 131	
cis-1,2-Dichloroethene	1	0.025	0.0213	85.4	78.2 - 119	
cis-1,3-Dichloropropene	1	0.025	0.0223	89	79.6 - 120	
Dibromomethane	1	0.025	0.0223	89	79.4 - 120	
Dichlorodifluoromethane	1	0.025	0.0194	77.7	57.1 - 137	
Dicyclopentadiene	1	0.025	0.0241	96.5	72.7 - 137	
Di-isopropyl ether	1	0.025	0.0221	88.5	70.4 - 133	
Ethylbenzene	1	0.025	0.0238	95.1	79.7 - 122	
Hexachloro-1,3-butadiene	1	0.025	0.0199	79.7	68.2 - 123	
Isopropylbenzene	1	0.025	0.0251	101	80 - 135	
Methyl tert-butyl ether	1	0.025	0.0210	84.2	73 - 129	
Methylene Chloride	1	0.025	0.0216	86.6	72.6 - 120	
Naphthalene	1	0.025	0.0228	91.2	69.8 - 128	
n-Butylbenzene	1	0.025	0.0217	86.6	77.5 - 126	
n-Hexane	1	0.025	0.0208	83.1	68.4 - 132	
n-Propylbenzene	1	0.025	0.0230	92	77.9 - 123	
p-Isopropyltoluene	1	0.025	0.0235	93.9	75.8 - 129	
Propene	1	0.025	0.0137	54.7	16.3 - 187	
sec-Butylbenzene	1	0.025	0.0238	95.2	75.8 - 126	
Styrene	1	0.025	0.0252	101	82.4 - 126	
tert-Butylbenzene	1	0.025	0.0248	99.1	76.4 - 126	
Tetrachloroethene	1	0.025	0.0218	87.2	73.9 - 125	
Toluene	1	0.025	0.0237	94.9	79.7 - 118	
trans-1,2-Dichloroethene	1	0.025	0.0215	86.1	73.8 - 122	
trans-1,3-Dichloropropene	1	0.025	0.0223	89	75.9 - 124	
Trichloroethene	1	0.025	0.0223	89.3	77.9 - 118	
Trichlorofluoromethane	1	0.025	0.0211	84.6	67.7 - 131	
Vinyl chloride	1	0.025	0.0203	81.1	66.7 - 130	
Xylenes, Total	1	0.075	0.0694	92.5	78.8 - 121	

Parameters in bold text are reported in this SDG

12065 Lebanon Rd
Mt. Juliet, TN 37122
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(800) 767-5859
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Quality Control Summary
SDG: L671404
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Volatile Organic Compounds by Method 8260B		
Project No:	ST010022.0026	Matrix:	Soil - mg/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	11/27/2013	**Analytic Batch:**	**WG695588**
Analysis Date:	12/5/2013 5:37:00 AM	Analyst:	611
Instrument ID:	VOCMS14		
Sample Numbers:	L671404-01, -02, -03, -04		

Laboratory Control Sample Duplicate (LCSD)

Analyte	Dil	True Value	Found	% Rec	Control Limits	Qual
1,1,1,2-Tetrachloroethane	1	0.025	0.0218	87.4	72.9 - 124	
1,1,1-Trichloroethane	1	0.025	0.0200	80.2	73.7 - 124	
1,1,2,2-Tetrachloroethane	1	0.025	0.0216	86.5	69.4 - 122	
1,1,2-Trichloroethane	1	0.025	0.0247	98.9	79.1 - 118	
1,1,2-Trichlorotrifluoroethane	1	0.025	0.0224	89.6	70 - 146	
1,1-Dichloroethane	1	0.025	0.0221	88.3	75 - 124	
1,1-Dichloroethene	1	0.025	0.0202	80.7	70.4 - 129	
1,1-Dichloropropene	1	0.025	0.0215	86	74.9 - 124	
1,2,3-Trichlorobenzene	1	0.025	0.0228	91.3	69.3 - 131	
1,2,3-Trichloropropane	1	0.025	0.0213	85.2	71.4 - 123	
1,2,3-Trimethylbenzene	1	0.025	0.0202	81	73.6 - 113	
1,2,4-Trichlorobenzene	1	0.025	0.0243	97.2	71.9 - 137	
1,2,4-Trimethylbenzene	1	0.025	0.0229	91.7	75.5 - 122	
1,2-Dibromo-3-Chloropropane	1	0.025	0.0172	68.9	62.8 - 133	
1,2-Dibromoethane	1	0.025	0.0222	88.7	78.6 - 120	
1,2-Dichlorobenzene	1	0.025	0.0231	92.6	78.3 - 118	
1,2-Dichloroethane	1	0.025	0.0201	80.2	70.1 - 124	
1,2-Dichloropropane	1	0.025	0.0232	93	77.9 - 119	
1,3,5-Trimethylbenzene	1	0.025	0.0239	95.6	75.9 - 124	
1,3-Butadiene	1	0.025	0.0187	74.6	53.2 - 141	
1,3-Dichlorobenzene	1	0.025	0.0240	96.1	72 - 126	
1,3-Dichloropropane	1	0.025	0.0234	93.4	79.1 - 117	
1,4-Dichlorobenzene	1	0.025	0.0226	90.5	78.3 - 117	
2,2-Dichloropropane	1	0.025	0.0190	76.2	61.3 - 136	
2-Butanone (MEK)	1	0.125	0.0927	74.2	53.7 - 153	
2-Chlorotoluene	1	0.025	0.0234	93.7	75.6 - 121	
4-Chlorotoluene	1	0.025	0.0231	92.3	77.3 - 120	
4-Ethyltoluene	1	0.025	0.0238	95.2	76.5 - 130	
4-Methyl-2-pentanone (MIBK)	1	0.125	0.1056	84.5	70.4 - 137	
Acetone	1	0.125	0.1002	80.2	35.1 - 175	
Acrylonitrile	1	0.125	0.1130	90.4	56.4 - 128	
Benzene	1	0.025	0.0226	90.5	77.1 - 121	
Bromobenzene	1	0.025	0.0223	89.3	78.2 - 115	
Bromodichloromethane	1	0.025	0.0199	79.5	74.9 - 115	
Bromoform	1	0.025	0.0210	83.8	65.9 - 132	
Bromomethane	1	0.025	0.0244	97.6	48.7 - 165	

Parameters in bold text are reported in this SDG

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(800) 767-5859
Fax (615) 758-5859
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Quality Control Summary
SDG: L671404
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Volatile Organic Compounds by Method 8260B		
Project No:	ST010022.0026	Matrix:	Soil - mg/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	11/27/2013	**Analytic Batch:**	**WG695588**
Analysis Date:	12/5/2013 5:37:00 AM	Analyst:	611
Instrument ID:	VOCMS14		
Sample Numbers:	L671404-01, -02, -03, -04		

Laboratory Control Sample Duplicate (LCSD)

Analyte	Dil	True Value	Found	% Rec	Control Limits	Qual
Carbon disulfide	1	0.025	0.0198	79.2	66.9 - 145	
Carbon tetrachloride	1	0.025	0.0202	80.9	70 - 124	
Chlorobenzene	1	0.025	0.0247	98.9	79.1 - 119	
Chlorodibromomethane	1	0.025	0.0216	86.5	73.5 - 121	
Chloroethane	1	0.025	0.0251	101	66.2 - 132	
Chloroform	1	0.025	0.0225	90.1	76.7 - 122	
Chloromethane	1	0.025	0.0215	85.8	63.4 - 131	
cis-1,2-Dichloroethene	1	0.025	0.0219	87.6	78.2 - 119	
cis-1,3-Dichloropropene	1	0.025	0.0222	89	79.6 - 120	
Dibromomethane	1	0.025	0.0215	85.9	79.4 - 120	
Dichlorodifluoromethane	1	0.025	0.0194	77.4	57.1 - 137	
Dicyclopentadiene	1	0.025	0.0244	97.7	72.7 - 137	
Di-isopropyl ether	1	0.025	0.0222	88.7	70.4 - 133	
Ethylbenzene	1	0.025	0.0240	95.9	79.7 - 122	
Hexachloro-1,3-butadiene	1	0.025	0.0193	77.3	68.2 - 123	
Isopropylbenzene	1	0.025	0.0253	101	80 - 135	
Methyl tert-butyl ether	1	0.025	0.0209	83.6	73 - 129	
Methylene Chloride	1	0.025	0.0216	86.3	72.6 - 120	
Naphthalene	1	0.025	0.0216	86.6	69.8 - 128	
n-Butylbenzene	1	0.025	0.0219	87.6	77.5 - 126	
n-Hexane	1	0.025	0.0210	84	68.4 - 132	
n-Propylbenzene	1	0.025	0.0234	93.5	77.9 - 123	
p-Isopropyltoluene	1	0.025	0.0235	94.2	75.8 - 129	
Propene	1	0.025	0.0132	52.7	16.3 - 187	
sec-Butylbenzene	1	0.025	0.0237	94.9	75.8 - 126	
Styrene	1	0.025	0.0253	101	82.4 - 126	
tert-Butylbenzene	1	0.025	0.0249	99.8	76.4 - 126	
Tetrachloroethene	1	0.025	0.0229	91.4	73.9 - 125	
Toluene	1	0.025	0.0232	92.9	79.7 - 118	
trans-1,2-Dichloroethene	1	0.025	0.0219	87.7	73.8 - 122	
trans-1,3-Dichloropropene	1	0.025	0.0207	82.9	75.9 - 124	
Trichloroethene	1	0.025	0.0219	87.8	77.9 - 118	
Trichlorofluoromethane	1	0.025	0.0213	85.1	67.7 - 131	
Vinyl chloride	1	0.025	0.0212	84.7	66.7 - 130	
Xylenes, Total	1	0.075	0.0699	93.1	78.8 - 121	

Parameters in bold text are reported in this SDG

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Mt. Juliet, TN 37122
(615) 758-5858
(800) 767-5859
Fax (615) 758-5859
Tax I.D 62-0814289
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Quality Control Summary
SDG: L671404
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Volatile Organic Compounds by Method 8260B		
Project No:	ST010022.0026	Matrix:	Soil - mg/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	11/27/2013	**Analytic Batch:**	**WG695588**
Analysis Date:	12/5/2013 5:37:00 AM	Analyst:	611
Instrument ID:	VOCMS14		
Sample Numbers:	L671404-01, -02, -03, -04		

Laboratory Control Sample / Laboratory Control Sample Duplicate

Analyte	Dil	Spike	LCS	% Rec	LCSD	% Rec	Control Limits	% Rec Qual	% RPD	Control Limits	RPD Qual
1,1,1,2-Tetrachloroethane	1	0.025	0.0206	82.3	0.0218	87.4	72.9 - 124		5.96	20	
1,1,1-Trichloroethane	1	0.025	0.0201	80.4	0.0200	80.2	73.7 - 124		0.3	20	
1,1,2,2-Tetrachloroethane	1	0.025	0.0228	91.3	0.0216	86.5	69.4 - 122		5.38	20	
1,1,2-Trichloroethane	1	0.025	0.0243	97.1	0.0247	98.9	79.1 - 118		1.84	20	
1,1,2-Trichlorotrifluoroethane	1	0.025	0.0219	87.6	0.0224	89.6	70 - 146		2.28	20	
1,1-Dichloroethane	1	0.025	0.0213	85.1	0.0221	88.3	75 - 124		3.71	20	
1,1-Dichloroethene	1	0.025	0.0200	80.2	0.0202	80.7	70.4 - 129		0.67	20	
1,1-Dichloropropene	1	0.025	0.0211	84.4	0.0215	86	74.9 - 124		1.89	20	
1,2,3-Trichlorobenzene	1	0.025	0.0229	91.4	0.0228	91.3	69.3 - 131		0.11	20	
1,2,3-Trichloropropane	1	0.025	0.0231	92.2	0.0213	85.2	71.4 - 123		7.88	20	
1,2,3-Trimethylbenzene	1	0.025	0.0204	81.6	0.0202	81	73.6 - 113		0.79	20	
1,2,4-Trichlorobenzene	1	0.025	0.0238	95.1	0.0243	97.2	71.9 - 137		2.22	20	
1,2,4-Trimethylbenzene	1	0.025	0.0229	91.5	0.0229	91.7	75.5 - 122		0.23	20	
1,2-Dibromo-3-Chloropropane	1	0.025	0.0193	77.1	0.0172	68.9	62.8 - 133		11.1	20	
1,2-Dibromoethane	1	0.025	0.0221	88.5	0.0222	88.7	78.6 - 120		0.15	20	
1,2-Dichlorobenzene	1	0.025	0.0229	91.8	0.0231	92.6	78.3 - 118		0.89	20	
1,2-Dichloroethane	1	0.025	0.0202	80.7	0.0201	80.2	70.1 - 124		0.57	20	
1,2-Dichloropropane	1	0.025	0.0235	94	0.0232	93	77.9 - 119		1.12	20	
1,3,5-Trimethylbenzene	1	0.025	0.0241	96.3	0.0239	95.6	75.9 - 124		0.76	20	
1,3-Butadiene	1	0.025	0.0190	76	0.0187	74.6	53.2 - 141		1.9	20	
1,3-Dichlorobenzene	1	0.025	0.0235	94.1	0.0240	96.1	72 - 126		2.16	20	
1,3-Dichloropropane	1	0.025	0.0237	94.8	0.0234	93.4	79.1 - 117		1.5	20	
1,4-Dichlorobenzene	1	0.025	0.0228	91.3	0.0226	90.5	78.3 - 117		0.85	20	
2,2-Dichloropropane	1	0.025	0.0193	77	0.0190	76.2	61.3 - 136		1.11	20	
2-Butanone (MEK)	1	0.125	0.1359	109	0.0927	74.2	53.7 - 153		37.8	21.2	R7
2-Chlorotoluene	1	0.025	0.0231	92.4	0.0234	93.7	75.6 - 121		1.32	20	
4-Chlorotoluene	1	0.025	0.0229	91.4	0.0231	92.3	77.3 - 120		0.93	20	
4-Ethyltoluene	1	0.025	0.0234	93.5	0.0238	95.2	76.5 - 130		1.8	20	
4-Methyl-2-pentanone (MIBK)	1	0.125	0.1148	91.8	0.1056	84.5	70.4 - 137		8.37	20	
Acetone	1	0.125	0.1113	89.1	0.1002	80.2	35.1 - 175		10.5	26.1	
Acrylonitrile	1	0.125	0.1157	92.6	0.1130	90.4	56.4 - 128		2.39	20	
Benzene	1	0.025	0.0224	89.5	0.0226	90.5	77.1 - 121		1.15	20	
Bromobenzene	1	0.025	0.0221	88.6	0.0223	89.3	78.2 - 115		0.8	20	
Bromodichloromethane	1	0.025	0.0196	78.5	0.0199	79.5	74.9 - 115		1.33	20	
Bromoform	1	0.025	0.0215	86.2	0.0210	83.8	65.9 - 132		2.77	20	
Bromomethane	1	0.025	0.0245	98	0.0244	97.6	48.7 - 165		0.42	20	

Parameters in bold text are reported in this SDG

12065 Lebanon Rd
Mt. Juliet, TN 37122
(615) 758-5858
(800) 767-5859
Fax (615) 758-5859
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Quality Control Summary
SDG: L671404
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Volatile Organic Compounds by Method 8260B		
Project No:	ST010022.0026	Matrix:	Soil - mg/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	11/27/2013	**Analytic Batch:**	**WG695588**
Analysis Date:	12/5/2013 5:37:00 AM	Analyst:	611
Instrument ID:	VOCMS14		
Sample Numbers:	L671404-01, -02, -03, -04		

Laboratory Control Sample / Laboratory Control Sample Duplicate

Analyte	Dil	Spike	LCS	% Rec	LCSD	% Rec	Control Limits	% Rec Qual	% RPD	Control Limits	RPD Qual
Carbon disulfide	1	0.025	0.0196	78.4	0.0198	79.2	66.9 - 145		0.97	20	
Carbon tetrachloride	1	0.025	0.0201	80.3	0.0202	80.9	70 - 124		0.7	20	
Chlorobenzene	1	0.025	0.0242	96.9	0.0247	98.9	79.1 - 119		1.97	20	
Chlorodibromomethane	1	0.025	0.0209	83.6	0.0216	86.5	73.5 - 121		3.36	20	
Chloroethane	1	0.025	0.0252	101	0.0251	101	66.2 - 132		0.43	20	
Chloroform	1	0.025	0.0221	88.2	0.0225	90.1	76.7 - 122		2.15	20	
Chloromethane	1	0.025	0.0207	82.6	0.0215	85.8	63.4 - 131		3.77	20	
cis-1,2-Dichloroethene	1	0.025	0.0213	85.4	0.0219	87.6	78.2 - 119		2.56	20	
cis-1,3-Dichloropropene	1	0.025	0.0223	89	0.0222	89	79.6 - 120		0.04	20	
Dibromomethane	1	0.025	0.0223	89	0.0215	85.9	79.4 - 120		3.6	20	
Dichlorodifluoromethane	1	0.025	0.0194	77.7	0.0194	77.4	57.1 - 137		0.41	20	
Dicyclopentadiene	1	0.025	0.0241	96.5	0.0244	97.7	72.7 - 137		1.27	20	
Di-isopropyl ether	1	0.025	0.0221	88.5	0.0222	88.7	70.4 - 133		0.3	20	
Ethylbenzene	1	0.025	0.0238	95.1	0.0240	95.9	79.7 - 122		0.87	20	
Hexachloro-1,3-butadiene	1	0.025	0.0199	79.7	0.0193	77.3	68.2 - 123		2.99	20	
Isopropylbenzene	1	0.025	0.0251	101	0.0253	101	80 - 135		0.51	20	
Methyl tert-butyl ether	1	0.025	0.0210	84.2	0.0209	83.6	73 - 129		0.67	20	
Methylene Chloride	1	0.025	0.0216	86.6	0.0216	86.3	72.6 - 120		0.35	20	
Naphthalene	1	0.025	0.0228	91.2	0.0216	86.6	69.8 - 128		5.24	20	
n-Butylbenzene	1	0.025	0.0217	86.6	0.0219	87.6	77.5 - 126		1.12	20	
n-Hexane	1	0.025	0.0208	83.1	0.0210	84	68.4 - 132		1.08	20	
n-Propylbenzene	1	0.025	0.0230	92	0.0234	93.5	77.9 - 123		1.64	20	
p-Isopropyltoluene	1	0.025	0.0235	93.9	0.0235	94.2	75.8 - 129		0.32	20	
Propene	1	0.025	0.0137	54.7	0.0132	52.7	16.3 - 187		3.83	20	
sec-Butylbenzene	1	0.025	0.0238	95.2	0.0237	94.9	75.8 - 126		0.24	20	
Styrene	1	0.025	0.0252	101	0.0253	101	82.4 - 126		0.72	20	
tert-Butylbenzene	1	0.025	0.0248	99.1	0.0249	99.8	76.4 - 126		0.7	20	
Tetrachloroethene	1	0.025	0.0218	87.2	0.0229	91.4	73.9 - 125		4.77	20	
Toluene	1	0.025	0.0237	94.9	0.0232	92.9	79.7 - 118		2.14	20	
trans-1,2-Dichloroethene	1	0.025	0.0215	86.1	0.0219	87.7	73.8 - 122		1.84	20	
trans-1,3-Dichloropropene	1	0.025	0.0223	89	0.0207	82.9	75.9 - 124		7.14	20	
Trichloroethene	1	0.025	0.0223	89.3	0.0219	87.8	77.9 - 118		1.74	20	
Trichlorofluoromethane	1	0.025	0.0211	84.6	0.0213	85.1	67.7 - 131		0.59	20	
Vinyl chloride	1	0.025	0.0203	81.1	0.0212	84.7	66.7 - 130		4.25	20	
Xylenes, Total	1	0.075	0.0694	92.5	0.0699	93.1	78.8 - 121		0.68	20	

Parameters in bold text are reported in this SDG

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(615) 758-5858
(800) 767-5859
Fax (615) 758-5859
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Quality Control Summary
SDG: L671404
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Volatile Organic Compounds by Method 8260B		
Project No:	ST010022.0026	Matrix:	Soil - mg/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	11/27/2013	**Analytic Batch:**	**WG695026**
Analysis Date:	12/4/2013 5:09:00 AM	Analyst:	611
Instrument ID:	VOCMS20		
Sample Numbers:	L671404-01, -02, -03, -04		

Matrix Spike / Matrix Spike Duplicate

L671363-01

Analyte	Dil	Spike Value	Sample	MS	% Rec	MSD	% Rec	Control Limits	% Rec Qual	RPD	Control Limits	RPD Qual
1,1,1,2-Tetrachloroethane	1	0.025	0.0	0.0224	89.7	0.0228	91	64 - 128		1.52	20	
1,1,1-Trichloroethane	1	0.025	0.0	0.0267	107	0.0272	109	58.7 - 134		2.06	20	
1,1,2,2-Tetrachloroethane	1	0.025	0.0	0.0233	93.1	0.0239	95.7	56 - 132		2.72	22.2	
1,1,2-Trichloroethane	1	0.025	0.0	0.0237	94.7	0.0241	96.5	66.3 - 125		1.94	20	
1,1,2-Trichlorotrifluoroethane	1	0.025	0.0	0.0312	125	0.0277	111	54.8 - 154		12.1	22.5	
1,1-Dichloroethane	1	0.025	0.0	0.0266	106	0.0277	111	58.5 - 132		3.95	20	
1,1-Dichloroethene	1	0.025	0.0	0.0281	112	0.0275	110	51.1 - 140		1.93	20.2	
1,1-Dichloropropene	1	0.025	0.0	0.0273	109	0.0284	114	57.3 - 136		3.82	20	
1,2,3-Trichlorobenzene	1	0.025	0.0003	0.0244	96.3	0.0247	97.2	59.1 - 138		0.95	23.7	
1,2,3-Trichloropropane	1	0.025	0.0	0.0228	91.4	0.0232	93	61.4 - 128		1.73	22.4	
1,2,3-Trimethylbenzene	1	0.025	0.0	0.0225	90.1	0.0227	90.6	61.3 - 122		0.52	20	
1,2,4-Trichlorobenzene	1	0.025	0.0	0.0260	104	0.0260	104	63.6 - 143		0.25	21.9	
1,2,4-Trimethylbenzene	1	0.025	0.0	0.0221	88.3	0.0231	92.6	57.4 - 137		4.69	20	
1,2-Dibromo-3-Chloropropane	1	0.025	0.0	0.0249	99.8	0.0261	104	57.3 - 136		4.57	27	
1,2-Dibromoethane	1	0.025	0.0	0.0220	88.1	0.0227	90.7	67.1 - 125		2.92	20	
1,2-Dichlorobenzene	1	0.025	0.0	0.0237	94.6	0.0238	95.1	68.2 - 123		0.44	20	
1,2-Dichloroethane	1	0.025	0.0	0.0255	102	0.0264	106	60 - 126		3.52	20	
1,2-Dichloropropane	1	0.025	0.0	0.0256	103	0.0266	106	64.2 - 123		3.58	20	
1,3,5-Trimethylbenzene	1	0.025	0.0	0.0234	93.4	0.0241	96.4	63.6 - 132		3.12	20.5	
1,3-Butadiene	1	0.025	0.0	0.0251	101	0.0254	102	30.5 - 151		1.17	21.9	
1,3-Dichlorobenzene	1	0.025	0.0	0.0201	80.4	0.0207	82.7	63.1 - 131		2.76	20	
1,3-Dichloropropane	1	0.025	0.0	0.0228	91.4	0.0235	94	67.9 - 121		2.81	20	
1,4-Dichlorobenzene	1	0.025	0.0	0.0238	95.1	0.0243	97.2	68.6 - 123		2.22	20	
2,2-Dichloropropane	1	0.025	0.0	0.0277	111	0.0286	114	50.5 - 144		3.17	21.9	
2-Butanone (MEK)	1	0.125	0.0	0.1432	115	0.1463	117	22.4 - 138		2.14	27	
2-Chlorotoluene	1	0.025	0.0	0.0212	84.7	0.0219	87.7	63.6 - 128		3.45	20	
4-Chlorotoluene	1	0.025	0.0	0.0223	89.4	0.0231	92.4	65.7 - 127		3.38	20	
4-Ethyltoluene	1	0.025	0.0	0.0229	91.8	0.0237	94.7	64.5 - 138		3.11	20	
4-Methyl-2-pentanone (MIBK)	1	0.125	0.0	0.1457	117	0.1458	117	60.8 - 140		0.11	25.1	
Acetone	1	0.125	0.0019	0.1291	102	0.1297	102	10 - 130		0.42	27.9	
Acrylonitrile	1	0.125	0.0	0.1415	113	0.1429	114	49.4 - 133		0.99	25.3	
Benzene	1	0.025	0.0	0.0257	103	0.0263	105	54.3 - 133		2.42	20	
Bromobenzene	1	0.025	0.0	0.0220	87.9	0.0228	91	63.9 - 124		3.53	20	
Bromodichloromethane	1	0.025	0.0	0.0232	92.9	0.0243	97	63.9 - 121		4.36	20	
Bromoform	1	0.025	0.0	0.0215	86.1	0.0221	88.3	59.5 - 134		2.52	20.8	
Bromomethane	1	0.025	0.0	0.0334	134	0.0317	127	41.7 - 155		5.22	20.5	

Parameters in bold text are reported in this SDG

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(615) 758-5858
(800) 767-5859
Fax (615) 758-5859
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Quality Control Summary
SDG: L671404
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Volatile Organic Compounds by Method 8260B		
Project No:	ST010022.0026	Matrix:	Soil - mg/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	11/27/2013	**Analytic Batch:**	**WG695026**
Analysis Date:	12/4/2013 5:09:00 AM	Analyst:	611
Instrument ID:	VOCMS20		
Sample Numbers:	L671404-01, -02, -03, -04		

Matrix Spike / Matrix Spike Duplicate

L671363-01

Analyte	Dil	Spike Value	Sample	MS	% Rec	MSD	% Rec	Control Limits	% Rec Qual	RPD	Control Limits	RPD Qual
Carbon disulfide	1	0.025	0.0	0.0257	103	0.0251	100	43.3 - 149		2.56	21	
Carbon tetrachloride	1	0.025	0.0	0.0261	104	0.0271	108	55.7 - 134		4.03	20.3	
Chlorobenzene	1	0.025	0.0	0.0212	84.8	0.0223	89.2	67 - 125		4.96	20	
Chlorodibromomethane	1	0.025	0.0	0.0216	86.5	0.0226	90.2	64.3 - 125		4.25	20	
Chloroethane	1	0.025	0.0	0.0264	105	0.0284	114	51.5 - 136		7.53	20.8	
Chloroform	1	0.025	0.0	0.0265	106	0.0274	110	63 - 129		3.33	20	
Chloromethane	1	0.025	0.0	0.0246	98.4	0.0244	97.7	42.4 - 135		0.75	20	
cis-1,2-Dichloroethene	1	0.025	0.0	0.0252	101	0.0264	106	59.2 - 129		4.7	20	
cis-1,3-Dichloropropene	1	0.025	0.0	0.0251	100	0.0260	104	66.4 - 125		3.66	20	
Dibromomethane	1	0.025	0.0	0.0246	98.3	0.0249	99.7	68.2 - 124		1.47	20	
Dichlorodifluoromethane	1	0.025	0.0	0.0285	114	0.0280	112	40.6 - 144		1.87	20.2	
Dicyclopentadiene	1	0.025	0.0	0.0256	102	0.0266	106	61.8 - 139		3.95	20.2	
Di-isopropyl ether	1	0.025	0.0	0.0278	111	0.0285	114	56.9 - 136		2.52	20	
Ethylbenzene	1	0.025	0.0	0.0220	88	0.0226	90.5	61.4 - 133		2.86	20	
Hexachloro-1,3-butadiene	1	0.025	0.0	0.0246	98.4	0.0235	93.9	55.1 - 136		4.66	23.6	
Isopropylbenzene	1	0.025	0.0	0.0255	102	0.0262	105	66.8 - 141		2.52	20	
Methyl tert-butyl ether	1	0.025	0.0	0.0270	108	0.0269	108	57.7 - 134		0.52	20	
Methylene Chloride	1	0.025	0.0	0.0235	94.1	0.0242	96.8	58.1 - 122		2.79	20	
Naphthalene	1	0.025	0.0004	0.0258	102	0.0258	102	58 - 135		0.21	25.5	
n-Butylbenzene	1	0.025	0.0	0.0273	109	0.0278	111	62.7 - 140		2.03	20	
n-Hexane	1	0.025	0.0	0.0263	105	0.0265	106	45 - 144		1.06	20	
n-Propylbenzene	1	0.025	0.0	0.0226	90.3	0.0234	93.4	10 - 176		3.35	26.6	
p-Isopropyltoluene	1	0.025	0.0	0.0238	95.1	0.0246	98.5	63.2 - 139		3.44	20.4	
Propene	1	0.025	0.0	0.0267	107	0.0262	105	65.9 - 131		1.79	20	
sec-Butylbenzene	1	0.025	0.0	0.0237	94.7	0.0241	96.5	62.2 - 136		1.9	20.3	
Styrene	1	0.025	0.0	0.0243	97.1	0.0248	99.3	66.8 - 133		2.3	20	
tert-Butylbenzene	1	0.025	0.0	0.0230	92.2	0.0239	95.5	63.3 - 134		3.52	20.3	
Tetrachloroethene	1	0.025	0.0	0.0208	83	0.0217	86.6	53 - 139		4.25	20	
Toluene	1	0.025	0.0	0.0233	93	0.0245	97.8	61.4 - 130		5.01	20	
trans-1,2-Dichloroethene	1	0.025	0.0	0.0249	99.6	0.0259	104	56.5 - 129		4.06	20	
trans-1,3-Dichloropropene	1	0.025	0.0	0.0242	96.9	0.0255	102	64.1 - 128		5.04	20	
Trichloroethene	1	0.025	0.0	0.0236	94.2	0.0248	99.3	44.1 - 149		5.27	20	
Trichlorofluoromethane	1	0.025	0.0	0.0275	110	0.0282	113	49.6 - 145		2.55	21.2	
Vinyl chloride	1	0.025	0.0	0.0262	105	0.0262	105	47.8 - 137		0.04	20	
Xylenes, Total	1	0.075	0.0	0.0674	89.9	0.0700	93.3	63.3 - 131		3.73	20	

Parameters in bold text are reported in this SDG

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(800) 767-5859
Fax (615) 758-5859
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Quality Control Summary
SDG: L671404
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Volatile Organic Compounds by Method 8260B		
Project No:	ST010022.0026	Matrix:	Soil - mg/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	11/27/2013	**Analytic Batch:**	**WG695588**
Analysis Date:	12/5/2013 5:37:00 AM	Analyst:	611
Instrument ID:	VOCMS14		
Sample Numbers:	L671404-01, -02, -03, -04		

Matrix Spike / Matrix Spike Duplicate

L671745-01

Analyte	Dil	Spike Value	Sample	MS	% Rec	MSD	% Rec	Control Limits	% Rec Qual	RPD	Control Limits	RPD Qual
1,1,1,2-Tetrachloroethane	5	0.025	0.0	0.1011	80.9	0.1054	84.3	64 - 128		4.22	20	
1,1,1-Trichloroethane	5	0.025	0.0	0.0897	71.7	0.0977	78.1	58.7 - 134		8.52	20	
1,1,2,2-Tetrachloroethane	5	0.025	0.0	0.1021	81.7	0.1086	86.9	56 - 132		6.18	22.2	
1,1,2-Trichloroethane	5	0.025	0.0	0.1077	86.2	0.1149	91.9	66.3 - 125		6.42	20	
1,1,2-Trichlorotrifluoroethane	5	0.025	0.0	0.0971	77.7	0.1063	85.1	54.8 - 154		9.09	22.5	
1,1-Dichloroethane	5	0.025	0.0	0.0987	78.9	0.1036	82.9	58.5 - 132		4.89	20	
1,1-Dichloroethene	5	0.025	0.0	0.0876	70.1	0.0929	74.3	51.1 - 140		5.77	20.2	
1,1-Dichloropropene	5	0.025	0.0	0.0913	73.1	0.0990	79.2	57.3 - 136		8.07	20	
1,2,3-Trichlorobenzene	5	0.025	0.0	0.1082	86.5	0.1101	88.1	59.1 - 138		1.79	23.7	
1,2,3-Trichloropropane	5	0.025	0.0	0.1052	84.1	0.1183	94.7	61.4 - 128		11.8	22.4	
1,2,3-Trimethylbenzene	5	0.025	0.0	0.0944	75.5	0.0946	75.7	61.3 - 122		0.2	20	
1,2,4-Trichlorobenzene	5	0.025	0.0	0.1129	90.4	0.1107	88.6	63.6 - 143		1.98	21.9	
1,2,4-Trimethylbenzene	5	0.025	0.0	0.1013	81	0.1096	87.7	57.4 - 137		7.88	20	
1,2-Dibromo-3-Chloropropane	5	0.025	0.0	0.0885	70.8	0.0926	74.1	57.3 - 136		4.47	27	
1,2-Dibromoethane	5	0.025	0.0	0.1005	80.4	0.1085	86.8	67.1 - 125		7.7	20	
1,2-Dichlorobenzene	5	0.025	0.0	0.1072	85.8	0.1091	87.3	68.2 - 123		1.69	20	
1,2-Dichloroethane	5	0.025	0.0	0.0895	71.6	0.0931	74.4	60 - 126		3.95	20	
1,2-Dichloropropane	5	0.025	0.0	0.1038	83	0.1056	84.5	64.2 - 123		1.76	20	
1,3,5-Trimethylbenzene	5	0.025	0.0	0.1066	85.3	0.1143	91.4	63.6 - 132		6.91	20.5	
1,3-Butadiene	5	0.025	0.0	0.0781	62.5	0.0843	67.5	30.5 - 151		7.61	21.9	
1,3-Dichlorobenzene	5	0.025	0.0	0.1061	84.9	0.1137	91	63.1 - 131		6.95	20	
1,3-Dichloropropane	5	0.025	0.0	0.1061	84.9	0.1105	88.4	67.9 - 121		4.01	20	
1,4-Dichlorobenzene	5	0.025	0.0	0.1051	84.1	0.1056	84.5	68.6 - 123		0.46	20	
2,2-Dichloropropane	5	0.025	0.0	0.0895	71.6	0.0971	77.7	50.5 - 144		8.1	21.9	
2-Butanone (MEK)	5	0.125	0.0	0.5364	85.8	0.4899	78.4	22.4 - 138		9.06	27	
2-Chlorotoluene	5	0.025	0.0	0.1086	86.9	0.1100	88	63.6 - 128		1.22	20	
4-Chlorotoluene	5	0.025	0.0	0.1021	81.7	0.1086	86.9	65.7 - 127		6.14	20	
4-Ethyltoluene	5	0.025	0.0	0.1066	85.3	0.1135	90.8	64.5 - 138		6.3	20	
4-Methyl-2-pentanone (MIBK)	5	0.125	0.0	0.5180	82.9	0.5233	83.7	60.8 - 140		1.02	25.1	
Acetone	5	0.125	0.0258	0.5004	75.9	0.5418	82.6	10 - 130		7.96	27.9	
Acrylonitrile	5	0.125	0.0	0.5229	83.7	0.5458	87.3	49.4 - 133		4.27	25.3	
Benzene	5	0.025	0.0	0.0977	78.2	0.1028	82.2	54.3 - 133		5.04	20	
Bromobenzene	5	0.025	0.0	0.0999	79.9	0.1077	86.2	63.9 - 124		7.53	20	
Bromodichloromethane	5	0.025	0.0	0.0907	72.6	0.0923	73.8	63.9 - 121		1.75	20	
Bromoform	5	0.025	0.0	0.1005	80.4	0.1057	84.6	59.5 - 134		5.07	20.8	
Bromomethane	5	0.025	0.0	0.1052	84.1	0.1134	90.7	41.7 - 155		7.53	20.5	

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Quality Control Summary
SDG: L671404
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Volatile Organic Compounds by Method 8260B		
Project No:	ST010022.0026	Matrix:	Soil - mg/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	11/27/2013	**Analytic Batch:**	**WG695588**
Analysis Date:	12/5/2013 5:37:00 AM	Analyst:	611
Instrument ID:	VOCMS14		
Sample Numbers:	L671404-01, -02, -03, -04		

Matrix Spike / Matrix Spike Duplicate

L671745-01

Analyte	Dil	Spike Value	Sample	MS	% Rec	MSD	% Rec	Control Limits	% Rec Qual	RPD	Control Limits	RPD Qual
Carbon disulfide	5	0.025	0.0	0.0765	61.2	0.0819	65.5	43.3 - 149		6.83	21	
Carbon tetrachloride	5	0.025	0.0	0.0905	72.4	0.0958	76.6	55.7 - 134		5.66	20.3	
Chlorobenzene	5	0.025	0.0	0.1121	89.6	0.1161	92.9	67 - 125		3.52	20	
Chlorodibromomethane	5	0.025	0.0	0.0960	76.8	0.1032	82.5	64.3 - 125		7.19	20	
Chloroethane	5	0.025	0.0	0.1002	80.1	0.1115	89.2	51.5 - 136		10.7	20.8	
Chloroform	5	0.025	0.0	0.1014	81.1	0.1049	83.9	63 - 129		3.44	20	
Chloromethane	5	0.025	0.0	0.0852	68.1	0.0893	71.4	42.4 - 135		4.71	20	
cis-1,2-Dichloroethene	5	0.025	0.0	0.0982	78.5	0.1015	81.2	59.2 - 129		3.29	20	
cis-1,3-Dichloropropene	5	0.025	0.0	0.0992	79.3	0.1009	80.7	66.4 - 125		1.71	20	
Dibromomethane	5	0.025	0.0	0.1000	80	0.1019	81.5	68.2 - 124		1.89	20	
Dichlorodifluoromethane	5	0.025	0.0	0.0771	61.7	0.0833	66.7	40.6 - 144		7.76	20.2	
Dicyclopentadiene	5	0.025	0.0	0.1111	88.9	0.1191	95.3	61.8 - 139		7.01	20.2	
Di-isopropyl ether	5	0.025	0.0	0.1008	80.7	0.1049	83.9	56.9 - 136		3.93	20	
Ethylbenzene	5	0.025	0.0	0.1048	83.9	0.1129	90.3	61.4 - 133		7.42	20	
Hexachloro-1,3-butadiene	5	0.025	0.0	0.0926	74	0.0917	73.3	55.1 - 136		0.98	23.6	
Isopropylbenzene	5	0.025	0.0	0.1145	91.6	0.1229	98.3	66.8 - 141		7.05	20	
Methyl tert-butyl ether	5	0.025	0.0	0.0953	76.2	0.1009	80.7	57.7 - 134		5.67	20	
Methylene Chloride	5	0.025	0.0004	0.0987	78.6	0.0997	79.4	58.1 - 122		0.99	20	
Naphthalene	5	0.025	0.0011	0.1061	84	0.1093	86.6	58 - 135		2.98	25.5	
n-Butylbenzene	5	0.025	0.0	0.0977	78.2	0.1005	80.4	62.7 - 140		2.81	20	
n-Hexane	5	0.025	0.0	0.0802	64.2	0.0826	66.1	45 - 144		2.88	20	
n-Propylbenzene	5	0.025	0.0	0.1054	84.3	0.1118	89.5	10 - 176		5.96	26.6	
p-Isopropyltoluene	5	0.025	0.0	0.1056	84.5	0.1135	90.8	63.2 - 139		7.23	20.4	
Propene	5	0.025	0.0	0.0577	46.1	0.0609	48.7	65.9 - 131	M2	5.41	20	
sec-Butylbenzene	5	0.025	0.0	0.1065	85.2	0.1143	91.4	62.2 - 136		7.03	20.3	
Styrene	5	0.025	0.0	0.1151	92.1	0.1197	95.7	66.8 - 133		3.89	20	
tert-Butylbenzene	5	0.025	0.0	0.1120	89.6	0.1201	96.1	63.3 - 134		6.96	20.3	
Tetrachloroethene	5	0.025	0.0	0.0997	79.8	0.1113	89	53 - 139		11	20	
Toluene	5	0.025	0.0	0.1044	83.5	0.1062	85	61.4 - 130		1.75	20	
trans-1,2-Dichloroethene	5	0.025	0.0	0.0939	75.2	0.0993	79.5	56.5 - 129		5.56	20	
trans-1,3-Dichloropropene	5	0.025	0.0	0.0949	76	0.0956	76.5	64.1 - 128		0.69	20	
Trichloroethene	5	0.025	0.0	0.0986	78.9	0.1032	82.6	44.1 - 149		4.55	20	
Trichlorofluoromethane	5	0.025	0.0	0.0917	73.4	0.0996	79.7	49.6 - 145		8.27	21.2	
Vinyl chloride	5	0.025	0.0	0.0868	69.4	0.0914	73.1	47.8 - 137		5.21	20	
Xylenes, Total	5	0.075	0.0005	0.3114	82.9	0.3350	89.2	63.3 - 131		7.31	20	

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Quality Control Summary
SDG: L671404
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Volatile Organic Compounds by Method 8260B		
Project No:	ST010022.0026	Matrix:	Soil - mg/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	11/27/2013	**Analytic Batch:**	**WG695026**
Analysis Date:	12/4/2013 5:09:00 AM	Analyst:	611
Instrument ID:	VOCMS20		
Sample Numbers:	L671404-01, -02, -03, -04		

Internal Standard Response and Retention Time Summary

File ID: 1203_29
Analyzed: 12/03/13 220000

	DCB		DFB		BCP		PFB	
	Response	**RT**	**Response**	**RT**	**Response**	**RT**	**Response**	**RT**
12 Hr. Std	197677	8.25	435362	4.70	77976	5.87	234829	4.37
Upper Limit	395000	8.75	871000	5.20	156000	6.37	470000	4.87
Lower Limit	98800	7.75	218000	4.20	39000	5.37	117000	3.87
Sample ID	**Response**	**RT**	**Response**	**RT**	**Response**	**RT**	**Response**	**RT**
L671404-01 25X	226304	8.25	477774	4.69	79650	5.86	256982	4.36
L671404-02 24.50X	231148	8.25	501247	4.69	82621	5.86	270158	4.36
L671404-03 20X	208250	8.25	441682	4.69	72899	5.87	244545	4.36
L671404-04 23X	224766	8.25	464071	4.69	76383	5.86	256025	4.36
MSD WG695026	234043	8.25	541640	4.70	98880	5.87	280712	4.37
MS WG695026	224280	8.25	519954	4.69	95648	5.87	270373	4.36
LCSD WG695026	198990	8.25	423758	4.69	78812	5.87	234756	4.37
LCS WG695026	199512	8.25	420902	4.69	76501	5.86	230027	4.36
BLANK WG695026	219472	8.25	475285	4.70	79950	5.87	251015	4.37

Legend:
DCB -- 1,4-Dichlorobenzene-d4
DFB -- 1,4-Difluorobenzene
BCP -- 2-Bromo-1-Chloropropane
PFB -- Pentafluorobenzene

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L671404
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Volatile Organic Compounds by Method 8260B		
Project No:	ST010022.0026	Matrix:	Soil - mg/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	11/27/2013	**Analytic Batch:**	**WG695588**
Analysis Date:	12/5/2013 5:37:00 AM	Analyst:	611
Instrument ID:	VOCMS14		
Sample Numbers:	L671404-01, -02, -03, -04		

Internal Standard Response and Retention Time Summary

File ID: 1205_02
Analyzed: 12/04/13 232400

	DCB		DFB		BCP		PFB	
	Response	**RT**	**Response**	**RT**	**Response**	**RT**	**Response**	**RT**
12 Hr. Std	264570	8.35	587668	4.80	86380	5.96	346538	4.46
Upper Limit	529000	8.85	1180000	5.30	173000	6.46	693000	4.96
Lower Limit	132000	7.85	294000	4.30	43200	5.46	173000	3.96
Sample ID	**Response**	**RT**	**Response**	**RT**	**Response**	**RT**	**Response**	**RT**
L671404-01 25X	288049	8.35	669275	4.79	88203	5.96	386877	4.46
L671404-02 24.50X	303374	8.35	703448	4.79	93714	5.96	393598	4.45
L671404-03 20X	251256	8.35	570593	4.79	75857	5.96	335831	4.46
L671404-04 23X	295038	8.35	691306	4.79	90169	5.96	389007	4.46
MSD WG695588 5X	274529	8.35	611297	4.80	83335	5.96	354786	4.46
MS WG695588 5X	294797	8.36	668265	4.80	94470	5.96	388543	4.47
LCSD WG695588	297839	8.35	660734	4.80	92153	5.96	375597	4.46
LCS WG695588	295001	8.35	648879	4.80	92362	5.96	377661	4.46
BLANK WG695588	294097	8.35	660181	4.80	92389	5.96	378756	4.46

Legend:
DCB -- 1,4-Dichlorobenzene-d4
DFB -- 1,4-Difluorobenzene
BCP -- 2-Bromo-1-Chloropropane
PFB -- Pentafluorobenzene

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L671404
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Volatile Organic Compounds by Method 8260B		
Project No:	ST010022.0026	Matrix:	Soil - mg/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	11/27/2013	**Analytic Batch:**	**WG695026**
Analysis Date:	12/4/2013 5:09:00 AM	Analyst:	611
Instrument ID:	VOCMS20		
Sample Numbers:	L671404-01, -02, -03, -04		

Surrogate Summary

			BFB		DFM		TD8		TFT	
Laboratory Sample ID	Instrument	File ID	ppm	% Rec	ppm	% Rec	ppm	% Rec	ppm	% Rec
L671404-01 25x	VOCMS20	1203_49	0.0417	104	0.0413	103	0.0417	104		
L671404-02 24.50x	VOCMS20	1203_50	0.0411	103	0.0400	100	0.0405	101		
L671404-03 20x	VOCMS20	1203_51	0.0424	106	0.0406	101	0.0413	103		
L671404-04 23x	VOCMS20	1203_52	0.0429	107	0.0412	103	0.0420	105		
LCS WG695026	VOCMS20	1203_30	0.0393	98.3	0.0439	110	0.0434	108	0.0424	106
LCSD WG695026	VOCMS20	1203_31	0.0395	98.7	0.0430	108	0.0433	108	0.0420	105
MS WG695026	VOCMS20	1203_32	0.0384	96.1	0.0451	113	0.0423	106	0.0395	98.8
MSD WG695026	VOCMS20	1203_33	0.0392	97.9	0.0451	113	0.0422	105	0.0386	96.4
BLANK WG695026	VOCMS20	1203_35	0.0407	102	0.0422	105	0.0407	102	0.0401	100

BFB --4-BROMOFLUOROBENZENE	True Value: 0.04 ppm	Limits: 71 - 126
DFM --DIBROMOFLUOROMETHANE	True Value: 0.04 ppm	Limits: 78.3 - 121
TD8 --TOLUENE-D8	True Value: 0.04 ppm	Limits: 88.50 - 111
TFT --A,A,A-TRIFLUOROTOLUENE	True Value: 0.04 ppm	Limits: 85 - 114

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Quality Control Summary
SDG: L671404
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Volatile Organic Compounds by Method 8260B		
Project No:	ST010022.0026	Matrix:	Soil - mg/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	11/27/2013	**Analytic Batch:**	**WG695588**
Analysis Date:	12/5/2013 5:37:00 AM	Analyst:	611
Instrument ID:	VOCMS14		
Sample Numbers:	L671404-01, -02, -03, -04		

Surrogate Summary

			BFB		DFM		TD8		TFT	
Laboratory Sample ID	Instrument	File ID	ppm	% Rec	ppm	% Rec	ppm	% Rec	ppm	% Rec
L671404-01 25x	VOCMS14	1205_18	0.0394	98.4	0.0379	94.8	0.0406	101		
L671404-02 24.50x	VOCMS14	1205_19	0.0396	98.9	0.0371	92.6	0.0416	104		
L671404-03 20x	VOCMS14	1205_20	0.0400	99.9	0.0365	91.1	0.0412	103		
L671404-04 23x	VOCMS14	1205_21	0.0405	101	0.0368	92.0	0.0413	103		
LCS WG695588	VOCMS14	1205_03	0.0389	97.3	0.0392	98.0	0.0418	105	0.0408	102
LCSD WG695588	VOCMS14	1205_04	0.0389	97.1	0.0395	98.8	0.0421	105	0.0409	102
MS WG695588 5x	VOCMS14	1205_05	0.0382	95.6	0.0385	96.3	0.0414	103	0.0408	102
MSD WG695588 5x	VOCMS14	1205_06	0.0396	98.9	0.0405	101	0.0416	104	0.0413	103
BLANK WG695588	VOCMS14	1205_09	0.0412	103	0.0376	94.0	0.0428	107	0.0416	104

BFB --4-BROMOFLUOROBENZENE	True Value: 0.04 ppm	Limits: 71 - 126
DFM --DIBROMOFLUOROMETHANE	True Value: 0.04 ppm	Limits: 78.3 - 121
TD8 --TOLUENE-D8	True Value: 0.04 ppm	Limits: 88.50 - 111
TFT --A,A,A-TRIFLUOROTOLUENE	True Value: 0.04 ppm	Limits: 85 - 114

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Quality Control Summary
SDG: L671404
Kinder Morgan - Rocklin, CA-AZ Work

Test:	TPH by Method 8015D/DRO_AZ		
Project No:	ST010022.0026	Matrix:	Soil - mg/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	11/27/2013	**Analytic Batch:**	**WG694927**
Analysis Date:	12/2/2013 7:55:00 PM	Analyst:	187
Instrument ID:	SVGC2	Prep Date:	11/29/2013
Sample Numbers:	L671404-01, -02, -03, -04		

Method Blank

Analyte	CAS	RDL	Qualifier
C10-C22 Hydrocarbons		< 30.0	
C22-C32 Hydrocarbons		< 50.0	

Laboratory Control Sample (LCS)

Analyte	Dil	True Value	Found	% Rec	Control Limits	Qual
C10-C22 Hydrocarbons	1	30	23.023	76.7	70 - 130	
C22-C32 Hydrocarbons	1	30	30.793	103	70 - 130	

Laboratory Control Sample Duplicate (LCSD)

Analyte	Dil	True Value	Found	% Rec	Control Limits	Qual
C10-C22 Hydrocarbons	1	30	23.528	78.4	70 - 130	
C22-C32 Hydrocarbons	1	30	31.282	104	70 - 130	

Laboratory Control Sample / Laboratory Control Sample Duplicate

Analyte	Dil	Spike	LCS	% Rec	LCSD	% Rec	Control Limits	% Rec Qual	% RPD	Control Limits	RPD Qual
C10-C22 Hydrocarbons	1	30	23.023	76.7	23.528	78.4	70 - 130		2.17	20	
C22-C32 Hydrocarbons	1	30	30.793	103	31.282	104	70 - 130		1.58	20	

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L671404
Kinder Morgan - Rocklin, CA-AZ Work

Test:	TPH by Method 8015D/DRO_AZ		
Project No:	ST010022.0026	Matrix:	Soil - mg/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	11/27/2013	**Analytic Batch:**	**WG694927**
Analysis Date:	12/2/2013 7:55:00 PM	Analyst:	187
Instrument ID:	SVGC2	Prep Date:	11/29/2013
Sample Numbers:	L671404-01, -02, -03, -04		

Surrogate Summary

Laboratory Sample ID	Instrument	File ID	o-Terphenyl ppm	o-Terphenyl % Rec
L671404-01	SVGC2	1202_43	0.623	77.8
L671404-02	SVGC2	1202_44	0.647	80.8
L671404-03	SVGC2	1202_45	0.639	79.9
L671404-04	SVGC2	1202_46	0.642	80.2
BLANK WG694927	SVGC2	1202_08	0.708	88.5
LCS WG694927	SVGC2	1202_09	0.686	85.7
LCSD WG694927	SVGC2	1202_10	0.699	87.4

o-Terphenyl --O-TERPHENYL True Value: 0.8 ppm Limits: 70 - 130

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Quality Control Summary
SDG: L671404
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Polychlorinated Biphenyls by Method 8082		
Project No:	ST010022.0026	Matrix:	Soil - ug/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	11/27/2013	**Analytic Batch:**	**WG695049**
Analysis Date:	12/3/2013 12:24:00 PM	Analyst:	164
Instrument ID:	SVGC20	Prep Date:	12/1/2013
Sample Numbers:	L671404-01, -02, -03, -04		

Method Blank

Analyte	CAS	RDL	Qualifier
PCB 1016	12674-11-2	< 17.0	
PCB 1221	11104-28-2	< 17.0	
PCB 1232	11141-16-5	< 17.0	
PCB 1242	53469-21-9	< 17.0	
PCB 1248	12672-29-6	< 17.0	
PCB 1254	11097-69-1	< 17.0	
PCB 1260	11096-82-5	< 17.0	

Laboratory Control Sample (LCS)

Analyte	Dil	True Value	Found	% Rec	Control Limits	Qual
PCB 1016	1	167	156.59	93.8	63.2 - 118	
PCB 1260	1	167	174.93	105	64.6 - 123	

Laboratory Control Sample Duplicate (LCSD)

Analyte	Dil	True Value	Found	% Rec	Control Limits	Qual
PCB 1016	1	167	149.92	89.8	63.2 - 118	
PCB 1260	1	167	163.89	98.1	64.6 - 123	

Laboratory Control Sample / Laboratory Control Sample Duplicate

Analyte	Dil	Spike	LCS	% Rec	LCSD	% Rec	Control Limits	% Rec Qual	% RPD	Control Limits	RPD Qual
PCB 1016	1	167	156.59	93.8	149.92	89.8	63.2 - 118		4.35	20	
PCB 1260	1	167	174.93	105	163.89	98.1	64.6 - 123		6.52	20.8	

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L671404
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Polychlorinated Biphenyls by Method 8082		
Project No:	ST010022.0026	Matrix:	Soil - ug/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	11/27/2013	**Analytic Batch:**	**WG695049**
Analysis Date:	12/3/2013 12:24:00 PM	Analyst:	164
Instrument ID:	SVGC20	Prep Date:	12/1/2013
Sample Numbers:	L671404-01, -02, -03, -04		

Matrix Spike / Matrix Spike Duplicate

L671406-13

Analyte	Dil	Spike Value	Sample	MS	% Rec	MSD	% Rec	Control Limits	% Rec Qual	RPD	Control Limits	RPD Qual
PCB 1016	1	167	0.0	180.92	108	179.29	107	23.5 - 134		0.9	25.8	
PCB 1260	1	167	0.0	228.25	137	221.63	133	16.1 - 139		2.94	25.9	

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L671404
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Polychlorinated Biphenyls by Method 8082		
Project No:	ST010022.0026	Matrix:	Soil - ug/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	11/27/2013	**Analytic Batch:**	**WG695049**
Analysis Date:	12/3/2013 12:24:00 PM	Analyst:	164
Instrument ID:	SVGC20	Prep Date:	12/1/2013
Sample Numbers:	L671404-01, -02, -03, -04		

Surrogate Summary

Laboratory			DCB Column 1		DCB Column 2		TCX Column 1		TCX Column 2	
Sample ID	Instrument	File ID	ppm	% Rec	ppm	% Rec	ppm	% Rec	ppm	% Rec
L671404-01	SVGC20	1203_28	0.0636	95.5	0.0656	98.5	0.0683	103	0.0698	105
L671404-02	SVGC20	1203_29	0.0594	89.3	0.0609	91.5	0.0712	107	0.0725	109
L671404-03	SVGC20	1203_30	0.0508	76.3	0.0531	79.7	0.0653	98.1	0.0671	101
L671404-04	SVGC20	1203_31	0.0544	81.7	0.0559	84.0	0.0685	103	0.0700	105
BLANK WG695049	SVGC20	1203_24	0.0743	111	0.0740	111	0.0753	113	0.0756	113
LCS WG695049	SVGC20	1203_25	0.0684	103	0.0697	105	0.0704	106	0.0718	108
LCSD WG695049	SVGC20	1203_26	0.0611	91.8	0.0629	94.5	0.0630	94.7	0.0650	97.5
MS WG695049	SVGC20	1203_53	0.0765	115	0.0763	115	0.0773	116	0.0778	117
MSD WG695049	SVGC20	1203_54	0.0768	115	0.0787	118	0.0734	110	0.0754	113

DCB --DECACHLOROBIPHENYL	True Value: 0.0666 ppm	Limits: 10 - 145
TCX --TETRACHLORO-M-XYLENE	True Value: 0.0666 ppm	Limits: 21.10 - 148

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Quality Control Summary
SDG: L671404
Kinder Morgan - Rocklin, CA-AZ Work

Test:	OP Pesticides by Method 8141		
Project No:	ST010022.0026	Matrix:	Soil - mg/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	11/27/2013	**Analytic Batch:**	**WG695054**
Analysis Date:	12/3/2013 11:40:00 PM	Analyst:	386
Instrument ID:	SVGC12	Prep Date:	12/1/2013
Sample Numbers:	L671404-01, -02, -03, -04		

Method Blank

Analyte	CAS	RDL	Qualifier
Azinphos-Methyl	86-50-0	< 0.100	
Bolstar (Sulprofos)	35400-43-2	< 0.100	
Chlorpyrifos	2921-88-2	< 0.100	
Coumaphos	56-72-4	< 0.100	
Demeton,-O and -S	8065-48-3	< 0.0700	
Diazinon	333-41-5	< 0.100	
Dichlorvos	62-73-7	< 0.100	
Dimethoate	60-51-5	< 0.100	
Disulfoton	298-04-4	< 0.100	
EPN	2104-64-5	< 0.100	
Ethoprop	13194-48-4	< 0.100	
Ethyl Parathion	56-38-2	< 0.100	
Fensulfothion	115-90-2	< 0.100	
Fenthion	55-38-9	< 0.100	
Malathion	121-75-5	< 0.100	
Merphos	150-50-5	< 0.100	
Methyl parathion	298-00-0	< 0.100	
Mevinphos	7786-34-7	< 0.100	
Naled	300-76-5	< 0.100	
Phorate	298-02-2	< 0.100	
Ronnel	299-84-3	< 0.100	
Stirophos	22248-79-9	< 0.100	
Sulfotep	3689-24-5	< 0.100	
TEPP	21646-99-1	< 0.100	
Tokuthion (Prothothiofos)	34643-46-4	< 0.100	
Trichloronate	327-98-0	< 0.100	

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L671404
Kinder Morgan - Rocklin, CA-AZ Work

Test:	OP Pesticides by Method 8141		
Project No:	ST010022.0026	Matrix:	Soil - mg/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	11/27/2013	**Analytic Batch:**	**WG695054**
Analysis Date:	12/3/2013 11:40:00 PM	Analyst:	386
Instrument ID:	SVGC12	Prep Date:	12/1/2013
Sample Numbers:	L671404-01, -02, -03, -04		

Laboratory Control Sample (LCS)

Analyte	Dil	True Value	Found	% Rec	Control Limits	Qual
Azinphos-Methyl	1	0.3335	0.2499	74.9	55.4 - 123	
Bolstar (Sulprofos)	1	0.3335	0.2407	72.2	57.9 - 120	
Chlorpyrifos	1	0.3335	0.2434	73	58.3 - 118	
Coumaphos	1	0.3335	0.2432	72.9	56.7 - 119	
Demeton,-O and -S	1	0.1668	0.1158	69.4	57.8 - 113	
Diazinon	1	0.3335	0.2087	62.6	43.8 - 134	
Dichlorvos	1	0.3335	0.1762	52.8	34.2 - 108	
Dimethoate	1	0.3335	0.2001	60	37.4 - 109	
Disulfoton	1	0.3335	0.2397	71.9	59.6 - 114	
EPN	1	0.3335	0.2512	75.3	50.5 - 126	
Ethoprop	1	0.3335	0.2354	70.6	58.2 - 117	
Ethyl Parathion	1	0.3335	0.2544	76.3	51.1 - 130	
Fensulfothion	1	0.3335	0.2352	70.5	37.8 - 111	
Fenthion	1	0.3335	0.2353	70.5	59 - 118	
Malathion	1	0.3335	0.2398	71.9	55 - 127	
Merphos	1	0.3335	0.2300	69	10 - 156	
Methyl parathion	1	0.3335	0.2636	79	57.8 - 120	
Mevinphos	1	0.3335	0.2044	61.3	44.2 - 116	
Naled	1	0.3335	0.1325	39.7	10.8 - 138	
Phorate	1	0.3335	0.2390	71.7	58.1 - 114	
Ronnel	1	0.3335	0.2391	71.7	59.1 - 114	
Stirophos	1	0.3335	0.2427	72.8	55.7 - 119	
Sulfotep	1	0.3335	0.2368	71	57.2 - 121	
TEPP	1	0.3335	0.0129	3.88	0 - 117	
Tokuthion (Prothothiofos)	1	0.3335	0.2383	71.4	55.6 - 119	
Trichloronate	1	0.3335	0.2415	72.4	57.4 - 114	

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L671404
Kinder Morgan - Rocklin, CA-AZ Work

Test:	OP Pesticides by Method 8141		
Project No:	ST010022.0026	Matrix:	Soil - mg/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	11/27/2013	**Analytic Batch:**	**WG695054**
Analysis Date:	12/3/2013 11:40:00 PM	Analyst:	386
Instrument ID:	SVGC12	Prep Date:	12/1/2013
Sample Numbers:	L671404-01, -02, -03, -04		

Laboratory Control Sample Duplicate (LCSD)

Analyte	Dil	True Value	Found	% Rec	Control Limits	Qual
Azinphos-Methyl	1	0.3335	0.2969	89	55.4 - 123	
Bolstar (Sulprofos)	1	0.3335	0.2973	89.2	57.9 - 120	
Chlorpyrifos	1	0.3335	0.3026	90.7	58.3 - 118	
Coumaphos	1	0.3335	0.2948	88.4	56.7 - 119	
Demeton,-O and -S	1	0.1668	0.1432	85.8	57.8 - 113	
Diazinon	1	0.3335	0.2607	78.2	43.8 - 134	
Dichlorvos	1	0.3335	0.2151	64.5	34.2 - 108	
Dimethoate	1	0.3335	0.2245	67.3	37.4 - 109	
Disulfoton	1	0.3335	0.2930	87.9	59.6 - 114	
EPN	1	0.3335	0.2973	89.2	50.5 - 126	
Ethoprop	1	0.3335	0.2880	86.4	58.2 - 117	
Ethyl Parathion	1	0.3335	0.3153	94.5	51.1 - 130	
Fensulfothion	1	0.3335	0.2634	79	37.8 - 111	
Fenthion	1	0.3335	0.2940	88.2	59 - 118	
Malathion	1	0.3335	0.3006	90.1	55 - 127	
Merphos	1	0.3335	0.2922	87.6	10 - 156	
Methyl parathion	1	0.3335	0.3229	96.8	57.8 - 120	
Mevinphos	1	0.3335	0.2492	74.7	44.2 - 116	
Naled	1	0.3335	0.1702	51	10.8 - 138	
Phorate	1	0.3335	0.2934	88	58.1 - 114	
Ronnel	1	0.3335	0.2952	88.5	59.1 - 114	
Stirophos	1	0.3335	0.3028	90.8	55.7 - 119	
Sulfotep	1	0.3335	0.2890	86.7	57.2 - 121	
TEPP	1	0.3335	0.0100	2.99	0 - 117	
Tokuthion (Prothothiofos)	1	0.3335	0.2980	89.4	55.6 - 119	
Trichloronate	1	0.3335	0.2995	89.8	57.4 - 114	

Parameters in bold text are reported in this SDG

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Mt. Juliet, TN 37122
(615) 758-5858
(800) 767-5859
Fax (615) 758-5859
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Quality Control Summary
SDG: L671404
Kinder Morgan - Rocklin, CA-AZ Work

Test:	OP Pesticides by Method 8141		
Project No:	ST010022.0026	Matrix:	Soil - mg/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	11/27/2013	**Analytic Batch:**	**WG695054**
Analysis Date:	12/3/2013 11:40:00 PM	Analyst:	386
Instrument ID:	SVGC12	Prep Date:	12/1/2013
Sample Numbers:	L671404-01, -02, -03, -04		

Laboratory Control Sample / Laboratory Control Sample Duplicate

Analyte	Dil	Spike	LCS	% Rec	LCSD	% Rec	Control Limits	% Rec Qual	% RPD	Control Limits	RPD Qual
Azinphos-Methyl	1	0.3335	0.2499	74.9	0.2969	89	55.4 - 123		17.2	20	
Bolstar (Sulprofos)	1	0.3335	0.2407	72.2	0.2973	89.2	57.9 - 120		21	20	R7
Chlorpyrifos	1	0.3335	0.2434	73	0.3026	90.7	58.3 - 118		21.7	20	R7
Coumaphos	1	0.3335	0.2432	72.9	0.2948	88.4	56.7 - 119		19.2	20	
Demeton,-O and -S	1	0.1668	0.1158	69.4	0.1432	85.8	57.8 - 113		21.1	20	R7
Diazinon	1	0.3335	0.2087	62.6	0.2607	78.2	43.8 - 134		22.1	20	R7
Dichlorvos	1	0.3335	0.1762	52.8	0.2151	64.5	34.2 - 108		19.9	21.7	
Dimethoate	1	0.3335	0.2001	60	0.2245	67.3	37.4 - 109		11.5	24.7	
Disulfoton	1	0.3335	0.2397	71.9	0.2930	87.9	59.6 - 114		20	20	R7
EPN	1	0.3335	0.2512	75.3	0.2973	89.2	50.5 - 126		16.8	20	
Ethoprop	1	0.3335	0.2354	70.6	0.2880	86.4	58.2 - 117		20.1	20	R7
Ethyl Parathion	1	0.3335	0.2544	76.3	0.3153	94.5	51.1 - 130		21.4	20	R7
Fensulfothion	1	0.3335	0.2352	70.5	0.2634	79	37.8 - 111		11.3	20.2	
Fenthion	1	0.3335	0.2353	70.5	0.2940	88.2	59 - 118		22.2	20	R7
Malathion	1	0.3335	0.2398	71.9	0.3006	90.1	55 - 127		22.5	20	R7
Merphos	1	0.3335	0.2300	69	0.2922	87.6	10 - 156		23.8	20	R7
Methyl parathion	1	0.3335	0.2636	79	0.3229	96.8	57.8 - 120		20.2	20	R7
Mevinphos	1	0.3335	0.2044	61.3	0.2492	74.7	44.2 - 116		19.8	20	
Naled	1	0.3335	0.1325	39.7	0.1702	51	10.8 - 138		24.9	23.5	R7
Phorate	1	0.3335	0.2390	71.7	0.2934	88	58.1 - 114		20.4	20	R7
Ronnel	1	0.3335	0.2391	71.7	0.2952	88.5	59.1 - 114		21	20	R7
Stirophos	1	0.3335	0.2427	72.8	0.3028	90.8	55.7 - 119		22	20	R7
Sulfotep	1	0.3335	0.2368	71	0.2890	86.7	57.2 - 121		19.8	20	
TEPP	1	0.3335	0.0129	3.88	0.0100	2.99	0 - 117		25.9	40	
Tokuthion (Prothothiofos)	1	0.3335	0.2383	71.4	0.2980	89.4	55.6 - 119		22.3	20	R7
Trichloronate	1	0.3335	0.2415	72.4	0.2995	89.8	57.4 - 114		21.4	20	R7

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(800) 767-5859
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Quality Control Summary
SDG: L671404
Kinder Morgan - Rocklin, CA-AZ Work

Test:	OP Pesticides by Method 8141		
Project No:	ST010022.0026	Matrix:	Soil - mg/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	11/27/2013	**Analytic Batch:**	**WG695054**
Analysis Date:	12/3/2013 11:40:00 PM	Analyst:	386
Instrument ID:	SVGC12	Prep Date:	12/1/2013
Sample Numbers:	L671404-01, -02, -03, -04		

Matrix Spike / Matrix Spike Duplicate

L671404-04

Analyte	Dil	Spike Value	Sample	MS	% Rec	MSD	% Rec	Control Limits	% Rec Qual	RPD	Control Limits	RPD Qual
Azinphos-Methyl	1	0.3335	0.0	0.2795	83.8	0.3240	97.2	21.6 - 134		14.7	37.7	
Bolstar (Sulprofos)	1	0.3335	0.0	0.2723	81.6	0.3141	94.2	38.1 - 117		14.3	28.3	
Chlorpyrifos	1	0.3335	0.0	0.2803	84	0.3115	93.4	39.5 - 109		10.6	29.6	
Coumaphos	1	0.3335	0.0	0.2741	82.2	0.3138	94.1	32.2 - 129		13.5	29.5	
Demeton,-O and -S	1	0.1668	0.0	0.1353	81.1	0.1588	95.2	17.3 - 123		16	40	
Diazinon	1	0.3335	0.0	0.2707	81.2	0.3069	92	34.6 - 118		12.5	31.3	
Dichlorvos	1	0.3335	0.0	0.2542	76.2	0.2992	89.7	14.8 - 126		16.2	38.6	
Dimethoate	1	0.3335	0.0	0.1103	33.1	0.2839	85.1	10 - 128		88	40	R5
Disulfoton	1	0.3335	0.0	0.2690	80.7	0.3098	92.9	38.1 - 108		14.1	29.3	
EPN	1	0.3335	0.0	0.2819	84.5	0.3295	98.8	34.1 - 123		15.6	26.8	
Ethoprop	1	0.3335	0.0	0.2659	79.7	0.3102	93	35.9 - 111		15.4	32.1	
Ethyl Parathion	1	0.3335	0.0	0.2852	85.5	0.3238	97.1	34 - 116		12.7	29.4	
Fensulfothion	1	0.3335	0.0	0.2870	86	0.3349	100	16.5 - 127		15.4	40	
Fenthion	1	0.3335	0.0	0.2654	79.6	0.3006	90.1	38.5 - 111		12.5	28	
Malathion	1	0.3335	0.0	0.2655	79.6	0.3067	92	37.4 - 114		14.4	27.7	
Merphos	1	0.3335	0.0	0.2681	80.4	0.3072	92.1	32.7 - 108		13.6	33.4	
Methyl parathion	1	0.3335	0.0	0.2951	88.5	0.3422	103	33 - 114		14.8	32	
Mevinphos	1	0.3335	0.0	0.2262	67.8	0.3098	92.9	13.4 - 123		31.2	40	
Naled	1	0.3335	0.0	0.2321	69.6	0.2762	82.8	10 - 154		17.4	40	
Phorate	1	0.3335	0.0	0.2670	80.1	0.3110	93.3	37.4 - 108		15.2	31.9	
Ronnel	1	0.3335	0.0	0.2692	80.7	0.3097	92.9	37.9 - 108		14	29.2	
Stirophos	1	0.3335	0.0	0.2738	82.1	0.3129	93.8	32.2 - 113		13.3	29.3	
Sulfotep	1	0.3335	0.0	0.2642	79.2	0.3025	90.7	37.9 - 112		13.5	27.3	
TEPP	1	0.3335	0.0	0.1323	39.7	0.2998	89.9	10 - 132		77.5	40	R5
Tokuthion (Prothothiofos)	1	0.3335	0.0	0.2728	81.8	0.3103	93	37.6 - 114		12.9	29.2	
Trichloronate	1	0.3335	0.0	0.2785	83.5	0.3105	93.1	40 - 107		10.9	29.5	

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L671404
Kinder Morgan - Rocklin, CA-AZ Work

Test:	OP Pesticides by Method 8141		
Project No:	ST010022.0026	Matrix:	Soil - mg/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	11/27/2013	**Analytic Batch:**	**WG695054**
Analysis Date:	12/3/2013 11:40:00 PM	Analyst:	386
Instrument ID:	SVGC12	Prep Date:	12/1/2013
Sample Numbers:	L671404-01, -02, -03, -04		

Surrogate Summary

Laboratory			TBP Column 1		TBP Column 2		TPP Column 1		TPP Column 2	
Sample ID	Instrument	File ID	ppm	% Rec	ppm	% Rec	ppm	% Rec	ppm	% Rec
L671404-01	SVGC12	1202A_52	0.273	82.0	0.267	80.0	0.287	86.2	0.286	85.9
L671404-02	SVGC12	1202A_53	0.278	83.5	0.269	80.7	0.282	84.7	0.279	83.7
L671404-03	SVGC12	1202A_54	0.278	83.4	0.264	79.2	0.283	85.0	0.269	80.9
L671404-04	SVGC12	1202A_55	0.307	92.2	0.276	83.0	0.309	92.7	0.279	83.9
BLANK WG695054	SVGC12	1202A_41	0.230	69.0	0.207	62.2	0.268	80.3	0.251	75.3
LCS WG695054	SVGC12	1202A_42	0.245	73.6	0.234	70.4	0.256	77.0	0.255	76.6
LCSD WG695054	SVGC12	1202A_43	0.279	83.9	0.261	78.4	0.288	86.6	0.275	82.6
MS WG695054	SVGC12	1202A_56	0.291	87.3	0.286	85.9	0.298	89.5	0.299	89.9
MSD WG695054	SVGC12	1202A_57	0.303	91.1	0.305	91.7	0.317	95.2	0.320	96.1

TBP --TRIBUTYL PHOSPHATE	True Value: 0.333 ppm	Limits: 26.9 - 135
TPP --TRIPHENYL PHOSPHATE	True Value: 0.333 ppm	Limits: 40 - 121

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Quality Control Summary
SDG: L671404
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Pesticides by Method 8081A		
Project No:	ST010022.0026	Matrix:	Soil - ug/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	11/27/2013	**Analytic Batch:**	**WG695114**
Analysis Date:	12/3/2013 1:22:00 PM	Analyst:	297
Instrument ID:	SVGC24	Prep Date:	12/2/2013
Sample Numbers:	L671404-01, -02, -03, -04		

Method Blank

Analyte	CAS	RDL	Qualifier
4,4-DDD	72-54-8	< 20.0	
4,4-DDE	72-55-9	< 20.0	
4,4-DDT	50-29-3	< 20.0	
Aldrin	309-00-2	< 20.0	
Alpha BHC	319-84-6	< 20.0	
Beta BHC	319-85-7	< 20.0	
Chlordane	57-74-9	< 200	
Chlorpyrifos	2921-88-2	< 100	
Delta BHC	319-86-8	< 20.0	
Dieldrin	60-57-1	< 20.0	
Endosulfan I	959-98-8	< 20.0	
Endosulfan II	33213-65-9	< 20.0	
Endosulfan sulfate	1031-07-8	< 20.0	
Endrin	72-20-8	< 20.0	
Endrin aldehyde	7421-93-4	< 20.0	
Endrin ketone	53494-70-5	< 20.0	
Gamma BHC	58-89-9	< 20.0	
Heptachlor	76-44-8	< 20.0	
Heptachlor epoxide	1024-57-3	< 20.0	
Hexachlorobenzene	118-74-1	< 20.0	
Methoxychlor	72-43-5	< 20.0	
Toxaphene	8001-35-2	< 400	

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L671404
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Pesticides by Method 8081A		
Project No:	ST010022.0026	Matrix:	Soil - ug/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	11/27/2013	**Analytic Batch:**	**WG695114**
Analysis Date:	12/3/2013 1:22:00 PM	Analyst:	297
Instrument ID:	SVGC24	Prep Date:	12/2/2013
Sample Numbers:	L671404-01, -02, -03, -04		

Laboratory Control Sample (LCS)

Analyte	Dil	True Value	Found	% Rec	Control Limits	Qual
4,4-DDD	1	67	66.940	99.9	70.3 - 111	
4,4-DDE	1	67	68.696	103	69.9 - 113	
4,4-DDT	1	67	68.638	102	68.1 - 111	
Aldrin	1	67	65.339	97.5	66.9 - 111	
Alpha BHC	1	67	62.608	93.4	65.1 - 111	
Beta BHC	1	67	66.501	99.3	69.6 - 112	
Chlorpyrifos	1	67	74.146	111	68.5 - 121	
Delta BHC	1	67	62.314	93	68.3 - 114	
Dieldrin	1	67	69.261	103	70.2 - 112	
Endosulfan I	1	67	69.630	104	69.8 - 113	
Endosulfan II	1	67	67.919	101	69.2 - 113	
Endosulfan sulfate	1	67	58.126	86.8	62 - 123	
Endrin	1	67	72.035	108	65.9 - 115	
Endrin aldehyde	1	67	65.962	98.5	47.6 - 124	
Endrin ketone	1	67	62.218	92.9	69 - 120	
Gamma BHC	1	67	65.081	97.1	68.2 - 111	
Heptachlor	1	67	68.017	102	65.9 - 111	
Heptachlor epoxide	1	67	69.744	104	69.7 - 113	
Hexachlorobenzene	1	67	65.004	97	59.6 - 113	
Methoxychlor	1	67	74.203	111	66.2 - 114	

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Quality Control Summary
SDG: L671404
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Pesticides by Method 8081A		
Project No:	ST010022.0026	Matrix:	Soil - ug/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	11/27/2013	**Analytic Batch:**	**WG695114**
Analysis Date:	12/3/2013 1:22:00 PM	Analyst:	297
Instrument ID:	SVGC24	Prep Date:	12/2/2013
Sample Numbers:	L671404-01, -02, -03, -04		

Laboratory Control Sample Duplicate (LCSD)

Analyte	Dil	True Value	Found	% Rec	Control Limits	Qual
4,4-DDD	1	67	69.592	104	70.3 - 111	
4,4-DDE	1	67	70.831	106	69.9 - 113	
4,4-DDT	1	67	71.082	106	68.1 - 111	
Aldrin	1	67	68.404	102	66.9 - 111	
Alpha BHC	1	67	65.692	98	65.1 - 111	
Beta BHC	1	67	69.331	103	69.6 - 112	
Chlorpyrifos	1	67	76.653	114	68.5 - 121	
Delta BHC	1	67	65.069	97.1	68.3 - 114	
Dieldrin	1	67	70.991	106	70.2 - 112	
Endosulfan I	1	67	71.588	107	69.8 - 113	
Endosulfan II	1	67	69.290	103	69.2 - 113	
Endosulfan sulfate	1	67	59.230	88.4	62 - 123	
Endrin	1	67	74.284	111	65.9 - 115	
Endrin aldehyde	1	67	65.240	97.4	47.6 - 124	
Endrin ketone	1	67	64.006	95.5	69 - 120	
Gamma BHC	1	67	68.321	102	68.2 - 111	
Heptachlor	1	67	70.648	105	65.9 - 111	
Heptachlor epoxide	1	67	71.570	107	69.7 - 113	
Hexachlorobenzene	1	67	70.306	105	59.6 - 113	
Methoxychlor	1	67	75.067	112	66.2 - 114	

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L671404
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Pesticides by Method 8081A		
Project No:	ST010022.0026	Matrix:	Soil - ug/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	11/27/2013	**Analytic Batch:**	**WG695114**
Analysis Date:	12/3/2013 1:22:00 PM	Analyst:	297
Instrument ID:	SVGC24	Prep Date:	12/2/2013
Sample Numbers:	L671404-01, -02, -03, -04		

Laboratory Control Sample / Laboratory Control Sample Duplicate

Analyte	Dil	Spike	LCS	% Rec	LCSD	% Rec	Control Limits	% Rec Qual	% RPD	Control Limits	RPD Qual
4,4-DDD	1	67	66.940	99.9	69.592	104	70.3 - 111		3.89	20	
4,4-DDE	1	67	68.696	103	70.831	106	69.9 - 113		3.06	20	
4,4-DDT	1	67	68.638	102	71.082	106	68.1 - 111		3.5	20	
Aldrin	1	67	65.339	97.5	68.404	102	66.9 - 111		4.58	20	
Alpha BHC	1	67	62.608	93.4	65.692	98	65.1 - 111		4.81	20	
Beta BHC	1	67	66.501	99.3	69.331	103	69.6 - 112		4.17	20	
Chlorpyrifos	1	67	74.146	111	76.653	114	68.5 - 121		3.32	20	
Delta BHC	1	67	62.314	93	65.069	97.1	68.3 - 114		4.33	20	
Dieldrin	1	67	69.261	103	70.991	106	70.2 - 112		2.47	20	
Endosulfan I	1	67	69.630	104	71.588	107	69.8 - 113		2.77	20	
Endosulfan II	1	67	67.919	101	69.290	103	69.2 - 113		2	20	
Endosulfan sulfate	1	67	58.126	86.8	59.230	88.4	62 - 123		1.88	20	
Endrin	1	67	72.035	108	74.284	111	65.9 - 115		3.07	20	
Endrin aldehyde	1	67	65.962	98.5	65.240	97.4	47.6 - 124		1.1	20	
Endrin ketone	1	67	62.218	92.9	64.006	95.5	69 - 120		2.83	20	
Gamma BHC	1	67	65.081	97.1	68.321	102	68.2 - 111		4.86	20	
Heptachlor	1	67	68.017	102	70.648	105	65.9 - 111		3.8	20	
Heptachlor epoxide	1	67	69.744	104	71.570	107	69.7 - 113		2.58	20	
Hexachlorobenzene	1	67	65.004	97	70.306	105	59.6 - 113		7.84	20	
Methoxychlor	1	67	74.203	111	75.067	112	66.2 - 114		1.16	20	

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Quality Control Summary
SDG: L671404
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Pesticides by Method 8081A		
Project No:	ST010022.0026	Matrix:	Soil - ug/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	11/27/2013	**Analytic Batch:**	**WG695114**
Analysis Date:	12/3/2013 1:22:00 PM	Analyst:	297
Instrument ID:	SVGC24	Prep Date:	12/2/2013
Sample Numbers:	L671404-01, -02, -03, -04		

Matrix Spike / Matrix Spike Duplicate

L671209-01

Analyte	Dil	Spike Value	Sample	MS	% Rec	MSD	% Rec	Control Limits	% Rec Qual	RPD	Control Limits	RPD Qual
4,4-DDD	1	67	0.0	68.240	102	69.368	104	23.4 - 145		1.64	20	
4,4-DDE	1	67	0.0	70.439	105	71.801	107	16.4 - 147		1.92	20	
4,4-DDT	1	67	0.0	69.303	103	72.104	108	26.7 - 129		3.96	23.8	
Aldrin	1	67	0.0	67.912	101	69.123	103	40.2 - 116		1.77	20	
Alpha BHC	1	67	0.0	65.141	97.2	66.152	98.7	53.6 - 109		1.54	20	
Beta BHC	1	67	0.0	67.653	101	67.473	101	38.3 - 126		0.27	20	
Chlorpyrifos	1	67	0.0	77.825	116	79.256	118	10 - 170		1.82	20	
Delta BHC	1	67	0.0	65.338	97.5	65.643	98	44.8 - 125		0.47	20	
Dieldrin	1	67	0.0	69.026	103	70.879	106	31.4 - 137		2.65	20	
Endosulfan I	1	67	0.0	70.326	105	71.353	106	40.3 - 120		1.45	20	
Endosulfan II	1	67	0.0	68.418	102	69.683	104	29.1 - 140		1.83	20	
Endosulfan sulfate	1	67	0.0	62.868	93.8	64.591	96.4	43.3 - 129		2.7	21.5	
Endrin	1	67	0.0	73.064	109	73.887	110	34.9 - 125		1.12	21.2	
Endrin aldehyde	1	67	0.0	66.097	98.7	65.815	98.2	15.6 - 139		0.43	20	
Endrin ketone	1	67	0.0	65.735	98.1	70.222	105	35.4 - 137		6.6	20	
Gamma BHC	1	67	0.0	67.685	101	68.382	102	55.3 - 110		1.03	20	
Heptachlor	1	67	0.0	70.258	105	68.680	103	41.6 - 115		2.27	20	
Heptachlor epoxide	1	67	0.0	69.931	104	70.866	106	34.8 - 128		1.33	20	
Hexachlorobenzene	1	67	0.0	70.598	105	72.917	109	40.2 - 119		3.23	20	
Methoxychlor	1	67	0.0	78.065	117	80.950	121	16 - 134		3.63	25.4	

Parameters in bold text are reported in this SDG

12065 Lebanon Rd
Mt. Juliet, TN 37122
(615) 758-5858
(800) 767-5859
Fax (615) 758-5859
Tax I.D 62-0814289
Est. 1970

Quality Control Summary
SDG: L671404
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Pesticides by Method 8081A		
Project No:	ST010022.0026	Matrix:	Soil - ug/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	11/27/2013	**Analytic Batch:**	**WG695114**
Analysis Date:	12/3/2013 1:22:00 PM	Analyst:	297
Instrument ID:	SVGC24	Prep Date:	12/2/2013
Sample Numbers:	L671404-01, -02, -03, -04		

Surrogate Summary

Laboratory			DCB Column 1		DCB Column 2		TCX Column 1		TCX Column 2	
Sample ID	Instrument	File ID	ppm	% Rec	ppm	% Rec	ppm	% Rec	ppm	% Rec
L671404-01	SVGC24	1203_25	0.0720	108	0.0552	82.9	0.0593	89.0	0.0585	87.8
L671404-02	SVGC24	1203_26	0.0818	123	0.0590	88.6	0.0659	99.0	0.0619	93.0
L671404-03	SVGC24	1203_27	0.0761	114	0.0558	83.8	0.0622	93.4	0.0609	91.4
L671404-04	SVGC24	1203_28	0.0990	149 S4	0.0586	87.9	0.0630	94.5	0.0629	94.5
BLANK WG695114	SVGC20	1203_56	0.0620	93.1	0.0624	93.6	0.0562	84.3	0.0578	86.8
LCS WG695114	SVGC20	1203_57	0.0659	98.9	0.0662	99.4	0.0615	92.4	0.0633	95.0
LCSD WG695114	SVGC20	1203_58	0.0631	94.7	0.0637	95.6	0.0603	90.6	0.0629	94.4
MS WG695114	SVGC20	1203_67	0.0601	90.2	0.0604	90.7	0.0616	92.5	0.0632	94.9
MSD WG695114	SVGC20	1203_68	0.0535	80.4	0.0547	82.2	0.0545	81.8	0.0570	85.6
BLANK WG695114	SVGC24	1203_09	0.0589	88.5	0.0569	85.4	0.0615	92.4	0.0610	91.5
LCS WG695114	SVGC24	1203_10	0.0723	109	0.0599	89.9	0.0643	96.5	0.0627	94.2
LCSD WG695114	SVGC24	1203_11	0.0650	97.6	0.0605	90.8	0.0675	101	0.0642	96.5
MS WG695114	SVGC24	1203_19	0.0527	79.1	0.0531	79.8	0.0615	92.4	0.0601	90.3
MSD WG695114	SVGC24	1203_20	0.0864	130	0.0485	72.8	0.0643	96.6	0.0599	90.0

DCB --DECACHLOROBIPHENYL	True Value: 0.0666 ppm	Limits: 10 - 145
TCX --TETRACHLORO-M-XYLENE	True Value: 0.0666 ppm	Limits: 21.10 - 148

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Quality Control Summary
SDG: L671404
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Herbicides by Method 8151		
Project No:	ST010022.0026	Matrix:	Soil - mg/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	11/27/2013	**Analytic Batch:**	**WG695229**
Analysis Date:	12/4/2013 6:14:00 PM	Analyst:	267
Instrument ID:	SVGC11	Prep Date:	12/3/2013
Sample Numbers:	L671404-01, -02, -03, -04		

Method Blank

Analyte	CAS	RDL	Qualifier
2,4,5-T	93-76-5	< 0.0700	
2,4,5-TP (Silvex)	93-72-1	< 0.0700	
2,4-D	94-75-7	< 0.0700	
2,4-DB	94-82-6	< 0.0700	
Dalapon	75-99-0	< 0.800	
Dicamba	1918-00-9	< 0.0700	
Dichloroprop	120-36-5	< 0.0700	
Dinoseb	88-85-7	< 0.0700	
MCPA	94-74-6	< 6.5	
MCPP	93-65-2	< 6.5	

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L671404
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Herbicides by Method 8151		
Project No:	ST010022.0026	Matrix:	Soil - mg/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	11/27/2013	**Analytic Batch:**	**WG695229**
Analysis Date:	12/4/2013 6:14:00 PM	Analyst:	267
Instrument ID:	SVGC11	Prep Date:	12/3/2013
Sample Numbers:	L671404-01, -02, -03, -04		

Laboratory Control Sample (LCS)

Analyte	Dil	True Value	Found	% Rec	Control Limits	Qual
2,4,5-T	1	0.1667	0.1359	81.5	38.1 - 115	
2,4,5-TP (Silvex)	1	0.1667	0.1314	78.9	49 - 119	
2,4-D	1	0.1667	0.1134	68	38.9 - 103	
2,4-DB	1	0.1667	0.1389	83.3	29.1 - 111	
Dalapon	1	0.1667	0.1170	70.2	28.4 - 114	
Dicamba	1	0.1667	0.1324	79.4	48.3 - 115	
Dichloroprop	1	0.1667	0.1117	67	42.4 - 128	
Dinoseb	1	0.1667	0.0915	54.9	10 - 113	
MCPA	1	16.666	10.690	64.1	10 - 149	
MCPP	1	16.666	17.408	104	47.9 - 173	

Laboratory Control Sample Duplicate (LCSD)

Analyte	Dil	True Value	Found	% Rec	Control Limits	Qual
2,4,5-T	1	0.1667	0.1309	78.5	38.1 - 115	
2,4,5-TP (Silvex)	1	0.1667	0.1253	75.2	49 - 119	
2,4-D	1	0.1667	0.1081	64.9	38.9 - 103	
2,4-DB	1	0.1667	0.1370	82.2	29.1 - 111	
Dalapon	1	0.1667	0.1225	73.5	28.4 - 114	
Dicamba	1	0.1667	0.1301	78	48.3 - 115	
Dichloroprop	1	0.1667	0.1083	65	42.4 - 128	
Dinoseb	1	0.1667	0.0938	56.3	10 - 113	
MCPA	1	16.666	14.151	84.9	10 - 149	
MCPP	1	16.666	16.978	102	47.9 - 173	

Parameters in bold text are reported in this SDG

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Est. 1970

Quality Control Summary
SDG: L671404
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Herbicides by Method 8151		
Project No:	ST010022.0026	Matrix:	Soil - mg/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	11/27/2013	**Analytic Batch:**	**WG695229**
Analysis Date:	12/4/2013 6:14:00 PM	Analyst:	267
Instrument ID:	SVGC11	Prep Date:	12/3/2013
Sample Numbers:	L671404-01, -02, -03, -04		

Laboratory Control Sample / Laboratory Control Sample Duplicate

Analyte	Dil	Spike	LCS	% Rec	LCSD	% Rec	Control Limits	% Rec Qual	% RPD	Control Limits	RPD Qual
2,4,5-T	1	0.1667	0.1359	81.5	0.1309	78.5	38.1 - 115		3.79	23.2	
2,4,5-TP (Silvex)	1	0.1667	0.1314	78.9	0.1253	75.2	49 - 119		4.76	20.2	
2,4-D	1	0.1667	0.1134	68	0.1081	64.9	38.9 - 103		4.79	24.7	
2,4-DB	1	0.1667	0.1389	83.3	0.1370	82.2	29.1 - 111		1.36	27.6	
Dalapon	1	0.1667	0.1170	70.2	0.1225	73.5	28.4 - 114		4.55	28	
Dicamba	1	0.1667	0.1324	79.4	0.1301	78	48.3 - 115		1.75	22.1	
Dichloroprop	1	0.1667	0.1117	67	0.1083	65	42.4 - 128		3.11	23.6	
Dinoseb	1	0.1667	0.0915	54.9	0.0938	56.3	10 - 113		2.48	40	
MCPA	1	16.666	10.690	64.1	14.151	84.9	10 - 149		27.9	40	
MCPP	1	16.666	17.408	104	16.978	102	47.9 - 173		2.5	32.4	

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L671404
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Herbicides by Method 8151		
Project No:	ST010022.0026	Matrix:	Soil - mg/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	11/27/2013	**Analytic Batch:**	**WG695229**
Analysis Date:	12/4/2013 6:14:00 PM	Analyst:	267
Instrument ID:	SVGC11	Prep Date:	12/3/2013
Sample Numbers:	L671404-01, -02, -03, -04		

Matrix Spike / Matrix Spike Duplicate

L671196-01

Analyte	Dil	Spike Value	Sample	MS	% Rec	MSD	% Rec	Control Limits	% Rec Qual	RPD	Control Limits	RPD Qual
2,4,5-T	5	0.03334	0.0	0.1426	85.6	0.1184	71.1	27.7 - 112		18.5	28	
2,4,5-TP (Silvex)	5	0.03334	0.0	0.1325	79.5	0.1046	62.7	31.2 - 122		23.6	28.4	
2,4-D	5	0.03334	0.0	0.2933	176	0.2117	127	10 - 133	M1	32.3	40	
2,4-DB	5	0.03334	0.1895	0.3338	86.5	0.1784	0	14.7 - 121	M2	60.7	34	R2
Dalapon	5	0.03334	0.0	0.1524	91.4	0.1165	69.9	10 - 121		26.7	40	
Dicamba	5	0.03334	0.0	0.1606	96.4	0.1997	120	24.8 - 121		21.7	29.4	
Dichloroprop	5	0.03334	0.0	0.1362	81.7	0.0851	51	39.4 - 119		46.2	23.7	R5
Dinoseb	5	0.03334	0.0	0.0954	57.2	0.1011	60.7	10 - 117		5.89	40	
MCPA	5	3.3332	0.0	25.225	151	16.406	98.4	10 - 162		42.4	40	R5
MCPP	5	3.3332	0.0	50.725	304	52.952	318	26 - 190	M1	4.29	36.5	

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L671404
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Herbicides by Method 8151		
Project No:	ST010022.0026	Matrix:	Soil - mg/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	11/27/2013	**Analytic Batch:**	**WG695229**
Analysis Date:	12/4/2013 6:14:00 PM	Analyst:	267
Instrument ID:	SVGC11	Prep Date:	12/3/2013
Sample Numbers:	L671404-01, -02, -03, -04		

Surrogate Summary

Laboratory			2,4-DAA Column 1		2,4-DAA Column 2	
Sample ID	Instrument	File ID	ppm	% Rec	ppm	% Rec
L671404-01	SVGC11	1204_10	0.133	80.0	0.151	90.7
L671404-02	SVGC11	1204_11	0.144	86.8	0.160	96.1
L671404-03	SVGC11	1204_12	0.130	78.2	0.148	89.0
L671404-04	SVGC11	1204_13	0.141	84.7	0.161	96.7
BLANK WG695229	SVGC11	1204_04	0.122	73.0	0.142	85.4
LCS WG695229	SVGC11	1204_05	0.142	85.4	0.163	97.7
LCSD WG695229	SVGC11	1204_06	0.141	84.9	0.162	97.4
MS WG695229 5x	SVGC11	1204_15	0.152	91.4	0.218	131
MSD WG695229 5x	SVGC11	1204_16	0.146	87.7	0.191	115

2,4-DAA --2,4-DICHLOROPHENYL ACETIC ACID True Value: 0.1665 ppm Limits: 13.1 - 131

Company Name/Address: **Kinder Morgan** : Silvercraft
Attn: Paul Salcido

Billing Information:

Report to: Sasha Arnold

Email To: Sasha Arnold

Project Description: KMEP: Silvercraft

City/State Collected: Tucson

Phone: **480-905-9311**
Fax:

Client Project #: STOL0000 0036

Lab Project #

Collected by (print): Sal

Site/Facility ID #: Silvercraft

P.O. #

Collected by (signature):

Immediately Packed on Ice: N ___ Y X

Rush? (Lab MUST Be Notified)
___ Same Day ____ 200%
___ Next Day ____ 100%
___ Two Day ____ 50%
___ Three Day ____ 25%

Date Results Needed

Email? ___No ___Yes
FAX? ___No ___Yes

Analysis / Container / Preservative

Chain of Custody Page 1 of 1

ESC LAB SCIENCES
12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

LR 671404

B016

Accinum: **KINARCPAZ**
Template:
Prelogin:
TSR:
Cooler:
Shipped Via:

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Ctnrs	CARB 435 (PLM) Level A (asbestos)-**Sub out**	8082 PCBs, SW 9095 Paint filter/ 4oz jar	8081, 8141 / 4oz jar	8151 Herbicides/ 4oz jar	8015AZ (C10-C32), RCRA 8 metals/ 4oz jar	Flashpoint 1010, pH 9045B / 4oz jar	VOC 8260B + MTBE, TBA, TAME/ 40mL amber/MeOH				Rem./Contaminant	Sample # (lab only)
RB- R2466	Comp	Soil		11/27/13	1030	7	X	X	X	X	X	X	X					-01
RB- R29622	"	"		"	1100	7	X	X	X	X	X	X	X					-02
RB-604	"	"		"	1130	7	X	X	X	X	X	X	X					-03
RB-6249	"	"		"	1200	7	X	X	X	X	X	X	X					-04

* Matrix: SS - Soil GW - Groundwater WW - WasteWater DW - Drinking Water OT - Other_____

Remarks:

pH _____ Temp _____
Flow _____ Other _____

5135551379 6 7

Hold #

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)
[signature]	11/27/13	1515	Emily Vann
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)
Emily Vann	11/29/13	1830	FedEx
Relinquished by: (Signature)	Date:	Time:	Received for lab by: (Signature)

Samples returned via: ☐ UPS ☐ FedEx ☐ Courier ☐ ____

Temp: 7.1 °C Bottles Received: 28

Date: 11-30-13 Time: 0930

Condition: (lab use only)

COC Seal Intact: ___Y ___N ___NA

pH Checked: NCF:

Refer to LG714105

Company Name/Address: **Kinder Morgan** Silvercraft
Attn: Paul Salcido

Billing Information:

Report to: Sarah Arnold
Email To: Sarah Arnold
Project Description: KMEP-Silvercraft
City/State Collected: Tucson
Phone: 480-905-9311
Fax:
Client Project # Stokedd 0036
Lab Project #
Collected by (print): Sal
Site/Facility ID # Silvercraft
P.O. #
Collected by (signature):
Immediately Packed on Ice: N ___ Y X
Rush? (Lab MUST Be Notified)
___ Same Day ___ 200%
___ Next Day ___ 100%
___ Two Day ___ 50%
___ Three Day ___ 25%
Date Results Needed
Email? ___No ___Yes
FAX? ___No ___Yes

Analysis / Container / Preservative: CARB 435 (PLM) Level A (asbestos)-Sub out; 8082 PCBs, SW 9095 Paint filter/ 4oz jar; 8081, 8141 / 4oz jar; 8151 Herbicides/ 4oz jar; 8015AZ (C10-C32), RCRA 8 metals/ 4oz jar; Flashpoint 1010, pH 9045B / 4oz jar; VOC 8260B + MTBE, TBA, TAME/ 40mL amber/MeOH

Sample-ID	Comp/Grab	Matrix *	Depth	Date	Time	# of Ctrs	CARB 435 (PLM) Level A (asbestos)-Sub out	8082 PCBs, SW 9095 Paint filter/ 4oz jar	8081, 8141 / 4oz jar	8151 Herbicides/ 4oz jar	8015AZ (C10-C32), RCRA 8 metals/ 4oz jar	Flashpoint 1010, pH 9045B / 4oz jar	VOC 8260B + MTBE, TBA, TAME/ 40mL amber/MeOH	Sample # (lab only)
RB- R2966	Comp	Soil	—	11/27/13	1030	7	X	X	X	X	X	X	X	-01
RB- R29622	"	"	—	"	1100	7	X	X	X	X	X	X	X	-02
RB-6014	"	"	—	"	1130	7	X	X	X	X	X	X	X	-03
RB-6249	"	"	—	"	1200	7	X	X	X	X	X	X	X	-04

Chain of Custody Page 1 of 1

ESC LAB SCIENCES
12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

LA 67140445
B016
Acctnum: KINARCPAZ
Template:
Prelogin:
TSR:
Cooler:
Shipped Via:
Remarks/Contaminants | Sample # (lab only)

5113555137962

* Matrix: SS - Soil GW - Groundwater WW - WasteWater DW - Drinking Water OT - Other ___

pH ___ Temp ___
Flow ___ Other ___

Remarks: Refer to 667164

Relinquished by: (Signature) Date: 11/27/13 Time: 1515 Received by: (Signature) Emily Vann
Samples returned via: ☐ UPS ☐ FedEx ☐ Courier ☐ ___
Relinquished by: (Signature) Emily Vann Date: 11/29/13 Time: 1830 Received by: (Signature) FedEx
Temp: 7.1 °C Bottles Received: 28
Relinquished by: (Signature) Date: Time: Received for lab by: (Signature) Date: 11-30-13 Time: 0930

Hold #
Condition: (lab use only)
COC Seal Intact: ___Y ___N ___NA
pH Checked: NCF:

SanAir Technologies Laboratory

Analysis Report

prepared for

ESC Lab Sciences

Report Date: 12/11/2013
SanAir ID#: 13029080

NVLAP LAB CODE 200870-0

Virginia SBE
Certification # 652931

Texas Licensed Mold Analysis Laboratory
License # LAB0166

SanAir Technologies Laboratory

804.897.1177 www.sanair.com

SanAir Technologies Laboratory, Inc.

1551 Oakbridge Drive, Suite B, Powhatan, VA 23139
804.897.1177 Toll Free: 888.895.1177 Fax: 804.897.0070
Web: http://www.sanair.com E-mail: iaq@sanair.com

ESC Lab Sciences
12065 Lebanon Rd
Mt Juliet, TN 37123

December 11, 2013

SanAir ID # 13029080
Project Name:
Project Number:

Dear Janice Cozby,

We at SanAir would like to thank you for the work you recently submitted. The 4 sample(s) were received on Wednesday, December 04, 2013 via FedEx. The final report(s) is enclosed for the following sample(s): L671405-01, L671405-02, L671405-03, L671405-04.

These results only pertain to this job and should not be used in the interpretation of any other job. This report is only complete in its entirety. Refer to the listing below of the pages included in a complete final report.

Sincerely,

Sandra Sobrino

Sandra Sobrino
Asbestos & Materials Laboratory Manager
SanAir Technologies Laboratory

Final Report Includes:
- Cover Letter
- Analysis Pages
- Disclaimers and Additional Information

sample conditions:
4 sample(s) in Good condition

SanAir Technologies Laboratory, Inc.

1551 Oakbridge Drive, Suite B, Powhatan, VA 23139
804.897.1177 Toll Free: 888.895.1177 Fax: 804.897.0070
Web: http://www.sanair.com E-mail: iaq@sanair.com

SanAir ID Number

13029080

FINAL REPORT

Name: ESC Lab Sciences
Address: 12065 Lebanon Rd
Mt Juliet, TN 37123

Project Number:
P.O. Number: S19216
Project Name:

Collected Date: 11/27/2013
Received Date: 12/4/2013 10:30:00 AM
Report Date: 12/11/2013 5:33:41 PM
Analyst: Sobrino, Sandra

Asbestos Soil/Vermiculite PLM CARB 435 (LOD 0.1%)

SanAir ID / Description	Stereoscopic Appearance	Components % Fibrous	Components % Non-Fibrous	Asbestos Fibers
L671405-01 / 13029080-001	Brown Non-Fibrous Heterogeneous		100% Other	None Detected

SanAir ID / Description	Stereoscopic Appearance	Components % Fibrous	Components % Non-Fibrous	Asbestos Fibers
L671405-02 / 13029080-002	Brown Non-Fibrous Heterogeneous		100% Other	None Detected

SanAir ID / Description	Stereoscopic Appearance	Components % Fibrous	Components % Non-Fibrous	Asbestos Fibers
L671405-03 / 13029080-003	Brown Non-Fibrous Heterogeneous		100% Other	None Detected

SanAir ID / Description	Stereoscopic Appearance	Components % Fibrous	Components % Non-Fibrous	Asbestos Fibers
L671405-04 / 13029080-004	Brown Non-Fibrous Heterogeneous		100% Other	None Detected

Certification

Signature: Sandra Sobrino
Date: 12/11/2013

Reviewed:
Date: 12/11/2013

Disclaimer

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Sub-Contract Chain of Custody

Environmental Science Corp
12065 Lebanon Road
Mt. Juliet, TN 37122
(615) 773-9756 (615) 758-5859 fax

Sub-Contract Lab : SANAIRPVA
City / State : Powhatan, VA
Results Needed by : 5 DAY TAT - 12/11/13
ESC Purchase Order # : S19216

Send Reports To : Janice Cozby jcozby@esclabsciences.com

WORKGROUP	WG695294
Date Created :	12/3/2013

SAMPLENO Container #	MATRIX	Date / Time Collected	PARAMETER	Code	METHOD	Comments
L671405-01 16113796	SS	11/27/2013 10:3(	Asbestos-PLM	ASBESTOS	PLM	CARB 435 - 0.1%
L671405-02 16113797	SS	11/27/2013 11:0(	Asbestos-PLM	ASBESTOS	PLM	CARB 435 - 0.1%
L671405-03 16113798	SS	11/27/2013 11:3(	Asbestos-PLM	ASBESTOS	PLM	CARB 435 - 0.1%
L671405-04 16113799	SS	11/27/2013 12:0(	Asbestos-PLM	ASBESTOS	PLM	CARB 435 - 0.1%

Relinquished by J Cozby Date: 120313
Received by : Date:
Relinquished by RWD Date: DEC 04 2013 10:30A
Received by : Date:

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(800) 767-5859
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Est. 1970

Quality Control Summary
SDG: L675524

For: Kinder Morgan - Rocklin, CA-AZ Work
KMEP: Silvercroft

L675524

Lab SampleID.	Client ID
L675524-01	RB-R29616
L675524-02	RB-R29622
L675524-03	RB-6014
L675524-04	RB-6249

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Quality Control Summary

SDG: L675524

For: Kinder Morgan - Rocklin, CA-AZ Work
Project: KMEP: Silvercroft
December 27, 2013

Sample Receiving and Handling

All sample aliquots were received at the correct temperature, in the proper containers, and with the appropriate preservatives. All method specified holding times were met.

Polynuclear Aromatic Hydrocarbons by Method 8270C-SIM

Laboratory Control Sample

Samples L675524-01, -02, -03, and -04 were analyzed in analytical batch WG698980. The laboratory control sample associated with these samples was within the laboratory control limits for all target analytes reported from this batch. The relative percent difference was within laboratory limits for all target analytes reported from this batch.

Matrix Spike/Matrix Spike Duplicate

For analytical batch WG698980 matrix spike/matrix spike duplicate analysis was performed on sample L675362-01. The matrix spike recoveries and relative percent differences were within laboratory control limits for all target analytes reported from this batch.

Blank Analysis

The method blank, the initial, and all continuing calibration blanks contained no analytes at concentrations above the method reporting limit.

Nancy F. McLain
ESC Representative
ESC Lab Sciences

12065 Lebanon Rd.
Mt. Juliet, TN 37122
(615) 758-5858
1-800-767-5859
Fax (615) 758-5859

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Est. 1970

Bob Forsberg / Sasha Arnold
ARCADIS
14201 N. 87th Street, Suite 135
Scottsdale, AZ 85260

Report Summary

Thursday December 26, 2013

Report Number: L675524
Samples Received: 11/30/13
Client Project: ST010022.0026

Description: KMEP Silvercroft Wash

The analytical results in this report are based upon information supplied by you, the client, and are for your exclusive use. If you have any questions regarding this data package, please do not hesitate to call.

Entire Report Reviewed By: Alan Harvill

T. Alan Harvill , ESC Representative

Laboratory Certification Numbers

A2LA - 1461-01, AIHA - 100789, AL - 40660, CA - 01157CA, CT - PH-0197, FL - E87487, GA - 923, IN - C-TN-01, KY - 90010, KYUST - 0016, NC - ENV375/DW21704/BIO041, ND - R-140. NJ - TN002, NJ NELAP - TN002, SC - 84004, TN - 2006, VA - 460132, WV - 233, AZ - 0612, MN - 047-999-395, NY - 11742, WI - 998093910, NV - TN000032011-1, TX - T104704245-11-3, OK - 9915, PA - 68-02979, IA Lab #364, EPA - TN002

Accreditation is only applicable to the test methods specified on each scope of accreditation held by ESC Lab Sciences.
Note: The use of the preparatory EPA Method 3511 is not approved or endorsed by the CA ELAP.

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Quality Control Summary
SDG: L675524

For: Kinder Morgan - Rocklin, CA-AZ Work
KMEP: Silvercroft

L675524

Lab SampleID.	Client ID
L675524-01	RB-R29616
L675524-02	RB-R29622
L675524-03	RB-6014
L675524-04	RB-6249

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SAMPLE NUMBER
RB-R29616

Customer :	Kinder Morgan - Rocklin, CA-AZ Work	Project :	ST010022.0026
Source :	SILVER CRAFT	Date Sampled :	11/27/2013 10:30 AM
Location :	KMEP: Silvercroft	Sampled By :	SA
Lab Sample ID :	**L675524-01**	Date Received :	11/30/2013

8270C-SIM

Analytic Batch: WG698980 | Analysis Date: 12/26/2013 | Analysis Time: 12:14
Instrument: BNAMS22 | Analyst: 377 | Preparation Date: 12/25/2013 10:12
Method: 8270C-SIM | Dilution: 1

CAS NO	Analyte	RL mg/kg	RESULTS mg/kg	FLAG
120-12-7	Anthracene	0.0060	< 0.0060	
83-32-9	Acenaphthene	0.0060	< 0.0060	
208-96-8	Acenaphthylene	0.0060	< 0.0060	
56-55-3	Benzo(a)anthracene	0.0060	< 0.0060	
50-32-8	Benzo(a)pyrene	0.0060	< 0.0060	
205-99-2	Benzo(b)fluoranthene	0.0060	< 0.0060	
191-24-2	Benzo(g,h,i)perylene	0.0060	< 0.0060	
207-08-9	Benzo(k)fluoranthene	0.0060	< 0.0060	
218-01-9	Chrysene	0.0060	< 0.0060	
53-70-3	Dibenz(a,h)anthracene	0.0060	< 0.0060	
206-44-0	Fluoranthene	0.0060	< 0.0060	
86-73-7	Fluorene	0.0060	< 0.0060	
193-39-5	Indeno(1,2,3-cd)pyrene	0.0060	< 0.0060	
91-20-3	Naphthalene	0.020	< 0.020	
85-01-8	Phenanthrene	0.0060	< 0.0060	
129-00-0	Pyrene	0.0060	< 0.0060	
90-12-0	1-Methylnaphthalene	0.020	< 0.020	
91-57-6	2-Methylnaphthalene	0.020	< 0.020	
91-58-7	2-Chloronaphthalene	0.020	< 0.020	

Surrogates

Analyte	PERCENT RECOVERY	QUALIFIERS	FLAG
Nitrobenzene-d5	**95.3**		
2-Fluorobiphenyl	**92.6**		
p-Terphenyl-d14	**88.6**		

LEGEND

RL - Reporting Limit

Comments: 1) Sample results are reported as rounded values.
2) These results are applicable only to the items tested.

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SAMPLE NUMBER
RB-R29622

Customer :	Kinder Morgan - Rocklin, CA-AZ Work	Project :	ST010022.0026
Source :	SILVER CRAFT	Date Sampled :	11/27/2013 11:00 AM
Location :	KMEP: Silvercroft	Sampled By :	SA
Lab Sample ID :	**L675524-02**	Date Received :	11/30/2013

8270C-SIM

Analytic Batch: WG698980 | Analysis Date: 12/26/2013 | Analysis Time: 12:36
Instrument: BNAMS22 | Analyst: 377 | Preparation Date: 12/25/2013 10:12
Method: 8270C-SIM | Dilution: 1

CAS NO	Analyte	RL mg/kg	RESULTS mg/kg	FLAG
120-12-7	Anthracene	0.0060	< 0.0060	
83-32-9	Acenaphthene	0.0060	< 0.0060	
208-96-8	Acenaphthylene	0.0060	< 0.0060	
56-55-3	Benzo(a)anthracene	0.0060	< 0.0060	
50-32-8	Benzo(a)pyrene	0.0060	< 0.0060	
205-99-2	Benzo(b)fluoranthene	0.0060	< 0.0060	
191-24-2	Benzo(g,h,i)perylene	0.0060	< 0.0060	
207-08-9	Benzo(k)fluoranthene	0.0060	< 0.0060	
218-01-9	Chrysene	0.0060	< 0.0060	
53-70-3	Dibenz(a,h)anthracene	0.0060	< 0.0060	
206-44-0	Fluoranthene	0.0060	< 0.0060	
86-73-7	Fluorene	0.0060	< 0.0060	
193-39-5	Indeno(1,2,3-cd)pyrene	0.0060	< 0.0060	
91-20-3	Naphthalene	0.020	< 0.020	
85-01-8	Phenanthrene	0.0060	< 0.0060	
129-00-0	Pyrene	0.0060	< 0.0060	
90-12-0	1-Methylnaphthalene	0.020	< 0.020	
91-57-6	2-Methylnaphthalene	0.020	< 0.020	
91-58-7	2-Chloronaphthalene	0.020	< 0.020	

Surrogates

Analyte	PERCENT RECOVERY	QUALIFIERS	FLAG
Nitrobenzene-d5	**95.3**		
2-Fluorobiphenyl	**97.5**		
p-Terphenyl-d14	**89.9**		

LEGEND

RL - Reporting Limit

Comments: 1) Sample results are reported as rounded values.
2) These results are applicable only to the items tested.

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SAMPLE NUMBER
RB-6014

Customer :	Kinder Morgan - Rocklin, CA-AZ Work	Project :	ST010022.0026
Source :	SILVER CRAFT	Date Sampled :	11/27/2013 11:30 AM
Location :	KMEP: Silvercroft	Sampled By :	SA
Lab Sample ID :	**L675524-03**	Date Received :	11/30/2013

8270C-SIM

Analytic Batch: WG698980 | Analysis Date: 12/26/2013 | Analysis Time: 12:58
Instrument: BNAMS22 | Analyst: 377 | Preparation Date: 12/25/2013 10:12
Method: 8270C-SIM | Dilution: 1

CAS NO	Analyte	RL mg/kg	RESULTS mg/kg	FLAG
120-12-7	Anthracene	0.0060	< 0.0060	
83-32-9	Acenaphthene	0.0060	< 0.0060	
208-96-8	Acenaphthylene	0.0060	< 0.0060	
56-55-3	Benzo(a)anthracene	0.0060	< 0.0060	
50-32-8	Benzo(a)pyrene	0.0060	< 0.0060	
205-99-2	Benzo(b)fluoranthene	0.0060	< 0.0060	
191-24-2	Benzo(g,h,i)perylene	0.0060	< 0.0060	
207-08-9	Benzo(k)fluoranthene	0.0060	< 0.0060	
218-01-9	Chrysene	0.0060	< 0.0060	
53-70-3	Dibenz(a,h)anthracene	0.0060	< 0.0060	
206-44-0	Fluoranthene	0.0060	< 0.0060	
86-73-7	Fluorene	0.0060	< 0.0060	
193-39-5	Indeno(1,2,3-cd)pyrene	0.0060	< 0.0060	
91-20-3	Naphthalene	0.020	< 0.020	
85-01-8	Phenanthrene	0.0060	< 0.0060	
129-00-0	Pyrene	0.0060	< 0.0060	
90-12-0	1-Methylnaphthalene	0.020	< 0.020	
91-57-6	2-Methylnaphthalene	0.020	< 0.020	
91-58-7	2-Chloronaphthalene	0.020	< 0.020	

Surrogates

Analyte	PERCENT RECOVERY	QUALIFIERS	FLAG
Nitrobenzene-d5	**85.6**		
2-Fluorobiphenyl	**90.6**		
p-Terphenyl-d14	**85.9**		

LEGEND

RL - Reporting Limit

Comments: 1) Sample results are reported as rounded values.
2) These results are applicable only to the items tested.

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SAMPLE NUMBER
RB-6249

Customer :	Kinder Morgan - Rocklin, CA-AZ Work	Project :	ST010022.0026
Source :	SILVER CRAFT	Date Sampled :	11/27/2013 12:00 PM
Location :	KMEP: Silvercroft	Sampled By :	SA
Lab Sample ID :	**L675524-04**	Date Received :	11/30/2013

8270C-SIM

Analytic Batch: WG698980 | Analysis Date: 12/26/2013 | Analysis Time: 1:20 PM
Instrument: BNAMS22 | Analyst: 377 | Preparation Date: 12/25/2013 10:12
Method: 8270C-SIM | Dilution: 1

CAS NO	Analyte	RL mg/kg	RESULTS mg/kg	FLAG
120-12-7	Anthracene	0.0060	< 0.0060	
83-32-9	Acenaphthene	0.0060	< 0.0060	
208-96-8	Acenaphthylene	0.0060	< 0.0060	
56-55-3	Benzo(a)anthracene	0.0060	< 0.0060	
50-32-8	Benzo(a)pyrene	0.0060	< 0.0060	
205-99-2	Benzo(b)fluoranthene	0.0060	< 0.0060	
191-24-2	Benzo(g,h,i)perylene	0.0060	< 0.0060	
207-08-9	Benzo(k)fluoranthene	0.0060	< 0.0060	
218-01-9	Chrysene	0.0060	< 0.0060	
53-70-3	Dibenz(a,h)anthracene	0.0060	< 0.0060	
206-44-0	Fluoranthene	0.0060	< 0.0060	
86-73-7	Fluorene	0.0060	< 0.0060	
193-39-5	Indeno(1,2,3-cd)pyrene	0.0060	< 0.0060	
91-20-3	Naphthalene	0.020	< 0.020	
85-01-8	Phenanthrene	0.0060	< 0.0060	
129-00-0	Pyrene	0.0060	< 0.0060	
90-12-0	1-Methylnaphthalene	0.020	< 0.020	
91-57-6	2-Methylnaphthalene	0.020	< 0.020	
91-58-7	2-Chloronaphthalene	0.020	< 0.020	

Surrogates

Analyte	PERCENT RECOVERY	QUALIFIERS	FLAG
Nitrobenzene-d5	**97.8**		
2-Fluorobiphenyl	**98.7**		
p-Terphenyl-d14	**93.2**		

LEGEND

RL - Reporting Limit

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Quality Control Summary
SDG: L675524
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Polynuclear Aromatic Hydrocarbons by Method 8270C-SIM		
Project No:	ST010022.0026	Matrix:	Soil - ug/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	11/27/2013	**Analytic Batch:**	**WG698980**
Analysis Date:	12/26/2013 12:14:00 PM	Analyst:	377
Instrument ID:	BNAMS22	Prep Date:	12/24/2013
Sample Numbers:	L675524-01, -02, -03, -04		

Method Blank

Analyte	CAS	RDL	Qualifier
1-Methylnaphthalene	90-12-0	< 20.0	
2-Chloronaphthalene	91-58-7	< 20.0	
2-Methylnaphthalene	91-57-6	< 20.0	
Acenaphthene	83-32-9	< 6.00	
Acenaphthylene	208-96-8	< 6.00	
Anthracene	120-12-7	< 6.00	
Benzo(a)anthracene	56-55-3	< 6.00	
Benzo(a)pyrene	50-32-8	< 6.00	
Benzo(b)fluoranthene	205-99-2	< 6.00	
Benzo(g,h,i)perylene	191-24-2	< 6.00	
Benzo(k)fluoranthene	207-08-9	< 6.00	
Chrysene	218-01-9	< 6.00	
Dibenz(a,h)anthracene	53-70-3	< 6.00	
Fluoranthene	206-44-0	< 6.00	
Fluorene	86-73-7	< 6.00	
Indeno(1,2,3-cd)pyrene	193-39-5	< 6.00	
Naphthalene	91-20-3	< 20.0	
Phenanthrene	85-01-8	< 6.00	
Pyrene	129-00-0	< 6.00	

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L675524
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Polynuclear Aromatic Hydrocarbons by Method 8270C-SIM		
Project No:	ST010022.0026	Matrix:	Soil - ug/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	11/27/2013	**Analytic Batch:**	**WG698980**
Analysis Date:	12/26/2013 12:14:00 PM	Analyst:	377
Instrument ID:	BNAMS22	Prep Date:	12/24/2013
Sample Numbers:	L675524-01, -02, -03, -04		

Laboratory Control Sample (LCS)

Analyte	Dil	True Value	Found	% Rec	Control Limits	Qual
1-Methylnaphthalene	1	80	76.402	95.5	62.5 - 121	
2-Chloronaphthalene	1	80	79.375	99.2	62.1 - 120	
2-Methylnaphthalene	1	80	76.046	95.1	62.5 - 121	
Acenaphthene	1	80	77.500	96.9	62.4 - 121	
Acenaphthylene	1	80	73.866	92.3	62.9 - 123	
Anthracene	1	80	80.920	101	64.9 - 129	
Benzo(a)anthracene	1	80	71.289	89.1	61.8 - 125	
Benzo(a)pyrene	1	80	76.946	96.2	63.4 - 119	
Benzo(b)fluoranthene	1	80	76.975	96.2	62.7 - 119	
Benzo(g,h,i)perylene	1	80	75.826	94.8	68.2 - 129	
Benzo(k)fluoranthene	1	80	77.020	96.3	64.5 - 128	
Chrysene	1	80	82.118	103	64.4 - 128	
Dibenz(a,h)anthracene	1	80	78.638	98.3	65.3 - 128	
Fluoranthene	1	80	71.664	89.6	61.8 - 129	
Fluorene	1	80	76.122	95.2	60.8 - 121	
Indeno(1,2,3-cd)pyrene	1	80	79.950	99.9	67.6 - 129	
Naphthalene	1	80	74.021	92.5	59.5 - 116	
Phenanthrene	1	80	75.432	94.3	59.4 - 121	
Pyrene	1	80	79.349	99.2	61.2 - 130	

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L675524
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Polynuclear Aromatic Hydrocarbons by Method 8270C-SIM		
Project No:	ST010022.0026	Matrix:	Soil - ug/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	11/27/2013	**Analytic Batch:**	**WG698980**
Analysis Date:	12/26/2013 12:14:00 PM	Analyst:	377
Instrument ID:	BNAMS22	Prep Date:	12/24/2013
Sample Numbers:	L675524-01, -02, -03, -04		

Laboratory Control Sample Duplicate (LCSD)

Analyte	Dil	True Value	Found	% Rec	Control Limits	Qual
1-Methylnaphthalene	1	80	71.211	89	62.5 - 121	
2-Chloronaphthalene	1	80	72.309	90.4	62.1 - 120	
2-Methylnaphthalene	1	80	69.914	87.4	62.5 - 121	
Acenaphthene	1	80	70.507	88.1	62.4 - 121	
Acenaphthylene	1	80	67.204	84	62.9 - 123	
Anthracene	1	80	74.893	93.6	64.9 - 129	
Benzo(a)anthracene	1	80	65.016	81.3	61.8 - 125	
Benzo(a)pyrene	1	80	69.585	87	63.4 - 119	
Benzo(b)fluoranthene	1	80	72.410	90.5	62.7 - 119	
Benzo(g,h,i)perylene	1	80	70.757	88.4	68.2 - 129	
Benzo(k)fluoranthene	1	80	69.532	86.9	64.5 - 128	
Chrysene	1	80	74.310	92.9	64.4 - 128	
Dibenz(a,h)anthracene	1	80	72.935	91.2	65.3 - 128	
Fluoranthene	1	80	65.167	81.5	61.8 - 129	
Fluorene	1	80	69.542	86.9	60.8 - 121	
Indeno(1,2,3-cd)pyrene	1	80	74.402	93	67.6 - 129	
Naphthalene	1	80	68.223	85.3	59.5 - 116	
Phenanthrene	1	80	68.720	85.9	59.4 - 121	
Pyrene	1	80	73.962	92.5	61.2 - 130	

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L675524
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Polynuclear Aromatic Hydrocarbons by Method 8270C-SIM		
Project No:	ST010022.0026	Matrix:	Soil - ug/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	11/27/2013	**Analytic Batch:**	**WG698980**
Analysis Date:	12/26/2013 12:14:00 PM	Analyst:	377
Instrument ID:	BNAMS22	Prep Date:	12/24/2013
Sample Numbers:	L675524-01, -02, -03, -04		

Laboratory Control Sample / Laboratory Control Sample Duplicate

Analyte	Dil	Spike	LCS	% Rec	LCSD	% Rec	Control Limits	% Rec Qual	% RPD	Control Limits	RPD Qual
1-Methylnaphthalene	1	80	76.402	95.5	71.211	89	62.5 - 121		7.03	20	
2-Chloronaphthalene	1	80	79.375	99.2	72.309	90.4	62.1 - 120		9.32	20	
2-Methylnaphthalene	1	80	76.046	95.1	69.914	87.4	62.5 - 121		8.4	20	
Acenaphthene	1	80	77.500	96.9	70.507	88.1	62.4 - 121		9.45	20	
Acenaphthylene	1	80	73.866	92.3	67.204	84	62.9 - 123		9.45	20	
Anthracene	1	80	80.920	101	74.893	93.6	64.9 - 129		7.74	20	
Benzo(a)anthracene	1	80	71.289	89.1	65.016	81.3	61.8 - 125		9.2	20	
Benzo(a)pyrene	1	80	76.946	96.2	69.585	87	63.4 - 119		10	20	
Benzo(b)fluoranthene	1	80	76.975	96.2	72.410	90.5	62.7 - 119		6.11	20	
Benzo(g,h,i)perylene	1	80	75.826	94.8	70.757	88.4	68.2 - 129		6.92	20	
Benzo(k)fluoranthene	1	80	77.020	96.3	69.532	86.9	64.5 - 128		10.2	20	
Chrysene	1	80	82.118	103	74.310	92.9	64.4 - 128		9.98	20	
Dibenz(a,h)anthracene	1	80	78.638	98.3	72.935	91.2	65.3 - 128		7.53	20	
Fluoranthene	1	80	71.664	89.6	65.167	81.5	61.8 - 129		9.5	20	
Fluorene	1	80	76.122	95.2	69.542	86.9	60.8 - 121		9.03	20	
Indeno(1,2,3-cd)pyrene	1	80	79.950	99.9	74.402	93	67.6 - 129		7.19	20	
Naphthalene	1	80	74.021	92.5	68.223	85.3	59.5 - 116		8.15	20	
Phenanthrene	1	80	75.432	94.3	68.720	85.9	59.4 - 121		9.31	20	
Pyrene	1	80	79.349	99.2	73.962	92.5	61.2 - 130		7.03	20	

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L675524
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Polynuclear Aromatic Hydrocarbons by Method 8270C-SIM		
Project No:	ST010022.0026	Matrix:	Soil - ug/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	11/27/2013	**Analytic Batch:**	**WG698980**
Analysis Date:	12/26/2013 12:14:00 PM	Analyst:	377
Instrument ID:	BNAMS22	Prep Date:	12/24/2013
Sample Numbers:	L675524-01, -02, -03, -04		

Matrix Spike / Matrix Spike Duplicate

L675362-01

Analyte	Dil	Spike Value	Sample	MS	% Rec	MSD	% Rec	Control Limits	% Rec Qual	RPD	Control Limits	RPD Qual
1-Methylnaphthalene	1	80	0.0	62.069	77.6	63.983	80	58.9 - 123		3.04	20	
2-Chloronaphthalene	1	80	0.0	65.395	81.7	66.477	83.1	61.6 - 120		1.64	20	
2-Methylnaphthalene	1	80	0.0	61.173	76.5	62.682	78.4	50.7 - 129		2.44	20	
Acenaphthene	1	80	0.0	60.989	76.2	62.677	78.3	51.6 - 124		2.73	20	
Acenaphthylene	1	80	0.0	60.588	75.7	62.851	78.6	58.3 - 126		3.67	20	
Anthracene	1	80	0.0	63.650	79.6	65.153	81.4	47.9 - 137		2.33	20	
Benzo(a)anthracene	1	80	0.0	54.093	67.6	53.352	66.7	34.2 - 138		1.38	22.8	
Benzo(a)pyrene	1	80	0.0	59.659	74.6	59.378	74.2	34.6 - 133		0.47	26.3	
Benzo(b)fluoranthene	1	80	0.0	51.080	63.9	45.490	56.9	19.8 - 142		11.6	30.3	
Benzo(g,h,i)perylene	1	80	0.0	56.172	70.2	55.291	69.1	20 - 149		1.58	27.1	
Benzo(k)fluoranthene	1	80	0.0	62.553	78.2	65.783	82.2	32.1 - 137		5.03	24.6	
Chrysene	1	80	0.0	63.857	79.8	66.583	83.2	36.6 - 137		4.18	22.7	
Dibenz(a,h)anthracene	1	80	0.0	61.063	76.3	61.283	76.6	27.1 - 145		0.36	21.9	
Fluoranthene	1	80	0.0	52.703	65.9	50.385	63	39.8 - 141		4.5	22.2	
Fluorene	1	80	0.0	60.437	75.5	60.786	76	42.5 - 130		0.58	20	
Indeno(1,2,3-cd)pyrene	1	80	0.0	58.871	73.6	58.230	72.8	19 - 151		1.09	25	
Naphthalene	1	80	1.2811	61.263	75	63.595	77.9	40.6 - 135		3.74	20	
Phenanthrene	1	80	0.0	57.881	72.4	57.840	72.3	39.7 - 129		0.07	20	
Pyrene	1	80	0.0	57.777	72.2	55.996	70	31.5 - 141		3.13	23.5	

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Quality Control Summary
SDG: L675524
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Polynuclear Aromatic Hydrocarbons by Method 8270C-SIM		
Project No:	ST010022.0026	Matrix:	Soil - ug/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	11/27/2013	**Analytic Batch:**	**WG698980**
Analysis Date:	12/26/2013 12:14:00 PM	Analyst:	377
Instrument ID:	BNAMS22	Prep Date:	12/24/2013
Sample Numbers:	L675524-01, -02, -03, -04		

Internal Standard Response and Retention Time Summary

File ID: 1226_04
Analyzed: 12/26/13 044500

	ACE		CHR		NAP		PER	
	Response	**RT**	**Response**	**RT**	**Response**	**RT**	**Response**	**RT**
12 Hr. Std	65678	7.26	145775	11.50	82240	5.34	162547	13.05
Upper Limit	131000	7.76	292000	12.00	164000	5.84	325000	13.55
Lower Limit	32800	6.76	72900	11.00	41100	4.84	81300	12.55
Sample ID	**Response**	**RT**	**Response**	**RT**	**Response**	**RT**	**Response**	**RT**
L675524-01	63028	7.26	134514	11.49	72772	5.34	154876	13.05
L675524-02	59333	7.26	127736	11.50	69835	5.34	146011	13.05
L675524-03	60199	7.26	131498	11.50	70040	5.34	150562	13.05
L675524-04	54237	7.26	120013	11.50	67460	5.34	140753	13.05
MSD WG698980	61524	7.26	132539	11.49	75770	5.34	147314	13.04
MS WG698980	60764	7.26	133106	11.49	75317	5.34	148153	13.04
LCSD WG698980	63800	7.26	134484	11.49	77685	5.34	147761	13.04
LCS WG698980	58728	7.26	127196	11.50	72539	5.34	144783	13.05
BLANK WG698980	63154	7.26	128041	11.50	77392	5.34	143492	13.04

Legend:

ACE -- Acenaphthene-d10
CHR -- Chrysene-d12
NAP -- Naphthalene-d8
PER -- Perylene-d12
PHEN -- Phenanthrene-d10

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L675524
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Polynuclear Aromatic Hydrocarbons by Method 8270C-SIM		
Project No:	ST010022.0026	Matrix:	Soil - ug/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	11/27/2013	**Analytic Batch:**	**WG698980**
Analysis Date:	12/26/2013 12:14:00 PM	Analyst:	377
Instrument ID:	BNAMS22	Prep Date:	12/24/2013
Sample Numbers:	L675524-01, -02, -03, -04		

Internal Standard Response and Retention Time Summary

File ID: 1226_04
Analyzed: 12/26/13 044500

	ACE		PHEN	
	Response	**RT**	**Response**	**RT**
12 Hr. Std	65678	7.26	134301	8.81
Upper Limit	131000	7.76	269000	9.31
Lower Limit	32800	6.76	67200	8.31
Sample ID	**Response**	**RT**	**Response**	**RT**
L675524-01	63028	7.26	116864	8.80
L675524-02	59333	7.26	110166	8.81
L675524-03	60199	7.26	111954	8.81
L675524-04	54237	7.26	103447	8.81
MSD WG698980	61524	7.26	119679	8.80
MS WG698980	60764	7.26	118761	8.80
LCSD WG698980	63800	7.26	123147	8.80
LCS WG698980	58728	7.26	114818	8.81
BLANK WG698980	63154	7.26	115509	8.81

Legend:
ACE -- Acenaphthene-d10
CHR -- Chrysene-d12
NAP -- Naphthalene-d8
PER -- Perylene-d12
PHEN -- Phenanthrene-d10

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L675524
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Polynuclear Aromatic Hydrocarbons by Method 8270C-SIM		
Project No:	ST010022.0026	Matrix:	Soil - ug/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	11/27/2013	**Analytic Batch:**	**WG698980**
Analysis Date:	12/26/2013 12:14:00 PM	Analyst:	377
Instrument ID:	BNAMS22	Prep Date:	12/24/2013
Sample Numbers:	L675524-01, -02, -03, -04		

Surrogate Summary

			FBP		NBZ		TPH	
Laboratory Sample ID	Instrument	File ID	ppm	% Rec	ppm	% Rec	ppm	% Rec
L675524-01	BNAMS22	1226_24	0.0772	92.6	0.0794	95.3	0.0738	88.6
L675524-02	BNAMS22	1226_25	0.0812	97.5	0.0794	95.3	0.0749	89.9
L675524-03	BNAMS22	1226_26	0.0755	90.6	0.0713	85.6	0.0715	85.9
L675524-04	BNAMS22	1226_27	0.0822	98.7	0.0815	97.8	0.0776	93.2
LCS WG698980	BNAMS22	1226_05	0.0843	101	0.0869	104	0.0792	95.0
LCSD WG698980	BNAMS22	1226_06	0.0762	91.4	0.0773	92.8	0.0716	85.9
BLANK WG698980	BNAMS22	1226_07	0.0783	94.0	0.0774	92.9	0.0767	92.0
MS WG698980	BNAMS22	1226_09	0.0744	89.3	0.0740	88.8	0.0671	80.6
MSD WG698980	BNAMS22	1226_10	0.0784	94.1	0.0841	101	0.0712	85.4

FBP --2-FLUOROBIPHENYL	True Value: 0.0833 ppm	Limits: 51.1 - 131
NBZ --NITROBENZENE-D5	True Value: 0.0833 ppm	Limits: 40.9 - 147
TPH --P-TERPHENYL-D14	True Value: 0.0833 ppm	Limits: 45.30 - 138

Company Name/Address: **Kinder Morgan** Silvercraft
Attn: Paul Salcido

Billing Information:

Report to: Sasha Arnold
Email To: Sasha Arnold
Project Description: KMEP-Silvercraft
City/State Collected: Tucson
Phone: 480-905-9311
Fax:
Client Project #: 5010022026
Lab Project #:
Collected by (print): Sid
Site/Facility ID #: Silvercraft
P.O. #:
Collected by (signature):
Immediately Packed on Ice: N ___ Y X
Rush? (Lab MUST Be Notified): ___ Same Day ....200%; ___ Next Day ....100%; ___ Two Day ....50%; ___ Three Day 25%
Date Results Needed:
Email? ___No ___Yes
FAX? ___No ___Yes

Analysis / Container / Preservative

Chain of Custody Page 1 of 1

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12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

L# 671904
B016
Acctnum: KINARCPAZ
Template:
Prelogin:
TSR:
Cooler:
Shipped Via:

	Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	CARB 435 (PLM) Level A (asbestos)-Sub out	8082 PCBs, SW 9095 Paint filter/ 4oz jar	8081, 8141 / 4oz jar	8151 Herbicides/ 4oz jar	8015AZ (C10-C32), RCRA 8 metals/ 4oz jar	Flashpoint 1010, pH 9045B / 4oz jar	VOC 8260B + MTBE, TBA, TAME/ 40mL amber/MeOH			Rem./Contaminant	Sample # (lab only)
RB-	R2966	Comp	Soil		11/27/13	1030	7	X	X	X	X	X	X	X			1675574.01	-01
RB-	R29622	"	"		"	1100	7	X	X	X	X	X	X	X			-02	-02
	RB-6014	"	"		"	1130	7	X	X	X	X	X	X	X			-03	-03
	RB-6249	"	"		"	1200	7	X	X	X	X	X	X	X			-04	-04

* Matrix: SS - Soil GW - Groundwater WW - WasteWater DW - Drinking Water OT - Other_____

pH _____ Temp _____
Flow _____ Other _____

5113555137967

Remarks:

Hold #

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Samples returned via: ☐ UPS ☐ FedEx ☐ Courier ☐ ____	Condition: (lab use only)
	11/27/13	1515			
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Temp: 3.1 °C Bottles Received: 28	COC Seal Intact: ___Y ___N ___NA OK
	11/29/13	1830	FedEx		
Relinquished by: (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: 11-30-13 Time: 0930	pH Checked: NCF:

Refer to L0714105

L675524

Troy Dunlap

From: Mark Beasley
Sent: Monday, December 23, 2013 11:36 AM
To: Login; Sample Storage; Extractions; Due SVOC
Cc: Jarred Willis
Subject: L671404 *KINARCPAZ* rush relogs

Relog L671404-01 thru -04 for SV8270PAHSIM. Log as R2 due 12/26.

Thanks
Mark Beasley
ESC Lab Sciences
Direct Phone: (615) 773-9672
Toll-free: 1-800-767-5859 ext 9672
Email: mbeasley@esclabsciences.com

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Quality Control Summary
SDG: L672629

For: Kinder Morgan - Rocklin, CA-AZ Work
KMEP: Silvercroft

L672629

Lab SampleID.	Client ID
L672629-01	RB-5979

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Mt. Juliet, TN 37122
(615) 758-5858
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Fax (615) 758-5859
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Quality Control Summary
SDG: L672629

For: Kinder Morgan - Rocklin, CA-AZ Work
Project: KMEP: Silvercroft
December 13, 2013

Sample Receiving and Handling

All sample aliquots were received at the correct temperature, in the proper containers, and with the appropriate preservatives. All method specified holding times were met.

pH by Method 9045D

Laboratory Control Sample

Sample L672629-01 was analyzed in analytical batch WG696271. The laboratory control sample associated with this sample was within the laboratory control limits for all target analytes reported from this batch. The relative percent difference was within laboratory limits for all target analytes reported from this batch.

Sample Duplicate Analysis

For analytical batch WG696271 sample duplicate analysis was performed on sample L672629-01. The relative percent differences were within the method limits for target analytes reported from this batch.

For analytical batch WG696271 sample duplicate analysis was performed on sample L672799-04. The relative percent differences were within the method limits for target analytes reported from this batch.

Matrix Spike/Matrix Spike Duplicate

Precision for batch WG696271 was evaluated using the LCS/LCSD. The RPDs were within method limits.

Ignitability by Method D93/1010A

Laboratory Control Sample

Sample L672629-01 was analyzed in analytical batch WG696499. The laboratory control sample associated with this sample was within the laboratory control limits for all target analytes reported from this batch. The relative percent difference was within laboratory limits for all target analytes reported from this batch.

Sample Duplicate Analysis

For analytical batch WG696499 sample duplicate analysis was performed on sample L672192-01. The relative percent differences were within the method limits for target analytes reported from this batch.

For analytical batch WG696499 sample duplicate analysis was performed on sample L672192-02. The relative percent differences were within the method limits for target analytes reported from this batch.

For analytical batch WG696499 sample duplicate analysis was performed on sample L672280-01. The relative percent differences were within the method limits for target analytes reported from this batch.

Matrix Spike/Matrix Spike Duplicate

Precision for batch WG696499 was evaluated using the LCS/LCSD. The RPDs were within method limits.

Paint Filter by Method 9095B

Sample Duplicate Analysis

For analytical batch WG696713 sample duplicate analysis was performed on sample L672629-01. The relative percent differences were within the method limits for target analytes reported from this batch.

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Quality Control Summary
SDG: L672629
For: Kinder Morgan - Rocklin, CA-AZ Work
Project: KMEP: Silvercroft
December 13, 2013

Matrix Spike/Matrix Spike Duplicate
Precision for batch WG696713 was evaluated using the DUP. The RPDs were within method limits.

Mercury by Method 7471
Laboratory Control Sample
Sample L672629-01 was analyzed in analytical batch WG696388. The laboratory control sample associated with this sample was within the laboratory control limits for all target analytes reported from this batch.

Sample Duplicate Analysis
For analytical batch WG696388 sample duplicate analysis was performed on sample L672654-01. The relative percent differences were within the method limits for target analytes reported from this batch.

Matrix Spike/Matrix Spike Duplicate
For analytical batch WG696388 matrix spike/matrix spike duplicate analysis was performed on sample L672654-01. The matrix spike recoveries were below laboratory control limits for Mercury. The relative percent difference was within laboratory limits for all target analytes reported from this batch. Mercury did not meet the method limit criteria for the post digest spike.

Blank Analysis
The method blank, the initial, and all continuing calibration blanks contained no analytes at concentrations above the method reporting limit.

Trace Metals by Method 6010B
Laboratory Control Sample
Sample L672629-01 was analyzed in analytical batch WG696302. The laboratory control sample associated with this sample was within the laboratory control limits for all target analytes reported from this batch.

Sample Duplicate Analysis
For analytical batch WG696302 sample duplicate analysis was performed on sample L672632-05. The relative percent difference exceeded the method limits for Barium and Selenium.

Matrix Spike/Matrix Spike Duplicate
For analytical batch WG696302 matrix spike/matrix spike duplicate analysis was performed on sample L672632-05. The matrix spike recoveries were below laboratory control limits for Barium. The spike recoveries were within limits for the remaining target compounds reported from this batch. The relative percent difference was within laboratory limits for all target analytes reported from this batch. Lead did not meet the method limit criteria for the serial dilution.

Blank Analysis
The method blank, the initial, and all continuing calibration blanks contained no analytes at concentrations above the method reporting limit.

Volatile Organic Compounds by Method 8260B
Laboratory Control Sample
Sample L672629-01 was analyzed in analytical batch WG696108. The laboratory control sample associated with this sample had all target analytes within method limits except for Acetone. The relative percent difference was within laboratory limits for all target analytes reported from this batch.

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Quality Control Summary
SDG: L672629
For: Kinder Morgan - Rocklin, CA-AZ Work
Project: KMEP: Silvercroft
December 13, 2013

Matrix Spike/Matrix Spike Duplicate
For analytical batch WG696108 matrix spike/matrix spike duplicate analysis was performed on sample L672625-01. The matrix spike recoveries were above laboratory control limits for 2-Butanone (MEK) and Acetone. The matrix spike recoveries were below laboratory control limits for 1,2,3-Trichlorobenzene, 1,2,4-Trichlorobenzene, 1,2-Dichlorobenzene, 1,3,5-Trimethylbenzene, 1,3-Dichlorobenzene, 1,4-Dichlorobenzene, 2-Chlorotoluene, 4-Chlorotoluene, Chlorobenzene, Hexachloro-1,3-butadiene, n-Butylbenzene, p-Isopropyltoluene, sec-Butylbenzene, Styrene, and tert-Butylbenzene. The spike recoveries were within limits for the remaining target compounds reported from this batch. The relative percent difference exceeded laboratory limits for 1,1,2-Trichlorotrifluoroethane, 1,1-Dichloroethene, Bromomethane, Carbon disulfide, Chloroethane, Hexachloro-1,3-butadiene, and Trichlorofluoromethane.

Blank Analysis
The method blank, the initial, and all continuing calibration blanks contained no analytes at concentrations above the method reporting limit.

Polychlorinated Biphenyls by Method 8081/8082
Laboratory Control Sample
Sample L672629-01 was analyzed in analytical batch WG696459. The laboratory control sample associated with this sample was within the laboratory control limits for all target analytes reported from this batch. The relative percent difference was within laboratory limits for all target analytes reported from this batch.

Matrix Spike/Matrix Spike Duplicate
For analytical batch WG696459 matrix spike/matrix spike duplicate analysis was performed on sample L672629-01. The matrix spike recoveries and relative percent differences were within laboratory control limits for all target analytes reported from this batch.

Blank Analysis
The method blank, the initial, and all continuing calibration blanks contained no analytes at concentrations above the method reporting limit.

Pesticides by Method 8081/8082
Laboratory Control Sample
Sample L672629-01 was analyzed in analytical batch WG696459. The laboratory control sample associated with this sample was within the laboratory control limits for all target analytes reported from this batch. The relative percent difference was within laboratory limits for all target analytes reported from this batch.

Matrix Spike/Matrix Spike Duplicate
For analytical batch WG696459 matrix spike/matrix spike duplicate analysis was performed on sample L672496-01. The matrix spike recoveries and relative percent differences were within laboratory control limits for all target analytes reported from this batch.

Blank Analysis
The method blank, the initial, and all continuing calibration blanks contained no analytes at concentrations above the method reporting limit.

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Mt. Juliet, TN 37122
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(800) 767-5859
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Quality Control Summary
SDG: L672629

For: Kinder Morgan - Rocklin, CA-AZ Work
Project: KMEP: Silvercroft
December 13, 2013

TPH by Method 8015D/DRO_AZ

Laboratory Control Sample

Sample L672629-01 was analyzed in analytical batch WG696293. The laboratory control sample associated with this sample was within the laboratory control limits for all target analytes reported from this batch. The relative percent difference was within laboratory limits for all target analytes reported from this batch.

Matrix Spike/Matrix Spike Duplicate

Precision for batch WG696293 was evaluated using the LCS/LCSD. The RPDs were within method limits.

Blank Analysis

The method blank, the initial, and all continuing calibration blanks contained no analytes at concentrations above the method reporting limit.

Herbicides by Method 8151

Laboratory Control Sample

Sample L672629-01 was analyzed in analytical batch WG696255. The laboratory control sample associated with this sample was within the laboratory control limits for all target analytes reported from this batch. The relative percent difference was within laboratory limits for all target analytes reported from this batch.

Matrix Spike/Matrix Spike Duplicate

For analytical batch WG696255 matrix spike/matrix spike duplicate analysis was performed on sample L672496-02. The matrix spike recoveries and relative percent differences were within laboratory control limits for all target analytes reported from this batch.

Blank Analysis

The method blank, the initial, and all continuing calibration blanks contained no analytes at concentrations above the method reporting limit.

OP Pesticides by Method 8141

Laboratory Control Sample

Sample L672629-01 was analyzed in analytical batch WG696297. The laboratory control sample associated with this sample was within the laboratory control limits for all target analytes reported from this batch. The relative percent difference was within laboratory limits for all target analytes reported from this batch.

Matrix Spike/Matrix Spike Duplicate

For analytical batch WG696297 matrix spike/matrix spike duplicate analysis was performed on sample L672629-01. The matrix spike recoveries and relative percent differences were within laboratory control limits for all target analytes reported from this batch.

Blank Analysis

The method blank, the initial, and all continuing calibration blanks contained no analytes at concentrations above the method reporting limit.

Nancy F. McLain
ESC Representative
ESC Lab Sciences

12065 Lebanon Rd.
Mt. Juliet, TN 37122
(615) 758-5858
1-800-767-5859
Fax (615) 758-5859

Tax I.D. 62-0814289

Est. 1970

Bob Forsberg / Sasha Arnold
ARCADIS
14201 N. 87th Street, Suite 135
Scottsdale, AZ 85260

Report Summary

Thursday December 12, 2013

Report Number: L672629
Samples Received: 12/07/13
Client Project: ST010022.0024

Description: KMEP Silvercroft Wash

The analytical results in this report are based upon information supplied by you, the client, and are for your exclusive use. If you have any questions regarding this data package, please do not hesitate to call.

Entire Report Reviewed By: Jarred Willis , ESC Representative

Laboratory Certification Numbers

A2LA - 1461-01, AIHA - 100789, AL - 40660, CA - 01157CA, CT - PH-0197, FL - E87487, GA - 923, IN - C-TN-01, KY - 90010, KYUST - 0016, NC - ENV375/DW21704/BIO041, ND - R-140. NJ - TN002, NJ NELAP - TN002, SC - 84004, TN - 2006, VA - 460132, WV - 233, AZ - 0612, MN - 047-999-395, NY - 11742, WI - 998093910, NV - TN000032011-1, TX - T104704245-11-3, OK - 9915, PA - 68-02979, IA Lab #364, EPA - TN002

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Where applicable, sampling conducted by ESC is performed per guidance provided in laboratory standard operating procedures: 060302, 060303, and 060304.

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Quality Control Summary
SDG: L672629

For: Kinder Morgan - Rocklin, CA-AZ Work
KMEP: Silvercroft

L672629

Lab SampleID.	Client ID
L672629-01	RB-5979

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SAMPLE NUMBER
RB-5979

Customer :	Kinder Morgan - Rocklin, CA-AZ Work	Project :	ST010022.0024
Source :	SILVERCROFT	Date Sampled :	12/6/2013 12:00 PM
Location :	KMEP: Silvercroft	Sampled By :	R. O. Keefe
Lab Sample ID :	**L672629-01**	Date Received :	12/7/2013

D93/1010A

Analytic Batch: WG696499 | Analysis Date: 12/11/2013 | Analysis Time: 1:16 PM
Instrument: KOEHLER | Analyst: 596 | Preparation Date: 12/11/2013 1:15
Method: D93/1010A | Dilution: 1

CAS NO	Analyte	RL Deg. F	RESULTS Deg. F	FLAG
	Ignitability		**SEE FOOTNOTE**	

9045D

Analytic Batch: WG696271 | Analysis Date: 12/10/2013 | Analysis Time: 2:00 PM
Instrument: AB15+ ACCU | Analyst: 519 | Preparation Date: 12/10/2013 1:28
Method: 9045D | Dilution: 1

CAS NO	Analyte	RL su	RESULTS su	FLAG
00010-29-7	pH		**8.9**	

9095B

Analytic Batch: WG696713 | Analysis Date: 12/12/2013 | Analysis Time: 12:07
Instrument: NONE | Analyst: 596 | Preparation Date: 12/12/2013 12:06
Method: 9095B | Dilution: 1

CAS NO	Analyte	RL %	RESULTS %	FLAG
	Paint Filter Test		**SEE FOOTNOTE**	

Comments:
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SAMPLE NUMBER
RB-5979

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Source :	SILVERCROFT	Date Sampled :	12/6/2013 12:00 PM
Location :	KMEP: Silvercroft	Sampled By :	R. O. Keefe
Lab Sample ID :	**L672629-01**	Date Received :	12/7/2013

7471

Analytic Batch: WG696388 | Analysis Date: 12/12/2013 | Analysis Time: 10:23
Instrument: CVAA1 | Analyst: 619 | Preparation Date: 12/10/2013 2:34
Method: 7471 | Dilution: 1

CAS NO	Analyte	RL mg/kg	RESULTS mg/kg	FLAG
7439-97-6	Mercury	0.020	< 0.020	

6010B

Analytic Batch: WG696302 | Analysis Date: 12/11/2013 | Analysis Time: 7:38 PM
Instrument: ICP7 | Analyst: | Preparation Date: 12/9/2013 9:14
Method: 6010B | Dilution: 1

CAS NO	Analyte	RL mg/kg	RESULTS mg/kg	FLAG
7440-38-2	Arsenic	1.0	**2.8**	
7440-39-3	Barium	0.25	**130**	
7440-43-9	Cadmium	0.25	< 0.25	
7440-47-3	Chromium	0.50	**4.1**	
7439-92-1	Lead	0.25	**7.4**	
7782-49-2	Selenium	1.0	< 1.0	
7440-22-4	Silver	0.50	< 0.50	

8260B

Analytic Batch: WG696108 | Analysis Date: 12/8/2013 | Analysis Time: 5:59
Instrument: VOCMS18 | Analyst: 611 | Preparation Date: 12/7/2013 5:06
Method: 8260B | Dilution: 19

CAS NO	Analyte	RL mg/kg	RESULTS mg/kg	FLAG
67-64-1	Acetone	0.95	< 0.95	L1
107-13-1	Acrylonitrile	0.19	< 0.19	
71-43-2	Benzene	0.019	< 0.019	
108-86-1	Bromobenzene	0.019	< 0.019	
75-27-4	Bromodichloromethane	0.019	< 0.019	
75-25-2	Bromoform	0.019	< 0.019	
74-83-9	Bromomethane	0.095	< 0.095	
106-99-0	1,3-Butadiene	0.038	< 0.038	
104-51-8	n-Butylbenzene	0.019	< 0.019	
135-98-8	sec-Butylbenzene	0.019	< 0.019	

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SAMPLE NUMBER
RB-5979

Customer :	Kinder Morgan - Rocklin, CA-AZ Work	Project :	ST010022.0024
Source :	SILVERCROFT	Date Sampled :	12/6/2013 12:00 PM
Location :	KMEP: Silvercroft	Sampled By :	R. O. Keefe
Lab Sample ID :	**L672629-01**	Date Received :	12/7/2013

8260B

Analytic Batch: WG696108 | Analysis Date: 12/8/2013 | Analysis Time: 5:59
Instrument: VOCMS18 | Analyst: 611 | Preparation Date: 12/7/2013 5:06
Method: 8260B | Dilution: 19

CAS NO	Analyte	RL mg/kg	RESULTS mg/kg	FLAG
98-06-6	tert-Butylbenzene	0.019	< 0.019	
75-15-0	Carbon disulfide	0.019	< 0.019	
56-23-5	Carbon tetrachloride	0.019	< 0.019	
108-90-7	Chlorobenzene	0.019	< 0.019	
124-48-1	Chlorodibromomethane	0.019	< 0.019	
75-00-3	Chloroethane	0.095	< 0.095	
67-66-3	Chloroform	0.095	< 0.095	
74-87-3	Chloromethane	0.048	< 0.048	
95-49-8	2-Chlorotoluene	0.019	< 0.019	
106-43-4	4-Chlorotoluene	0.019	< 0.019	
110-82-7	Cyclohexane	0.019	< 0.019	
96-12-8	1,2-Dibromo-3-Chloropropane	0.095	< 0.095	
106-93-4	1,2-Dibromoethane	0.019	< 0.019	
74-95-3	Dibromomethane	0.019	< 0.019	
95-50-1	1,2-Dichlorobenzene	0.019	< 0.019	
541-73-1	1,3-Dichlorobenzene	0.019	< 0.019	
106-46-7	1,4-Dichlorobenzene	0.019	< 0.019	
75-71-8	Dichlorodifluoromethane	0.095	< 0.095	
75-34-3	1,1-Dichloroethane	0.019	< 0.019	
107-06-2	1,2-Dichloroethane	0.019	< 0.019	
75-35-4	1,1-Dichloroethene	0.019	< 0.019	
156-59-2	cis-1,2-Dichloroethene	0.019	< 0.019	
156-60-5	trans-1,2-Dichloroethene	0.019	< 0.019	
78-87-5	1,2-Dichloropropane	0.019	< 0.019	
563-58-6	1,1-Dichloropropene	0.019	< 0.019	
142-28-9	1,3-Dichloropropane	0.019	< 0.019	
10061-01-5	cis-1,3-Dichloropropene	0.019	< 0.019	
10061-02-6	trans-1,3-Dichloropropene	0.019	< 0.019	
594-20-7	2,2-Dichloropropane	0.019	< 0.019	
77-73-6	Dicyclopentadiene	0.019	< 0.019	
108-20-3	Di-isopropyl ether	0.019	< 0.019	
100-41-4	Ethylbenzene	0.019	< 0.019	
622-96-8	4-Ethyltoluene	0.019	< 0.019	

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Source :	SILVERCROFT	Date Sampled :	12/6/2013 12:00 PM
Location :	KMEP: Silvercroft	Sampled By :	R. O. Keefe
Lab Sample ID :	**L672629-01**	Date Received :	12/7/2013

8260B

Analytic Batch: WG696108 | Analysis Date: 12/8/2013 | Analysis Time: 5:59
Instrument: VOCMS18 | Analyst: 611 | Preparation Date: 12/7/2013 5:06
Method: 8260B | Dilution: 19

CAS NO	Analyte	RL mg/kg	RESULTS mg/kg	FLAG
87-68-3	Hexachloro-1,3-butadiene	0.019	< 0.019	
110-54-3	n-Hexane	0.19	< 0.19	
98-82-8	Isopropylbenzene	0.019	< 0.019	
99-87-6	p-Isopropyltoluene	0.019	< 0.019	
78-93-3	2-Butanone (MEK)	0.19	< 0.19	
75-09-2	Methylene Chloride	0.095	< 0.095	
108-10-1	4-Methyl-2-pentanone (MIBK)	0.19	< 0.19	
1634-04-4	Methyl tert-butyl ether	0.019	< 0.019	
108-87-2	Methyl Cyclohexane	0.019	< 0.019	
91-20-3	Naphthalene	0.095	< 0.095	
115-07-1	Propene	0.048	< 0.048	
103-65-1	n-Propylbenzene	0.019	< 0.019	
100-42-5	Styrene	0.019	< 0.019	
630-20-6	1,1,1,2-Tetrachloroethane	0.019	< 0.019	
79-34-5	1,1,2,2-Tetrachloroethane	0.019	< 0.019	
76-13-1	1,1,2-Trichlorotrifluoroethane	0.019	< 0.019	
127-18-4	Tetrachloroethene	0.019	< 0.019	
108-88-3	Toluene	0.095	< 0.095	
87-61-6	1,2,3-Trichlorobenzene	0.019	< 0.019	
120-82-1	1,2,4-Trichlorobenzene	0.019	< 0.019	
71-55-6	1,1,1-Trichloroethane	0.019	< 0.019	
79-00-5	1,1,2-Trichloroethane	0.019	< 0.019	
79-01-6	Trichloroethene	0.019	< 0.019	
75-69-4	Trichlorofluoromethane	0.095	< 0.095	
96-18-4	1,2,3-Trichloropropane	0.048	< 0.048	
95-63-6	1,2,4-Trimethylbenzene	0.019	< 0.019	
526-73-8	1,2,3-Trimethylbenzene	0.019	< 0.019	
108-67-8	1,3,5-Trimethylbenzene	0.019	< 0.019	
75-01-4	Vinyl chloride	0.019	< 0.019	
1330-20-7	Xylenes, Total	0.057	< 0.057	
	Toluene-d8	**100**		
	Dibromofluoromethane	**96.6**		
	4-Bromofluorobenzene	**96.4**		

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SAMPLE NUMBER
RB-5979

Customer :	Kinder Morgan - Rocklin, CA-AZ Work	Project :	ST010022.0024
Source :	SILVERCROFT	Date Sampled :	12/6/2013 12:00 PM
Location :	KMEP: Silvercroft	Sampled By :	R. O. Keefe
Lab Sample ID :	**L672629-01**	Date Received :	12/7/2013

8015D/DRO_AZ

Analytic Batch: WG696293 | Analysis Date: 12/11/2013 | Analysis Time: 1:02
Instrument: SVGC2 | Analyst: 187 | Preparation Date: 12/9/2013 6:23
Method: 8015D/DRO_AZ | Dilution: 1

CAS NO	Analyte	RL mg/kg	RESULTS mg/kg	FLAG
	C10-C22 Hydrocarbons	30	< 30	
	C22-C32 Hydrocarbons	50	< 50	

Surrogates

Analyte	PERCENT RECOVERY	QUALIFIERS	FLAG
o-Terphenyl	**81.9**		

8081/8082

Analytic Batch: WG696459 | Analysis Date: 12/11/2013 | Analysis Time: 12:05
Instrument: SVGC20 | Analyst: 119 | Preparation Date: 12/10/2013 10:06
Method: 8081/8082 | Dilution: 1

CAS NO	Analyte	RL mg/kg	RESULTS mg/kg	FLAG
12674-11-2	PCB 1016	0.017	< 0.017	
11104-28-2	PCB 1221	0.017	< 0.017	
11141-16-5	PCB 1232	0.017	< 0.017	
53469-21-9	PCB 1242	0.017	< 0.017	
12672-29-6	PCB 1248	0.017	< 0.017	
11097-69-1	PCB 1254	0.017	< 0.017	
11096-82-5	PCB 1260	0.017	< 0.017	

Surrogates

Analyte	PERCENT RECOVERY	QUALIFIERS	FLAG
Decachlorobiphenyl	**77.6**		
Tetrachloro-m-xylene	**105**		

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SAMPLE NUMBER
RB-5979

Customer :	Kinder Morgan - Rocklin, CA-AZ Work	Project :	ST010022.0024
Source :	SILVERCROFT	Date Sampled :	12/6/2013 12:00 PM
Location :	KMEP: Silvercroft	Sampled By :	R. O. Keefe
Lab Sample ID :	**L672629-01**	Date Received :	12/7/2013

8081/8082

Analytic Batch: WG696459 | Analysis Date: 12/11/2013 | Analysis Time: 1:45 PM
Instrument: SVGC24 | Analyst: 297 | Preparation Date: 12/10/2013 10:06
Method: 8081/8082 | Dilution: 1

CAS NO	Analyte	RL mg/kg	RESULTS mg/kg	FLAG
309-00-2	Aldrin	0.020	< 0.020	
319-84-6	Alpha BHC	0.020	< 0.020	
319-85-7	Beta BHC	0.020	< 0.020	
319-86-8	Delta BHC	0.020	< 0.020	
58-89-9	Gamma BHC	0.020	< 0.020	
57-74-9	Chlordane	0.20	< 0.20	
72-54-8	4,4-DDD	0.020	< 0.020	
72-55-9	4,4-DDE	0.020	< 0.020	
50-29-3	4,4-DDT	0.020	< 0.020	
60-57-1	Dieldrin	0.020	< 0.020	
959-98-8	Endosulfan I	0.020	< 0.020	
33213-65-9	Endosulfan II	0.020	< 0.020	
1031-07-8	Endosulfan sulfate	0.020	< 0.020	
72-20-8	Endrin	0.020	< 0.020	
7421-93-4	Endrin aldehyde	0.020	< 0.020	
53494-70-5	Endrin ketone	0.020	< 0.020	
76-44-8	Heptachlor	0.020	< 0.020	
1024-57-3	Heptachlor epoxide	0.020	< 0.020	
118-74-1	Hexachlorobenzene	0.020	< 0.020	
72-43-5	Methoxychlor	0.020	< 0.020	
8001-35-2	Toxaphene	0.40	< 0.40	

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SAMPLE NUMBER
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Source :	SILVERCROFT	Date Sampled :	12/6/2013 12:00 PM
Location :	KMEP: Silvercroft	Sampled By :	R. O. Keefe
Lab Sample ID :	**L672629-01**	Date Received :	12/7/2013

8151

Analytic Batch: WG696255 | Analysis Date: 12/10/2013 | Analysis Time: 2:10
Instrument: SVGC11 | Analyst: 267 | Preparation Date: 12/9/2013 12:22
Method: 8151 | Dilution: 1

CAS NO	Analyte	RL mg/kg	RESULTS mg/kg	FLAG
94-75-7	2,4-D	0.070	< 0.070	
75-99-0	Dalapon	0.80	< 0.80	
94-82-6	2,4-DB	0.070	< 0.070	
1918-00-9	Dicamba	0.070	< 0.070	
120-36-5	Dichloroprop	0.070	< 0.070	
88-85-7	Dinoseb	0.070	< 0.070	
94-74-6	MCPA	6.5	< 6.5	
93-65-2	MCPP	6.5	< 6.5	
93-76-5	2,4,5-T	0.070	< 0.070	
93-72-1	2,4,5-TP (Silvex)	0.070	< 0.070	

Surrogates

Analyte	PERCENT RECOVERY	QUALIFIERS	FLAG
2,4-Dichlorophenyl Acetic Acid	**92.8**		

8141

Analytic Batch: WG696297 | Analysis Date: 12/11/2013 | Analysis Time: 6:45 PM
Instrument: SVGC12 | Analyst: 386 | Preparation Date: 12/11/2013 3:46
Method: 8141 | Dilution: 1

CAS NO	Analyte	RL mg/kg	RESULTS mg/kg	FLAG
86-50-0	Azinphos-Methyl	0.10	< 0.10	
35400-43-2	Bolstar (Sulprofos)	0.10	< 0.10	
2921-88-2	Chlorpyrifos	0.10	< 0.10	
56-72-4	Coumaphos	0.10	< 0.10	
8065-48-3	Demeton,-O and -S	0.070	< 0.070	
333-41-5	Diazinon	0.10	< 0.10	
62-73-7	Dichlorvos	0.10	< 0.10	
60-51-5	Dimethoate	0.10	< 0.10	
298-04-4	Disulfoton	0.10	< 0.10	
2104-64-5	EPN	0.10	< 0.10	

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SAMPLE NUMBER
RB-5979

Customer :	Kinder Morgan - Rocklin, CA-AZ Work	Project :	ST010022.0024
Source :	SILVERCROFT	Date Sampled :	12/6/2013 12:00 PM
Location :	KMEP: Silvercroft	Sampled By :	R. O. Keefe
Lab Sample ID :	**L672629-01**	Date Received :	12/7/2013

8141

Analytic Batch: WG696297 | Analysis Date: 12/11/2013 | Analysis Time: 6:45 PM
Instrument: SVGC12 | Analyst: 386 | Preparation Date: 12/11/2013 3:46
Method: 8141 | Dilution: 1

CAS NO	Analyte	RL mg/kg	RESULTS mg/kg	FLAG
13194-48-4	Ethoprop	0.10	< 0.10	
56-38-2	Ethyl Parathion	0.10	< 0.10	
115-90-2	Fensulfothion	0.10	< 0.10	
55-38-9	Fenthion	0.10	< 0.10	
121-75-5	Malathion	0.10	< 0.10	
150-50-5	Merphos	0.10	< 0.10	
298-00-0	Methyl parathion	0.10	< 0.10	
7786-34-7	Mevinphos	0.10	< 0.10	
300-76-5	Naled	0.10	< 0.10	
298-02-2	Phorate	0.10	< 0.10	
299-84-3	Ronnel	0.10	< 0.10	
22248-79-9	Stirophos	0.10	< 0.10	
3689-24-5	Sulfotep	0.10	< 0.10	
21646-99-1	TEPP	0.10	< 0.10	
34643-46-4	Tokuthion (Prothothiofos)	0.10	< 0.10	
327-98-0	Trichloronate	0.10	< 0.10	

Surrogates

Analyte	PERCENT RECOVERY	QUALIFIERS	FLAG
Tributyl Phosphate	**84.9**		
Triphenyl Phosphate	**92.2**		

LEGEND

RL - Reporting Limit
Did Not Ignite @ 170 F
8.9@20.1c
Contains No Free Liquid

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SAMPLE NUMBER
RB-5979

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Source :	SILVERCROFT	Date Sampled :	12/6/2013 12:00 PM
Location :	KMEP: Silvercroft	Sampled By :	R. O. Keefe
Lab Sample ID :	**L672629-01**	Date Received :	12/7/2013

QUALIFIERS

L1 -	The associated blank spike recovery was above laboratory acceptance limits.

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Quality Control Summary
SDG: L672629
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Ignitability by Method D93/1010A		
Project No:	ST010022.0024	Matrix:	Soil - mg/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	12/6/2013	**Analytic Batch:**	**WG696499**
Analysis Date:	12/11/2013 1:16:00 PM	Analyst:	596
Instrument ID:	KOEHLER		
Sample Numbers:	L672629-01		

Laboratory Control Sample (LCS)

Analyte	Dil	True Value	Found	% Rec	Control Limits	Qual
Ignitability	1	82	81	98.8	93 - 107	

Laboratory Control Sample Duplicate (LCSD)

Analyte	Dil	True Value	Found	% Rec	Control Limits	Qual
Ignitability	1	82	81	98.8	93 - 107	

Laboratory Control Sample / Laboratory Control Sample Duplicate

Analyte	Dil	Spike	LCS	% Rec	LCSD	% Rec	Control Limits	% Rec Qual	% RPD	Control Limits	RPD Qual
Ignitability	1	82	81	98.8	81	98.8	93 - 107		0	20	

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L672629
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Ignitability by Method D93/1010A		
Project No:	ST010022.0024	Matrix:	Soil - mg/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	12/6/2013	**Analytic Batch:**	**WG696499**
Analysis Date:	12/11/2013 1:16:00 PM	Analyst:	596
Instrument ID:	KOEHLER		
Sample Numbers:	L672629-01		

Sample Duplicate

L672192-01

Analyte	Dil	Sample Result	DUP Result	% RPD	Limit	Qualifier
Ignitability	1	0.0	0.0	0	10	

Sample Duplicate

L672192-02

Analyte	Dil	Sample Result	DUP Result	% RPD	Limit	Qualifier
Ignitability	1	0.0	0.0	0	10	

Sample Duplicate

L672280-01

Analyte	Dil	Sample Result	DUP Result	% RPD	Limit	Qualifier
Ignitability	1	0.0	0.0	0	10	

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Quality Control Summary
SDG: L672629
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Paint Filter by Method 9095B		
Project No:	ST010022.0024	Matrix:	Soil - mg/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	12/6/2013	**Analytic Batch:**	**WG696713**
Analysis Date:	12/12/2013 12:07:00 PM	Analyst:	596
Instrument ID:	NONE		
Sample Numbers:	L672629-01		

Sample Duplicate

L672629-01

Analyte	Dil	Sample Result	DUP Result	% RPD	Limit	Qualifier
Paint Filter Test	1	0.0	0.0	0	20	

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Quality Control Summary
SDG: L672629
Kinder Morgan - Rocklin, CA-AZ Work

Test:	pH by Method 9045D		
Project No:	ST010022.0024	Matrix:	Soil - mg/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	12/6/2013	**Analytic Batch:**	**WG696271**
Analysis Date:	12/10/2013 2:00:00 PM	Analyst:	519
Instrument ID:	AB15+ ACCU	Prep Date:	12/9/2013
Sample Numbers:	L672629-01		

Laboratory Control Sample (LCS)

Analyte	Dil	True Value	Found	% Rec	Control Limits	Qual
pH	1	5.93	6	101	98.3 - 101.7	

Laboratory Control Sample Duplicate (LCSD)

Analyte	Dil	True Value	Found	% Rec	Control Limits	Qual
pH	1	5.93	6	101	98.3 - 101.7	

Laboratory Control Sample / Laboratory Control Sample Duplicate

Analyte	Dil	Spike	LCS	% Rec	LCSD	% Rec	Control Limits	% Rec Qual	% RPD	Control Limits	RPD Qual
pH	1	5.93	6	101	6	101	98.3 - 101.7		0	20	

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Quality Control Summary
SDG: L672629
Kinder Morgan - Rocklin, CA-AZ Work

Test:	pH by Method 9045D		
Project No:	ST010022.0024	Matrix:	Soil - mg/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	12/6/2013	**Analytic Batch:**	**WG696271**
Analysis Date:	12/10/2013 2:00:00 PM	Analyst:	519
Instrument ID:	AB15+ ACCU	Prep Date:	12/9/2013
Sample Numbers:	L672629-01		

Sample Duplicate

L672629-01

Analyte	Dil	Sample Result	DUP Result	% RPD	Limit	Qualifier
pH	1	8.9	8.86	0.45	1	

Sample Duplicate

L672799-04

Analyte	Dil	Sample Result	DUP Result	% RPD	Limit	Qualifier
pH	1	9.4	9.46	0.64	1	

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Quality Control Summary
SDG: L672629
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Mercury by Method 7471		
Project No:	ST010022.0024	Matrix:	Soil - mg/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	12/6/2013	**Analytic Batch:**	**WG696388**
Analysis Date:	12/12/2013 10:23:00 AM	Analyst:	619
Instrument ID:	CVAA1	Prep Date:	12/10/2013
Sample Numbers:	L672629-01		

Method Blank

Analyte	CAS	RDL	Qualifier
Mercury	7439-97-6	< 0.0200	

Laboratory Control Sample (LCS)

Analyte	Dil	True Value	Found	% Rec	Control Limits	Qual
Mercury	50	12.4	11.345	91	71.6 - 128	

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Quality Control Summary
SDG: L672629
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Mercury by Method 7471		
Project No:	ST010022.0024	Matrix:	Soil - mg/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	12/6/2013	**Analytic Batch:**	**WG696388**
Analysis Date:	12/12/2013 10:23:00 AM	Analyst:	619
Instrument ID:	CVAA1	Prep Date:	12/10/2013
Sample Numbers:	L672629-01		

Sample Duplicate

L672654-01

Analyte	Dil	Sample Result	DUP Result	% RPD	Limit	Qualifier
Mercury	100	<2	<2		20	

Serial Dilution

L672654-01

Analyte	Dil	Sample Result	SD Result	% RPD	Limit	Qualifier
Mercury	500	<2	<10		10	

Matrix Spike / Matrix Spike Duplicate

L672654-01

Analyte	Dil	Spike Value	Sample	MS	% Rec	MSD	% Rec	Control Limits	% Rec Qual	RPD	Control Limits	RPD Qual
Mercury	100	0.0025	-0.069	0.2139	86	0.1863	75	80 - 120	M2	14	20	

Post Digest Spike

L672654-01

Analyte	Dil	Spike Value	Sample	Result	% Rec	Control Limits	Qualifier
Mercury	100	0.15	-0.069	7.0778	47	85-115	O1

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Quality Control Summary
SDG: L672629
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Trace Metals by Method 6010B		
Project No:	ST010022.0024	Matrix:	Soil - mg/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	12/6/2013	**Analytic Batch:**	**WG696302**
Analysis Date:	12/11/2013 7:38:00 PM	Analyst:	
Instrument ID:	ICP7	Prep Date:	12/9/2013
Sample Numbers:	L672629-01		

Method Blank

Analyte	CAS	RDL	Qualifier
Arsenic	7440-38-2	< 1.00	
Barium	7440-39-3	< 0.250	
Cadmium	7440-43-9	< 0.250	
Chromium	7440-47-3	< 0.500	
Lead	7439-92-1	< 0.250	
Selenium	7782-49-2	< 1.00	
Silver	7440-22-4	< 0.500	

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Quality Control Summary
SDG: L672629
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Trace Metals by Method 6010B		
Project No:	ST010022.0024	Matrix:	Soil - mg/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	12/6/2013	**Analytic Batch:**	**WG696302**
Analysis Date:	12/11/2013 7:38:00 PM	Analyst:	
Instrument ID:	ICP7	Prep Date:	12/9/2013
Sample Numbers:	L672629-01		

Laboratory Control Sample (LCS)

Analyte	Dil	True Value	Found	% Rec	Control Limits	Qual
Arsenic	1	237	231.17	98	83.1 - 117	
Barium	1	252	249.46	99	84.1 - 116	
Cadmium	1	191	182.73	96	83.2 - 117	
Chromium	1	128	126.53	99	81.3 - 118	
Lead	1	103	99.742	97	83.1 - 117	
Selenium	1	110	110.52	100	78.7 - 122	
Silver	1	47.3	46.565	98	66.2 - 134	

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Quality Control Summary
SDG: L672629
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Trace Metals by Method 6010B		
Project No:	ST010022.0024	Matrix:	Soil - mg/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	12/6/2013	**Analytic Batch:**	**WG696302**
Analysis Date:	12/11/2013 7:38:00 PM	Analyst:	
Instrument ID:	ICP7	Prep Date:	12/9/2013
Sample Numbers:	L672629-01		

Sample Duplicate

L672632-05

Analyte	Dil	Sample Result	DUP Result	% RPD	Limit	Qualifier
Arsenic	1	9.7766	8.1263	18	20	
Barium	1	75.425	54.471	32	20	R8
Cadmium	1	<0.25	<0.25		20	
Chromium	1	13.984	15.145	8	20	
Lead	1	13.642	11.978	13	20	
Selenium	1	2.5493	1.8168	34	20	R8
Silver	1	<0.5	<0.5		20	

Serial Dilution

L672632-05

Analyte	Dil	Sample Result	SD Result	% RPD	Limit	Qualifier
Arsenic	5	9.7766	10.042	3	10	
Barium	5	75.425	80.606	7	10	
Cadmium	5	<0.25	<1.25		10	
Chromium	5	13.984	14.706	5	10	
Lead	5	13.642	15.347	12	10	O1
Selenium	5	2.5493	2.3388	8	10	
Silver	5	<0.5	<2.5		10	

Matrix Spike / Matrix Spike Duplicate

L672632-05

Analyte	Dil	Spike Value	Sample	MS	% Rec	MSD	% Rec	Control Limits	% Rec Qual	RPD	Control Limits	RPD Qual
Arsenic	1	50	9.7766	52.725	86	49.422	79	75 - 125		6	20	
Barium	1	50	75.425	109.10	67	100.10	49	75 - 125	M2	9	20	
Cadmium	1	50	0.0367	43.457	87	40.759	81	75 - 125		6	20	
Chromium	1	50	13.984	59.546	91	56.019	84	75 - 125		6	20	
Lead	1	50	13.642	56.496	86	53.297	79	75 - 125		6	20	
Selenium	1	50	2.5493	46.417	88	43.156	81	75 - 125		7	20	
Silver	1	50	-0.422	43.859	88	41.632	83	75 - 125		5	20	

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Quality Control Summary
SDG: L672629
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Trace Metals by Method 6010B		
Project No:	ST010022.0024	Matrix:	Soil - mg/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	12/6/2013	**Analytic Batch:**	**WG696302**
Analysis Date:	12/11/2013 7:38:00 PM	Analyst:	
Instrument ID:	ICP7	Prep Date:	12/9/2013
Sample Numbers:	L672629-01		

Post Digest Spike

L672632-05

Analyte	Dil	Spike Value	Sample	Result	% Rec	Control Limits	Qualifier
Arsenic	1	49.5	9.7766	54.957	91	75-125	
Barium	1	49.5	75.425	117.73	85	75-125	
Cadmium	1	49.5	0.0367	43.708	88	75-125	
Chromium	1	49.5	13.984	57.886	89	75-125	
Lead	1	49.5	13.642	57.889	89	75-125	
Selenium	1	49.5	2.5493	48.329	92	75-125	
Silver	1	49.5	-0.422	44.446	90	75-125	

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Quality Control Summary
SDG: L672629
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Volatile Organic Compounds by Method 8260B		
Project No:	ST010022.0024	Matrix:	Soil - mg/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	12/6/2013	**Analytic Batch:**	**WG696108**
Analysis Date:	12/8/2013 5:59:00 AM	Analyst:	611
Instrument ID:	VOCMS18		
Sample Numbers:	L672629-01		

Method Blank

Analyte	CAS	RDL	Qualifier
1,1,1,2-Tetrachloroethane	630-20-6	< 0.00100	
1,1,1-Trichloroethane	71-55-6	< 0.00100	
1,1,2,2-Tetrachloroethane	79-34-5	< 0.00100	
1,1,2-Trichloroethane	79-00-5	< 0.00100	
1,1,2-Trichlorotrifluoroethane	76-13-1	< 0.00100	
1,1-Dichloroethane	75-34-3	< 0.00100	
1,1-Dichloroethene	75-35-4	< 0.00100	
1,1-Dichloropropene	563-58-6	< 0.00100	
1,2,3-Trichlorobenzene	87-61-6	< 0.00100	
1,2,3-Trichloropropane	96-18-4	< 0.00250	
1,2,3-Trimethylbenzene	526-73-8	< 0.00100	
1,2,4-Trichlorobenzene	120-82-1	< 0.00100	
1,2,4-Trimethylbenzene	95-63-6	< 0.00100	
1,2-Dibromo-3-Chloropropane	96-12-8	< 0.00500	
1,2-Dibromoethane	106-93-4	< 0.00100	
1,2-Dichlorobenzene	95-50-1	< 0.00100	
1,2-Dichloroethane	107-06-2	< 0.00100	
1,2-Dichloropropane	78-87-5	< 0.00100	
1,3,5-Trimethylbenzene	108-67-8	< 0.00100	
1,3-Butadiene	106-99-0	< 0.00200	
1,3-Dichlorobenzene	541-73-1	< 0.00100	
1,3-Dichloropropane	142-28-9	< 0.00100	
1,4-Dichlorobenzene	106-46-7	< 0.00100	
2,2-Dichloropropane	594-20-7	< 0.00100	
2-Butanone (MEK)	78-93-3	< 0.0100	
2-Chlorotoluene	95-49-8	< 0.00100	
4-Chlorotoluene	106-43-4	< 0.00100	
4-Ethyltoluene	622-96-8	< 0.00100	
4-Methyl-2-pentanone (MIBK)	108-10-1	< 0.0100	
Acetone	67-64-1	< 0.0500	
Acrylonitrile	107-13-1	< 0.0100	
Benzene	71-43-2	< 0.00100	
Bromobenzene	108-86-1	< 0.00100	
Bromodichloromethane	75-27-4	< 0.00100	
Bromoform	75-25-2	< 0.00100	
Bromomethane	74-83-9	< 0.00500	
Carbon disulfide	75-15-0	< 0.00100	

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Quality Control Summary
SDG: L672629
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Volatile Organic Compounds by Method 8260B		
Project No:	ST010022.0024	Matrix:	Soil - mg/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	12/6/2013	**Analytic Batch:**	**WG696108**
Analysis Date:	12/8/2013 5:59:00 AM	Analyst:	611
Instrument ID:	VOCMS18		
Sample Numbers:	L672629-01		

Method Blank

Analyte	CAS	RDL	Qualifier
Carbon tetrachloride	56-23-5	< 0.00100	
Chlorobenzene	108-90-7	< 0.00100	
Chlorodibromomethane	124-48-1	< 0.00100	
Chloroethane	75-00-3	< 0.00500	
Chloroform	67-66-3	< 0.00500	
Chloromethane	74-87-3	< 0.00250	
cis-1,2-Dichloroethene	156-59-2	< 0.00100	
cis-1,3-Dichloropropene	10061-01-5	< 0.00100	
Cyclohexane	110-82-7	< 0.00100	
Dibromomethane	74-95-3	< 0.00100	
Dichlorodifluoromethane	75-71-8	< 0.00500	
Dicyclopentadiene	77-73-6	< 0.00100	
Di-isopropyl ether	108-20-3	< 0.00100	
Ethylbenzene	100-41-4	< 0.00100	
Hexachloro-1,3-butadiene	87-68-3	< 0.00100	
Isopropylbenzene	98-82-8	< 0.00100	
Methyl Cyclohexane	108-87-2	< 0.00100	
Methyl tert-butyl ether	1634-04-4	< 0.00100	
Methylene Chloride	75-09-2	< 0.00500	
Naphthalene	91-20-3	< 0.00500	
n-Butylbenzene	104-51-8	< 0.00100	
n-Hexane	110-54-3	< 0.0100	
n-Propylbenzene	103-65-1	< 0.00100	
p-Isopropyltoluene	99-87-6	< 0.00100	
Propene	115-07-1	< 0.00250	
sec-Butylbenzene	135-98-8	< 0.00100	
Styrene	100-42-5	< 0.00100	
tert-Butylbenzene	98-06-6	< 0.00100	
Tetrachloroethene	127-18-4	< 0.00100	
Toluene	108-88-3	< 0.00500	
trans-1,2-Dichloroethene	156-60-5	< 0.00100	
trans-1,3-Dichloropropene	10061-02-6	< 0.00100	
Trichloroethene	79-01-6	< 0.00100	
Trichlorofluoromethane	75-69-4	< 0.00500	
Vinyl chloride	75-01-4	< 0.00100	
Xylenes, Total	1330-20-7	< 0.00300	

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Quality Control Summary
SDG: L672629
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Volatile Organic Compounds by Method 8260B		
Project No:	ST010022.0024	Matrix:	Soil - mg/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	12/6/2013	**Analytic Batch:**	**WG696108**
Analysis Date:	12/8/2013 5:59:00 AM	Analyst:	611
Instrument ID:	VOCMS18		
Sample Numbers:	L672629-01		

Laboratory Control Sample (LCS)

Analyte	Dil	True Value	Found	% Rec	Control Limits	Qual
1,1,1,2-Tetrachloroethane	1	0.025	0.0231	92.4	72.9 - 124	
1,1,1-Trichloroethane	1	0.025	0.0268	107	73.7 - 124	
1,1,2,2-Tetrachloroethane	1	0.025	0.0230	92	69.4 - 122	
1,1,2-Trichloroethane	1	0.025	0.0245	98	79.1 - 118	
1,1,2-Trichlorotrifluoroethane	1	0.025	0.0231	92.5	70 - 146	
1,1-Dichloroethane	1	0.025	0.0289	116	75 - 124	
1,1-Dichloroethene	1	0.025	0.0242	96.9	70.4 - 129	
1,1-Dichloropropene	1	0.025	0.0266	106	74.9 - 124	
1,2,3-Trichlorobenzene	1	0.025	0.0256	102	69.3 - 131	
1,2,3-Trichloropropane	1	0.025	0.0245	98.1	71.4 - 123	
1,2,3-Trimethylbenzene	1	0.025	0.0216	86.3	73.6 - 113	
1,2,4-Trichlorobenzene	1	0.025	0.0260	104	71.9 - 137	
1,2,4-Trimethylbenzene	1	0.025	0.0228	91.3	75.5 - 122	
1,2-Dibromo-3-Chloropropane	1	0.025	0.0232	92.7	62.8 - 133	
1,2-Dibromoethane	1	0.025	0.0225	89.9	78.6 - 120	
1,2-Dichlorobenzene	1	0.025	0.0245	98.2	78.3 - 118	
1,2-Dichloroethane	1	0.025	0.0252	101	70.1 - 124	
1,2-Dichloropropane	1	0.025	0.0280	112	77.9 - 119	
1,3,5-Trimethylbenzene	1	0.025	0.0226	90.5	75.9 - 124	
1,3-Butadiene	1	0.025	0.0239	95.7	53.2 - 141	
1,3-Dichlorobenzene	1	0.025	0.0239	95.7	72 - 126	
1,3-Dichloropropane	1	0.025	0.0233	93.4	79.1 - 117	
1,4-Dichlorobenzene	1	0.025	0.0245	97.8	78.3 - 117	
2,2-Dichloropropane	1	0.025	0.0247	98.6	61.3 - 136	
2-Butanone (MEK)	1	0.125	0.1832	147	53.7 - 153	
2-Chlorotoluene	1	0.025	0.0214	85.8	75.6 - 121	
4-Chlorotoluene	1	0.025	0.0232	92.6	77.3 - 120	
4-Ethyltoluene	1	0.025	0.0242	96.9	76.5 - 130	
4-Methyl-2-pentanone (MIBK)	1	0.125	0.1415	113	70.4 - 137	
Acetone	1	0.125	0.2268	181	35.1 - 175	L1
Acrylonitrile	1	0.125	0.1578	126	56.4 - 128	
Benzene	1	0.025	0.0272	109	77.1 - 121	
Bromobenzene	1	0.025	0.0235	93.8	78.2 - 115	
Bromodichloromethane	1	0.025	0.0230	92	74.9 - 115	
Bromoform	1	0.025	0.0226	90.3	65.9 - 132	
Bromomethane	1	0.025	0.0222	88.7	48.7 - 165	

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L672629
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Volatile Organic Compounds by Method 8260B		
Project No:	ST010022.0024	Matrix:	Soil - mg/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	12/6/2013	**Analytic Batch:**	**WG696108**
Analysis Date:	12/8/2013 5:59:00 AM	Analyst:	611
Instrument ID:	VOCMS18		
Sample Numbers:	L672629-01		

Laboratory Control Sample (LCS)

Analyte	Dil	True Value	Found	% Rec	Control Limits	Qual
Carbon disulfide	1	0.025	0.0223	89.1	66.9 - 145	
Carbon tetrachloride	1	0.025	0.0251	100	70 - 124	
Chlorobenzene	1	0.025	0.0228	91.2	79.1 - 119	
Chlorodibromomethane	1	0.025	0.0220	88	73.5 - 121	
Chloroethane	1	0.025	0.0213	85.2	66.2 - 132	
Chloroform	1	0.025	0.0264	105	76.7 - 122	
Chloromethane	1	0.025	0.0305	122	63.4 - 131	
cis-1,2-Dichloroethene	1	0.025	0.0257	103	78.2 - 119	
cis-1,3-Dichloropropene	1	0.025	0.0242	96.8	79.6 - 120	
Dibromomethane	1	0.025	0.0254	102	79.4 - 120	
Dichlorodifluoromethane	1	0.025	0.0251	100	57.1 - 137	
Dicyclopentadiene	1	0.025	0.0245	98	72.7 - 137	
Di-isopropyl ether	1	0.025	0.0309	124	70.4 - 133	
Ethylbenzene	1	0.025	0.0235	94.2	79.7 - 122	
Hexachloro-1,3-butadiene	1	0.025	0.0259	104	68.2 - 123	
Isopropylbenzene	1	0.025	0.0247	98.9	80 - 135	
Methyl tert-butyl ether	1	0.025	0.0255	102	73 - 129	
Methylene Chloride	1	0.025	0.0268	107	72.6 - 120	
Naphthalene	1	0.025	0.0241	96.5	69.8 - 128	
n-Butylbenzene	1	0.025	0.0263	105	77.5 - 126	
n-Hexane	1	0.025	0.0292	117	68.4 - 132	
n-Propylbenzene	1	0.025	0.0231	92.5	77.9 - 123	
p-Isopropyltoluene	1	0.025	0.0243	97.1	75.8 - 129	
Propene	1	0.025	0.0262	105	16.3 - 187	
sec-Butylbenzene	1	0.025	0.0224	89.7	75.8 - 126	
Styrene	1	0.025	0.0236	94.4	82.4 - 126	
tert-Butylbenzene	1	0.025	0.0235	94.2	76.4 - 126	
Tetrachloroethene	1	0.025	0.0234	93.5	73.9 - 125	
Toluene	1	0.025	0.0246	98.4	79.7 - 118	
trans-1,2-Dichloroethene	1	0.025	0.0258	103	73.8 - 122	
trans-1,3-Dichloropropene	1	0.025	0.0232	92.7	75.9 - 124	
Trichloroethene	1	0.025	0.0247	98.6	77.9 - 118	
Trichlorofluoromethane	1	0.025	0.0217	86.8	67.7 - 131	
Vinyl chloride	1	0.025	0.0259	104	66.7 - 130	
Xylenes, Total	1	0.075	0.0684	91.2	78.8 - 121	

Parameters in bold text are reported in this SDG

12065 Lebanon Rd
Mt. Juliet, TN 37122
(615) 758-5858
(800) 767-5859
Fax (615) 758-5859
Tax I.D 62-0814289
Est. 1970

Quality Control Summary
SDG: L672629
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Volatile Organic Compounds by Method 8260B		
Project No:	ST010022.0024	Matrix:	Soil - mg/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	12/6/2013	**Analytic Batch:**	**WG696108**
Analysis Date:	12/8/2013 5:59:00 AM	Analyst:	611
Instrument ID:	VOCMS18		
Sample Numbers:	L672629-01		

Laboratory Control Sample Duplicate (LCSD)

Analyte	Dil	True Value	Found	% Rec	Control Limits	Qual
1,1,1,2-Tetrachloroethane	1	0.025	0.0218	87.2	72.9 - 124	
1,1,1-Trichloroethane	1	0.025	0.0251	101	73.7 - 124	
1,1,2,2-Tetrachloroethane	1	0.025	0.0217	86.9	69.4 - 122	
1,1,2-Trichloroethane	1	0.025	0.0230	91.9	79.1 - 118	
1,1,2-Trichlorotrifluoroethane	1	0.025	0.0220	87.9	70 - 146	
1,1-Dichloroethane	1	0.025	0.0277	111	75 - 124	
1,1-Dichloroethene	1	0.025	0.0227	90.8	70.4 - 129	
1,1-Dichloropropene	1	0.025	0.0252	101	74.9 - 124	
1,2,3-Trichlorobenzene	1	0.025	0.0247	98.8	69.3 - 131	
1,2,3-Trichloropropane	1	0.025	0.0213	85.4	71.4 - 123	
1,2,3-Trimethylbenzene	1	0.025	0.0214	85.8	73.6 - 113	
1,2,4-Trichlorobenzene	1	0.025	0.0258	103	71.9 - 137	
1,2,4-Trimethylbenzene	1	0.025	0.0221	88.5	75.5 - 122	
1,2-Dibromo-3-Chloropropane	1	0.025	0.0216	86.5	62.8 - 133	
1,2-Dibromoethane	1	0.025	0.0212	84.8	78.6 - 120	
1,2-Dichlorobenzene	1	0.025	0.0244	97.6	78.3 - 118	
1,2-Dichloroethane	1	0.025	0.0240	96.1	70.1 - 124	
1,2-Dichloropropane	1	0.025	0.0263	105	77.9 - 119	
1,3,5-Trimethylbenzene	1	0.025	0.0221	88.3	75.9 - 124	
1,3-Butadiene	1	0.025	0.0228	91.2	53.2 - 141	
1,3-Dichlorobenzene	1	0.025	0.0225	90.1	72 - 126	
1,3-Dichloropropane	1	0.025	0.0224	89.7	79.1 - 117	
1,4-Dichlorobenzene	1	0.025	0.0238	95.1	78.3 - 117	
2,2-Dichloropropane	1	0.025	0.0238	95.3	61.3 - 136	
2-Butanone (MEK)	1	0.125	0.1719	137	53.7 - 153	
2-Chlorotoluene	1	0.025	0.0208	83.1	75.6 - 121	
4-Chlorotoluene	1	0.025	0.0224	89.6	77.3 - 120	
4-Ethyltoluene	1	0.025	0.0237	94.7	76.5 - 130	
4-Methyl-2-pentanone (MIBK)	1	0.125	0.1283	103	70.4 - 137	
Acetone	1	0.125	0.2214	177	35.1 - 175	L1
Acrylonitrile	1	0.125	0.1432	115	56.4 - 128	
Benzene	1	0.025	0.0260	104	77.1 - 121	
Bromobenzene	1	0.025	0.0226	90.3	78.2 - 115	
Bromodichloromethane	1	0.025	0.0219	87.5	74.9 - 115	
Bromoform	1	0.025	0.0209	83.6	65.9 - 132	
Bromomethane	1	0.025	0.0212	84.9	48.7 - 165	

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L672629
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Volatile Organic Compounds by Method 8260B		
Project No:	ST010022.0024	Matrix:	Soil - mg/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	12/6/2013	**Analytic Batch:**	**WG696108**
Analysis Date:	12/8/2013 5:59:00 AM	Analyst:	611
Instrument ID:	VOCMS18		
Sample Numbers:	L672629-01		

Laboratory Control Sample Duplicate (LCSD)

Analyte	Dil	True Value	Found	% Rec	Control Limits	Qual
Carbon disulfide	1	0.025	0.0209	83.6	66.9 - 145	
Carbon tetrachloride	1	0.025	0.0237	94.9	70 - 124	
Chlorobenzene	1	0.025	0.0219	87.7	79.1 - 119	
Chlorodibromomethane	1	0.025	0.0210	84.1	73.5 - 121	
Chloroethane	1	0.025	0.0201	80.5	66.2 - 132	
Chloroform	1	0.025	0.0251	100	76.7 - 122	
Chloromethane	1	0.025	0.0286	114	63.4 - 131	
cis-1,2-Dichloroethene	1	0.025	0.0243	97.2	78.2 - 119	
cis-1,3-Dichloropropene	1	0.025	0.0234	93.8	79.6 - 120	
Dibromomethane	1	0.025	0.0236	94.5	79.4 - 120	
Dichlorodifluoromethane	1	0.025	0.0231	92.6	57.1 - 137	
Dicyclopentadiene	1	0.025	0.0238	95.1	72.7 - 137	
Di-isopropyl ether	1	0.025	0.0289	116	70.4 - 133	
Ethylbenzene	1	0.025	0.0228	91.1	79.7 - 122	
Hexachloro-1,3-butadiene	1	0.025	0.0256	102	68.2 - 123	
Isopropylbenzene	1	0.025	0.0238	95.2	80 - 135	
Methyl tert-butyl ether	1	0.025	0.0233	93.1	73 - 129	
Methylene Chloride	1	0.025	0.0247	98.9	72.6 - 120	
Naphthalene	1	0.025	0.0230	92	69.8 - 128	
n-Butylbenzene	1	0.025	0.0262	105	77.5 - 126	
n-Hexane	1	0.025	0.0273	109	68.4 - 132	
n-Propylbenzene	1	0.025	0.0226	90.4	77.9 - 123	
p-Isopropyltoluene	1	0.025	0.0236	94.5	75.8 - 129	
Propene	1	0.025	0.0239	95.8	16.3 - 187	
sec-Butylbenzene	1	0.025	0.0222	88.7	75.8 - 126	
Styrene	1	0.025	0.0222	88.8	82.4 - 126	
tert-Butylbenzene	1	0.025	0.0230	91.9	76.4 - 126	
Tetrachloroethene	1	0.025	0.0228	91.1	73.9 - 125	
Toluene	1	0.025	0.0238	95.1	79.7 - 118	
trans-1,2-Dichloroethene	1	0.025	0.0239	95.4	73.8 - 122	
trans-1,3-Dichloropropene	1	0.025	0.0223	89	75.9 - 124	
Trichloroethene	1	0.025	0.0238	95.3	77.9 - 118	
Trichlorofluoromethane	1	0.025	0.0208	83.4	67.7 - 131	
Vinyl chloride	1	0.025	0.0240	96.1	66.7 - 130	
Xylenes, Total	1	0.075	0.0670	89.4	78.8 - 121	

Parameters in bold text are reported in this SDG

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(800) 767-5859
Fax (615) 758-5859
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Quality Control Summary
SDG: L672629
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Volatile Organic Compounds by Method 8260B		
Project No:	ST010022.0024	Matrix:	Soil - mg/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	12/6/2013	**Analytic Batch:**	**WG696108**
Analysis Date:	12/8/2013 5:59:00 AM	Analyst:	611
Instrument ID:	VOCMS18		
Sample Numbers:	L672629-01		

Laboratory Control Sample / Laboratory Control Sample Duplicate

Analyte	Dil	Spike	LCS	% Rec	LCSD	% Rec	Control Limits	% Rec Qual	% RPD	Control Limits	RPD Qual
1,1,1,2-Tetrachloroethane	1	0.025	0.0231	92.4	0.0218	87.2	72.9 - 124		5.77	20	
1,1,1-Trichloroethane	1	0.025	0.0268	107	0.0251	101	73.7 - 124		6.23	20	
1,1,2,2-Tetrachloroethane	1	0.025	0.0230	92	0.0217	86.9	69.4 - 122		5.69	20	
1,1,2-Trichloroethane	1	0.025	0.0245	98	0.0230	91.9	79.1 - 118		6.43	20	
1,1,2-Trichlorotrifluoroethane	1	0.025	0.0231	92.5	0.0220	87.9	70 - 146		5.13	20	
1,1-Dichloroethane	1	0.025	0.0289	116	0.0277	111	75 - 124		4.34	20	
1,1-Dichloroethene	1	0.025	0.0242	96.9	0.0227	90.8	70.4 - 129		6.51	20	
1,1-Dichloropropene	1	0.025	0.0266	106	0.0252	101	74.9 - 124		5.22	20	
1,2,3-Trichlorobenzene	1	0.025	0.0256	102	0.0247	98.8	69.3 - 131		3.52	20	
1,2,3-Trichloropropane	1	0.025	0.0245	98.1	0.0213	85.4	71.4 - 123		13.9	20	
1,2,3-Trimethylbenzene	1	0.025	0.0216	86.3	0.0214	85.8	73.6 - 113		0.6	20	
1,2,4-Trichlorobenzene	1	0.025	0.0260	104	0.0258	103	71.9 - 137		0.49	20	
1,2,4-Trimethylbenzene	1	0.025	0.0228	91.3	0.0221	88.5	75.5 - 122		3.06	20	
1,2-Dibromo-3-Chloropropane	1	0.025	0.0232	92.7	0.0216	86.5	62.8 - 133		6.97	20	
1,2-Dibromoethane	1	0.025	0.0225	89.9	0.0212	84.8	78.6 - 120		5.89	20	
1,2-Dichlorobenzene	1	0.025	0.0245	98.2	0.0244	97.6	78.3 - 118		0.63	20	
1,2-Dichloroethane	1	0.025	0.0252	101	0.0240	96.1	70.1 - 124		4.91	20	
1,2-Dichloropropane	1	0.025	0.0280	112	0.0263	105	77.9 - 119		6.3	20	
1,3,5-Trimethylbenzene	1	0.025	0.0226	90.5	0.0221	88.3	75.9 - 124		2.45	20	
1,3-Butadiene	1	0.025	0.0239	95.7	0.0228	91.2	53.2 - 141		4.83	20	
1,3-Dichlorobenzene	1	0.025	0.0239	95.7	0.0225	90.1	72 - 126		6.02	20	
1,3-Dichloropropane	1	0.025	0.0233	93.4	0.0224	89.7	79.1 - 117		3.95	20	
1,4-Dichlorobenzene	1	0.025	0.0245	97.8	0.0238	95.1	78.3 - 117		2.78	20	
2,2-Dichloropropane	1	0.025	0.0247	98.6	0.0238	95.3	61.3 - 136		3.5	20	
2-Butanone (MEK)	1	0.125	0.1832	147	0.1719	137	53.7 - 153		6.37	21.2	
2-Chlorotoluene	1	0.025	0.0214	85.8	0.0208	83.1	75.6 - 121		3.19	20	
4-Chlorotoluene	1	0.025	0.0232	92.6	0.0224	89.6	77.3 - 120		3.33	20	
4-Ethyltoluene	1	0.025	0.0242	96.9	0.0237	94.7	76.5 - 130		2.29	20	
4-Methyl-2-pentanone (MIBK)	1	0.125	0.1415	113	0.1283	103	70.4 - 137		9.77	20	
Acetone	1	0.125	0.2268	181	0.2214	177	35.1 - 175	L1	2.4	26.1	
Acrylonitrile	1	0.125	0.1578	126	0.1432	115	56.4 - 128		9.76	20	
Benzene	1	0.025	0.0272	109	0.0260	104	77.1 - 121		4.26	20	
Bromobenzene	1	0.025	0.0235	93.8	0.0226	90.3	78.2 - 115		3.78	20	
Bromodichloromethane	1	0.025	0.0230	92	0.0219	87.5	74.9 - 115		4.99	20	
Bromoform	1	0.025	0.0226	90.3	0.0209	83.6	65.9 - 132		7.74	20	
Bromomethane	1	0.025	0.0222	88.7	0.0212	84.9	48.7 - 165		4.43	20	

Parameters in bold text are reported in this SDG

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(800) 767-5859
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Quality Control Summary
SDG: L672629
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Volatile Organic Compounds by Method 8260B		
Project No:	ST010022.0024	Matrix:	Soil - mg/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	12/6/2013	**Analytic Batch:**	**WG696108**
Analysis Date:	12/8/2013 5:59:00 AM	Analyst:	611
Instrument ID:	VOCMS18		
Sample Numbers:	L672629-01		

Laboratory Control Sample / Laboratory Control Sample Duplicate

Analyte	Dil	Spike	LCS	% Rec	LCSD	% Rec	Control Limits	% Rec Qual	% RPD	Control Limits	RPD Qual
Carbon disulfide	1	0.025	0.0223	89.1	0.0209	83.6	66.9 - 145		6.45	20	
Carbon tetrachloride	1	0.025	0.0251	100	0.0237	94.9	70 - 124		5.41	20	
Chlorobenzene	1	0.025	0.0228	91.2	0.0219	87.7	79.1 - 119		3.89	20	
Chlorodibromomethane	1	0.025	0.0220	88	0.0210	84.1	73.5 - 121		4.51	20	
Chloroethane	1	0.025	0.0213	85.2	0.0201	80.5	66.2 - 132		5.75	20	
Chloroform	1	0.025	0.0264	105	0.0251	100	76.7 - 122		4.89	20	
Chloromethane	1	0.025	0.0305	122	0.0286	114	63.4 - 131		6.4	20	
cis-1,2-Dichloroethene	1	0.025	0.0257	103	0.0243	97.2	78.2 - 119		5.42	20	
cis-1,3-Dichloropropene	1	0.025	0.0242	96.8	0.0234	93.8	79.6 - 120		3.15	20	
Dibromomethane	1	0.025	0.0254	102	0.0236	94.5	79.4 - 120		7.32	20	
Dichlorodifluoromethane	1	0.025	0.0251	100	0.0231	92.6	57.1 - 137		8.04	20	
Dicyclopentadiene	1	0.025	0.0245	98	0.0238	95.1	72.7 - 137		3	20	
Di-isopropyl ether	1	0.025	0.0309	124	0.0289	116	70.4 - 133		6.76	20	
Ethylbenzene	1	0.025	0.0235	94.2	0.0228	91.1	79.7 - 122		3.32	20	
Hexachloro-1,3-butadiene	1	0.025	0.0259	104	0.0256	102	68.2 - 123		1.31	20	
Isopropylbenzene	1	0.025	0.0247	98.9	0.0238	95.2	80 - 135		3.77	20	
Methyl tert-butyl ether	1	0.025	0.0255	102	0.0233	93.1	73 - 129		9	20	
Methylene Chloride	1	0.025	0.0268	107	0.0247	98.9	72.6 - 120		8.15	20	
Naphthalene	1	0.025	0.0241	96.5	0.0230	92	69.8 - 128		4.81	20	
n-Butylbenzene	1	0.025	0.0263	105	0.0262	105	77.5 - 126		0.34	20	
n-Hexane	1	0.025	0.0292	117	0.0273	109	68.4 - 132		6.91	20	
n-Propylbenzene	1	0.025	0.0231	92.5	0.0226	90.4	77.9 - 123		2.36	20	
p-Isopropyltoluene	1	0.025	0.0243	97.1	0.0236	94.5	75.8 - 129		2.7	20	
Propene	1	0.025	0.0262	105	0.0239	95.8	16.3 - 187		9.03	20	
sec-Butylbenzene	1	0.025	0.0224	89.7	0.0222	88.7	75.8 - 126		1.06	20	
Styrene	1	0.025	0.0236	94.4	0.0222	88.8	82.4 - 126		6.14	20	
tert-Butylbenzene	1	0.025	0.0235	94.2	0.0230	91.9	76.4 - 126		2.43	20	
Tetrachloroethene	1	0.025	0.0234	93.5	0.0228	91.1	73.9 - 125		2.59	20	
Toluene	1	0.025	0.0246	98.4	0.0238	95.1	79.7 - 118		3.4	20	
trans-1,2-Dichloroethene	1	0.025	0.0258	103	0.0239	95.4	73.8 - 122		7.93	20	
trans-1,3-Dichloropropene	1	0.025	0.0232	92.7	0.0223	89	75.9 - 124		4.07	20	
Trichloroethene	1	0.025	0.0247	98.6	0.0238	95.3	77.9 - 118		3.41	20	
Trichlorofluoromethane	1	0.025	0.0217	86.8	0.0208	83.4	67.7 - 131		4	20	
Vinyl chloride	1	0.025	0.0259	104	0.0240	96.1	66.7 - 130		7.61	20	
Xylenes, Total	1	0.075	0.0684	91.2	0.0670	89.4	78.8 - 121		1.98	20	

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L672629
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Volatile Organic Compounds by Method 8260B		
Project No:	ST010022.0024	Matrix:	Soil - mg/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	12/6/2013	**Analytic Batch:**	**WG696108**
Analysis Date:	12/8/2013 5:59:00 AM	Analyst:	611
Instrument ID:	VOCMS18		
Sample Numbers:	L672629-01		

Matrix Spike / Matrix Spike Duplicate

L672625-01

Analyte	Dil	Spike Value	Sample	MS	% Rec	MSD	% Rec	Control Limits	% Rec Qual	RPD	Control Limits	RPD Qual
1,1,1,2-Tetrachloroethane	1	0.025	0.0	0.0184	73.4	0.0174	69.6	64 - 128		5.31	20	
1,1,1-Trichloroethane	1	0.025	0.0	0.0235	94	0.0210	84	58.7 - 134		11.3	20	
1,1,2,2-Tetrachloroethane	1	0.025	0.0	0.0205	81.8	0.0188	75	56 - 132		8.68	22.2	
1,1,2-Trichloroethane	1	0.025	0.0	0.0213	85.1	0.0193	77.3	66.3 - 125		9.57	20	
1,1,2-Trichlorotrifluoroethane	1	0.025	0.0	0.0211	84.4	0.0168	67.1	54.8 - 154		22.8	22.5	R5
1,1-Dichloroethane	1	0.025	0.0	0.0253	101	0.0227	90.6	58.5 - 132		11.1	20	
1,1-Dichloroethene	1	0.025	0.0	0.0213	85.3	0.0166	66.3	51.1 - 140		25	20.2	R5
1,1-Dichloropropene	1	0.025	0.0	0.0230	91.8	0.0204	81.6	57.3 - 136		11.8	20	
1,2,3-Trichlorobenzene	1	0.025	0.0	0.0164	65.7	0.0131	52.6	59.1 - 138	M2	22.2	23.7	
1,2,3-Trichloropropane	1	0.025	0.0	0.0219	87.4	0.0193	77	61.4 - 128		12.6	22.4	
1,2,3-Trimethylbenzene	1	0.025	0.0	0.0177	70.6	0.0153	61.3	61.3 - 122		14.2	20	
1,2,4-Trichlorobenzene	1	0.025	0.0	0.0170	68	0.0137	54.9	63.6 - 143	M2	21.3	21.9	
1,2,4-Trimethylbenzene	1	0.025	0.0	0.0163	65	0.0149	59.7	57.4 - 137		8.48	20	
1,2-Dibromo-3-Chloropropane	1	0.025	0.0	0.0239	95.4	0.0217	86.7	57.3 - 136		9.62	27	
1,2-Dibromoethane	1	0.025	0.0	0.0197	78.8	0.0183	73	67.1 - 125		7.54	20	
1,2-Dichlorobenzene	1	0.025	0.0	0.0196	78.2	0.0166	66.5	68.2 - 123	M2	16.1	20	
1,2-Dichloroethane	1	0.025	0.0	0.0224	89.7	0.0204	81.6	60 - 126		9.52	20	
1,2-Dichloropropane	1	0.025	0.0	0.0237	94.9	0.0216	86.3	64.2 - 123		9.49	20	
1,3,5-Trimethylbenzene	1	0.025	0.0	0.0166	66.5	0.0150	59.9	63.6 - 132	M2	10.4	20.5	
1,3-Butadiene	1	0.025	0.0	0.0219	87.7	0.0179	71.7	30.5 - 151		20	21.9	
1,3-Dichlorobenzene	1	0.025	0.0	0.0163	65.3	0.0149	59.5	63.1 - 131	M2	9.28	20	
1,3-Dichloropropane	1	0.025	0.0	0.0202	80.8	0.0193	77.2	67.9 - 121		4.52	20	
1,4-Dichlorobenzene	1	0.025	0.0	0.0188	75.1	0.0163	65.1	68.6 - 123	M2	14.2	20	
2,2-Dichloropropane	1	0.025	0.0	0.0222	88.7	0.0197	78.9	50.5 - 144		11.6	21.9	
2-Butanone (MEK)	1	0.125	0.0	0.2155	172	0.1869	150	22.4 - 138	M1	14.2	27	
2-Chlorotoluene	1	0.025	0.0	0.0156	62.4	0.0148	59.2	63.6 - 128	M2	5.39	20	
4-Chlorotoluene	1	0.025	0.0	0.0168	67.3	0.0156	62.6	65.7 - 127	M2	7.32	20	
4-Ethyltoluene	1	0.025	0.0	0.0177	70.8	0.0163	65.1	64.5 - 138		8.36	20	
4-Methyl-2-pentanone (MIBK)	1	0.125	0.0	0.1438	115	0.1263	101	60.8 - 140		13	25.1	
Acetone	1	0.125	0.0034	0.2926	231	0.2479	196	10 - 130	M6	16.5	27.9	
Acrylonitrile	1	0.125	0.0	0.1610	129	0.1381	111	49.4 - 133		15.3	25.3	
Benzene	1	0.025	0.0	0.0233	93.1	0.0210	83.8	54.3 - 133		10.4	20	
Bromobenzene	1	0.025	0.0	0.0176	70.3	0.0164	65.7	63.9 - 124		6.82	20	
Bromodichloromethane	1	0.025	0.0	0.0195	78.2	0.0177	70.6	63.9 - 121		10.2	20	
Bromoform	1	0.025	0.0	0.0194	77.5	0.0175	70	59.5 - 134		10.1	20.8	
Bromomethane	1	0.025	0.0	0.0191	76.4	0.0149	59.5	41.7 - 155		25	20.5	R5

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Quality Control Summary
SDG: L672629
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Volatile Organic Compounds by Method 8260B		
Project No:	ST010022.0024	Matrix:	Soil - mg/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	12/6/2013	**Analytic Batch:**	**WG696108**
Analysis Date:	12/8/2013 5:59:00 AM	Analyst:	611
Instrument ID:	VOCMS18		
Sample Numbers:	L672629-01		

Matrix Spike / Matrix Spike Duplicate

L672625-01

Analyte	Dil	Spike Value	Sample	MS	% Rec	MSD	% Rec	Control Limits	% Rec Qual	RPD	Control Limits	RPD Qual
Carbon disulfide	1	0.025	0.0	0.0178	71	0.0140	56.1	43.3 - 149		23.6	21	R5
Carbon tetrachloride	1	0.025	0.0	0.0221	88.4	0.0195	78	55.7 - 134		12.5	20.3	
Chlorobenzene	1	0.025	0.0	0.0176	70.4	0.0166	66.2	67 - 125	M2	6.08	20	
Chlorodibromomethane	1	0.025	0.0	0.0185	74.1	0.0173	69.2	64.3 - 125		6.94	20	
Chloroethane	1	0.025	0.0	0.0190	76	0.0146	58.2	51.5 - 136		26.5	20.8	R5
Chloroform	1	0.025	0.0	0.0229	91.8	0.0204	81.8	63 - 129		11.5	20	
Chloromethane	1	0.025	0.0	0.0267	107	0.0233	93.3	42.4 - 135		13.6	20	
cis-1,2-Dichloroethene	1	0.025	0.0	0.0223	89.3	0.0195	78.2	59.2 - 129		13.2	20	
cis-1,3-Dichloropropene	1	0.025	0.0	0.0207	82.7	0.0195	78	66.4 - 125		5.89	20	
Dibromomethane	1	0.025	0.0	0.0225	90	0.0199	79.5	68.2 - 124		12.3	20	
Dichlorodifluoromethane	1	0.025	0.0	0.0250	99.9	0.0207	82.9	40.6 - 144		18.6	20.2	
Dicyclopentadiene	1	0.025	0.0	0.0184	73.7	0.0169	67.5	61.8 - 139		8.76	20.2	
Di-isopropyl ether	1	0.025	0.0	0.0262	105	0.0238	95.3	56.9 - 136		9.63	20	
Ethylbenzene	1	0.025	0.0	0.0184	73.8	0.0174	69.4	61.4 - 133		6.09	20	
Hexachloro-1,3-butadiene	1	0.025	0.0	0.0141	56.4	0.0105	41.8	55.1 - 136	M2	29.7	23.6	R2
Isopropylbenzene	1	0.025	0.0	0.0189	75.5	0.0174	69.6	66.8 - 141		8.12	20	
Methyl tert-butyl ether	1	0.025	0.0	0.0232	92.7	0.0207	82.9	57.7 - 134		11.2	20	
Methylene Chloride	1	0.025	0.0	0.0226	90.5	0.0199	79.6	58.1 - 122		12.8	20	
Naphthalene	1	0.025	0.0	0.0194	77.6	0.0163	65	58 - 135		17.6	25.5	
n-Butylbenzene	1	0.025	0.0	0.0186	74.3	0.0153	61.2	62.7 - 140	M2	19.5	20	
n-Hexane	1	0.025	0.0	0.0216	86.4	0.0191	76.4	45 - 144		12.2	20	
n-Propylbenzene	1	0.025	0.0	0.0169	67.7	0.0156	62.4	10 - 176		8.05	26.6	
p-Isopropyltoluene	1	0.025	0.0	0.0165	65.9	0.0146	58.6	63.2 - 139	M2	11.8	20.4	
Propene	1	0.025	0.0	0.0257	103	0.0214	85.6	65.9 - 131		18.2	20	
sec-Butylbenzene	1	0.025	0.0	0.0154	61.7	0.0140	55.9	62.2 - 136	M2	9.92	20.3	
Styrene	1	0.025	0.0	0.0177	70.9	0.0163	65.4	66.8 - 133	M2	8.07	20	
tert-Butylbenzene	1	0.025	0.0	0.0169	67.5	0.0156	62.3	63.3 - 134	M2	7.98	20.3	
Tetrachloroethene	1	0.025	0.0	0.0185	74	0.0170	68	53 - 139		8.46	20	
Toluene	1	0.025	0.0	0.0201	80.5	0.0186	74.5	61.4 - 130		7.71	20	
trans-1,2-Dichloroethene	1	0.025	0.0	0.0217	86.7	0.0189	75.5	56.5 - 129		13.8	20	
trans-1,3-Dichloropropene	1	0.025	0.0	0.0204	81.7	0.0192	76.7	64.1 - 128		6.36	20	
Trichloroethene	1	0.025	0.0	0.0207	82.6	0.0186	74.4	44.1 - 149		10.5	20	
Trichlorofluoromethane	1	0.025	0.0	0.0205	82.1	0.0157	62.7	49.6 - 145		26.8	21.2	R5
Vinyl chloride	1	0.025	0.0	0.0233	93.1	0.0195	77.9	47.8 - 137		17.8	20	
Xylenes, Total	1	0.075	0.0	0.0537	71.5	0.0494	65.9	63.3 - 131		8.23	20	

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Quality Control Summary
SDG: L672629
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Volatile Organic Compounds by Method 8260B		
Project No:	ST010022.0024	Matrix:	Soil - mg/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	12/6/2013	**Analytic Batch:**	**WG696108**
Analysis Date:	12/8/2013 5:59:00 AM	Analyst:	611
Instrument ID:	VOCMS18		
Sample Numbers:	L672629-01		

Internal Standard Response and Retention Time Summary

File ID: 1208_02
Analyzed: 12/07/13 230600

	DCB		DFB		BCP		PFB	
	Response	**RT**	**Response**	**RT**	**Response**	**RT**	**Response**	**RT**
12 Hr. Std	142979	8.08	333932	4.56	57947	5.71	190152	4.24
Upper Limit	286000	8.58	668000	5.06	116000	6.21	380000	4.74
Lower Limit	71500	7.58	167000	4.06	29000	5.21	95100	3.74
Sample ID	**Response**	**RT**	**Response**	**RT**	**Response**	**RT**	**Response**	**RT**
L672629-01 19X	137622	8.08	325306	4.56	53407	5.71	182381	4.24
MSD WG696108	140460	8.08	328880	4.56	59558	5.71	184009	4.24
MS WG696108	127944	8.08	314061	4.56	57907	5.71	173636	4.24
LCSD WG696108	134294	8.08	316938	4.57	55704	5.71	178097	4.24
LCS WG696108	140748	8.08	319159	4.57	57093	5.71	181521	4.24
BLANK WG696108	129632	8.08	325672	4.57	56649	5.72	185981	4.24

Legend:

DCB -- 1,4-Dichlorobenzene-d4
DFB -- 1,4-Difluorobenzene
BCP -- 2-Bromo-1-Chloropropane
PFB -- Pentafluorobenzene

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Quality Control Summary
SDG: L672629
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Volatile Organic Compounds by Method 8260B		
Project No:	ST010022.0024	Matrix:	Soil - mg/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	12/6/2013	**Analytic Batch:**	**WG696108**
Analysis Date:	12/8/2013 5:59:00 AM	Analyst:	611
Instrument ID:	VOCMS18		
Sample Numbers:	L672629-01		

Surrogate Summary

			BFB		DFM		TD8		TFT	
Laboratory Sample ID	Instrument	File ID	ppm	% Rec	ppm	% Rec	ppm	% Rec	ppm	% Rec
L672629-01 19x	VOCMS18	1208_20	0.0386	96.4	0.0386	96.6	0.0401	100		
LCS WG696108	VOCMS18	1208_03	0.0370	92.6	0.0406	102	0.0401	100	0.0406	101
LCSD WG696108	VOCMS18	1208_04	0.0363	90.8	0.0400	100	0.0397	99.4	0.0396	99.1
MS WG696108	VOCMS18	1208_05	0.0354	88.5	0.0424	106	0.0394	98.5	0.0389	97.3
MSD WG696108	VOCMS18	1208_06	0.0361	90.3	0.0409	102	0.0403	101	0.0395	98.7
BLANK WG696108	VOCMS18	1208_09	0.0353	88.2	0.0393	98.4	0.0408	102	0.0409	102

BFB --4-BROMOFLUOROBENZENE	True Value: 0.04 ppm	Limits: 71 - 126
DFM --DIBROMOFLUOROMETHANE	True Value: 0.04 ppm	Limits: 78.3 - 121
TD8 --TOLUENE-D8	True Value: 0.04 ppm	Limits: 88.50 - 111
TFT --A,A,A-TRIFLUOROTOLUENE	True Value: 0.04 ppm	Limits: 85 - 114

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Quality Control Summary
SDG: L672629
Kinder Morgan - Rocklin, CA-AZ Work

Test:	TPH by Method 8015D/DRO_AZ		
Project No:	ST010022.0024	Matrix:	Soil - mg/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	12/6/2013	**Analytic Batch:**	**WG696293**
Analysis Date:	12/11/2013 1:02:00 AM	Analyst:	187
Instrument ID:	SVGC2	Prep Date:	12/9/2013
Sample Numbers:	L672629-01		

Method Blank

Analyte	CAS	RDL	Qualifier
C10-C22 Hydrocarbons		< 30.0	
C22-C32 Hydrocarbons		< 50.0	

Laboratory Control Sample (LCS)

Analyte	Dil	True Value	Found	% Rec	Control Limits	Qual
C10-C22 Hydrocarbons	1	30	28.631	95.4	70 - 130	
C22-C32 Hydrocarbons	1	30	32.926	110	70 - 130	

Laboratory Control Sample Duplicate (LCSD)

Analyte	Dil	True Value	Found	% Rec	Control Limits	Qual
C10-C22 Hydrocarbons	1	30	28.342	94.5	70 - 130	
C22-C32 Hydrocarbons	1	30	32.631	109	70 - 130	

Laboratory Control Sample / Laboratory Control Sample Duplicate

Analyte	Dil	Spike	LCS	% Rec	LCSD	% Rec	Control Limits	% Rec Qual	% RPD	Control Limits	RPD Qual
C10-C22 Hydrocarbons	1	30	28.631	95.4	28.342	94.5	70 - 130		1.01	20	
C22-C32 Hydrocarbons	1	30	32.926	110	32.631	109	70 - 130		0.9	20	

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Quality Control Summary
SDG: L672629
Kinder Morgan - Rocklin, CA-AZ Work

Test:	TPH by Method 8015D/DRO_AZ		
Project No:	ST010022.0024	Matrix:	Soil - mg/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	12/6/2013	**Analytic Batch:**	**WG696293**
Analysis Date:	12/11/2013 1:02:00 AM	Analyst:	187
Instrument ID:	SVGC2	Prep Date:	12/9/2013
Sample Numbers:	L672629-01		

Surrogate Summary

Laboratory Sample ID	Instrument	File ID	o-Terphenyl ppm	o-Terphenyl % Rec
L672629-01	SVGC2	1210A_34	0.655	81.9
BLANK WG696293	SVGC2	1210A_31	0.610	76.2
LCS WG696293	SVGC2	1210A_32	0.654	81.8
LCSD WG696293	SVGC2	1210A_33	0.659	82.4

o-Terphenyl --O-TERPHENYL True Value: 0.8 ppm Limits: 70 - 130

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Quality Control Summary
SDG: L672629
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Polychlorinated Biphenyls by Method 8081/8082		
Project No:	ST010022.0024	Matrix:	Soil - ug/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	12/6/2013	**Analytic Batch:**	**WG696459**
Analysis Date:	12/11/2013 12:05:00 PM	Analyst:	119
Instrument ID:	SVGC20, SVGC24	Prep Date:	12/10/2013
Sample Numbers:	L672629-01		

Method Blank

Analyte	CAS	RDL	Qualifier
PCB 1016	12674-11-2	< 17.0	
PCB 1221	11104-28-2	< 17.0	
PCB 1232	11141-16-5	< 17.0	
PCB 1242	53469-21-9	< 17.0	
PCB 1248	12672-29-6	< 17.0	
PCB 1254	11097-69-1	< 17.0	
PCB 1260	11096-82-5	< 17.0	

Laboratory Control Sample (LCS)

Analyte	Dil	True Value	Found	% Rec	Control Limits	Qual
PCB 1016	1	167	155.85	93.3	63.2 - 118	
PCB 1260	1	167	174.35	104	64.6 - 123	

Laboratory Control Sample Duplicate (LCSD)

Analyte	Dil	True Value	Found	% Rec	Control Limits	Qual
PCB 1016	1	167	167.75	100	63.2 - 118	
PCB 1260	1	167	186.61	112	64.6 - 123	

Laboratory Control Sample / Laboratory Control Sample Duplicate

Analyte	Dil	Spike	LCS	% Rec	LCSD	% Rec	Control Limits	% Rec Qual	% RPD	Control Limits	RPD Qual
PCB 1016	1	167	155.85	93.3	167.75	100	63.2 - 118		7.35	20	
PCB 1260	1	167	174.35	104	186.61	112	64.6 - 123		6.8	20.8	

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Quality Control Summary
SDG: L672629
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Polychlorinated Biphenyls by Method 8081/8082		
Project No:	ST010022.0024	Matrix:	Soil - ug/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	12/6/2013	**Analytic Batch:**	**WG696459**
Analysis Date:	12/11/2013 12:05:00 PM	Analyst:	119
Instrument ID:	SVGC20, SVGC24	Prep Date:	12/10/2013
Sample Numbers:	L672629-01		

Matrix Spike / Matrix Spike Duplicate

L672629-01

Analyte	Dil	Spike Value	Sample	MS	% Rec	MSD	% Rec	Control Limits	% Rec Qual	RPD	Control Limits	RPD Qual
PCB 1016	1	167	0.0	182.42	109	186.32	112	23.5 - 134		2.12	25.8	
PCB 1260	1	167	0.0	183.56	110	194.42	116	16.1 - 139		5.74	25.9	

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Quality Control Summary
SDG: L672629
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Polychlorinated Biphenyls by Method 8081/8082		
Project No:	ST010022.0024	Matrix:	Soil - ug/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	12/6/2013	**Analytic Batch:**	**WG696459**
Analysis Date:	12/11/2013 12:05:00 PM	Analyst:	119
Instrument ID:	SVGC20	Prep Date:	12/10/2013
Sample Numbers:	L672629-01		

Surrogate Summary

Laboratory			DCB Column 1		DCB Column 2		TCX Column 1		TCX Column 2	
Sample ID	Instrument	File ID	ppm	% Rec	ppm	% Rec	ppm	% Rec	ppm	% Rec
L672629-01	SVGC24	1211_16	0.0440	66.1	0.0446	67.0	0.0554	83.1	0.0547	82.1
L672629-01	SVGC20	1211_24	0.0517	77.6	0.0555	83.3	0.0699	105	0.0717	108
BLANK WG696459	SVGC20	1211_06	0.0637	95.7	0.0662	99.4	0.0648	97.3	0.0667	100
LCS WG696459	SVGC20	1211_07	0.0663	99.5	0.0682	102	0.0673	101	0.0689	103
LCSD WG696459	SVGC20	1211_08	0.0679	102	0.0696	104	0.0686	103	0.0701	105
MS WG696459	SVGC20	1211_25	0.0453	68.0	0.0493	74.0	0.0709	106	0.0732	110
MSD WG696459	SVGC20	1211_26	0.0497	74.7	0.0517	77.6	0.0715	107	0.0738	111
BLANK WG696459	SVGC24	1211_09	0.0587	88.1	0.0595	89.3	0.0641	96.3	0.0635	95.3
LCS WG696459	SVGC24	1211_10	0.0612	91.9	0.0621	93.3	0.0677	102	0.0668	100
LCSD WG696459	SVGC24	1211_11	0.0756	114	0.0613	92.1	0.0802	120	0.0666	100
MS WG696459	SVGC24	1211_18	0.0509	76.5	0.0528	79.3	0.0585	87.9	0.0563	84.5
MSD WG696459	SVGC24	1211_19	0.0509	76.4	0.0525	78.8	0.0602	90.4	0.0563	84.6

DCB --DECACHLOROBIPHENYL	True Value: 0.0666 ppm	Limits: 10 - 145
TCX --TETRACHLORO-M-XYLENE	True Value: 0.0666 ppm	Limits: 21.10 - 148

12065 Lebanon Rd
Mt. Juliet, TN 37122
(615) 758-5858
(800) 767-5859
Fax (615) 758-5859
Tax I.D 62-0814289
Est. 1970

Quality Control Summary
SDG: L672629
Kinder Morgan - Rocklin, CA-AZ Work

Test:	OP Pesticides by Method 8141		
Project No:	ST010022.0024	Matrix:	Soil - mg/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	12/6/2013	**Analytic Batch:**	**WG696297**
Analysis Date:	12/11/2013 6:45:00 PM	Analyst:	386
Instrument ID:	SVGC12	Prep Date:	12/9/2013
Sample Numbers:	L672629-01		

Method Blank

Analyte	CAS	RDL	Qualifier
Azinphos-Methyl	86-50-0	< 0.100	
Bolstar (Sulprofos)	35400-43-2	< 0.100	
Chlorpyrifos	2921-88-2	< 0.100	
Coumaphos	56-72-4	< 0.100	
Demeton,-O and -S	8065-48-3	< 0.0700	
Diazinon	333-41-5	< 0.100	
Dichlorvos	62-73-7	< 0.100	
Dimethoate	60-51-5	< 0.100	
Disulfoton	298-04-4	< 0.100	
EPN	2104-64-5	< 0.100	
Ethoprop	13194-48-4	< 0.100	
Ethyl Parathion	56-38-2	< 0.100	
Fensulfothion	115-90-2	< 0.100	
Fenthion	55-38-9	< 0.100	
Malathion	121-75-5	< 0.100	
Merphos	150-50-5	< 0.100	
Methyl parathion	298-00-0	< 0.100	
Mevinphos	7786-34-7	< 0.100	
Naled	300-76-5	< 0.100	
Phorate	298-02-2	< 0.100	
Ronnel	299-84-3	< 0.100	
Stirophos	22248-79-9	< 0.100	
Sulfotep	3689-24-5	< 0.100	
TEPP	21646-99-1	< 0.100	
Tokuthion (Prothothiofos)	34643-46-4	< 0.100	
Trichloronate	327-98-0	< 0.100	

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L672629
Kinder Morgan - Rocklin, CA-AZ Work

Test:	OP Pesticides by Method 8141		
Project No:	ST010022.0024	Matrix:	Soil - mg/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	12/6/2013	**Analytic Batch:**	**WG696297**
Analysis Date:	12/11/2013 6:45:00 PM	Analyst:	386
Instrument ID:	SVGC12	Prep Date:	12/9/2013
Sample Numbers:	L672629-01		

Laboratory Control Sample (LCS)

Analyte	Dil	True Value	Found	% Rec	Control Limits	Qual
Azinphos-Methyl	1	0.3335	0.3463	104	55.4 - 123	
Bolstar (Sulprofos)	1	0.3335	0.3320	99.5	57.9 - 120	
Chlorpyrifos	1	0.3335	0.3273	98.1	58.3 - 118	
Coumaphos	1	0.3335	0.3394	102	56.7 - 119	
Demeton,-O and -S	1	0.1668	0.1568	94	57.8 - 113	
Diazinon	1	0.3335	0.3262	97.8	43.8 - 134	
Dichlorvos	1	0.3335	0.2634	79	34.2 - 108	
Dimethoate	1	0.3335	0.3022	90.6	37.4 - 109	
Disulfoton	1	0.3335	0.3206	96.1	59.6 - 114	
EPN	1	0.3335	0.3592	108	50.5 - 126	
Ethoprop	1	0.3335	0.3147	94.4	58.2 - 117	
Ethyl Parathion	1	0.3335	0.3488	105	51.1 - 130	
Fensulfothion	1	0.3335	0.3313	99.3	37.8 - 111	
Fenthion	1	0.3335	0.3164	94.9	59 - 118	
Malathion	1	0.3335	0.3285	98.5	55 - 127	
Merphos	1	0.3335	0.3121	93.6	10 - 156	
Methyl parathion	1	0.3335	0.3469	104	57.8 - 120	
Mevinphos	1	0.3335	0.2850	85.5	44.2 - 116	
Naled	1	0.3335	0.3196	95.8	10.8 - 138	
Phorate	1	0.3335	0.3144	94.3	58.1 - 114	
Ronnel	1	0.3335	0.3252	97.5	59.1 - 114	
Stirophos	1	0.3335	0.3292	98.7	55.7 - 119	
Sulfotep	1	0.3335	0.3180	95.3	57.2 - 121	
TEPP	1	0.3335	0.2895	86.8	0 - 117	
Tokuthion (Prothothiofos)	1	0.3335	0.3277	98.2	55.6 - 119	
Trichloronate	1	0.3335	0.3315	99.4	57.4 - 114	

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L672629
Kinder Morgan - Rocklin, CA-AZ Work

Test:	OP Pesticides by Method 8141		
Project No:	ST010022.0024	Matrix:	Soil - mg/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	12/6/2013	**Analytic Batch:**	**WG696297**
Analysis Date:	12/11/2013 6:45:00 PM	Analyst:	386
Instrument ID:	SVGC12	Prep Date:	12/9/2013
Sample Numbers:	L672629-01		

Laboratory Control Sample Duplicate (LCSD)

Analyte	Dil	True Value	Found	% Rec	Control Limits	Qual
Azinphos-Methyl	1	0.3335	0.3420	103	55.4 - 123	
Bolstar (Sulprofos)	1	0.3335	0.3302	99	57.9 - 120	
Chlorpyrifos	1	0.3335	0.3283	98.4	58.3 - 118	
Coumaphos	1	0.3335	0.3370	101	56.7 - 119	
Demeton,-O and -S	1	0.1668	0.1588	95.2	57.8 - 113	
Diazinon	1	0.3335	0.3273	98.1	43.8 - 134	
Dichlorvos	1	0.3335	0.2678	80.3	34.2 - 108	
Dimethoate	1	0.3335	0.3084	92.5	37.4 - 109	
Disulfoton	1	0.3335	0.3225	96.7	59.6 - 114	
EPN	1	0.3335	0.3610	108	50.5 - 126	
Ethoprop	1	0.3335	0.3191	95.7	58.2 - 117	
Ethyl Parathion	1	0.3335	0.3523	106	51.1 - 130	
Fensulfothion	1	0.3335	0.3345	100	37.8 - 111	
Fenthion	1	0.3335	0.3124	93.7	59 - 118	
Malathion	1	0.3335	0.3298	98.9	55 - 127	
Merphos	1	0.3335	0.3122	93.6	10 - 156	
Methyl parathion	1	0.3335	0.3530	106	57.8 - 120	
Mevinphos	1	0.3335	0.2888	86.6	44.2 - 116	
Naled	1	0.3335	0.3242	97.2	10.8 - 138	
Phorate	1	0.3335	0.3171	95.1	58.1 - 114	
Ronnel	1	0.3335	0.3272	98.1	59.1 - 114	
Stirophos	1	0.3335	0.3289	98.6	55.7 - 119	
Sulfotep	1	0.3335	0.3211	96.3	57.2 - 121	
TEPP	1	0.3335	0.2924	87.7	0 - 117	
Tokuthion (Prothothiofos)	1	0.3335	0.3242	97.2	55.6 - 119	
Trichloronate	1	0.3335	0.3373	101	57.4 - 114	

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L672629
Kinder Morgan - Rocklin, CA-AZ Work

Test:	OP Pesticides by Method 8141		
Project No:	ST010022.0024	Matrix:	Soil - mg/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	12/6/2013	**Analytic Batch:**	**WG696297**
Analysis Date:	12/11/2013 6:45:00 PM	Analyst:	386
Instrument ID:	SVGC12	Prep Date:	12/9/2013
Sample Numbers:	L672629-01		

Laboratory Control Sample / Laboratory Control Sample Duplicate

Analyte	Dil	Spike	LCS	% Rec	LCSD	% Rec	Control Limits	% Rec Qual	% RPD	Control Limits	RPD Qual
Azinphos-Methyl	1	0.3335	0.3463	104	0.3420	103	55.4 - 123		1.24	20	
Bolstar (Sulprofos)	1	0.3335	0.3320	99.5	0.3302	99	57.9 - 120		0.55	20	
Chlorpyrifos	1	0.3335	0.3273	98.1	0.3283	98.4	58.3 - 118		0.33	20	
Coumaphos	1	0.3335	0.3394	102	0.3370	101	56.7 - 119		0.71	20	
Demeton,-O and -S	1	0.1668	0.1568	94	0.1588	95.2	57.8 - 113		1.25	20	
Diazinon	1	0.3335	0.3262	97.8	0.3273	98.1	43.8 - 134		0.31	20	
Dichlorvos	1	0.3335	0.2634	79	0.2678	80.3	34.2 - 108		1.65	21.7	
Dimethoate	1	0.3335	0.3022	90.6	0.3084	92.5	37.4 - 109		2.04	24.7	
Disulfoton	1	0.3335	0.3206	96.1	0.3225	96.7	59.6 - 114		0.62	20	
EPN	1	0.3335	0.3592	108	0.3610	108	50.5 - 126		0.49	20	
Ethoprop	1	0.3335	0.3147	94.4	0.3191	95.7	58.2 - 117		1.38	20	
Ethyl Parathion	1	0.3335	0.3488	105	0.3523	106	51.1 - 130		1	20	
Fensulfothion	1	0.3335	0.3313	99.3	0.3345	100	37.8 - 111		0.98	20.2	
Fenthion	1	0.3335	0.3164	94.9	0.3124	93.7	59 - 118		1.27	20	
Malathion	1	0.3335	0.3285	98.5	0.3298	98.9	55 - 127		0.39	20	
Merphos	1	0.3335	0.3121	93.6	0.3122	93.6	10 - 156		0.03	20	
Methyl parathion	1	0.3335	0.3469	104	0.3530	106	57.8 - 120		1.73	20	
Mevinphos	1	0.3335	0.2850	85.5	0.2888	86.6	44.2 - 116		1.33	20	
Naled	1	0.3335	0.3196	95.8	0.3242	97.2	10.8 - 138		1.43	23.5	
Phorate	1	0.3335	0.3144	94.3	0.3171	95.1	58.1 - 114		0.84	20	
Ronnel	1	0.3335	0.3252	97.5	0.3272	98.1	59.1 - 114		0.61	20	
Stirophos	1	0.3335	0.3292	98.7	0.3289	98.6	55.7 - 119		0.11	20	
Sulfotep	1	0.3335	0.3180	95.3	0.3211	96.3	57.2 - 121		0.99	20	
TEPP	1	0.3335	0.2895	86.8	0.2924	87.7	0 - 117		1	40	
Tokuthion (Prothothiofos)	1	0.3335	0.3277	98.2	0.3242	97.2	55.6 - 119		1.07	20	
Trichloronate	1	0.3335	0.3315	99.4	0.3373	101	57.4 - 114		1.73	20	

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Quality Control Summary
SDG: L672629
Kinder Morgan - Rocklin, CA-AZ Work

Test:	OP Pesticides by Method 8141		
Project No:	ST010022.0024	Matrix:	Soil - mg/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	12/6/2013	**Analytic Batch:**	**WG696297**
Analysis Date:	12/11/2013 6:45:00 PM	Analyst:	386
Instrument ID:	SVGC12	Prep Date:	12/9/2013
Sample Numbers:	L672629-01		

Matrix Spike / Matrix Spike Duplicate

L672629-01

Analyte	Dil	Spike Value	Sample	MS	% Rec	MSD	% Rec	Control Limits	% Rec Qual	RPD	Control Limits	RPD Qual
Azinphos-Methyl	1	0.3335	0.0	0.3034	91	0.3004	90.1	21.6 - 134		0.98	37.7	
Bolstar (Sulprofos)	1	0.3335	0.0	0.2886	86.5	0.2877	86.3	38.1 - 117		0.3	28.3	
Chlorpyrifos	1	0.3335	0.0	0.2867	86	0.2895	86.8	39.5 - 109		0.99	29.6	
Coumaphos	1	0.3335	0.0	0.2996	89.8	0.2940	88.2	32.2 - 129		1.88	29.5	
Demeton,-O and -S	1	0.1668	0.0	0.1351	81	0.1417	84.9	17.3 - 123		4.79	40	
Diazinon	1	0.3335	0.0	0.2821	84.6	0.2876	86.3	34.6 - 118		1.95	31.3	
Dichlorvos	1	0.3335	0.0	0.2281	68.4	0.2368	71	14.8 - 126		3.75	38.6	
Dimethoate	1	0.3335	0.0	0.2766	82.9	0.2796	83.8	10 - 128		1.08	40	
Disulfoton	1	0.3335	0.0	0.2792	83.7	0.2863	85.9	38.1 - 108		2.52	29.3	
EPN	1	0.3335	0.0	0.3029	90.8	0.3039	91.1	34.1 - 123		0.31	26.8	
Ethoprop	1	0.3335	0.0	0.2708	81.2	0.2787	83.6	35.9 - 111		2.85	32.1	
Ethyl Parathion	1	0.3335	0.0	0.3006	90.1	0.3058	91.7	34 - 116		1.72	29.4	
Fensulfothion	1	0.3335	0.0	0.3057	91.7	0.3008	90.2	16.5 - 127		1.63	40	
Fenthion	1	0.3335	0.0	0.2781	83.4	0.2811	84.3	38.5 - 111		1.09	28	
Malathion	1	0.3335	0.0	0.2887	86.6	0.2899	86.9	37.4 - 114		0.41	27.7	
Merphos	1	0.3335	0.0	0.2767	83	0.2833	85	32.7 - 108		2.35	33.4	
Methyl parathion	1	0.3335	0.0	0.3008	90.2	0.3044	91.3	33 - 114		1.18	32	
Mevinphos	1	0.3335	0.0	0.2470	74.1	0.2519	75.5	13.4 - 123		1.93	40	
Naled	1	0.3335	0.0	0.2661	79.8	0.2731	81.9	10 - 154		2.62	40	
Phorate	1	0.3335	0.0	0.2757	82.7	0.2839	85.1	37.4 - 108		2.93	31.9	
Ronnel	1	0.3335	0.0	0.2855	85.6	0.2905	87.1	37.9 - 108		1.73	29.2	
Stirophos	1	0.3335	0.0	0.2900	87	0.2897	86.9	32.2 - 113		0.09	29.3	
Sulfotep	1	0.3335	0.0	0.2783	83.4	0.2840	85.2	37.9 - 112		2.06	27.3	
TEPP	1	0.3335	0.0	0.2722	81.6	0.2781	83.4	10 - 132		2.12	40	
Tokuthion (Prothothiofos)	1	0.3335	0.0	0.2843	85.3	0.2866	85.9	37.6 - 114		0.8	29.2	
Trichloronate	1	0.3335	0.0	0.2870	86.1	0.2951	88.5	40 - 107		2.8	29.5	

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L672629
Kinder Morgan - Rocklin, CA-AZ Work

Test:	OP Pesticides by Method 8141		
Project No:	ST010022.0024	Matrix:	Soil - mg/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	12/6/2013	**Analytic Batch:**	**WG696297**
Analysis Date:	12/11/2013 6:45:00 PM	Analyst:	386
Instrument ID:	SVGC12	Prep Date:	12/9/2013
Sample Numbers:	L672629-01		

Surrogate Summary

Laboratory			TBP Column 1		TBP Column 2		TPP Column 1		TPP Column 2	
Sample ID	Instrument	File ID	ppm	% Rec	ppm	% Rec	ppm	% Rec	ppm	% Rec
L672629-01	SVGC12	1211A_13	0.283	84.9	0.291	87.3	0.307	92.2	0.303	91.0
BLANK WG696297	SVGC12	1211A_04	0.247	74.1	0.251	75.5	0.303	91.1	0.293	88.0
LCS WG696297	SVGC12	1211A_07	0.299	89.8	0.295	88.7	0.311	93.4	0.311	93.5
LCSD WG696297	SVGC12	1211A_08	0.300	90.2	0.297	89.1	0.316	94.8	0.311	93.2
MS WG696297	SVGC12	1211A_14	0.269	80.7	0.274	82.1	0.290	87.0	0.292	87.7
MSD WG696297	SVGC12	1211A_15	0.273	82.1	0.274	82.4	0.286	85.9	0.290	87.0

TBP --TRIBUTYL PHOSPHATE True Value: 0.333 ppm Limits: 26.9 - 135

TPP --TRIPHENYL PHOSPHATE True Value: 0.333 ppm Limits: 40 - 121

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Quality Control Summary
SDG: L672629
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Pesticides by Method 8081/8082		
Project No:	ST010022.0024	Matrix:	Soil - ug/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	12/6/2013	**Analytic Batch:**	**WG696459**
Analysis Date:	12/11/2013 12:05:00 PM	Analyst:	119
Instrument ID:	SVGC20, SVGC24	Prep Date:	12/10/2013
Sample Numbers:	L672629-01		

Method Blank

Analyte	CAS	RDL	Qualifier
4,4-DDD	72-54-8	< 20.0	
4,4-DDE	72-55-9	< 20.0	
4,4-DDT	50-29-3	< 20.0	
Aldrin	309-00-2	< 20.0	
Alpha BHC	319-84-6	< 20.0	
Beta BHC	319-85-7	< 20.0	
Chlordane	57-74-9	< 200	
Delta BHC	319-86-8	< 20.0	
Dieldrin	60-57-1	< 20.0	
Endosulfan I	959-98-8	< 20.0	
Endosulfan II	33213-65-9	< 20.0	
Endosulfan sulfate	1031-07-8	< 20.0	
Endrin	72-20-8	< 20.0	
Endrin aldehyde	7421-93-4	< 20.0	
Endrin ketone	53494-70-5	< 20.0	
Gamma BHC	58-89-9	< 20.0	
Heptachlor	76-44-8	< 20.0	
Heptachlor epoxide	1024-57-3	< 20.0	
Hexachlorobenzene	118-74-1	< 20.0	
Methoxychlor	72-43-5	< 20.0	
Toxaphene	8001-35-2	< 400	

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L672629
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Pesticides by Method 8081/8082		
Project No:	ST010022.0024	Matrix:	Soil - ug/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	12/6/2013	**Analytic Batch:**	**WG696459**
Analysis Date:	12/11/2013 12:05:00 PM	Analyst:	119
Instrument ID:	SVGC20, SVGC24	Prep Date:	12/10/2013
Sample Numbers:	L672629-01		

Laboratory Control Sample (LCS)

Analyte	Dil	True Value	Found	% Rec	Control Limits	Qual
4,4-DDD	1	67	67.954	101	70.3 - 111	
4,4-DDE	1	67	68.237	102	69.9 - 113	
4,4-DDT	1	67	68.520	102	68.1 - 111	
Aldrin	1	67	69.459	104	66.9 - 111	
Alpha BHC	1	67	68.229	102	65.1 - 111	
Beta BHC	1	67	67.620	101	69.6 - 112	
Delta BHC	1	67	69.569	104	68.3 - 114	
Dieldrin	1	67	68.606	102	70.2 - 112	
Endosulfan I	1	67	73.382	110	69.8 - 113	
Endosulfan II	1	67	67.743	101	69.2 - 113	
Endosulfan sulfate	1	67	71.314	106	62 - 123	
Endrin	1	67	71.800	107	65.9 - 115	
Endrin aldehyde	1	67	64.436	96.2	47.6 - 124	
Endrin ketone	1	67	70.246	105	69 - 120	
Gamma BHC	1	67	68.215	102	68.2 - 111	
Heptachlor	1	67	69.884	104	65.9 - 111	
Heptachlor epoxide	1	67	74.324	111	69.7 - 113	
Hexachlorobenzene	1	67	68.704	103	59.6 - 113	
Methoxychlor	1	67	71.857	107	66.2 - 114	

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L672629
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Pesticides by Method 8081/8082		
Project No:	ST010022.0024	Matrix:	Soil - ug/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	12/6/2013	**Analytic Batch:**	**WG696459**
Analysis Date:	12/11/2013 12:05:00 PM	Analyst:	119
Instrument ID:	SVGC20, SVGC24	Prep Date:	12/10/2013
Sample Numbers:	L672629-01		

Laboratory Control Sample Duplicate (LCSD)

Analyte	Dil	True Value	Found	% Rec	Control Limits	Qual
4,4-DDD	1	67	70.876	106	70.3 - 111	
4,4-DDE	1	67	71.393	107	69.9 - 113	
4,4-DDT	1	67	71.333	106	68.1 - 111	
Aldrin	1	67	70.189	105	66.9 - 111	
Alpha BHC	1	67	72.330	108	65.1 - 111	
Beta BHC	1	67	71.129	106	69.6 - 112	
Delta BHC	1	67	71.816	107	68.3 - 114	
Dieldrin	1	67	72.036	108	70.2 - 112	
Endosulfan I	1	67	73.034	109	69.8 - 113	
Endosulfan II	1	67	70.320	105	69.2 - 113	
Endosulfan sulfate	1	67	73.955	110	62 - 123	
Endrin	1	67	75.024	112	65.9 - 115	
Endrin aldehyde	1	67	67.829	101	47.6 - 124	
Endrin ketone	1	67	73.658	110	69 - 120	
Gamma BHC	1	67	71.232	106	68.2 - 111	
Heptachlor	1	67	70.840	106	65.9 - 111	
Heptachlor epoxide	1	67	71.802	107	69.7 - 113	
Hexachlorobenzene	1	67	70.149	105	59.6 - 113	
Methoxychlor	1	67	75.924	113	66.2 - 114	

Parameters in bold text are reported in this SDG

12065 Lebanon Rd
Mt. Juliet, TN 37122
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(800) 767-5859
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Est. 1970

Quality Control Summary
SDG: L672629
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Pesticides by Method 8081/8082		
Project No:	ST010022.0024	Matrix:	Soil - ug/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	12/6/2013	**Analytic Batch:**	**WG696459**
Analysis Date:	12/11/2013 12:05:00 PM	Analyst:	119
Instrument ID:	SVGC20, SVGC24	Prep Date:	12/10/2013
Sample Numbers:	L672629-01		

Laboratory Control Sample / Laboratory Control Sample Duplicate

Analyte	Dil	Spike	LCS	% Rec	LCSD	% Rec	Control Limits	% Rec Qual	% RPD	Control Limits	RPD Qual
4,4-DDD	1	67	67.954	101	70.876	106	70.3 - 111		4.21	20	
4,4-DDE	1	67	68.237	102	71.393	107	69.9 - 113		4.52	20	
4,4-DDT	1	67	68.520	102	71.333	106	68.1 - 111		4.02	20	
Aldrin	1	67	69.459	104	70.189	105	66.9 - 111		1.05	20	
Alpha BHC	1	67	68.229	102	72.330	108	65.1 - 111		5.84	20	
Beta BHC	1	67	67.620	101	71.129	106	69.6 - 112		5.06	20	
Delta BHC	1	67	69.569	104	71.816	107	68.3 - 114		3.18	20	
Dieldrin	1	67	68.606	102	72.036	108	70.2 - 112		4.88	20	
Endosulfan I	1	67	73.382	110	73.034	109	69.8 - 113		0.48	20	
Endosulfan II	1	67	67.743	101	70.320	105	69.2 - 113		3.73	20	
Endosulfan sulfate	1	67	71.314	106	73.955	110	62 - 123		3.64	20	
Endrin	1	67	71.800	107	75.024	112	65.9 - 115		4.39	20	
Endrin aldehyde	1	67	64.436	96.2	67.829	101	47.6 - 124		5.13	20	
Endrin ketone	1	67	70.246	105	73.658	110	69 - 120		4.74	20	
Gamma BHC	1	67	68.215	102	71.232	106	68.2 - 111		4.33	20	
Heptachlor	1	67	69.884	104	70.840	106	65.9 - 111		1.36	20	
Heptachlor epoxide	1	67	74.324	111	71.802	107	69.7 - 113		3.45	20	
Hexachlorobenzene	1	67	68.704	103	70.149	105	59.6 - 113		2.08	20	
Methoxychlor	1	67	71.857	107	75.924	113	66.2 - 114		5.5	20	

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Quality Control Summary
SDG: L672629
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Pesticides by Method 8081/8082		
Project No:	ST010022.0024	Matrix:	Soil - ug/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	12/6/2013	**Analytic Batch:**	**WG696459**
Analysis Date:	12/11/2013 12:05:00 PM	Analyst:	119
Instrument ID:	SVGC20, SVGC24	Prep Date:	12/10/2013
Sample Numbers:	L672629-01		

Matrix Spike / Matrix Spike Duplicate

L672496-01

Analyte	Dil	Spike Value	Sample	MS	% Rec	MSD	% Rec	Control Limits	% Rec Qual	RPD	Control Limits	RPD Qual
4,4-DDD	1	67	0.0	63.426	94.7	64.392	96.1	23.4 - 145		1.51	20	
4,4-DDE	1	67	0.0	64.283	95.9	64.699	96.6	16.4 - 147		0.65	20	
4,4-DDT	1	67	0.0	63.387	94.6	64.576	96.4	26.7 - 129		1.86	23.8	
Aldrin	1	67	0.0	63.027	94.1	64.039	95.6	40.2 - 116		1.59	20	
Alpha BHC	1	67	0.0	62.151	92.8	64.050	95.6	53.6 - 109		3.01	20	
Beta BHC	1	67	0.0	62.841	93.8	64.296	96	38.3 - 126		2.29	20	
Delta BHC	1	67	0.0	64.074	95.6	65.051	97.1	44.8 - 125		1.51	20	
Dieldrin	1	67	0.0	63.902	95.4	64.609	96.4	31.4 - 137		1.1	20	
Endosulfan I	1	67	0.0	64.248	95.9	65.209	97.3	40.3 - 120		1.48	20	
Endosulfan II	1	67	0.0	63.210	94.3	63.628	95	29.1 - 140		0.66	20	
Endosulfan sulfate	1	67	0.0	66.467	99.2	67.618	101	43.3 - 129		1.72	21.5	
Endrin	1	67	0.0	67.027	100	67.565	101	34.9 - 125		0.8	21.2	
Endrin aldehyde	1	67	0.0	59.750	89.2	59.873	89.4	15.6 - 139		0.21	20	
Endrin ketone	1	67	0.0	65.105	97.2	66.520	99.3	35.4 - 137		2.15	20	
Gamma BHC	1	67	0.0	63.637	95	64.838	96.8	55.3 - 110		1.87	20	
Heptachlor	1	67	0.0	64.622	96.5	63.968	95.5	41.6 - 115		1.02	20	
Heptachlor epoxide	1	67	0.0	64.484	96.2	65.714	98.1	34.8 - 128		1.89	20	
Hexachlorobenzene	1	67	0.0	65.555	97.8	68.770	103	40.2 - 119		4.79	20	
Methoxychlor	1	67	0.0	67.588	101	69.071	103	16 - 134		2.17	25.4	

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L672629
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Pesticides by Method 8081/8082		
Project No:	ST010022.0024	Matrix:	Soil - ug/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	12/6/2013	**Analytic Batch:**	**WG696459**
Analysis Date:	12/11/2013 12:05:00 PM	Analyst:	119
Instrument ID:	SVGC20	Prep Date:	12/10/2013
Sample Numbers:	L672629-01		

Surrogate Summary

Laboratory			DCB Column 1		DCB Column 2		TCX Column 1		TCX Column 2	
Sample ID	Instrument	File ID	ppm	% Rec	ppm	% Rec	ppm	% Rec	ppm	% Rec
L672629-01	SVGC24	1211_16	0.0440	66.1	0.0446	67.0	0.0554	83.1	0.0547	82.1
L672629-01	SVGC20	1211_24	0.0517	77.6	0.0555	83.3	0.0699	105	0.0717	108
BLANK WG696459	SVGC20	1211_06	0.0637	95.7	0.0662	99.4	0.0648	97.3	0.0667	100
LCS WG696459	SVGC20	1211_07	0.0663	99.5	0.0682	102	0.0673	101	0.0689	103
LCSD WG696459	SVGC20	1211_08	0.0679	102	0.0696	104	0.0686	103	0.0701	105
MS WG696459	SVGC20	1211_25	0.0453	68.0	0.0493	74.0	0.0709	106	0.0732	110
MSD WG696459	SVGC20	1211_26	0.0497	74.7	0.0517	77.6	0.0715	107	0.0738	111
BLANK WG696459	SVGC24	1211_09	0.0587	88.1	0.0595	89.3	0.0641	96.3	0.0635	95.3
LCS WG696459	SVGC24	1211_10	0.0612	91.9	0.0621	93.3	0.0677	102	0.0668	100
LCSD WG696459	SVGC24	1211_11	0.0756	114	0.0613	92.1	0.0802	120	0.0666	100
MS WG696459	SVGC24	1211_18	0.0509	76.5	0.0528	79.3	0.0585	87.9	0.0563	84.5
MSD WG696459	SVGC24	1211_19	0.0509	76.4	0.0525	78.8	0.0602	90.4	0.0563	84.6

DCB --DECACHLOROBIPHENYL	True Value: 0.0666 ppm	Limits: 10 - 145
TCX --TETRACHLORO-M-XYLENE	True Value: 0.0666 ppm	Limits: 21.10 - 148

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Quality Control Summary
SDG: L672629
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Herbicides by Method 8151		
Project No:	ST010022.0024	Matrix:	Soil - mg/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	12/6/2013	**Analytic Batch:**	**WG696255**
Analysis Date:	12/10/2013 2:10:00 AM	Analyst:	267
Instrument ID:	SVGC11	Prep Date:	12/9/2013
Sample Numbers:	L672629-01		

Method Blank

Analyte	CAS	RDL	Qualifier
2,4,5-T	93-76-5	< 0.0700	
2,4,5-TP (Silvex)	93-72-1	< 0.0700	
2,4-D	94-75-7	< 0.0700	
2,4-DB	94-82-6	< 0.0700	
Dalapon	75-99-0	< 0.800	
Dicamba	1918-00-9	< 0.0700	
Dichloroprop	120-36-5	< 0.0700	
Dinoseb	88-85-7	< 0.0700	
MCPA	94-74-6	< 6.5	
MCPP	93-65-2	< 6.5	

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L672629
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Herbicides by Method 8151		
Project No:	ST010022.0024	Matrix:	Soil - mg/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	12/6/2013	**Analytic Batch:**	**WG696255**
Analysis Date:	12/10/2013 2:10:00 AM	Analyst:	267
Instrument ID:	SVGC11	Prep Date:	12/9/2013
Sample Numbers:	L672629-01		

Laboratory Control Sample (LCS)

Analyte	Dil	True Value	Found	% Rec	Control Limits	Qual
2,4,5-T	1	0.1667	0.1409	84.5	38.1 - 115	
2,4,5-TP (Silvex)	1	0.1667	0.1318	79.1	49 - 119	
2,4-D	1	0.1667	0.1161	69.6	38.9 - 103	
2,4-DB	1	0.1667	0.1504	90.2	29.1 - 111	
Dalapon	1	0.1667	0.1157	69.4	28.4 - 114	
Dicamba	1	0.1667	0.1328	79.7	48.3 - 115	
Dichloroprop	1	0.1667	0.1119	67.1	42.4 - 128	
Dinoseb	1	0.1667	0.1200	72	10 - 113	
MCPA	1	16.666	12.042	72.3	10 - 149	
MCPP	1	16.666	17.47	105	47.9 - 173	

Laboratory Control Sample Duplicate (LCSD)

Analyte	Dil	True Value	Found	% Rec	Control Limits	Qual
2,4,5-T	1	0.1667	0.1499	89.9	38.1 - 115	
2,4,5-TP (Silvex)	1	0.1667	0.1361	81.7	49 - 119	
2,4-D	1	0.1667	0.1172	70.3	38.9 - 103	
2,4-DB	1	0.1667	0.1589	95.3	29.1 - 111	
Dalapon	1	0.1667	0.1312	78.7	28.4 - 114	
Dicamba	1	0.1667	0.1342	80.5	48.3 - 115	
Dichloroprop	1	0.1667	0.1170	70.2	42.4 - 128	
Dinoseb	1	0.1667	0.1217	73	10 - 113	
MCPA	1	16.666	15.773	94.6	10 - 149	
MCPP	1	16.666	17.927	108	47.9 - 173	

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L672629
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Herbicides by Method 8151		
Project No:	ST010022.0024	Matrix:	Soil - mg/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	12/6/2013	**Analytic Batch:**	**WG696255**
Analysis Date:	12/10/2013 2:10:00 AM	Analyst:	267
Instrument ID:	SVGC11	Prep Date:	12/9/2013
Sample Numbers:	L672629-01		

Laboratory Control Sample / Laboratory Control Sample Duplicate

Analyte	Dil	Spike	LCS	% Rec	LCSD	% Rec	Control Limits	% Rec Qual	% RPD	Control Limits	RPD Qual
2,4,5-T	1	0.1667	0.1409	84.5	0.1499	89.9	38.1 - 115		6.17	23.2	
2,4,5-TP (Silvex)	1	0.1667	0.1318	79.1	0.1361	81.7	49 - 119		3.22	20.2	
2,4-D	1	0.1667	0.1161	69.6	0.1172	70.3	38.9 - 103		0.94	24.7	
2,4-DB	1	0.1667	0.1504	90.2	0.1589	95.3	29.1 - 111		5.46	27.6	
Dalapon	1	0.1667	0.1157	69.4	0.1312	78.7	28.4 - 114		12.6	28	
Dicamba	1	0.1667	0.1328	79.7	0.1342	80.5	48.3 - 115		1.08	22.1	
Dichloroprop	1	0.1667	0.1119	67.1	0.1170	70.2	42.4 - 128		4.46	23.6	
Dinoseb	1	0.1667	0.1200	72	0.1217	73	10 - 113		1.45	40	
MCPA	1	16.666	12.042	72.3	15.773	94.6	10 - 149		26.8	40	
MCPP	1	16.666	17.47	105	17.927	108	47.9 - 173		2.58	32.4	

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L672629
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Herbicides by Method 8151		
Project No:	ST010022.0024	Matrix:	Soil - mg/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	12/6/2013	**Analytic Batch:**	**WG696255**
Analysis Date:	12/10/2013 2:10:00 AM	Analyst:	267
Instrument ID:	SVGC11	Prep Date:	12/9/2013
Sample Numbers:	L672629-01		

Matrix Spike / Matrix Spike Duplicate

L672496-02

Analyte	Dil	Spike Value	Sample	MS	% Rec	MSD	% Rec	Control Limits	% Rec Qual	RPD	Control Limits	RPD Qual
2,4,5-T	1	0.1667	0.0	0.1424	85.4	0.1448	86.9	27.7 - 112		1.69	28	
2,4,5-TP (Silvex)	1	0.1667	0.0	0.1284	77	0.1318	79	31.2 - 122		2.62	28.4	
2,4-D	1	0.1667	0.0	0.1255	75.3	0.1098	65.9	10 - 133		13.4	40	
2,4-DB	1	0.1667	0.0	0.1627	97.6	0.1646	98.7	14.7 - 121		1.12	34	
Dalapon	1	0.1667	0.0	0.1005	60.3	0.0975	58.5	10 - 121		3.03	40	
Dicamba	1	0.1667	0.0	0.1150	69	0.1138	68.3	24.8 - 121		1.01	29.4	
Dichloroprop	1	0.1667	0.0	0.1016	61	0.0999	59.9	39.4 - 119		1.74	23.7	
Dinoseb	1	0.1667	0.0	0.1126	67.6	0.1341	80.5	10 - 117		17.4	40	
MCPA	1	16.666	0.0	16.964	102	15.563	93.4	10 - 162		8.61	40	
MCPP	1	16.666	0.0	14.768	88.6	14.523	87.1	26 - 190		1.67	36.5	

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L672629
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Herbicides by Method 8151		
Project No:	ST010022.0024	Matrix:	Soil - mg/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	12/6/2013	**Analytic Batch:**	**WG696255**
Analysis Date:	12/10/2013 2:10:00 AM	Analyst:	267
Instrument ID:	SVGC11	Prep Date:	12/9/2013
Sample Numbers:	L672629-01		

Surrogate Summary

Laboratory Sample ID	Instrument	File ID	2,4-DAA Column 1 ppm	2,4-DAA Column 1 % Rec	2,4-DAA Column 2 ppm	2,4-DAA Column 2 % Rec
L672629-01	SVGC11	1209A_24	0.155	92.8	0.169	102
BLANK WG696255	SVGC11	1209A_13	0.161	96.4	0.164	98.2
LCS WG696255	SVGC11	1209A_14	0.151	90.6	0.148	89.0
LCSD WG696255	SVGC11	1209A_15	0.158	95.0	0.158	94.7
MS WG696255	SVGC11	1209A_22	0.141	84.8	0.144	86.6
MSD WG696255	SVGC11	1209A_23	0.133	79.9	0.156	93.6

2,4-DAA --2,4-DICHLOROPHENYL ACETIC ACID True Value: 0.1665 ppm Limits: 13.1 - 131

Company Name/Address:
Kinder Morgan
Attn: Paul Salcido

Billing Information:
ARCADIS
14201 N 87TH ST
SCOTTSDALE AZ 85260

Report to: B. FORSBERG

Email To:

Project Description: KMEP : SILVERCROFT

City/State Collected:

Phone: 480-905-9311
Fax:

Client Project # ST010022.0024

Lab Project #

Collected by (print): R. O'KEEFE

Site/Facility ID # SILVERCROFT

P.O. #

Collected by (signature):

Immediately Packed on Ice N ___ Y ✓

Rush? (Lab MUST Be Notified)
___ Same Day 200%
___ Next Day 100%
___ Two Day 50%
___ Three Day 25%

Date Results Needed

Email? ___No ___Yes
FAX? ___No ___Yes

Analysis / Container / Preservative

Chain of Custody Page 1 of 1

ESC LAB SCIENCES
12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

L# L672629
Tab J224
Acctnum: KINARCPAZ
Template:
Prelogin:
TSR:
Cooler:
Shipped Via:

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	CARB 435 (PLM) Level A (asbestos)-Sub out	8082 PCBs, SW 9095 Paint filter/ 4oz jar	8081, 8141 / 4oz jar	8151 Herbicides/ 4oz jar	8015AZ (C10-C32), RCRA 8 metals/ 4oz jar	Flashpoint 1010, pH 9045B / 4oz jar	VOC 8260B + MTBE, TBA, TAME/ 40mL amber/MeOH				Rem./Contaminant	Sample # (lab only)
RB-5979	GRAB	SOIL	N/A	12-6-13	1200	7	X	X	X	X	X	X	X					01

* Matrix: SS - Soil GW - Groundwater WW - WasteWater DW - Drinking Water OT - Other ____

Remarks: 5435 5513 8507

pH ____ Temp ____
Flow ____ Other ____

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)
[signature]	12-6-13	1700	Emily Vann
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)
Emily Vann	12/6/13	1830	FedEx
Relinquished by: (Signature)	Date:	Time:	Received for lab by: (Signature)
			[signature]

Samples returned via: ☐ UPS ☒ FedEx ☐ Courier ☐ ____
Temp: 3.2 °C Bottles Received: 7
Date: 12-7-13 Time: 1030

Hold #
Condition: (lab use only) ✓
COC Seal Intact: ___Y ___N ___NA
pH Checked:
NCF:

L672 671

Company Name/Address:
Kinder Morgan
Attn: Paul Salcido

Billing Information:
ARCADIS
14201 N 87TH ST
SCOTTSDALE AZ 85260

Report to: B. FORSBERG

Email To:

Project Description: KMEP : SILVERCROFT

City/State Collected:

Phone: 480-905-9311
Fax:

Client Project # ST010022.0024

Lab Project #

Collected by (print): R. O'KEEFE

Site/Facility ID # SILVERCROFT

P.O. #

Collected by (signature):

Immediately Packed on Ice N ___ Y ✓

Rush? (Lab MUST Be Notified)
___ Same Day 200%
___ Next Day 100%
___ Two Day 50%
___ Three Day 25%

Date Results Needed

Email? ___No ___Yes
FAX? ___No ___Yes

Analysis / Container / Preservative

Chain of Custody Page 1 of 1

ESC LAB SCIENCES
12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

L# L672

Tab J224

Acctnum: KINARCPAZ
Template:
Prelogin:
TSR:
Cooler:
Shipped Via:

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Ctrs	CARB 435 (PLM) Level A (asbestos)-Sub out	8082 PCBs, SW 9095 Paint filter/ 4oz jar	8081, 8141 / 4oz jar	8151 Herbicides/ 4oz jar	8015AZ (C10-C32), RCRA 8 metals/ 4oz jar	Flashpoint 1010, pH 9045B / 4oz jar	VOC 8260B + MTBE, TBA, TAME/ 40mL amber/MeOH				Rem./Contaminant	Sample # (lab only)
RB-5979	GRAB	SOIL	N/A	12-6-13	1200	7	X	X	X	X	X	X	X					01

* Matrix: SS - Soil GW - Groundwater WW - WasteWater DW - Drinking Water OT - Other_____

pH _____ Temp _____

Remarks: 5435 5513 8507

Flow _____ Other _____

Hold #

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Samples returned via: ☐ UPS ☒ FedEx ☐ Courier ☐ ___	Condition: (lab use only)
	12-6-13	1700	Emily Vann		
Relinquished by: (Signature) Emily Vann	12/6/13	1830	Received by: (Signature) FedEx	Temp: 32 °C Bottles Received: 7	COC Seal Intact: ___Y ___N ___NA
Relinquished by: (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: 12-7-13 Time: 1070	pH Checked: NCF:

SanAir Technologies Laboratory

Analysis Report

prepared for

ESC Lab Sciences

Report Date: 12/17/2013
Project #: WG696257
SanAir ID#: 13029612

NVLAP LAB CODE 200870-0

Virginia SBE
Certification # 652931

Texas Licensed Mold Analysis Laboratory
License # LAB0166

SanAir Technologies Laboratory

804.897.1177 www.sanair.com

SanAir Technologies Laboratory, Inc.

1551 Oakbridge Drive, Suite B, Powhatan, VA 23139
804.897.1177 Toll Free: 888.895.1177 Fax: 804.897.0070
Web: http://www.sanair.com E-mail: iaq@sanair.com

ESC Lab Sciences
12065 Lebanon Rd
Mt Juliet, TN 37123

December 17, 2013

SanAir ID # 13029612
Project Name:
Project Number: WG696257

Dear Janice Cozby,

We at SanAir would like to thank you for the work you recently submitted. The 1 sample(s) were received on Tuesday, December 10, 2013 via FedEx. The final report(s) is enclosed for the following sample(s): L672631-01.

These results only pertain to this job and should not be used in the interpretation of any other job. This report is only complete in its entirety. Refer to the listing below of the pages included in a complete final report.

Sincerely,

Sandra Sobrino

Sandra Sobrino
Asbestos & Materials Laboratory Manager
SanAir Technologies Laboratory

Final Report Includes:
- Cover Letter
- Analysis Pages
- Disclaimers and Additional Information

sample conditions:
1 sample(s) in Good condition

SanAir Technologies Laboratory, Inc.

1551 Oakbridge Drive, Suite B, Powhatan, VA 23139
804.897.1177 Toll Free: 888.895.1177 Fax: 804.897.0070
Web: http://www.sanair.com E-mail: iaq@sanair.com

SanAir ID Number

13029612

FINAL REPORT

Name: ESC Lab Sciences
Address: 12065 Lebanon Rd
Mt Juliet, TN 37123

Project Number: WG696257
P.O. Number:
Project Name:

Collected Date: 12/9/2013
Received Date: 12/10/2013 11:55:00 AM
Report Date: 12/17/2013 5:53:35 PM
Analyst: Sobrino, Sandra

Asbestos Soil/Vermiculite PLM CARB 435 (LOD 0.1%)

SanAir ID / Description	Stereoscopic Appearance	Components % Fibrous	Components % Non-Fibrous	Asbestos Fibers
L672631-01 / 13029612-001	Brown Non-Fibrous Heterogeneous		100% Other	None Detected

Certification

Signature: Sandra Sobrino
Date: 12/17/2013

Reviewed: Sandra Sobrino
Date: 12/17/2013

Disclaimer

The final report cannot be reproduced, except in full, without written authorization from SanAir. Fibers smaller than 5 microns cannot be seen with this method due to scope limitations. The accuracy of the results is dependent upon the client's sampling procedure and information provided to the laboratory by the client. SanAir assumes no responsibility for the sampling procedure and will provide evaluation reports based solely on the sample and information provided by the client. This report may not be used by the client to claim product endorsement by NVLAP, AIHA or any other agency of the U.S. government*; and may not be certified by every local, state and federal regulatory agencies.*

Sub-Contract Chain of Custody

15U24012

Environmental Science Corp
12065 Lebanon Road
Mt. Juliet, TN 37122
(615) 773-9756 (615) 758-5859 fax

Sub-Contract Lab : __SANAIRPVA____
City / State : _____Powhatan, VA_____
Results Needed by : ___5 DAY TAT - 12/17/13_____
ESC Purchase Order # : __S19270_____
Send Reports To : ____Janice Cozby jcozby@esclabsciences.com____

WORKGROUP	WG696257
Date Created :	12/9/2013

ABSP2

SAMPLENO Container #	MATRIX	Date / Time Collected	PARAMETER	Code	METHOD	Comments
L672631-01	SS	12/6/2013 12:00	Asbestos-PLM	ASBESTOS	PLM	CARB 435 <0.1%

16147501

Relinquished by JCozby Date: 120913
Received by : _____ Date: _____
Relinquished by _____ Date: _____
Received by : C. Rowe Date: 12 12013 11:55AM

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Est. 1970

Quality Control Summary
SDG: L675525

For: Kinder Morgan - Rocklin, CA-AZ Work
KMEP: Silvercroft

L675525

Lab SampleID.	Client ID
L675525-01	RB-5979

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Quality Control Summary
SDG: L675525

For: Kinder Morgan - Rocklin, CA-AZ Work
Project: KMEP: Silvercroft
December 27, 2013

Sample Receiving and Handling

All sample aliquots were received at the correct temperature, in the proper containers, and with the appropriate preservatives. All method specified holding times were met.

Polynuclear Aromatic Hydrocarbons by Method 8270C-SIM

Laboratory Control Sample

Sample L675525-01 was analyzed in analytical batch WG698980. The laboratory control sample associated with this sample was within the laboratory control limits for all target analytes reported from this batch. The relative percent difference was within laboratory limits for all target analytes reported from this batch.

Matrix Spike/Matrix Spike Duplicate

For analytical batch WG698980 matrix spike/matrix spike duplicate analysis was performed on sample L675362-01. The matrix spike recoveries and relative percent differences were within laboratory control limits for all target analytes reported from this batch.

Blank Analysis

The method blank, the initial, and all continuing calibration blanks contained no analytes at concentrations above the method reporting limit.

Nancy F. McLain
ESC Representative
ESC Lab Sciences

12065 Lebanon Rd.
Mt. Juliet, TN 37122
(615) 758-5858
1-800-767-5859
Fax (615) 758-5859

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Bob Forsberg / Sasha Arnold
ARCADIS
14201 N. 87th Street, Suite 135
Scottsdale, AZ 85260

Report Summary

Thursday December 26, 2013

Report Number: L675525
Samples Received: 12/07/13
Client Project: ST010022.0024

Description: KMEP Silvercroft Wash

The analytical results in this report are based upon information supplied by you, the client, and are for your exclusive use. If you have any questions regarding this data package, please do not hesitate to call.

Entire Report Reviewed By: Alan Harvill

T. Alan Harvill , ESC Representative

Laboratory Certification Numbers

A2LA - 1461-01, AIHA - 100789, AL - 40660, CA - 01157CA, CT - PH-0197, FL - E87487, GA - 923, IN - C-TN-01, KY - 90010, KYUST - 0016, NC - ENV375/DW21704/BIO041, ND - R-140. NJ - TN002, NJ NELAP - TN002, SC - 84004, TN - 2006, VA - 460132, WV - 233, AZ - 0612, MN - 047-999-395, NY - 11742, WI - 998093910, NV - TN000032011-1, TX - T104704245-11-3, OK - 9915, PA - 68-02979, IA Lab #364, EPA - TN002

Accreditation is only applicable to the test methods specified on each scope of accreditation held by ESC Lab Sciences.
Note: The use of the preparatory EPA Method 3511 is not approved or endorsed by the CA ELAP.

This report may not be reproduced, except in full, without written approval from ESC Lab Sciences.
Where applicable, sampling conducted by ESC is performed per guidance provided in laboratory standard operating procedures: 060302, 060303, and 060304.

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Quality Control Summary
SDG: L675525

For: Kinder Morgan - Rocklin, CA-AZ Work
KMEP: Silvercroft

L675525

Lab SampleID.	Client ID
L675525-01	RB-5979

ESC LAB SCIENCES
YOUR LAB OF CHOICE

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SAMPLE NUMBER
RB-5979

Customer :	Kinder Morgan - Rocklin, CA-AZ Work	Project :	ST010022.0024
Source :	SILVERCROFT	Date Sampled :	12/6/2013 12:00 PM
Location :	KMEP: Silvercroft	Sampled By :	R. O. Keefe
Lab Sample ID :	**L675525-01**	Date Received :	12/7/2013

8270C-SIM

Analytic Batch: WG698980 | Analysis Date: 12/26/2013 | Analysis Time: 1:41 PM
Instrument: BNAMS22 | Analyst: 377 | Preparation Date: 12/25/2013 10:12
Method: 8270C-SIM | Dilution: 1

CAS NO	Analyte	RL mg/kg	RESULTS mg/kg	FLAG
120-12-7	Anthracene	0.0060	< 0.0060	
83-32-9	Acenaphthene	0.0060	< 0.0060	
208-96-8	Acenaphthylene	0.0060	< 0.0060	
56-55-3	Benzo(a)anthracene	0.0060	< 0.0060	
50-32-8	Benzo(a)pyrene	0.0060	< 0.0060	
205-99-2	Benzo(b)fluoranthene	0.0060	< 0.0060	
191-24-2	Benzo(g,h,i)perylene	0.0060	< 0.0060	
207-08-9	Benzo(k)fluoranthene	0.0060	< 0.0060	
218-01-9	Chrysene	0.0060	< 0.0060	
53-70-3	Dibenz(a,h)anthracene	0.0060	< 0.0060	
206-44-0	Fluoranthene	0.0060	< 0.0060	
86-73-7	Fluorene	0.0060	< 0.0060	
193-39-5	Indeno(1,2,3-cd)pyrene	0.0060	< 0.0060	
91-20-3	Naphthalene	0.020	< 0.020	
85-01-8	Phenanthrene	0.0060	< 0.0060	
129-00-0	Pyrene	0.0060	< 0.0060	
90-12-0	1-Methylnaphthalene	0.020	< 0.020	
91-57-6	2-Methylnaphthalene	0.020	< 0.020	
91-58-7	2-Chloronaphthalene	0.020	< 0.020	

Surrogates

Analyte	PERCENT RECOVERY	QUALIFIERS	FLAG
Nitrobenzene-d5	**103**		
2-Fluorobiphenyl	**103**		
p-Terphenyl-d14	**95.1**		

LEGEND

RL - Reporting Limit

Comments: 1) Sample results are reported as rounded values.
2) These results are applicable only to the items tested.

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Quality Control Summary
SDG: L675525
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Polynuclear Aromatic Hydrocarbons by Method 8270C-SIM		
Project No:	ST010022.0024	Matrix:	Soil - ug/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	12/6/2013	**Analytic Batch:**	**WG698980**
Analysis Date:	12/26/2013 1:41:00 PM	Analyst:	377
Instrument ID:	BNAMS22	Prep Date:	12/24/2013
Sample Numbers:	L675525-01		

Method Blank

Analyte	CAS	RDL	Qualifier
1-Methylnaphthalene	90-12-0	< 20.0	
2-Chloronaphthalene	91-58-7	< 20.0	
2-Methylnaphthalene	91-57-6	< 20.0	
Acenaphthene	83-32-9	< 6.00	
Acenaphthylene	208-96-8	< 6.00	
Anthracene	120-12-7	< 6.00	
Benzo(a)anthracene	56-55-3	< 6.00	
Benzo(a)pyrene	50-32-8	< 6.00	
Benzo(b)fluoranthene	205-99-2	< 6.00	
Benzo(g,h,i)perylene	191-24-2	< 6.00	
Benzo(k)fluoranthene	207-08-9	< 6.00	
Chrysene	218-01-9	< 6.00	
Dibenz(a,h)anthracene	53-70-3	< 6.00	
Fluoranthene	206-44-0	< 6.00	
Fluorene	86-73-7	< 6.00	
Indeno(1,2,3-cd)pyrene	193-39-5	< 6.00	
Naphthalene	91-20-3	< 20.0	
Phenanthrene	85-01-8	< 6.00	
Pyrene	129-00-0	< 6.00	

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L675525
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Polynuclear Aromatic Hydrocarbons by Method 8270C-SIM		
Project No:	ST010022.0024	Matrix:	Soil - ug/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	12/6/2013	**Analytic Batch:**	**WG698980**
Analysis Date:	12/26/2013 1:41:00 PM	Analyst:	377
Instrument ID:	BNAMS22	Prep Date:	12/24/2013
Sample Numbers:	L675525-01		

Laboratory Control Sample (LCS)

Analyte	Dil	True Value	Found	% Rec	Control Limits	Qual
1-Methylnaphthalene	1	80	76.402	95.5	62.5 - 121	
2-Chloronaphthalene	1	80	79.375	99.2	62.1 - 120	
2-Methylnaphthalene	1	80	76.046	95.1	62.5 - 121	
Acenaphthene	1	80	77.500	96.9	62.4 - 121	
Acenaphthylene	1	80	73.866	92.3	62.9 - 123	
Anthracene	1	80	80.920	101	64.9 - 129	
Benzo(a)anthracene	1	80	71.289	89.1	61.8 - 125	
Benzo(a)pyrene	1	80	76.946	96.2	63.4 - 119	
Benzo(b)fluoranthene	1	80	76.975	96.2	62.7 - 119	
Benzo(g,h,i)perylene	1	80	75.826	94.8	68.2 - 129	
Benzo(k)fluoranthene	1	80	77.020	96.3	64.5 - 128	
Chrysene	1	80	82.118	103	64.4 - 128	
Dibenz(a,h)anthracene	1	80	78.638	98.3	65.3 - 128	
Fluoranthene	1	80	71.664	89.6	61.8 - 129	
Fluorene	1	80	76.122	95.2	60.8 - 121	
Indeno(1,2,3-cd)pyrene	1	80	79.950	99.9	67.6 - 129	
Naphthalene	1	80	74.021	92.5	59.5 - 116	
Phenanthrene	1	80	75.432	94.3	59.4 - 121	
Pyrene	1	80	79.349	99.2	61.2 - 130	

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L675525
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Polynuclear Aromatic Hydrocarbons by Method 8270C-SIM		
Project No:	ST010022.0024	Matrix:	Soil - ug/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	12/6/2013	**Analytic Batch:**	**WG698980**
Analysis Date:	12/26/2013 1:41:00 PM	Analyst:	377
Instrument ID:	BNAMS22	Prep Date:	12/24/2013
Sample Numbers:	L675525-01		

Laboratory Control Sample Duplicate (LCSD)

Analyte	Dil	True Value	Found	% Rec	Control Limits	Qual
1-Methylnaphthalene	1	80	71.211	89	62.5 - 121	
2-Chloronaphthalene	1	80	72.309	90.4	62.1 - 120	
2-Methylnaphthalene	1	80	69.914	87.4	62.5 - 121	
Acenaphthene	1	80	70.507	88.1	62.4 - 121	
Acenaphthylene	1	80	67.204	84	62.9 - 123	
Anthracene	1	80	74.893	93.6	64.9 - 129	
Benzo(a)anthracene	1	80	65.016	81.3	61.8 - 125	
Benzo(a)pyrene	1	80	69.585	87	63.4 - 119	
Benzo(b)fluoranthene	1	80	72.410	90.5	62.7 - 119	
Benzo(g,h,i)perylene	1	80	70.757	88.4	68.2 - 129	
Benzo(k)fluoranthene	1	80	69.532	86.9	64.5 - 128	
Chrysene	1	80	74.310	92.9	64.4 - 128	
Dibenz(a,h)anthracene	1	80	72.935	91.2	65.3 - 128	
Fluoranthene	1	80	65.167	81.5	61.8 - 129	
Fluorene	1	80	69.542	86.9	60.8 - 121	
Indeno(1,2,3-cd)pyrene	1	80	74.402	93	67.6 - 129	
Naphthalene	1	80	68.223	85.3	59.5 - 116	
Phenanthrene	1	80	68.720	85.9	59.4 - 121	
Pyrene	1	80	73.962	92.5	61.2 - 130	

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L675525
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Polynuclear Aromatic Hydrocarbons by Method 8270C-SIM		
Project No:	ST010022.0024	Matrix:	Soil - ug/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	12/6/2013	**Analytic Batch:**	**WG698980**
Analysis Date:	12/26/2013 1:41:00 PM	Analyst:	377
Instrument ID:	BNAMS22	Prep Date:	12/24/2013
Sample Numbers:	L675525-01		

Laboratory Control Sample / Laboratory Control Sample Duplicate

Analyte	Dil	Spike	LCS	% Rec	LCSD	% Rec	Control Limits	% Rec Qual	% RPD	Control Limits	RPD Qual
1-Methylnaphthalene	1	80	76.402	95.5	71.211	89	62.5 - 121		7.03	20	
2-Chloronaphthalene	1	80	79.375	99.2	72.309	90.4	62.1 - 120		9.32	20	
2-Methylnaphthalene	1	80	76.046	95.1	69.914	87.4	62.5 - 121		8.4	20	
Acenaphthene	1	80	77.500	96.9	70.507	88.1	62.4 - 121		9.45	20	
Acenaphthylene	1	80	73.866	92.3	67.204	84	62.9 - 123		9.45	20	
Anthracene	1	80	80.920	101	74.893	93.6	64.9 - 129		7.74	20	
Benzo(a)anthracene	1	80	71.289	89.1	65.016	81.3	61.8 - 125		9.2	20	
Benzo(a)pyrene	1	80	76.946	96.2	69.585	87	63.4 - 119		10	20	
Benzo(b)fluoranthene	1	80	76.975	96.2	72.410	90.5	62.7 - 119		6.11	20	
Benzo(g,h,i)perylene	1	80	75.826	94.8	70.757	88.4	68.2 - 129		6.92	20	
Benzo(k)fluoranthene	1	80	77.020	96.3	69.532	86.9	64.5 - 128		10.2	20	
Chrysene	1	80	82.118	103	74.310	92.9	64.4 - 128		9.98	20	
Dibenz(a,h)anthracene	1	80	78.638	98.3	72.935	91.2	65.3 - 128		7.53	20	
Fluoranthene	1	80	71.664	89.6	65.167	81.5	61.8 - 129		9.5	20	
Fluorene	1	80	76.122	95.2	69.542	86.9	60.8 - 121		9.03	20	
Indeno(1,2,3-cd)pyrene	1	80	79.950	99.9	74.402	93	67.6 - 129		7.19	20	
Naphthalene	1	80	74.021	92.5	68.223	85.3	59.5 - 116		8.15	20	
Phenanthrene	1	80	75.432	94.3	68.720	85.9	59.4 - 121		9.31	20	
Pyrene	1	80	79.349	99.2	73.962	92.5	61.2 - 130		7.03	20	

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L675525
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Polynuclear Aromatic Hydrocarbons by Method 8270C-SIM		
Project No:	ST010022.0024	Matrix:	Soil - ug/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	12/6/2013	**Analytic Batch:**	**WG698980**
Analysis Date:	12/26/2013 1:41:00 PM	Analyst:	377
Instrument ID:	BNAMS22	Prep Date:	12/24/2013
Sample Numbers:	L675525-01		

Matrix Spike / Matrix Spike Duplicate

L675362-01

Analyte	Dil	Spike Value	Sample	MS	% Rec	MSD	% Rec	Control Limits	% Rec Qual	RPD	Control Limits	RPD Qual
1-Methylnaphthalene	1	80	0.0	62.069	77.6	63.983	80	58.9 - 123		3.04	20	
2-Chloronaphthalene	1	80	0.0	65.395	81.7	66.477	83.1	61.6 - 120		1.64	20	
2-Methylnaphthalene	1	80	0.0	61.173	76.5	62.682	78.4	50.7 - 129		2.44	20	
Acenaphthene	1	80	0.0	60.989	76.2	62.677	78.3	51.6 - 124		2.73	20	
Acenaphthylene	1	80	0.0	60.588	75.7	62.851	78.6	58.3 - 126		3.67	20	
Anthracene	1	80	0.0	63.650	79.6	65.153	81.4	47.9 - 137		2.33	20	
Benzo(a)anthracene	1	80	0.0	54.093	67.6	53.352	66.7	34.2 - 138		1.38	22.8	
Benzo(a)pyrene	1	80	0.0	59.659	74.6	59.378	74.2	34.6 - 133		0.47	26.3	
Benzo(b)fluoranthene	1	80	0.0	51.080	63.9	45.490	56.9	19.8 - 142		11.6	30.3	
Benzo(g,h,i)perylene	1	80	0.0	56.172	70.2	55.291	69.1	20 - 149		1.58	27.1	
Benzo(k)fluoranthene	1	80	0.0	62.553	78.2	65.783	82.2	32.1 - 137		5.03	24.6	
Chrysene	1	80	0.0	63.857	79.8	66.583	83.2	36.6 - 137		4.18	22.7	
Dibenz(a,h)anthracene	1	80	0.0	61.063	76.3	61.283	76.6	27.1 - 145		0.36	21.9	
Fluoranthene	1	80	0.0	52.703	65.9	50.385	63	39.8 - 141		4.5	22.2	
Fluorene	1	80	0.0	60.437	75.5	60.786	76	42.5 - 130		0.58	20	
Indeno(1,2,3-cd)pyrene	1	80	0.0	58.871	73.6	58.230	72.8	19 - 151		1.09	25	
Naphthalene	1	80	1.2811	61.263	75	63.595	77.9	40.6 - 135		3.74	20	
Phenanthrene	1	80	0.0	57.881	72.4	57.840	72.3	39.7 - 129		0.07	20	
Pyrene	1	80	0.0	57.777	72.2	55.996	70	31.5 - 141		3.13	23.5	

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L675525
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Polynuclear Aromatic Hydrocarbons by Method 8270C-SIM		
Project No:	ST010022.0024	Matrix:	Soil - ug/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	12/6/2013	**Analytic Batch:**	**WG698980**
Analysis Date:	12/26/2013 1:41:00 PM	Analyst:	377
Instrument ID:	BNAMS22	Prep Date:	12/24/2013
Sample Numbers:	L675525-01		

Internal Standard Response and Retention Time Summary

File ID: 1226_04
Analyzed: 12/26/13 044500

	ACE		CHR		NAP		PER	
	Response	**RT**	**Response**	**RT**	**Response**	**RT**	**Response**	**RT**
12 Hr. Std	65678	7.26	145775	11.50	82240	5.34	162547	13.05
Upper Limit	131000	7.76	292000	12.00	164000	5.84	325000	13.55
Lower Limit	32800	6.76	72900	11.00	41100	4.84	81300	12.55
Sample ID	**Response**	**RT**	**Response**	**RT**	**Response**	**RT**	**Response**	**RT**
L675525-01	54500	7.26	124292	11.50	63453	5.34	142262	13.05
MSD WG698980	61524	7.26	132539	11.49	75770	5.34	147314	13.04
MS WG698980	60764	7.26	133106	11.49	75317	5.34	148153	13.04
LCSD WG698980	63800	7.26	134484	11.49	77685	5.34	147761	13.04
LCS WG698980	58728	7.26	127196	11.50	72539	5.34	144783	13.05
BLANK WG698980	63154	7.26	128041	11.50	77392	5.34	143492	13.04

Legend:

ACE -- Acenaphthene-d10
CHR -- Chrysene-d12
NAP -- Naphthalene-d8
PER -- Perylene-d12
PHEN -- Phenanthrene-d10

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L675525
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Polynuclear Aromatic Hydrocarbons by Method 8270C-SIM		
Project No:	ST010022.0024	Matrix:	Soil - ug/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	12/6/2013	**Analytic Batch:**	**WG698980**
Analysis Date:	12/26/2013 1:41:00 PM	Analyst:	377
Instrument ID:	BNAMS22	Prep Date:	12/24/2013
Sample Numbers:	L675525-01		

Internal Standard Response and Retention Time Summary

File ID: 1226_04
Analyzed: 12/26/13 044500

	ACE		PHEN	
	Response	**RT**	**Response**	**RT**
12 Hr. Std	65678	7.26	134301	8.81
Upper Limit	131000	7.76	269000	9.31
Lower Limit	32800	6.76	67200	8.31
Sample ID	**Response**	**RT**	**Response**	**RT**
L675525-01	54500	7.26	100708	8.81
MSD WG698980	61524	7.26	119679	8.80
MS WG698980	60764	7.26	118761	8.80
LCSD WG698980	63800	7.26	123147	8.80
LCS WG698980	58728	7.26	114818	8.81
BLANK WG698980	63154	7.26	115509	8.81

Legend:
ACE -- Acenaphthene-d10
CHR -- Chrysene-d12
NAP -- Naphthalene-d8
PER -- Perylene-d12
PHEN -- Phenanthrene-d10

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L675525
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Polynuclear Aromatic Hydrocarbons by Method 8270C-SIM		
Project No:	ST010022.0024	Matrix:	Soil - ug/kg
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	12/6/2013	**Analytic Batch:**	**WG698980**
Analysis Date:	12/26/2013 1:41:00 PM	Analyst:	377
Instrument ID:	BNAMS22	Prep Date:	12/24/2013
Sample Numbers:	L675525-01		

Surrogate Summary

Laboratory Sample ID	Instrument	File ID	FBP ppm	FBP % Rec	NBZ ppm	NBZ % Rec	TPH ppm	TPH % Rec
L675525-01	BNAMS22	1226_28	0.0858	103	0.0857	103	0.0792	95.1
LCS WG698980	BNAMS22	1226_05	0.0843	101	0.0869	104	0.0792	95.0
LCSD WG698980	BNAMS22	1226_06	0.0762	91.4	0.0773	92.8	0.0716	85.9
BLANK WG698980	BNAMS22	1226_07	0.0783	94.0	0.0774	92.9	0.0767	92.0
MS WG698980	BNAMS22	1226_09	0.0744	89.3	0.0740	88.8	0.0671	80.6
MSD WG698980	BNAMS22	1226_10	0.0784	94.1	0.0841	101	0.0712	85.4

FBP --2-FLUOROBIPHENYL	True Value: 0.0833 ppm	Limits: 51.1 - 131
NBZ --NITROBENZENE-D5	True Value: 0.0833 ppm	Limits: 40.9 - 147
TPH --P-TERPHENYL-D14	True Value: 0.0833 ppm	Limits: 45.30 - 138

Company Name/Address:
Kinder Morgan
Attn: Paul Salcido

Billing Information:
ARCADIS
16201 N 87TH ST
SCOTTSDALE AZ 85260

Report to: B. FORSBERG
Email To:

Project Description: KMEP : SILVERCROFT
City/State Collected:

Phone: 480-905-9311
Fax:
Client Project # ST010022.0024
Lab Project #

Collected by (print): R. O'KEEFE
Site/Facility ID # SILVERCROFT
P.O. #

Collected by (signature):
Immediately Packed on Ice N ___ Y ✓

Rush? (Lab MUST Be Notified)
___ Same Day ___ 200%
___ Next Day ___ 100%
___ Two Day ___ 50%
___ Three Day ___ 25%

Date Results Needed
Email? ___No ___Yes
FAX? ___No ___Yes

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	CARB 435 (PLM) Level A (asbestos)-Sub out	8082 PCBs, SW 9095 Paint filter/ 4oz jar	8081, 8141 / 4oz jar	8151 Herbicides/ 4oz jar	8015AZ (C10-C32), RCRA 8 metals/ 4oz jar	Flashpoint 1010, pH 9045B / 4oz jar	VOC 8260B + MTBE, TBA, TAME/ 40mL amber/MeOH				Item/Container	Sample # (lab only)
RB-5979	GRAB	SOIL	N/A	12-6-13	1200	7	X	X	X	X	X	X	X				1675525	-01

Chain of Custody Page 1 of 1

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Phone: 800-767-5859
Fax: 615-758-5859

L# L675525
Tab: J224
Acctnum: KINARCPAZ
Template:
Prelogin:
TSR:
Cooler:
Shipped Via:

* Matrix: SS - Soil GW - Groundwater WW - WasteWater DW - Drinking Water OT - Other ___

pH ___ Temp ___
Flow ___ Other ___

Remarks: 5435 5513 8507

Hold #

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Samples returned via: ☐ UPS ☐ FedEx ☐ Courier ☐ ___	Condition: (lab use only)
	12-6-13	1700	Emily Vann		OK
Relinquished by: (Signature) Emily Vann	12/6/13	1830	Received by: (Signature) FedEx	Temp: 3.2 °C Bottles Received: 7	COC Seal Intact: ___Y ___N ___NA
Relinquished by: (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: 12-7-13 Time: 1020	pH Checked: NCF:

L675575

Troy Dunlap

From: Mark Beasley
Sent: Monday, December 23, 2013 11:36 AM
To: Login; Sample Storage; Extractions; Due SVOC
Cc: Jarred Willis
Subject: L672629 *KINARCPAZ* rush relog

Relog L672629-01 for SV8270PAHSIM. Log as R2 due 12/26.

Thanks
Mark Beasley
ESC Lab Sciences
Direct Phone: (615) 773-9672
Toll-free: 1-800-767-5859 ext 9672
Email: mbeasley@esclabsciences.com

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Quality Control Summary
SDG: L672140

For: Kinder Morgan - Rocklin, CA-AZ Work
KMEP / Silvercroft

L672140

Lab SampleID.	Client ID
L672140-01	P-4502
L672140-02	P-7008

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Quality Control Summary
SDG: L672140

For: Kinder Morgan - Rocklin, CA-AZ Work
Project: KMEP / Silvercroft
December 10, 2013

Sample Receiving and Handling

All sample aliquots were received at the correct temperature, in the proper containers, and with the appropriate preservatives. Method specified holding times were not met for analyses on pH samples.

pH by Method 9040C

Laboratory Control Sample

Samples L672140-01 and 02 were analyzed in analytical batch WG695728. The laboratory control sample associated with these samples was within the laboratory control limits for all target analytes reported from this batch. The relative percent difference was within laboratory limits for all target analytes reported from this batch.

Sample Duplicate Analysis

For analytical batch WG695728 sample duplicate analysis was performed on sample L672067-02. The relative percent differences were within the method limits for target analytes reported from this batch.

For analytical batch WG695728 sample duplicate analysis was performed on sample L672267-01. The relative percent differences were within the method limits for target analytes reported from this batch.

Matrix Spike/Matrix Spike Duplicate

Precision for batch WG695728 was evaluated using the LCS/LCSD. The RPDs were within method limits.

Flashpoint by Method D93/1010A

Laboratory Control Sample

Samples L672140-01 and 02 were analyzed in analytical batch WG696159. The laboratory control sample associated with these samples was within the laboratory control limits for all target analytes reported from this batch. The relative percent difference was within laboratory limits for all target analytes reported from this batch.

Sample Duplicate Analysis

For analytical batch WG696159 sample duplicate analysis was performed on sample L672142-01. The relative percent differences were within the method limits for target analytes reported from this batch.

Matrix Spike/Matrix Spike Duplicate

Precision for batch WG696159 was evaluated using the LCS/LCSD. The RPDs were within method limits.

Mercury by Method 7470A

Laboratory Control Sample

Samples L672140-01 and 02 were analyzed in analytical batch WG695896. The laboratory control sample associated with these samples was within the laboratory control limits for all target analytes reported from this batch.

Sample Duplicate Analysis

For analytical batch WG695896 sample duplicate analysis was performed on sample L672140-02. The relative percent differences were within the method limits for target analytes reported from this batch.

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Quality Control Summary
SDG: L672140
For: Kinder Morgan - Rocklin, CA-AZ Work
Project: KMEP / Silvercroft
December 10, 2013

Matrix Spike/Matrix Spike Duplicate
For analytical batch WG695896 matrix spike/matrix spike duplicate analysis was performed on sample L672140-02. The matrix spike recoveries and relative percent differences were within laboratory control limits for all target analytes reported from this batch.

Blank Analysis
The method blank, the initial, and all continuing calibration blanks contained no analytes at concentrations above the method reporting limit.

Trace Metals by Method 6010B
Laboratory Control Sample
Samples L672140-01 and 02 were analyzed in analytical batch WG695859. The laboratory control sample associated with these samples was within the laboratory control limits for all target analytes reported from this batch.

Sample Duplicate Analysis
For analytical batch WG695859 sample duplicate analysis was performed on sample L672253-04. The relative percent differences were within the method limits for target analytes reported from this batch.

Matrix Spike/Matrix Spike Duplicate
For analytical batch WG695859 matrix spike/matrix spike duplicate analysis was performed on sample L672253-04. The matrix spike recoveries and relative percent differences were within laboratory control limits for all target analytes reported from this batch.

Blank Analysis
The method blank, the initial, and all continuing calibration blanks contained no analytes at concentrations above the method reporting limit.

Volatile Organic Compounds by Method 8260B
Laboratory Control Sample
Samples L672140-01 and 02 were analyzed in analytical batch WG695850. The laboratory control sample associated with these samples was within the laboratory control limits for all target analytes reported from this batch. The relative percent difference exceeded laboratory limits for Acetone.

Samples L672140-01 and 02 were analyzed in analytical batch WG696195. The laboratory control sample associated with these samples was within the laboratory control limits for all target analytes reported from this batch. The relative percent difference was within laboratory limits for all target analytes reported from this batch.

Matrix Spike/Matrix Spike Duplicate
For analytical batch WG695850 matrix spike/matrix spike duplicate analysis was performed on sample L672140-01. The matrix spike recoveries and relative percent differences were within laboratory control limits for all target analytes reported from this batch.

For analytical batch WG696195 matrix spike/matrix spike duplicate analysis was performed on sample L672648-01. The matrix spike recoveries and relative percent differences were within laboratory control limits for all target analytes reported from this batch.

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Quality Control Summary
SDG: L672140

For: Kinder Morgan - Rocklin, CA-AZ Work
Project: KMEP / Silvercroft
December 10, 2013

Blank Analysis
The method blank, the initial, and all continuing calibration blanks contained no analytes at concentrations above the method reporting limit.

Diesel Range Organics California by Method 3511/8015
Laboratory Control Sample
Samples L672140-01 and 02 were analyzed in analytical batch WG696056. The laboratory control sample associated with these samples was within the laboratory control limits for all target analytes reported from this batch. The relative percent difference was within laboratory limits for all target analytes reported from this batch.

Matrix Spike/Matrix Spike Duplicate
Precision for batch WG696056 was evaluated using the LCS/LCSD. The RPDs were within method limits.

Blank Analysis
The method blank, the initial, and all continuing calibration blanks contained no analytes at concentrations above the method reporting limit.

Nancy F. McLain
ESC Representative
ESC Lab Sciences

12065 Lebanon Rd.
Mt. Juliet, TN 37122
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1-800-767-5859
Fax (615) 758-5859

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Bob Forsberg / Sasha Arnold
ARCADIS
14201 N. 87th Street, Suite 135
Scottsdale, AZ 85260

Report Summary

Tuesday December 10, 2013

Report Number: L672140
Samples Received: 12/05/13
Client Project: ST010022.0026

Description: KMEP Silvercroft Wash

The analytical results in this report are based upon information supplied by you, the client, and are for your exclusive use. If you have any questions regarding this data package, please do not hesitate to call.

Entire Report Reviewed By: Jarred Willis , ESC Representative

Laboratory Certification Numbers

A2LA - 1461-01, AIHA - 100789, AL - 40660, CA - 01157CA, CT - PH-0197, FL - E87487, GA - 923, IN - C-TN-01, KY - 90010, KYUST - 0016, NC - ENV375/DW21704/BIO041, ND - R-140. NJ - TN002, NJ NELAP - TN002, SC - 84004, TN - 2006, VA - 460132, WV - 233, AZ - 0612, MN - 047-999-395, NY - 11742, WI - 998093910, NV - TN000032011-1, TX - T104704245-11-3, OK - 9915, PA - 68-02979, IA Lab #364, EPA - TN002

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Note: The use of the preparatory EPA Method 3511 is not approved or endorsed by the CA ELAP.

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Quality Control Summary
SDG: L672140

For: Kinder Morgan - Rocklin, CA-AZ Work
KMEP / Silvercroft

L672140

Lab SampleID.	Client ID
L672140-01	P-4502
L672140-02	P-7008

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SAMPLE NUMBER
P-4502

Customer :	Kinder Morgan - Rocklin, CA-AZ Work	Project :	ST010022.0026
Source :	SILVERCROFT WASH	Date Sampled :	12/3/2013 3:15 PM
Location :	KMEP / Silvercroft	Sampled By :	Mark Hammer
Lab Sample ID :	**L672140-01**	Date Received :	12/5/2013

D93/1010A

Analytic Batch: WG696159 | Analysis Date: 12/9/2013 | Analysis Time: 3:54 PM
Instrument: KOEHLER | Analyst: 596 | Preparation Date: 12/9/2013 3:53
Method: D93/1010A | Dilution: 1

CAS NO	Analyte	RL deg F	RESULTS deg F	FLAG
	Flashpoint		**SEE FOOTNOTE**	

9040C

Analytic Batch: WG695728 | Analysis Date: 12/6/2013 | Analysis Time: 10:41
Instrument: AB15+ ACCU | Analyst: 519 | Preparation Date: 12/6/2013 10:37
Method: 9040C | Dilution: 1

CAS NO	Analyte	RL su	RESULTS su	FLAG
00010-29-7	pH		**8.2**	H3

7470A

Analytic Batch: WG695896 | Analysis Date: 12/9/2013 | Analysis Time: 2:46 PM
Instrument: CVAA4 | Analyst: 572 | Preparation Date: 12/6/2013 11:53
Method: 7470A | Dilution: 1

CAS NO	Analyte	RL mg/l	RESULTS mg/l	FLAG
7439-97-6	Mercury	0.00020	< 0.00020	

Comments:
1) Sample results are reported as rounded values.
2) These results are applicable only to the items tested.

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SAMPLE NUMBER
P-4502

Customer :	Kinder Morgan - Rocklin, CA-AZ Work	Project :	ST010022.0026
Source :	SILVERCROFT WASH	Date Sampled :	12/3/2013 3:15 PM
Location :	KMEP / Silvercroft	Sampled By :	Mark Hammer
Lab Sample ID :	**L672140-01**	Date Received :	12/5/2013

6010B

Analytic Batch: WG695859 | Analysis Date: 12/6/2013 | Analysis Time: 3:04 PM
Instrument: ICP7 | Analyst: 388 | Preparation Date:
Method: 6010B | Dilution: 1

CAS NO	Analyte	RL mg/l	RESULTS mg/l	FLAG
7440-38-2	Arsenic	0.020	< 0.020	
7440-39-3	Barium	0.0050	**0.095**	
7440-43-9	Cadmium	0.0050	< 0.0050	
7440-47-3	Chromium	0.010	< 0.010	
7439-92-1	Lead	0.0050	**0.0080**	
7782-49-2	Selenium	0.020	< 0.020	
7440-22-4	Silver	0.010	< 0.010	

8260B

Analytic Batch: WG695850 | Analysis Date: 12/6/2013 | Analysis Time: 10:34
Instrument: VOCMS8 | Analyst: 611 | Preparation Date: 12/8/2013 12:55
Method: 8260B | Dilution: 1

CAS NO	Analyte	RL mg/l	RESULTS mg/l	FLAG
67-64-1	Acetone	0.050	< 0.050	
107-13-1	Acrylonitrile	0.010	< 0.010	
71-43-2	Benzene	0.0010	< 0.0010	
108-86-1	Bromobenzene	0.0010	< 0.0010	
74-97-5	Bromochloromethane	0.0010	< 0.0010	
75-27-4	Bromodichloromethane	0.0010	< 0.0010	
75-25-2	Bromoform	0.0010	< 0.0010	
74-83-9	Bromomethane	0.0050	< 0.0050	
104-51-8	n-Butylbenzene	0.0010	< 0.0010	
135-98-8	sec-Butylbenzene	0.0010	< 0.0010	
98-06-6	tert-Butylbenzene	0.0010	< 0.0010	
56-23-5	Carbon tetrachloride	0.0010	< 0.0010	
75-15-0	Carbon disulfide	0.0010	< 0.0010	
108-90-7	Chlorobenzene	0.0010	< 0.0010	
124-48-1	Chlorodibromomethane	0.0010	< 0.0010	
75-00-3	Chloroethane	0.0050	< 0.0050	
67-66-3	Chloroform	0.0050	< 0.0050	
74-87-3	Chloromethane	0.0025	< 0.0025	

Comments: 1) Sample results are reported as rounded values.
2) These results are applicable only to the items tested.

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SAMPLE NUMBER
P-4502

Customer :	Kinder Morgan - Rocklin, CA-AZ Work	Project :	ST010022.0026
Source :	SILVERCROFT WASH	Date Sampled :	12/3/2013 3:15 PM
Location :	KMEP / Silvercroft	Sampled By :	Mark Hammer
Lab Sample ID :	**L672140-01**	Date Received :	12/5/2013

8260B

Analytic Batch: WG695850 | Analysis Date: 12/6/2013 | Analysis Time: 10:34
Instrument: VOCMS8 | Analyst: 611 | Preparation Date: 12/8/2013 12:55
Method: 8260B | Dilution: 1

CAS NO	Analyte	RL mg/l	RESULTS mg/l	FLAG
96-12-8	1,2-Dibromo-3-Chloropropane	0.0050	< 0.0050	
106-93-4	1,2-Dibromoethane	0.0010	< 0.0010	
74-95-3	Dibromomethane	0.0010	< 0.0010	
95-50-1	1,2-Dichlorobenzene	0.0010	< 0.0010	
541-73-1	1,3-Dichlorobenzene	0.0010	< 0.0010	
106-46-7	1,4-Dichlorobenzene	0.0010	< 0.0010	
110-57-6	trans-1,4-Dichloro-2-butene	0.0025	< 0.0025	
75-71-8	Dichlorodifluoromethane	0.0050	< 0.0050	
75-34-3	1,1-Dichloroethane	0.0010	< 0.0010	
107-06-2	1,2-Dichloroethane	0.0010	< 0.0010	
75-35-4	1,1-Dichloroethene	0.0010	< 0.0010	
156-59-2	cis-1,2-Dichloroethene	0.0010	< 0.0010	
156-60-5	trans-1,2-Dichloroethene	0.0010	< 0.0010	
78-87-5	1,2-Dichloropropane	0.0010	< 0.0010	
10061-01-5	cis-1,3-Dichloropropene	0.0010	< 0.0010	
10061-02-6	trans-1,3-Dichloropropene	0.0010	< 0.0010	
100-41-4	Ethylbenzene	0.0010	< 0.0010	
87-68-3	Hexachloro-1,3-butadiene	0.0010	< 0.0010	
591-78-6	2-Hexanone	0.010	< 0.010	
78-93-3	2-Butanone (MEK)	0.010	< 0.010	
74-88-4	Iodomethane	0.010	< 0.010	
75-09-2	Methylene Chloride	0.0050	< 0.0050	
108-10-1	4-Methyl-2-pentanone (MIBK)	0.010	< 0.010	
91-20-3	Naphthalene	0.0050	< 0.0050	
103-65-1	n-Propylbenzene	0.0010	< 0.0010	
100-42-5	Styrene	0.0010	< 0.0010	
630-20-6	1,1,1,2-Tetrachloroethane	0.0010	< 0.0010	
79-34-5	1,1,2,2-Tetrachloroethane	0.0010	< 0.0010	
76-13-1	1,1,2-Trichlorotrifluoroethane	0.0010	< 0.0010	
127-18-4	Tetrachloroethene	0.0010	< 0.0010	
108-88-3	Toluene	0.0050	< 0.0050	
120-82-1	1,2,4-Trichlorobenzene	0.0010	< 0.0010	
71-55-6	1,1,1-Trichloroethane	0.0010	< 0.0010	

Comments: 1) Sample results are reported as rounded values.
2) These results are applicable only to the items tested.

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SAMPLE NUMBER
P-4502

Customer :	Kinder Morgan - Rocklin, CA-AZ Work	Project :	ST010022.0026
Source :	SILVERCROFT WASH	Date Sampled :	12/3/2013 3:15 PM
Location :	KMEP / Silvercroft	Sampled By :	Mark Hammer
Lab Sample ID :	**L672140-01**	Date Received :	12/5/2013

8260B

Analytic Batch: WG695850 | Analysis Date: 12/6/2013 | Analysis Time: 10:34
Instrument: VOCMS8 | Analyst: 611 | Preparation Date: 12/8/2013 12:55
Method: 8260B | Dilution: 1

CAS NO	Analyte	RL mg/l	RESULTS mg/l	FLAG
79-00-5	1,1,2-Trichloroethane	0.0010	< 0.0010	
79-01-6	Trichloroethene	0.0010	< 0.0010	
75-69-4	Trichlorofluoromethane	0.0050	< 0.0050	
96-18-4	1,2,3-Trichloropropane	0.0025	< 0.0025	
95-63-6	1,2,4-Trimethylbenzene	0.0010	< 0.0010	
108-67-8	1,3,5-Trimethylbenzene	0.0010	< 0.0010	
108-05-4	Vinyl acetate	0.010	< 0.010	
75-01-4	Vinyl chloride	0.0010	< 0.0010	
1330-20-7	Xylenes, Total	0.0030	< 0.0030	
108-20-3	Di-isopropyl ether	0.0010	< 0.0010	
64-17-5	Ethanol	0.10	< 0.10	
637-92-3	Ethyl tert-butyl ether	0.0010	< 0.0010	
1634-04-4	Methyl tert-butyl ether	0.0010	**0.012**	
994-05-8	tert-Amyl Methyl Ether	0.0010	**0.0026**	

Surrogates

	Analyte	PERCENT RECOVERY	QUALIFIERS	FLAG
	Toluene-d8	**99.9**		
	Dibromofluoromethane	**93.8**		
	4-Bromofluorobenzene	**90.8**		

Comments: 1) Sample results are reported as rounded values.
2) These results are applicable only to the items tested.

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SAMPLE NUMBER
P-4502

Customer :	Kinder Morgan - Rocklin, CA-AZ Work	Project :	ST010022.0026
Source :	SILVERCROFT WASH	Date Sampled :	12/3/2013 3:15 PM
Location :	KMEP / Silvercroft	Sampled By :	Mark Hammer
Lab Sample ID :	**L672140-01**	Date Received :	12/5/2013

8260B

Analytic Batch: WG696195 | Analysis Date: 12/9/2013 | Analysis Time: 2:01 PM
Instrument: VOCMS7 | Analyst: 611 | Preparation Date: 12/9/2013 7:09
Method: 8260B | Dilution: 20

CAS NO	Analyte	RL mg/l	RESULTS mg/l	FLAG
75-65-0	tert-Butyl alcohol	0.10	**0.47**	

3511/8015

Analytic Batch: WG696056 | Analysis Date: 12/9/2013 | Analysis Time: 5:29 PM
Instrument: SVGC27 | Analyst: 187 | Preparation Date: 12/8/2013 8:45
Method: 3511/8015 | Dilution: 1

CAS NO	Analyte	RL mg/l	RESULTS mg/l	FLAG
	C12-C22 Hydrocarbons	0.10	**0.13**	Y5
	C22-C32 Hydrocarbons	0.10	< 0.10	
	C32-C40 Hydrocarbons	0.10	< 0.10	

Surrogates

Analyte	PERCENT RECOVERY	QUALIFIERS	FLAG
o-Terphenyl	**98.5**		

LEGEND

RL - Reporting Limit
Did Not Flash @ 170 F
8.2@17.5c

QUALIFIERS

H3 - Sample was received and / or analysis requested past holding time.
Y5 - This sample has responded in the Diesel range, however it does not appear to be a hydrocarbon product

Comments: 1) Sample results are reported as rounded values.
2) These results are applicable only to the items tested.

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SAMPLE NUMBER
P-7008

Customer :	Kinder Morgan - Rocklin, CA-AZ Work	Project :	ST010022.0026
Source :	SILVERCROFT WASH	Date Sampled :	12/3/2013 3:35 PM
Location :	KMEP / Silvercroft	Sampled By :	Mark Hammer
Lab Sample ID :	**L672140-02**	Date Received :	12/5/2013

D93/1010A

Analytic Batch: WG696159 | Analysis Date: 12/9/2013 | Analysis Time: 3:54 PM
Instrument: KOEHLER | Analyst: 596 | Preparation Date: 12/9/2013 3:53
Method: D93/1010A | Dilution: 1

CAS NO	Analyte	RL deg F	RESULTS deg F	FLAG
	Flashpoint		**SEE FOOTNOTE**	

9040C

Analytic Batch: WG695728 | Analysis Date: 12/6/2013 | Analysis Time: 10:41
Instrument: AB15+ ACCU | Analyst: 519 | Preparation Date: 12/6/2013 10:37
Method: 9040C | Dilution: 1

CAS NO	Analyte	RL su	RESULTS su	FLAG
00010-29-7	pH		**8.1**	H3

7470A

Analytic Batch: WG695896 | Analysis Date: 12/9/2013 | Analysis Time: 1:39 PM
Instrument: CVAA4 | Analyst: 572 | Preparation Date: 12/6/2013 11:53
Method: 7470A | Dilution: 1

CAS NO	Analyte	RL mg/l	RESULTS mg/l	FLAG
7439-97-6	Mercury	0.00020	< 0.00020	

Comments:
1) Sample results are reported as rounded values.
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SAMPLE NUMBER
P-7008

Customer :	Kinder Morgan - Rocklin, CA-AZ Work	Project :	ST010022.0026
Source :	SILVERCROFT WASH	Date Sampled :	12/3/2013 3:35 PM
Location :	KMEP / Silvercroft	Sampled By :	Mark Hammer
Lab Sample ID :	**L672140-02**	Date Received :	12/5/2013

6010B

Analytic Batch: WG695859 | Analysis Date: 12/6/2013 | Analysis Time: 3:08 PM
Instrument: ICP7 | Analyst: 388 | Preparation Date:
Method: 6010B | Dilution: 1

CAS NO	Analyte	RL mg/l	RESULTS mg/l	FLAG
7440-38-2	Arsenic	0.020	< 0.020	
7440-39-3	Barium	0.0050	**0.050**	
7440-43-9	Cadmium	0.0050	< 0.0050	
7440-47-3	Chromium	0.010	< 0.010	
7439-92-1	Lead	0.0050	< 0.0050	
7782-49-2	Selenium	0.020	< 0.020	
7440-22-4	Silver	0.010	< 0.010	

8260B

Analytic Batch: WG695850 | Analysis Date: 12/7/2013 | Analysis Time: 12:17
Instrument: VOCMS8 | Analyst: 611 | Preparation Date: 12/8/2013 12:55
Method: 8260B | Dilution: 1

CAS NO	Analyte	RL mg/l	RESULTS mg/l	FLAG
67-64-1	Acetone	0.050	< 0.050	R7
107-13-1	Acrylonitrile	0.010	< 0.010	
71-43-2	Benzene	0.0010	< 0.0010	
108-86-1	Bromobenzene	0.0010	< 0.0010	
74-97-5	Bromochloromethane	0.0010	< 0.0010	
75-27-4	Bromodichloromethane	0.0010	< 0.0010	
75-25-2	Bromoform	0.0010	< 0.0010	
74-83-9	Bromomethane	0.0050	< 0.0050	
104-51-8	n-Butylbenzene	0.0010	< 0.0010	
135-98-8	sec-Butylbenzene	0.0010	< 0.0010	
98-06-6	tert-Butylbenzene	0.0010	< 0.0010	
56-23-5	Carbon tetrachloride	0.0010	< 0.0010	
75-15-0	Carbon disulfide	0.0010	< 0.0010	
108-90-7	Chlorobenzene	0.0010	< 0.0010	
124-48-1	Chlorodibromomethane	0.0010	< 0.0010	
75-00-3	Chloroethane	0.0050	< 0.0050	
67-66-3	Chloroform	0.0050	< 0.0050	
74-87-3	Chloromethane	0.0025	< 0.0025	

Comments: 1) Sample results are reported as rounded values.
2) These results are applicable only to the items tested.

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SAMPLE NUMBER
P-7008

Customer :	Kinder Morgan - Rocklin, CA-AZ Work	Project :	ST010022.0026
Source :	SILVERCROFT WASH	Date Sampled :	12/3/2013 3:35 PM
Location :	KMEP / Silvercroft	Sampled By :	Mark Hammer
Lab Sample ID :	**L672140-02**	Date Received :	12/5/2013

8260B

Analytic Batch: WG695850 | Analysis Date: 12/7/2013 | Analysis Time: 12:17
Instrument: VOCMS8 | Analyst: 611 | Preparation Date: 12/8/2013 12:55
Method: 8260B | Dilution: 1

CAS NO	Analyte	RL mg/l	RESULTS mg/l	FLAG
96-12-8	1,2-Dibromo-3-Chloropropane	0.0050	< 0.0050	
106-93-4	1,2-Dibromoethane	0.0010	< 0.0010	
74-95-3	Dibromomethane	0.0010	< 0.0010	
95-50-1	1,2-Dichlorobenzene	0.0010	< 0.0010	
541-73-1	1,3-Dichlorobenzene	0.0010	< 0.0010	
106-46-7	1,4-Dichlorobenzene	0.0010	< 0.0010	
110-57-6	trans-1,4-Dichloro-2-butene	0.0025	< 0.0025	
75-71-8	Dichlorodifluoromethane	0.0050	< 0.0050	
75-34-3	1,1-Dichloroethane	0.0010	< 0.0010	
107-06-2	1,2-Dichloroethane	0.0010	< 0.0010	
75-35-4	1,1-Dichloroethene	0.0010	< 0.0010	
156-59-2	cis-1,2-Dichloroethene	0.0010	< 0.0010	
156-60-5	trans-1,2-Dichloroethene	0.0010	< 0.0010	
78-87-5	1,2-Dichloropropane	0.0010	< 0.0010	
10061-01-5	cis-1,3-Dichloropropene	0.0010	< 0.0010	
10061-02-6	trans-1,3-Dichloropropene	0.0010	< 0.0010	
100-41-4	Ethylbenzene	0.0010	< 0.0010	
87-68-3	Hexachloro-1,3-butadiene	0.0010	< 0.0010	
591-78-6	2-Hexanone	0.010	< 0.010	
78-93-3	2-Butanone (MEK)	0.010	< 0.010	
74-88-4	Iodomethane	0.010	< 0.010	
75-09-2	Methylene Chloride	0.0050	< 0.0050	
108-10-1	4-Methyl-2-pentanone (MIBK)	0.010	< 0.010	
91-20-3	Naphthalene	0.0050	< 0.0050	
103-65-1	n-Propylbenzene	0.0010	< 0.0010	
100-42-5	Styrene	0.0010	< 0.0010	
630-20-6	1,1,1,2-Tetrachloroethane	0.0010	< 0.0010	
79-34-5	1,1,2,2-Tetrachloroethane	0.0010	< 0.0010	
76-13-1	1,1,2-Trichlorotrifluoroethane	0.0010	< 0.0010	
127-18-4	Tetrachloroethene	0.0010	< 0.0010	
108-88-3	Toluene	0.0050	< 0.0050	
120-82-1	1,2,4-Trichlorobenzene	0.0010	< 0.0010	
71-55-6	1,1,1-Trichloroethane	0.0010	< 0.0010	

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SAMPLE NUMBER
P-7008

Customer :	Kinder Morgan - Rocklin, CA-AZ Work	Project :	ST010022.0026
Source :	SILVERCROFT WASH	Date Sampled :	12/3/2013 3:35 PM
Location :	KMEP / Silvercroft	Sampled By :	Mark Hammer
Lab Sample ID :	**L672140-02**	Date Received :	12/5/2013

8260B

Analytic Batch: WG695850 | Analysis Date: 12/7/2013 | Analysis Time: 12:17
Instrument: VOCMS8 | Analyst: 611 | Preparation Date: 12/8/2013 12:55
Method: 8260B | Dilution: 1

CAS NO	Analyte	RL mg/l	RESULTS mg/l	FLAG
79-00-5	1,1,2-Trichloroethane	0.0010	< 0.0010	
79-01-6	Trichloroethene	0.0010	< 0.0010	
75-69-4	Trichlorofluoromethane	0.0050	< 0.0050	
96-18-4	1,2,3-Trichloropropane	0.0025	< 0.0025	
95-63-6	1,2,4-Trimethylbenzene	0.0010	< 0.0010	
108-67-8	1,3,5-Trimethylbenzene	0.0010	< 0.0010	
108-05-4	Vinyl acetate	0.010	< 0.010	
75-01-4	Vinyl chloride	0.0010	< 0.0010	
1330-20-7	Xylenes, Total	0.0030	< 0.0030	
108-20-3	Di-isopropyl ether	0.0010	< 0.0010	
64-17-5	Ethanol	0.10	< 0.10	
637-92-3	Ethyl tert-butyl ether	0.0010	< 0.0010	
1634-04-4	Methyl tert-butyl ether	0.0010	**0.0070**	
994-05-8	tert-Amyl Methyl Ether	0.0010	**0.0014**	

Surrogates

	Analyte	PERCENT RECOVERY	QUALIFIERS	FLAG
	Toluene-d8	**99.5**		
	Dibromofluoromethane	**90.5**		
	4-Bromofluorobenzene	**93.0**		

Comments: 1) Sample results are reported as rounded values.
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SAMPLE NUMBER
P-7008

Customer :	Kinder Morgan - Rocklin, CA-AZ Work	Project :	ST010022.0026
Source :	SILVERCROFT WASH	Date Sampled :	12/3/2013 3:35 PM
Location :	KMEP / Silvercroft	Sampled By :	Mark Hammer
Lab Sample ID :	**L672140-02**	Date Received :	12/5/2013

8260B

Analytic Batch: WG696195 | Analysis Date: 12/9/2013 | Analysis Time: 2:20 PM
Instrument: VOCMS7 | Analyst: 611 | Preparation Date: 12/9/2013 7:09
Method: 8260B | Dilution: 10

CAS NO	Analyte	RL mg/l	RESULTS mg/l	FLAG
75-65-0	tert-Butyl alcohol	0.050	**0.20**	

3511/8015

Analytic Batch: WG696056 | Analysis Date: 12/9/2013 | Analysis Time: 5:46 PM
Instrument: SVGC27 | Analyst: 187 | Preparation Date: 12/8/2013 8:45
Method: 3511/8015 | Dilution: 1

CAS NO	Analyte	RL mg/l	RESULTS mg/l	FLAG
	C12-C22 Hydrocarbons	0.10	**0.13**	Y5
	C22-C32 Hydrocarbons	0.10	**0.11**	Y6
	C32-C40 Hydrocarbons	0.10	< 0.10	

Surrogates

Analyte	PERCENT RECOVERY	QUALIFIERS	FLAG
o-Terphenyl	**99.6**		

LEGEND

RL - Reporting Limit
Did Not Flash @ 170 F
8.1@17.2c

QUALIFIERS

H3 - Sample was received and / or analysis requested past holding time.
R7 - LFB/LFBD RPD exceeded the laboratory acceptance limit. Recovery met acceptance criteria.
Y5 - This sample has responded in the Diesel range, however it does not appear to be a hydrocarbon product
Y6 - This sample has responded in the Oil range, however it does not appear to be a hydrocarbon product

Comments: 1) Sample results are reported as rounded values.
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Quality Control Summary
SDG: L672140
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Flashpoint by Method D93/1010A		
Project No:	ST010022.0026	Matrix:	Water - mg/L
Project:	KMEP / Silvercroft	EPA ID:	TN00003
Collection Date:	12/3/2013	**Analytic Batch:**	**WG696159**
Analysis Date:	12/9/2013 3:54:00 PM	Analyst:	596
Instrument ID:	KOEHLER		
Sample Numbers:	L672140-01, -02		

Laboratory Control Sample (LCS)

Analyte	Dil	True Value	Found	% Rec	Control Limits	Qual
Flashpoint	1	82	82	100	96 - 104	

Laboratory Control Sample Duplicate (LCSD)

Analyte	Dil	True Value	Found	% Rec	Control Limits	Qual
Flashpoint	1	82	82	100	96 - 104	

Laboratory Control Sample / Laboratory Control Sample Duplicate

Analyte	Dil	Spike	LCS	% Rec	LCSD	% Rec	Control Limits	% Rec Qual	% RPD	Control Limits	RPD Qual
Flashpoint	1	82	82	100	82	100	96 - 104		0	7	

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L672140
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Flashpoint by Method D93/1010A		
Project No:	ST010022.0026	Matrix:	Water - mg/L
Project:	KMEP / Silvercroft	EPA ID:	TN00003
Collection Date:	12/3/2013	**Analytic Batch:**	**WG696159**
Analysis Date:	12/9/2013 3:54:00 PM	Analyst:	596
Instrument ID:	KOEHLER		
Sample Numbers:	L672140-01, -02		

Sample Duplicate

L672142-01

Analyte	Dil	Sample Result	DUP Result	% RPD	Limit	Qualifier
Flashpoint	1	0.0	0.0	0	20	

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L672140
Kinder Morgan - Rocklin, CA-AZ Work

Test:	pH by Method 9040C		
Project No:	ST010022.0026	Matrix:	Water - mg/L
Project:	KMEP / Silvercroft	EPA ID:	TN00003
Collection Date:	12/3/2013	**Analytic Batch:**	**WG695728**
Analysis Date:	12/6/2013 10:41:00 AM	Analyst:	519
Instrument ID:	AB15+ ACCU		
Sample Numbers:	L672140-01, -02		

Laboratory Control Sample (LCS)

Analyte	Dil	True Value	Found	% Rec	Control Limits	Qual
pH	1	5.93	5.9	99.5	98.3 - 101.7	

Laboratory Control Sample Duplicate (LCSD)

Analyte	Dil	True Value	Found	% Rec	Control Limits	Qual
pH	1	5.93	5.9	99.5	98.3 - 101.7	

Laboratory Control Sample / Laboratory Control Sample Duplicate

Analyte	Dil	Spike	LCS	% Rec	LCSD	% Rec	Control Limits	% Rec Qual	% RPD	Control Limits	RPD Qual
pH	1	5.93	5.9	99.5	5.9	99.5	98.3 - 101.7		0	20	

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L672140
Kinder Morgan - Rocklin, CA-AZ Work

Test:	pH by Method 9040C		
Project No:	ST010022.0026	Matrix:	Water - mg/L
Project:	KMEP / Silvercroft	EPA ID:	TN00003
Collection Date:	12/3/2013	**Analytic Batch:**	**WG695728**
Analysis Date:	12/6/2013 10:41:00 AM	Analyst:	519
Instrument ID:	AB15+ ACCU		
Sample Numbers:	L672140-01, -02		

Sample Duplicate

L672067-02

Analyte	Dil	Sample Result	DUP Result	% RPD	Limit	Qualifier
pH	1	8.7	8.7	0	1	

Sample Duplicate

L672267-01

Analyte	Dil	Sample Result	DUP Result	% RPD	Limit	Qualifier
pH	1	8.9	8.89	0.11	1	

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L672140
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Mercury by Method 7470A		
Project No:	ST010022.0026	Matrix:	Water - ug/L
Project:	KMEP / Silvercroft	EPA ID:	TN00003
Collection Date:	12/3/2013	**Analytic Batch:**	**WG695896**
Analysis Date:	12/9/2013 2:46:00 PM	Analyst:	572
Instrument ID:	CVAA4	Prep Date:	12/6/2013
Sample Numbers:	L672140-01, -02		

Method Blank

Analyte	CAS	RDL	Qualifier
Mercury	7439-97-6	< 0.200	

Laboratory Control Sample (LCS)

Analyte	Dil	True Value	Found	% Rec	Control Limits	Qual
Mercury	1	3	2.8586	95	85 - 115	

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L672140
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Mercury by Method 7470A		
Project No:	ST010022.0026	Matrix:	Water - ug/L
Project:	KMEP / Silvercroft	EPA ID:	TN00003
Collection Date:	12/3/2013	**Analytic Batch:**	**WG695896**
Analysis Date:	12/9/2013 2:46:00 PM	Analyst:	572
Instrument ID:	CVAA4	Prep Date:	12/6/2013
Sample Numbers:	L672140-01, -02		

Sample Duplicate

L672140-02

Analyte	Dil	Sample Result	DUP Result	% RPD	Limit	Qualifier
Mercury	1	<0.2	<0.2		20	

Serial Dilution

L672140-02

Analyte	Dil	Sample Result	SD Result	% RPD	Limit	Qualifier
Mercury	5	<0.2	<1		10	

Matrix Spike / Matrix Spike Duplicate

L672140-02

Analyte	Dil	Spike Value	Sample	MS	% Rec	MSD	% Rec	Control Limits	% Rec Qual	RPD	Control Limits	RPD Qual
Mercury	1	3	0.0179	3.0238	100	3.4046	113	80 - 120		12	20	

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L672140
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Trace Metals by Method 6010B		
Project No:	ST010022.0026	Matrix:	Water - mg/L
Project:	KMEP / Silvercroft	EPA ID:	TN00003
Collection Date:	12/3/2013	**Analytic Batch:**	**WG695859**
Analysis Date:	12/6/2013 3:04:00 PM	Analyst:	388
Instrument ID:	ICP7, ICP5	Prep Date:	12/6/2013
Sample Numbers:	L672140-01, -02		

Method Blank

Analyte	CAS	RDL	Qualifier
Arsenic	7440-38-2	< 0.0200	
Barium	7440-39-3	< 0.00500	
Cadmium	7440-43-9	< 0.00500	
Chromium	7440-47-3	< 0.0100	
Lead	7439-92-1	< 0.00500	
Selenium	7782-49-2	< 0.0200	
Silver	7440-22-4	< 0.0100	

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L672140
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Trace Metals by Method 6010B		
Project No:	ST010022.0026	Matrix:	Water - mg/L
Project:	KMEP / Silvercroft	EPA ID:	TN00003
Collection Date:	12/3/2013	**Analytic Batch:**	**WG695859**
Analysis Date:	12/6/2013 3:04:00 PM	Analyst:	388
Instrument ID:	ICP7, ICP5	Prep Date:	12/6/2013
Sample Numbers:	L672140-01, -02		

Laboratory Control Sample (LCS)

Analyte	Dil	True Value	Found	% Rec	Control Limits	Qual
Arsenic	1	1	1.0250	103	85 - 115	
Barium	1	1	1.0513	105	85 - 115	
Cadmium	1	1	1.0224	102	85 - 115	
Chromium	1	1	1.0275	103	85 - 115	
Lead	1	1	1.0569	106	85 - 115	
Selenium	1	1	1.0196	102	85 - 115	
Silver	1	1	1.0012	100	85 - 115	

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L672140
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Trace Metals by Method 6010B		
Project No:	ST010022.0026	Matrix:	Water - mg/L
Project:	KMEP / Silvercroft	EPA ID:	TN00003
Collection Date:	12/3/2013	**Analytic Batch:**	**WG695859**
Analysis Date:	12/6/2013 3:04:00 PM	Analyst:	388
Instrument ID:	ICP7, ICP5	Prep Date:	12/6/2013
Sample Numbers:	L672140-01, -02		

Sample Duplicate

L672253-04

Analyte	Dil	Sample Result	DUP Result	% RPD	Limit	Qualifier
Arsenic	1	<0.02	<0.02		20	
Barium	1	0.0065	0.0061	5	20	
Cadmium	1	<0.005	<0.005		20	
Chromium	1	<0.01	<0.01		20	
Lead	1	<0.005	<0.005		20	
Selenium	1	<0.02	<0.02		20	
Silver	1	<0.01	<0.01		20	

Serial Dilution

L672253-04

Analyte	Dil	Sample Result	SD Result	% RPD	Limit	Qualifier
Arsenic	5	<0.02	<0.1		10	
Barium	5	0.0065	0.0066	2	10	
Cadmium	5	<0.005	<0.025		10	
Chromium	5	<0.01	<0.05		10	
Lead	5	<0.005	<0.025		10	
Selenium	5	<0.02	<0.1		10	
Silver	5	<0.01	<0.05		10	

Matrix Spike / Matrix Spike Duplicate

L672253-04

Analyte	Dil	Spike Value	Sample	MS	% Rec	MSD	% Rec	Control Limits	% Rec Qual	RPD	Control Limits	RPD Qual
Arsenic	1	1	0.0021	1.0013	100	1.0114	101	75 - 125		1	20	
Barium	1	1	0.0065	1.0470	104	1.0559	105	75 - 125		1	20	
Cadmium	1	1	0.0022	1.0109	101	1.0246	102	75 - 125		1	20	
Chromium	1	1	0.0030	1.0241	102	1.0335	103	75 - 125		1	20	
Lead	1	1	0.0013	1.0371	104	1.0591	106	75 - 125		2	20	
Selenium	1	1	0.0026	1.0254	102	1.0362	103	75 - 125		1	20	
Silver	1	1	0.0021	1.0003	100	1.0076	101	75 - 125		1	20	

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Fax (615) 758-5859
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Quality Control Summary
SDG: L672140
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Trace Metals by Method 6010B		
Project No:	ST010022.0026	Matrix:	Water - mg/L
Project:	KMEP / Silvercroft	EPA ID:	TN00003
Collection Date:	12/3/2013	**Analytic Batch:**	**WG695859**
Analysis Date:	12/6/2013 3:04:00 PM	Analyst:	388
Instrument ID:	ICP7, ICP5	Prep Date:	12/6/2013
Sample Numbers:	L672140-01, -02		

Post Digest Spike

L672253-04

Analyte	Dil	Spike Value	Sample	Result	% Rec	Control Limits	Qualifier
Arsenic	1	1.12	0.0021	1.1618	104	75-125	
Barium	1	1.12	0.0065	1.2066	107	75-125	
Cadmium	1	1.12	0.0022	1.1780	105	75-125	
Chromium	1	1.12	0.0030	1.1793	105	75-125	
Lead	1	1.12	0.0013	1.2009	107	75-125	
Selenium	1	1.12	0.0026	1.1824	105	75-125	
Silver	1	1.12	0.0021	1.1339	101	75-125	

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Quality Control Summary
SDG: L672140
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Volatile Organic Compounds by Method 8260B		
Project No:	ST010022.0026	Matrix:	Water - mg/L
Project:	KMEP / Silvercroft	EPA ID:	TN00003
Collection Date:	12/3/2013	**Analytic Batch:**	**WG695850**
Analysis Date:	12/6/2013 10:34:00 PM	Analyst:	611
Instrument ID:	VOCMS8		
Sample Numbers:	L672140-01, -02		

Method Blank

Analyte	CAS	RDL	Qualifier
1,1,1,2-Tetrachloroethane	630-20-6	< 0.00100	
1,1,1-Trichloroethane	71-55-6	< 0.00100	
1,1,2,2-Tetrachloroethane	79-34-5	< 0.00100	
1,1,2-Trichloroethane	79-00-5	< 0.00100	
1,1,2-Trichlorotrifluoroethane	76-13-1	< 0.00100	
1,1-Dichloroethane	75-34-3	< 0.00100	
1,1-Dichloroethene	75-35-4	< 0.00100	
1,2,3-Trichloropropane	96-18-4	< 0.00250	
1,2,4-Trichlorobenzene	120-82-1	< 0.00100	
1,2,4-Trimethylbenzene	95-63-6	< 0.00100	
1,2-Dibromo-3-Chloropropane	96-12-8	< 0.00500	
1,2-Dibromoethane	106-93-4	< 0.00100	
1,2-Dichlorobenzene	95-50-1	< 0.00100	
1,2-Dichloroethane	107-06-2	< 0.00100	
1,2-Dichloropropane	78-87-5	< 0.00100	
1,3,5-Trimethylbenzene	108-67-8	< 0.00100	
1,3-Dichlorobenzene	541-73-1	< 0.00100	
1,4-Dichlorobenzene	106-46-7	< 0.00100	
2-Butanone (MEK)	78-93-3	< 0.0100	
2-Hexanone	591-78-6	< 0.0100	
4-Methyl-2-pentanone (MIBK)	108-10-1	< 0.0100	
Acetone	67-64-1	< 0.0500	
Acrylonitrile	107-13-1	< 0.0100	
Benzene	71-43-2	< 0.00100	
Bromobenzene	108-86-1	< 0.00100	
Bromochloromethane	74-97-5	< 0.00100	
Bromodichloromethane	75-27-4	< 0.00100	
Bromoform	75-25-2	< 0.00100	
Bromomethane	74-83-9	< 0.00500	
Carbon disulfide	75-15-0	< 0.00100	
Carbon tetrachloride	56-23-5	< 0.00100	
Chlorobenzene	108-90-7	< 0.00100	
Chlorodibromomethane	124-48-1	< 0.00100	
Chloroethane	75-00-3	< 0.00500	
Chloroform	67-66-3	< 0.00500	
Chloromethane	74-87-3	< 0.00250	
cis-1,2-Dichloroethene	156-59-2	< 0.00100	

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L672140
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Volatile Organic Compounds by Method 8260B		
Project No:	ST010022.0026	Matrix:	Water - mg/L
Project:	KMEP / Silvercroft	EPA ID:	TN00003
Collection Date:	12/3/2013	**Analytic Batch:**	**WG695850**
Analysis Date:	12/6/2013 10:34:00 PM	Analyst:	611
Instrument ID:	VOCMS8		
Sample Numbers:	L672140-01, -02		

Method Blank

Analyte	CAS	RDL	Qualifier
cis-1,3-Dichloropropene	10061-01-5	< 0.00100	
Dibromomethane	74-95-3	< 0.00100	
Dichlorodifluoromethane	75-71-8	< 0.00500	
Di-isopropyl ether	108-20-3	< 0.00100	
Ethanol	64-17-5	< 0.100	
Ethyl tert-butyl ether	637-92-3	< 0.00100	
Ethylbenzene	100-41-4	< 0.00100	
Hexachloro-1,3-butadiene	87-68-3	< 0.00100	
Iodomethane	74-88-4	< 0.0100	
Methyl tert-butyl ether	1634-04-4	< 0.00100	
Methylene Chloride	75-09-2	< 0.00500	
Naphthalene	91-20-3	< 0.00500	
n-Butylbenzene	104-51-8	< 0.00100	
n-Propylbenzene	103-65-1	< 0.00100	
sec-Butylbenzene	135-98-8	< 0.00100	
Styrene	100-42-5	< 0.00100	
tert-Amyl Methyl Ether	994-05-8	< 0.00100	
tert-Butyl alcohol	75-65-0	< 0.00500	
tert-Butylbenzene	98-06-6	< 0.00100	
Tetrachloroethene	127-18-4	< 0.00100	
Toluene	108-88-3	< 0.00500	
trans-1,2-Dichloroethene	156-60-5	< 0.00100	
trans-1,3-Dichloropropene	10061-02-6	< 0.00100	
trans-1,4-Dichloro-2-butene	110-57-6	< 0.00250	
Trichloroethene	79-01-6	< 0.00100	
Trichlorofluoromethane	75-69-4	< 0.00500	
Vinyl acetate	108-05-4	< 0.0100	
Vinyl chloride	75-01-4	< 0.00100	
Xylenes, Total	1330-20-7	< 0.00300	

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Quality Control Summary
SDG: L672140
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Volatile Organic Compounds by Method 8260B		
Project No:	ST010022.0026	Matrix:	Water - mg/L
Project:	KMEP / Silvercroft	EPA ID:	TN00003
Collection Date:	12/3/2013	**Analytic Batch:**	**WG696195**
Analysis Date:	12/9/2013 2:01:00 PM	Analyst:	611
Instrument ID:	VOCMS7		
Sample Numbers:	L672140-01, -02		

Method Blank

Analyte	CAS	RDL	Qualifier
1,1,1,2-Tetrachloroethane	630-20-6	< 0.00100	
1,1,1-Trichloroethane	71-55-6	< 0.00100	
1,1,2,2-Tetrachloroethane	79-34-5	< 0.00100	
1,1,2-Trichloroethane	79-00-5	< 0.00100	
1,1,2-Trichlorotrifluoroethane	76-13-1	< 0.00100	
1,1-Dichloroethane	75-34-3	< 0.00100	
1,1-Dichloroethene	75-35-4	< 0.00100	
1,2,3-Trichloropropane	96-18-4	< 0.00250	
1,2,4-Trichlorobenzene	120-82-1	< 0.00100	
1,2,4-Trimethylbenzene	95-63-6	< 0.00100	
1,2-Dibromo-3-Chloropropane	96-12-8	< 0.00500	
1,2-Dibromoethane	106-93-4	< 0.00100	
1,2-Dichlorobenzene	95-50-1	< 0.00100	
1,2-Dichloroethane	107-06-2	< 0.00100	
1,2-Dichloropropane	78-87-5	< 0.00100	
1,3,5-Trimethylbenzene	108-67-8	< 0.00100	
1,3-Dichlorobenzene	541-73-1	< 0.00100	
1,4-Dichlorobenzene	106-46-7	< 0.00100	
2-Butanone (MEK)	78-93-3	< 0.0100	
2-Hexanone	591-78-6	< 0.0100	
4-Methyl-2-pentanone (MIBK)	108-10-1	< 0.0100	
Acetone	67-64-1	< 0.0500	
Acrylonitrile	107-13-1	< 0.0100	
Benzene	71-43-2	< 0.00100	
Bromobenzene	108-86-1	< 0.00100	
Bromochloromethane	74-97-5	< 0.00100	
Bromodichloromethane	75-27-4	< 0.00100	
Bromoform	75-25-2	< 0.00100	
Bromomethane	74-83-9	< 0.00500	
Carbon disulfide	75-15-0	< 0.00100	
Carbon tetrachloride	56-23-5	< 0.00100	
Chlorobenzene	108-90-7	< 0.00100	
Chlorodibromomethane	124-48-1	< 0.00100	
Chloroethane	75-00-3	< 0.00500	
Chloroform	67-66-3	< 0.00500	
Chloromethane	74-87-3	< 0.00250	
cis-1,2-Dichloroethene	156-59-2	< 0.00100	

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L672140
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Volatile Organic Compounds by Method 8260B		
Project No:	ST010022.0026	Matrix:	Water - mg/L
Project:	KMEP / Silvercroft	EPA ID:	TN00003
Collection Date:	12/3/2013	**Analytic Batch:**	**WG696195**
Analysis Date:	12/9/2013 2:01:00 PM	Analyst:	611
Instrument ID:	VOCMS7		
Sample Numbers:	L672140-01, -02		

Method Blank

Analyte	CAS	RDL	Qualifier
cis-1,3-Dichloropropene	10061-01-5	< 0.00100	
Dibromomethane	74-95-3	< 0.00100	
Dichlorodifluoromethane	75-71-8	< 0.00500	
Di-isopropyl ether	108-20-3	< 0.00100	
Ethanol	64-17-5	< 0.100	
Ethyl tert-butyl ether	637-92-3	< 0.00100	
Ethylbenzene	100-41-4	< 0.00100	
Hexachloro-1,3-butadiene	87-68-3	< 0.00100	
Iodomethane	74-88-4	< 0.0100	
Methyl tert-butyl ether	1634-04-4	< 0.00100	
Methylene Chloride	75-09-2	< 0.00500	
Naphthalene	91-20-3	< 0.00500	
n-Butylbenzene	104-51-8	< 0.00100	
n-Propylbenzene	103-65-1	< 0.00100	
sec-Butylbenzene	135-98-8	< 0.00100	
Styrene	100-42-5	< 0.00100	
tert-Amyl Methyl Ether	994-05-8	< 0.00100	
tert-Butyl alcohol	75-65-0	< 0.00500	
tert-Butylbenzene	98-06-6	< 0.00100	
Tetrachloroethene	127-18-4	< 0.00100	
Toluene	108-88-3	< 0.00500	
trans-1,2-Dichloroethene	156-60-5	< 0.00100	
trans-1,3-Dichloropropene	10061-02-6	< 0.00100	
trans-1,4-Dichloro-2-butene	110-57-6	< 0.00250	
Trichloroethene	79-01-6	< 0.00100	
Trichlorofluoromethane	75-69-4	< 0.00500	
Vinyl acetate	108-05-4	< 0.0100	
Vinyl chloride	75-01-4	< 0.00100	
Xylenes, Total	1330-20-7	< 0.00300	

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L672140
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Volatile Organic Compounds by Method 8260B		
Project No:	ST010022.0026	Matrix:	Water - mg/L
Project:	KMEP / Silvercroft	EPA ID:	TN00003
Collection Date:	12/3/2013	**Analytic Batch:**	**WG695850**
Analysis Date:	12/6/2013 10:34:00 PM	Analyst:	611
Instrument ID:	VOCMS8		
Sample Numbers:	L672140-01, -02		

Laboratory Control Sample (LCS)

Analyte	Dil	True Value	Found	% Rec	Control Limits	Qual
1,1,1,2-Tetrachloroethane	1	0.025	0.0231	92.4	74.2 - 124	
1,1,1-Trichloroethane	1	0.025	0.0209	83.8	73.2 - 123	
1,1,2,2-Tetrachloroethane	1	0.025	0.0234	93.7	70.7 - 122	
1,1,2-Trichloroethane	1	0.025	0.0235	93.9	77.7 - 118	
1,1,2-Trichlorotrifluoroethane	1	0.025	0.0211	84.3	67.2 - 143	
1,1-Dichloroethane	1	0.025	0.0212	84.9	70.7 - 126	
1,1-Dichloroethene	1	0.025	0.0212	84.9	67.8 - 129	
1,2,3-Trichloropropane	1	0.025	0.0238	95.3	71.8 - 121	
1,2,4-Trichlorobenzene	1	0.025	0.0266	107	69.7 - 136	
1,2,4-Trimethylbenzene	1	0.025	0.0233	93.3	75 - 123	
1,2-Dibromo-3-Chloropropane	1	0.025	0.0248	99.1	65.4 - 128	
1,2-Dibromoethane	1	0.025	0.0235	93.9	76.6 - 121	
1,2-Dichlorobenzene	1	0.025	0.0234	93.7	78.4 - 117	
1,2-Dichloroethane	1	0.025	0.0210	84.2	68.8 - 124	
1,2-Dichloropropane	1	0.025	0.0219	87.5	76.5 - 119	
1,3,5-Trimethylbenzene	1	0.025	0.0242	96.8	75.6 - 124	
1,3-Dichlorobenzene	1	0.025	0.0254	102	70.8 - 128	
1,4-Dichlorobenzene	1	0.025	0.0242	96.8	78.8 - 115	
2-Butanone (MEK)	1	0.125	0.1026	82.1	55 - 149	
2-Hexanone	1	0.125	0.1144	91.5	65.6 - 144	
4-Methyl-2-pentanone (MIBK)	1	0.125	0.1140	91.2	70.5 - 133	
Acetone	1	0.125	0.0990	79.2	35.6 - 163	
Acrylonitrile	1	0.125	0.1027	82.2	55.2 - 130	
Benzene	1	0.025	0.0214	85.6	74.8 - 121	
Bromobenzene	1	0.025	0.0232	92.8	77.5 - 116	
Bromochloromethane	1	0.025	0.0221	88.5	77.6 - 119	
Bromodichloromethane	1	0.025	0.0214	85.8	75.1 - 116	
Bromoform	1	0.025	0.0253	101	67.5 - 130	
Bromomethane	1	0.025	0.0347	139	49.9 - 162	
Carbon disulfide	1	0.025	0.0221	88.4	64.6 - 140	
Carbon tetrachloride	1	0.025	0.0223	89	70.2 - 123	
Chlorobenzene	1	0.025	0.0236	94.3	78.1 - 119	
Chlorodibromomethane	1	0.025	0.0227	90.7	74 - 121	
Chloroethane	1	0.025	0.0223	89.1	61.7 - 135	
Chloroform	1	0.025	0.0214	85.6	76 - 121	
Chloromethane	1	0.025	0.0204	81.6	61.5 - 129	

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L672140
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Volatile Organic Compounds by Method 8260B		
Project No:	ST010022.0026	Matrix:	Water - mg/L
Project:	KMEP / Silvercroft	EPA ID:	TN00003
Collection Date:	12/3/2013	**Analytic Batch:**	**WG695850**
Analysis Date:	12/6/2013 10:34:00 PM	Analyst:	611
Instrument ID:	VOCMS8		
Sample Numbers:	L672140-01, -02		

Laboratory Control Sample (LCS)

Analyte	Dil	True Value	Found	% Rec	Control Limits	Qual
cis-1,2-Dichloroethene	1	0.025	0.0210	83.9	76 - 119	
cis-1,3-Dichloropropene	1	0.025	0.0225	90.2	78.2 - 120	
Dibromomethane	1	0.025	0.0220	88	79.5 - 118	
Dichlorodifluoromethane	1	0.025	0.0212	85	54.8 - 135	
Di-isopropyl ether	1	0.025	0.0200	79.9	65.6 - 132	
Ethylbenzene	1	0.025	0.0235	94.1	78.8 - 122	
Hexachloro-1,3-butadiene	1	0.025	0.0236	94.3	64.7 - 129	
Iodomethane	1	0.125	0.1126	90.1	61 - 130	
Methyl tert-butyl ether	1	0.025	0.0206	82.4	71.2 - 126	
Methylene Chloride	1	0.025	0.0206	82.4	70.3 - 120	
Naphthalene	1	0.025	0.0248	99.3	68.4 - 128	
n-Butylbenzene	1	0.025	0.0225	90.1	76.2 - 126	
n-Propylbenzene	1	0.025	0.0237	94.7	78.2 - 122	
sec-Butylbenzene	1	0.025	0.0248	99.3	74.4 - 127	
Styrene	1	0.025	0.0242	96.7	80.4 - 126	
tert-Butylbenzene	1	0.025	0.0246	98.6	75.3 - 126	
Tetrachloroethene	1	0.025	0.0247	98.7	72.6 - 126	
Toluene	1	0.025	0.0223	89.2	79.7 - 116	
trans-1,2-Dichloroethene	1	0.025	0.0210	83.9	72.6 - 121	
trans-1,3-Dichloropropene	1	0.025	0.0225	90	74.3 - 123	
trans-1,4-Dichloro-2-butene	1	0.025	0.0203	81.2	65.1 - 123	
Trichloroethene	1	0.025	0.0234	93.7	77.7 - 118	
Trichlorofluoromethane	1	0.025	0.0222	88.7	63.5 - 135	
Vinyl acetate	1	0.125	0.0989	79.1	65 - 138	
Vinyl chloride	1	0.025	0.0212	84.7	65.9 - 128	
Xylenes, Total	1	0.075	0.0702	93.6	78.7 - 121	

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L672140
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Volatile Organic Compounds by Method 8260B		
Project No:	ST010022.0026	Matrix:	Water - mg/L
Project:	KMEP / Silvercroft	EPA ID:	TN00003
Collection Date:	12/3/2013	**Analytic Batch:**	**WG695850**
Analysis Date:	12/6/2013 10:34:00 PM	Analyst:	611
Instrument ID:	VOCMS8		
Sample Numbers:	L672140-01, -02		

Laboratory Control Sample Duplicate (LCSD)

Analyte	Dil	True Value	Found	% Rec	Control Limits	Qual
1,1,1,2-Tetrachloroethane	1	0.025	0.0235	93.9	74.2 - 124	
1,1,1-Trichloroethane	1	0.025	0.0222	88.7	73.2 - 123	
1,1,2,2-Tetrachloroethane	1	0.025	0.0230	92.1	70.7 - 122	
1,1,2-Trichloroethane	1	0.025	0.0230	91.8	77.7 - 118	
1,1,2-Trichlorotrifluoroethane	1	0.025	0.0217	87	67.2 - 143	
1,1-Dichloroethane	1	0.025	0.0226	90.3	70.7 - 126	
1,1-Dichloroethene	1	0.025	0.0229	91.6	67.8 - 129	
1,2,3-Trichloropropane	1	0.025	0.0237	94.6	71.8 - 121	
1,2,4-Trichlorobenzene	1	0.025	0.0273	109	69.7 - 136	
1,2,4-Trimethylbenzene	1	0.025	0.0238	95.4	75 - 123	
1,2-Dibromo-3-Chloropropane	1	0.025	0.0243	97.1	65.4 - 128	
1,2-Dibromoethane	1	0.025	0.0237	94.7	76.6 - 121	
1,2-Dichlorobenzene	1	0.025	0.0240	96	78.4 - 117	
1,2-Dichloroethane	1	0.025	0.0214	85.7	68.8 - 124	
1,2-Dichloropropane	1	0.025	0.0228	91.4	76.5 - 119	
1,3,5-Trimethylbenzene	1	0.025	0.0247	98.8	75.6 - 124	
1,3-Dichlorobenzene	1	0.025	0.0260	104	70.8 - 128	
1,4-Dichlorobenzene	1	0.025	0.0246	98.6	78.8 - 115	
2-Butanone (MEK)	1	0.125	0.1136	90.9	55 - 149	
2-Hexanone	1	0.125	0.1193	95.4	65.6 - 144	
4-Methyl-2-pentanone (MIBK)	1	0.125	0.1169	93.5	70.5 - 133	
Acetone	1	0.125	0.1263	101	35.6 - 163	
Acrylonitrile	1	0.125	0.1090	87.2	55.2 - 130	
Benzene	1	0.025	0.0220	88	74.8 - 121	
Bromobenzene	1	0.025	0.0237	94.6	77.5 - 116	
Bromochloromethane	1	0.025	0.0231	92.2	77.6 - 119	
Bromodichloromethane	1	0.025	0.0217	86.8	75.1 - 116	
Bromoform	1	0.025	0.0254	102	67.5 - 130	
Bromomethane	1	0.025	0.0353	141	49.9 - 162	
Carbon disulfide	1	0.025	0.0233	93	64.6 - 140	
Carbon tetrachloride	1	0.025	0.0233	93.3	70.2 - 123	
Chlorobenzene	1	0.025	0.0244	97.5	78.1 - 119	
Chlorodibromomethane	1	0.025	0.0223	89.4	74 - 121	
Chloroethane	1	0.025	0.0240	95.9	61.7 - 135	
Chloroform	1	0.025	0.0221	88.6	76 - 121	
Chloromethane	1	0.025	0.0213	85.1	61.5 - 129	

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L672140
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Volatile Organic Compounds by Method 8260B		
Project No:	ST010022.0026	Matrix:	Water - mg/L
Project:	KMEP / Silvercroft	EPA ID:	TN00003
Collection Date:	12/3/2013	**Analytic Batch:**	**WG695850**
Analysis Date:	12/6/2013 10:34:00 PM	Analyst:	611
Instrument ID:	VOCMS8		
Sample Numbers:	L672140-01, -02		

Laboratory Control Sample Duplicate (LCSD)

Analyte	Dil	True Value	Found	% Rec	Control Limits	Qual
cis-1,2-Dichloroethene	1	0.025	0.0218	87.1	76 - 119	
cis-1,3-Dichloropropene	1	0.025	0.0236	94.5	78.2 - 120	
Dibromomethane	1	0.025	0.0225	89.9	79.5 - 118	
Dichlorodifluoromethane	1	0.025	0.0226	90.3	54.8 - 135	
Di-isopropyl ether	1	0.025	0.0204	81.8	65.6 - 132	
Ethylbenzene	1	0.025	0.0243	97.1	78.8 - 122	
Hexachloro-1,3-butadiene	1	0.025	0.0241	96.3	64.7 - 129	
Iodomethane	1	0.125	0.1179	94.4	61 - 130	
Methyl tert-butyl ether	1	0.025	0.0211	84.4	71.2 - 126	
Methylene Chloride	1	0.025	0.0218	87.2	70.3 - 120	
Naphthalene	1	0.025	0.0253	101	68.4 - 128	
n-Butylbenzene	1	0.025	0.0233	93.3	76.2 - 126	
n-Propylbenzene	1	0.025	0.0242	96.9	78.2 - 122	
sec-Butylbenzene	1	0.025	0.0255	102	74.4 - 127	
Styrene	1	0.025	0.0247	98.9	80.4 - 126	
tert-Butylbenzene	1	0.025	0.0253	101	75.3 - 126	
Tetrachloroethene	1	0.025	0.0257	103	72.6 - 126	
Toluene	1	0.025	0.0233	93.3	79.7 - 116	
trans-1,2-Dichloroethene	1	0.025	0.0220	87.8	72.6 - 121	
trans-1,3-Dichloropropene	1	0.025	0.0233	93	74.3 - 123	
trans-1,4-Dichloro-2-butene	1	0.025	0.0205	81.9	65.1 - 123	
Trichloroethene	1	0.025	0.0248	99.2	77.7 - 118	
Trichlorofluoromethane	1	0.025	0.0234	93.6	63.5 - 135	
Vinyl acetate	1	0.125	0.1028	82.2	65 - 138	
Vinyl chloride	1	0.025	0.0227	90.9	65.9 - 128	
Xylenes, Total	1	0.075	0.0722	96.3	78.7 - 121	

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L672140
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Volatile Organic Compounds by Method 8260B		
Project No:	ST010022.0026	Matrix:	Water - mg/L
Project:	KMEP / Silvercroft	EPA ID:	TN00003
Collection Date:	12/3/2013	**Analytic Batch:**	**WG695850**
Analysis Date:	12/6/2013 10:34:00 PM	Analyst:	611
Instrument ID:	VOCMS8		
Sample Numbers:	L672140-01, -02		

Laboratory Control Sample / Laboratory Control Sample Duplicate

Analyte	Dil	Spike	LCS	% Rec	LCSD	% Rec	Control Limits	% Rec Qual	% RPD	Control Limits	RPD Qual
1,1,1,2-Tetrachloroethane	1	0.025	0.0231	92.4	0.0235	93.9	74.2 - 124		1.64	20	
1,1,1-Trichloroethane	1	0.025	0.0209	83.8	0.0222	88.7	73.2 - 123		5.74	20	
1,1,2,2-Tetrachloroethane	1	0.025	0.0234	93.7	0.0230	92.1	70.7 - 122		1.65	20	
1,1,2-Trichloroethane	1	0.025	0.0235	93.9	0.0230	91.8	77.7 - 118		2.21	20	
1,1,2-Trichlorotrifluoroethane	1	0.025	0.0211	84.3	0.0217	87	67.2 - 143		3.15	20	
1,1-Dichloroethane	1	0.025	0.0212	84.9	0.0226	90.3	70.7 - 126		6.12	20	
1,1-Dichloroethene	1	0.025	0.0212	84.9	0.0229	91.6	67.8 - 129		7.5	20	
1,2,3-Trichloropropane	1	0.025	0.0238	95.3	0.0237	94.6	71.8 - 121		0.74	20	
1,2,4-Trichlorobenzene	1	0.025	0.0266	107	0.0273	109	69.7 - 136		2.47	20	
1,2,4-Trimethylbenzene	1	0.025	0.0233	93.3	0.0238	95.4	75 - 123		2.23	20	
1,2-Dibromo-3-Chloropropane	1	0.025	0.0248	99.1	0.0243	97.1	65.4 - 128		2.01	20	
1,2-Dibromoethane	1	0.025	0.0235	93.9	0.0237	94.7	76.6 - 121		0.85	20	
1,2-Dichlorobenzene	1	0.025	0.0234	93.7	0.0240	96	78.4 - 117		2.41	20	
1,2-Dichloroethane	1	0.025	0.0210	84.2	0.0214	85.7	68.8 - 124		1.73	20	
1,2-Dichloropropane	1	0.025	0.0219	87.5	0.0228	91.4	76.5 - 119		4.36	20	
1,3,5-Trimethylbenzene	1	0.025	0.0242	96.8	0.0247	98.8	75.6 - 124		2.02	20	
1,3-Dichlorobenzene	1	0.025	0.0254	102	0.0260	104	70.8 - 128		2.17	20	
1,4-Dichlorobenzene	1	0.025	0.0242	96.8	0.0246	98.6	78.8 - 115		1.81	20	
2-Butanone (MEK)	1	0.125	0.1026	82.1	0.1136	90.9	55 - 149		10.1	20	
2-Hexanone	1	0.125	0.1144	91.5	0.1193	95.4	65.6 - 144		4.18	20	
4-Methyl-2-pentanone (MIBK)	1	0.125	0.1140	91.2	0.1169	93.5	70.5 - 133		2.45	20	
Acetone	1	0.125	0.0990	79.2	0.1263	101	35.6 - 163		24.3	23.9	R7
Acrylonitrile	1	0.125	0.1027	82.2	0.1090	87.2	55.2 - 130		5.92	20	
Benzene	1	0.025	0.0214	85.6	0.0220	88	74.8 - 121		2.84	20	
Bromobenzene	1	0.025	0.0232	92.8	0.0237	94.6	77.5 - 116		1.89	20	
Bromochloromethane	1	0.025	0.0221	88.5	0.0231	92.2	77.6 - 119		4.14	20	
Bromodichloromethane	1	0.025	0.0214	85.8	0.0217	86.8	75.1 - 116		1.26	20	
Bromoform	1	0.025	0.0253	101	0.0254	102	67.5 - 130		0.45	20	
Bromomethane	1	0.025	0.0347	139	0.0353	141	49.9 - 162		1.68	20	
Carbon disulfide	1	0.025	0.0221	88.4	0.0233	93	64.6 - 140		5.15	20	
Carbon tetrachloride	1	0.025	0.0223	89	0.0233	93.3	70.2 - 123		4.69	20	
Chlorobenzene	1	0.025	0.0236	94.3	0.0244	97.5	78.1 - 119		3.37	20	
Chlorodibromomethane	1	0.025	0.0227	90.7	0.0223	89.4	74 - 121		1.42	20	
Chloroethane	1	0.025	0.0223	89.1	0.0240	95.9	61.7 - 135		7.33	20	
Chloroform	1	0.025	0.0214	85.6	0.0221	88.6	76 - 121		3.41	20	
Chloromethane	1	0.025	0.0204	81.6	0.0213	85.1	61.5 - 129		4.25	20	

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L672140
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Volatile Organic Compounds by Method 8260B		
Project No:	ST010022.0026	Matrix:	Water - mg/L
Project:	KMEP / Silvercroft	EPA ID:	TN00003
Collection Date:	12/3/2013	**Analytic Batch:**	**WG695850**
Analysis Date:	12/6/2013 10:34:00 PM	Analyst:	611
Instrument ID:	VOCMS8		
Sample Numbers:	L672140-01, -02		

Laboratory Control Sample / Laboratory Control Sample Duplicate

Analyte	Dil	Spike	LCS	% Rec	LCSD	% Rec	Control Limits	% Rec Qual	% RPD	Control Limits	RPD Qual
cis-1,2-Dichloroethene	1	0.025	0.0210	83.9	0.0218	87.1	76 - 119		3.72	20	
cis-1,3-Dichloropropene	1	0.025	0.0225	90.2	0.0236	94.5	78.2 - 120		4.72	20	
Dibromomethane	1	0.025	0.0220	88	0.0225	89.9	79.5 - 118		2.14	20	
Dichlorodifluoromethane	1	0.025	0.0212	85	0.0226	90.3	54.8 - 135		6.03	20	
Di-isopropyl ether	1	0.025	0.0200	79.9	0.0204	81.8	65.6 - 132		2.36	20	
Ethylbenzene	1	0.025	0.0235	94.1	0.0243	97.1	78.8 - 122		3.07	20	
Hexachloro-1,3-butadiene	1	0.025	0.0236	94.3	0.0241	96.3	64.7 - 129		2.15	20	
Iodomethane	1	0.125	0.1126	90.1	0.1179	94.4	61 - 130		4.66	20	
Methyl tert-butyl ether	1	0.025	0.0206	82.4	0.0211	84.4	71.2 - 126		2.37	20	
Methylene Chloride	1	0.025	0.0206	82.4	0.0218	87.2	70.3 - 120		5.64	20	
Naphthalene	1	0.025	0.0248	99.3	0.0253	101	68.4 - 128		1.74	20	
n-Butylbenzene	1	0.025	0.0225	90.1	0.0233	93.3	76.2 - 126		3.47	20	
n-Propylbenzene	1	0.025	0.0237	94.7	0.0242	96.9	78.2 - 122		2.34	20	
sec-Butylbenzene	1	0.025	0.0248	99.3	0.0255	102	74.4 - 127		2.83	20	
Styrene	1	0.025	0.0242	96.7	0.0247	98.9	80.4 - 126		2.24	20	
tert-Butylbenzene	1	0.025	0.0246	98.6	0.0253	101	75.3 - 126		2.58	20	
Tetrachloroethene	1	0.025	0.0247	98.7	0.0257	103	72.6 - 126		4.13	20	
Toluene	1	0.025	0.0223	89.2	0.0233	93.3	79.7 - 116		4.51	20	
trans-1,2-Dichloroethene	1	0.025	0.0210	83.9	0.0220	87.8	72.6 - 121		4.51	20	
trans-1,3-Dichloropropene	1	0.025	0.0225	90	0.0233	93	74.3 - 123		3.32	20	
trans-1,4-Dichloro-2-butene	1	0.025	0.0203	81.2	0.0205	81.9	65.1 - 123		0.9	20	
Trichloroethene	1	0.025	0.0234	93.7	0.0248	99.2	77.7 - 118		5.61	20	
Trichlorofluoromethane	1	0.025	0.0222	88.7	0.0234	93.6	63.5 - 135		5.35	20	
Vinyl acetate	1	0.125	0.0989	79.1	0.1028	82.2	65 - 138		3.91	20	
Vinyl chloride	1	0.025	0.0212	84.7	0.0227	90.9	65.9 - 128		7.03	20	
Xylenes, Total	1	0.075	0.0702	93.6	0.0722	96.3	78.7 - 121		2.8	20	

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L672140
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Volatile Organic Compounds by Method 8260B		
Project No:	ST010022.0026	Matrix:	Water - mg/L
Project:	KMEP / Silvercroft	EPA ID:	TN00003
Collection Date:	12/3/2013	**Analytic Batch:**	**WG696195**
Analysis Date:	12/9/2013 2:01:00 PM	Analyst:	611
Instrument ID:	VOCMS7		
Sample Numbers:	L672140-01, -02		

Laboratory Control Sample (LCS)

Analyte	Dil	True Value	Found	% Rec	Control Limits	Qual
1,1,1,2-Tetrachloroethane	1	0.025	0.0275	110	74.2 - 124	
1,1,1-Trichloroethane	1	0.025	0.0228	91.2	73.2 - 123	
1,1,2,2-Tetrachloroethane	1	0.025	0.0243	97.2	70.7 - 122	
1,1,2-Trichloroethane	1	0.025	0.0266	107	77.7 - 118	
1,1,2-Trichlorotrifluoroethane	1	0.025	0.0232	92.7	67.2 - 143	
1,1-Dichloroethane	1	0.025	0.0223	89.3	70.7 - 126	
1,1-Dichloroethene	1	0.025	0.0234	93.7	67.8 - 129	
1,2,3-Trichloropropane	1	0.025	0.0261	104	71.8 - 121	
1,2,4-Trichlorobenzene	1	0.025	0.0274	110	69.7 - 136	
1,2,4-Trimethylbenzene	1	0.025	0.0252	101	75 - 123	
1,2-Dibromo-3-Chloropropane	1	0.025	0.0243	97	65.4 - 128	
1,2-Dibromoethane	1	0.025	0.0280	112	76.6 - 121	
1,2-Dichlorobenzene	1	0.025	0.0250	99.9	78.4 - 117	
1,2-Dichloroethane	1	0.025	0.0220	88.1	68.8 - 124	
1,2-Dichloropropane	1	0.025	0.0238	95.4	76.5 - 119	
1,3,5-Trimethylbenzene	1	0.025	0.0260	104	75.6 - 124	
1,3-Dichlorobenzene	1	0.025	0.0275	110	70.8 - 128	
1,4-Dichlorobenzene	1	0.025	0.0235	94.1	78.8 - 115	
2-Butanone (MEK)	1	0.125	0.1308	105	55 - 149	
2-Hexanone	1	0.125	0.1344	108	65.6 - 144	
4-Methyl-2-pentanone (MIBK)	1	0.125	0.1202	96.2	70.5 - 133	
Acetone	1	0.125	0.1603	128	35.6 - 163	
Acrylonitrile	1	0.125	0.1131	90.5	55.2 - 130	
Benzene	1	0.025	0.0213	85.2	74.8 - 121	
Bromobenzene	1	0.025	0.0232	92.8	77.5 - 116	
Bromochloromethane	1	0.025	0.0251	100	77.6 - 119	
Bromodichloromethane	1	0.025	0.0236	94.3	75.1 - 116	
Bromoform	1	0.025	0.0309	124	67.5 - 130	
Bromomethane	1	0.025	0.0151	60.4	49.9 - 162	
Carbon disulfide	1	0.025	0.0238	95.4	64.6 - 140	
Carbon tetrachloride	1	0.025	0.0247	98.9	70.2 - 123	
Chlorobenzene	1	0.025	0.0260	104	78.1 - 119	
Chlorodibromomethane	1	0.025	0.0276	110	74 - 121	
Chloroethane	1	0.025	0.0205	82	61.7 - 135	
Chloroform	1	0.025	0.0228	91.1	76 - 121	
Chloromethane	1	0.025	0.0179	71.4	61.5 - 129	

Parameters in bold text are reported in this SDG

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(800) 767-5859
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Quality Control Summary
SDG: L672140
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Volatile Organic Compounds by Method 8260B		
Project No:	ST010022.0026	Matrix:	Water - mg/L
Project:	KMEP / Silvercroft	EPA ID:	TN00003
Collection Date:	12/3/2013	**Analytic Batch:**	**WG696195**
Analysis Date:	12/9/2013 2:01:00 PM	Analyst:	611
Instrument ID:	VOCMS7		
Sample Numbers:	L672140-01, -02		

Laboratory Control Sample (LCS)

Analyte	Dil	True Value	Found	% Rec	Control Limits	Qual
cis-1,2-Dichloroethene	1	0.025	0.0221	88.4	76 - 119	
cis-1,3-Dichloropropene	1	0.025	0.0234	93.8	78.2 - 120	
Dibromomethane	1	0.025	0.0262	105	79.5 - 118	
Dichlorodifluoromethane	1	0.025	0.0228	91.3	54.8 - 135	
Di-isopropyl ether	1	0.025	0.0201	80.5	65.6 - 132	
Ethylbenzene	1	0.025	0.0259	103	78.8 - 122	
Hexachloro-1,3-butadiene	1	0.025	0.0264	106	64.7 - 129	
Iodomethane	1	0.125	0.1157	92.6	61 - 130	
Methyl tert-butyl ether	1	0.025	0.0218	87.1	71.2 - 126	
Methylene Chloride	1	0.025	0.0215	86.2	70.3 - 120	
Naphthalene	1	0.025	0.0228	91.3	68.4 - 128	
n-Butylbenzene	1	0.025	0.0220	88	76.2 - 126	
n-Propylbenzene	1	0.025	0.0253	101	78.2 - 122	
sec-Butylbenzene	1	0.025	0.0257	103	74.4 - 127	
Styrene	1	0.025	0.0266	106	80.4 - 126	
tert-Butylbenzene	1	0.025	0.0261	104	75.3 - 126	
Tetrachloroethene	1	0.025	0.0300	120	72.6 - 126	
Toluene	1	0.025	0.0235	94.1	79.7 - 116	
trans-1,2-Dichloroethene	1	0.025	0.0226	90.5	72.6 - 121	
trans-1,3-Dichloropropene	1	0.025	0.0256	102	74.3 - 123	
trans-1,4-Dichloro-2-butene	1	0.025	0.0222	88.8	65.1 - 123	
Trichloroethene	1	0.025	0.0264	105	77.7 - 118	
Trichlorofluoromethane	1	0.025	0.0217	86.8	63.5 - 135	
Vinyl acetate	1	0.125	0.1017	81.3	65 - 138	
Vinyl chloride	1	0.025	0.0216	86.4	65.9 - 128	
Xylenes, Total	1	0.075	0.0767	102	78.7 - 121	

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Quality Control Summary
SDG: L672140
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Volatile Organic Compounds by Method 8260B		
Project No:	ST010022.0026	Matrix:	Water - mg/L
Project:	KMEP / Silvercroft	EPA ID:	TN00003
Collection Date:	12/3/2013	**Analytic Batch:**	**WG696195**
Analysis Date:	12/9/2013 2:01:00 PM	Analyst:	611
Instrument ID:	VOCMS7		
Sample Numbers:	L672140-01, -02		

Laboratory Control Sample Duplicate (LCSD)

Analyte	Dil	True Value	Found	% Rec	Control Limits	Qual
1,1,1,2-Tetrachloroethane	1	0.025	0.0276	110	74.2 - 124	
1,1,1-Trichloroethane	1	0.025	0.0222	89	73.2 - 123	
1,1,2,2-Tetrachloroethane	1	0.025	0.0253	101	70.7 - 122	
1,1,2-Trichloroethane	1	0.025	0.0271	109	77.7 - 118	
1,1,2-Trichlorotrifluoroethane	1	0.025	0.0229	91.4	67.2 - 143	
1,1-Dichloroethane	1	0.025	0.0215	86.1	70.7 - 126	
1,1-Dichloroethene	1	0.025	0.0226	90.5	67.8 - 129	
1,2,3-Trichloropropane	1	0.025	0.0262	105	71.8 - 121	
1,2,4-Trichlorobenzene	1	0.025	0.0275	110	69.7 - 136	
1,2,4-Trimethylbenzene	1	0.025	0.0252	101	75 - 123	
1,2-Dibromo-3-Chloropropane	1	0.025	0.0255	102	65.4 - 128	
1,2-Dibromoethane	1	0.025	0.0284	113	76.6 - 121	
1,2-Dichlorobenzene	1	0.025	0.0249	99.5	78.4 - 117	
1,2-Dichloroethane	1	0.025	0.0210	83.9	68.8 - 124	
1,2-Dichloropropane	1	0.025	0.0235	94	76.5 - 119	
1,3,5-Trimethylbenzene	1	0.025	0.0259	104	75.6 - 124	
1,3-Dichlorobenzene	1	0.025	0.0276	110	70.8 - 128	
1,4-Dichlorobenzene	1	0.025	0.0233	93.3	78.8 - 115	
2-Butanone (MEK)	1	0.125	0.1148	91.8	55 - 149	
2-Hexanone	1	0.125	0.1360	109	65.6 - 144	
4-Methyl-2-pentanone (MIBK)	1	0.125	0.1189	95.1	70.5 - 133	
Acetone	1	0.125	0.1517	121	35.6 - 163	
Acrylonitrile	1	0.125	0.1080	86.4	55.2 - 130	
Benzene	1	0.025	0.0205	82.1	74.8 - 121	
Bromobenzene	1	0.025	0.0235	93.8	77.5 - 116	
Bromochloromethane	1	0.025	0.0249	99.6	77.6 - 119	
Bromodichloromethane	1	0.025	0.0229	91.8	75.1 - 116	
Bromoform	1	0.025	0.0316	126	67.5 - 130	
Bromomethane	1	0.025	0.0152	60.8	49.9 - 162	
Carbon disulfide	1	0.025	0.0226	90.5	64.6 - 140	
Carbon tetrachloride	1	0.025	0.0243	97.3	70.2 - 123	
Chlorobenzene	1	0.025	0.0262	105	78.1 - 119	
Chlorodibromomethane	1	0.025	0.0275	110	74 - 121	
Chloroethane	1	0.025	0.0203	81.3	61.7 - 135	
Chloroform	1	0.025	0.0225	89.9	76 - 121	
Chloromethane	1	0.025	0.0171	68.4	61.5 - 129	

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L672140
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Volatile Organic Compounds by Method 8260B		
Project No:	ST010022.0026	Matrix:	Water - mg/L
Project:	KMEP / Silvercroft	EPA ID:	TN00003
Collection Date:	12/3/2013	**Analytic Batch:**	**WG696195**
Analysis Date:	12/9/2013 2:01:00 PM	Analyst:	611
Instrument ID:	VOCMS7		
Sample Numbers:	L672140-01, -02		

Laboratory Control Sample Duplicate (LCSD)

Analyte	Dil	True Value	Found	% Rec	Control Limits	Qual
cis-1,2-Dichloroethene	1	0.025	0.0224	89.8	76 - 119	
cis-1,3-Dichloropropene	1	0.025	0.0226	90.3	78.2 - 120	
Dibromomethane	1	0.025	0.0253	101	79.5 - 118	
Dichlorodifluoromethane	1	0.025	0.0219	87.4	54.8 - 135	
Di-isopropyl ether	1	0.025	0.0199	79.8	65.6 - 132	
Ethylbenzene	1	0.025	0.0256	103	78.8 - 122	
Hexachloro-1,3-butadiene	1	0.025	0.0265	106	64.7 - 129	
Iodomethane	1	0.125	0.1131	90.5	61 - 130	
Methyl tert-butyl ether	1	0.025	0.0211	84.4	71.2 - 126	
Methylene Chloride	1	0.025	0.0212	84.7	70.3 - 120	
Naphthalene	1	0.025	0.0226	90.4	68.4 - 128	
n-Butylbenzene	1	0.025	0.0220	88	76.2 - 126	
n-Propylbenzene	1	0.025	0.0254	102	78.2 - 122	
sec-Butylbenzene	1	0.025	0.0258	103	74.4 - 127	
Styrene	1	0.025	0.0263	105	80.4 - 126	
tert-Butylbenzene	1	0.025	0.0263	105	75.3 - 126	
Tetrachloroethene	1	0.025	0.0293	117	72.6 - 126	
Toluene	1	0.025	0.0230	92.1	79.7 - 116	
trans-1,2-Dichloroethene	1	0.025	0.0225	90.1	72.6 - 121	
trans-1,3-Dichloropropene	1	0.025	0.0253	101	74.3 - 123	
trans-1,4-Dichloro-2-butene	1	0.025	0.0226	90.6	65.1 - 123	
Trichloroethene	1	0.025	0.0263	105	77.7 - 118	
Trichlorofluoromethane	1	0.025	0.0207	82.8	63.5 - 135	
Vinyl acetate	1	0.125	0.0979	78.3	65 - 138	
Vinyl chloride	1	0.025	0.0206	82.3	65.9 - 128	
Xylenes, Total	1	0.075	0.0761	101	78.7 - 121	

Parameters in bold text are reported in this SDG

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(800) 767-5859
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Quality Control Summary
SDG: L672140
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Volatile Organic Compounds by Method 8260B		
Project No:	ST010022.0026	Matrix:	Water - mg/L
Project:	KMEP / Silvercroft	EPA ID:	TN00003
Collection Date:	12/3/2013	**Analytic Batch:**	**WG696195**
Analysis Date:	12/9/2013 2:01:00 PM	Analyst:	611
Instrument ID:	VOCMS7		
Sample Numbers:	L672140-01, -02		

Laboratory Control Sample / Laboratory Control Sample Duplicate

Analyte	Dil	Spike	LCS	% Rec	LCSD	% Rec	Control Limits	% Rec Qual	% RPD	Control Limits	RPD Qual
1,1,1,2-Tetrachloroethane	1	0.025	0.0275	110	0.0276	110	74.2 - 124		0.5	20	
1,1,1-Trichloroethane	1	0.025	0.0228	91.2	0.0222	89	73.2 - 123		2.41	20	
1,1,2,2-Tetrachloroethane	1	0.025	0.0243	97.2	0.0253	101	70.7 - 122		4.05	20	
1,1,2-Trichloroethane	1	0.025	0.0266	107	0.0271	109	77.7 - 118		1.93	20	
1,1,2-Trichlorotrifluoroethane	1	0.025	0.0232	92.7	0.0229	91.4	67.2 - 143		1.39	20	
1,1-Dichloroethane	1	0.025	0.0223	89.3	0.0215	86.1	70.7 - 126		3.56	20	
1,1-Dichloroethene	1	0.025	0.0234	93.7	0.0226	90.5	67.8 - 129		3.46	20	
1,2,3-Trichloropropane	1	0.025	0.0261	104	0.0262	105	71.8 - 121		0.45	20	
1,2,4-Trichlorobenzene	1	0.025	0.0274	110	0.0275	110	69.7 - 136		0.3	20	
1,2,4-Trimethylbenzene	1	0.025	0.0252	101	0.0252	101	75 - 123		0.22	20	
1,2-Dibromo-3-Chloropropane	1	0.025	0.0243	97	0.0255	102	65.4 - 128		5.03	20	
1,2-Dibromoethane	1	0.025	0.0280	112	0.0284	113	76.6 - 121		1.32	20	
1,2-Dichlorobenzene	1	0.025	0.0250	99.9	0.0249	99.5	78.4 - 117		0.4	20	
1,2-Dichloroethane	1	0.025	0.0220	88.1	0.0210	83.9	68.8 - 124		4.81	20	
1,2-Dichloropropane	1	0.025	0.0238	95.4	0.0235	94	76.5 - 119		1.43	20	
1,3,5-Trimethylbenzene	1	0.025	0.0260	104	0.0259	104	75.6 - 124		0.47	20	
1,3-Dichlorobenzene	1	0.025	0.0275	110	0.0276	110	70.8 - 128		0.39	20	
1,4-Dichlorobenzene	1	0.025	0.0235	94.1	0.0233	93.3	78.8 - 115		0.84	20	
2-Butanone (MEK)	1	0.125	0.1308	105	0.1148	91.8	55 - 149		13.1	20	
2-Hexanone	1	0.125	0.1344	108	0.1360	109	65.6 - 144		1.18	20	
4-Methyl-2-pentanone (MIBK)	1	0.125	0.1202	96.2	0.1189	95.1	70.5 - 133		1.13	20	
Acetone	1	0.125	0.1603	128	0.1517	121	35.6 - 163		5.52	23.9	
Acrylonitrile	1	0.125	0.1131	90.5	0.1080	86.4	55.2 - 130		4.59	20	
Benzene	1	0.025	0.0213	85.2	0.0205	82.1	74.8 - 121		3.65	20	
Bromobenzene	1	0.025	0.0232	92.8	0.0235	93.8	77.5 - 116		1.1	20	
Bromochloromethane	1	0.025	0.0251	100	0.0249	99.6	77.6 - 119		0.83	20	
Bromodichloromethane	1	0.025	0.0236	94.3	0.0229	91.8	75.1 - 116		2.73	20	
Bromoform	1	0.025	0.0309	124	0.0316	126	67.5 - 130		2.27	20	
Bromomethane	1	0.025	0.0151	60.4	0.0152	60.8	49.9 - 162		0.67	20	
Carbon disulfide	1	0.025	0.0238	95.4	0.0226	90.5	64.6 - 140		5.21	20	
Carbon tetrachloride	1	0.025	0.0247	98.9	0.0243	97.3	70.2 - 123		1.62	20	
Chlorobenzene	1	0.025	0.0260	104	0.0262	105	78.1 - 119		0.69	20	
Chlorodibromomethane	1	0.025	0.0276	110	0.0275	110	74 - 121		0.24	20	
Chloroethane	1	0.025	0.0205	82	0.0203	81.3	61.7 - 135		0.88	20	
Chloroform	1	0.025	0.0228	91.1	0.0225	89.9	76 - 121		1.33	20	
Chloromethane	1	0.025	0.0179	71.4	0.0171	68.4	61.5 - 129		4.29	20	

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(800) 767-5859
Fax (615) 758-5859
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Quality Control Summary
SDG: L672140
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Volatile Organic Compounds by Method 8260B		
Project No:	ST010022.0026	Matrix:	Water - mg/L
Project:	KMEP / Silvercroft	EPA ID:	TN00003
Collection Date:	12/3/2013	**Analytic Batch:**	**WG696195**
Analysis Date:	12/9/2013 2:01:00 PM	Analyst:	611
Instrument ID:	VOCMS7		
Sample Numbers:	L672140-01, -02		

Laboratory Control Sample / Laboratory Control Sample Duplicate

Analyte	Dil	Spike	LCS	% Rec	LCSD	% Rec	Control Limits	% Rec Qual	% RPD	Control Limits	RPD Qual
cis-1,2-Dichloroethene	1	0.025	0.0221	88.4	0.0224	89.8	76 - 119		1.51	20	
cis-1,3-Dichloropropene	1	0.025	0.0234	93.8	0.0226	90.3	78.2 - 120		3.73	20	
Dibromomethane	1	0.025	0.0262	105	0.0253	101	79.5 - 118		3.5	20	
Dichlorodifluoromethane	1	0.025	0.0228	91.3	0.0219	87.4	54.8 - 135		4.31	20	
Di-isopropyl ether	1	0.025	0.0201	80.5	0.0199	79.8	65.6 - 132		0.93	20	
Ethylbenzene	1	0.025	0.0259	103	0.0256	103	78.8 - 122		0.9	20	
Hexachloro-1,3-butadiene	1	0.025	0.0264	106	0.0265	106	64.7 - 129		0.3	20	
Iodomethane	1	0.125	0.1157	92.6	0.1131	90.5	61 - 130		2.31	20	
Methyl tert-butyl ether	1	0.025	0.0218	87.1	0.0211	84.4	71.2 - 126		3.1	20	
Methylene Chloride	1	0.025	0.0215	86.2	0.0212	84.7	70.3 - 120		1.78	20	
Naphthalene	1	0.025	0.0228	91.3	0.0226	90.4	68.4 - 128		0.93	20	
n-Butylbenzene	1	0.025	0.0220	88	0.0220	88	76.2 - 126		0.05	20	
n-Propylbenzene	1	0.025	0.0253	101	0.0254	102	78.2 - 122		0.4	20	
sec-Butylbenzene	1	0.025	0.0257	103	0.0258	103	74.4 - 127		0.31	20	
Styrene	1	0.025	0.0266	106	0.0263	105	80.4 - 126		1	20	
tert-Butylbenzene	1	0.025	0.0261	104	0.0263	105	75.3 - 126		0.7	20	
Tetrachloroethene	1	0.025	0.0300	120	0.0293	117	72.6 - 126		2.16	20	
Toluene	1	0.025	0.0235	94.1	0.0230	92.1	79.7 - 116		2.15	20	
trans-1,2-Dichloroethene	1	0.025	0.0226	90.5	0.0225	90.1	72.6 - 121		0.48	20	
trans-1,3-Dichloropropene	1	0.025	0.0256	102	0.0253	101	74.3 - 123		1.13	20	
trans-1,4-Dichloro-2-butene	1	0.025	0.0222	88.8	0.0226	90.6	65.1 - 123		1.91	20	
Trichloroethene	1	0.025	0.0264	105	0.0263	105	77.7 - 118		0.28	20	
Trichlorofluoromethane	1	0.025	0.0217	86.8	0.0207	82.8	63.5 - 135		4.74	20	
Vinyl acetate	1	0.125	0.1017	81.3	0.0979	78.3	65 - 138		3.77	20	
Vinyl chloride	1	0.025	0.0216	86.4	0.0206	82.3	65.9 - 128		4.88	20	
Xylenes, Total	1	0.075	0.0767	102	0.0761	101	78.7 - 121		0.76	20	

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L672140
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Volatile Organic Compounds by Method 8260B		
Project No:	ST010022.0026	Matrix:	Water - mg/L
Project:	KMEP / Silvercroft	EPA ID:	TN00003
Collection Date:	12/3/2013	**Analytic Batch:**	**WG695850**
Analysis Date:	12/6/2013 10:34:00 PM	Analyst:	611
Instrument ID:	VOCMS8		
Sample Numbers:	L672140-01, -02		

Matrix Spike / Matrix Spike Duplicate

L672140-01

Analyte	Dil	Spike Value	Sample	MS	% Rec	MSD	% Rec	Control Limits	% Rec Qual	RPD	Control Limits	RPD Qual
1,1,1,2-Tetrachloroethane	1	0.025	0.0	0.0238	95.3	0.0210	83.9	64 - 128		12.7	20	
1,1,1-Trichloroethane	1	0.025	0.0	0.0227	91	0.0209	83.7	58.7 - 134		8.34	20	
1,1,2,2-Tetrachloroethane	1	0.025	0.0	0.0228	91.1	0.0214	85.7	56 - 132		6.16	22.2	
1,1,2-Trichloroethane	1	0.025	0.0	0.0231	92.3	0.0210	83.9	66.3 - 125		9.52	20	
1,1,2-Trichlorotrifluoroethane	1	0.025	0.0	0.0226	90.3	0.0211	84.4	54.8 - 154		6.8	22.5	
1,1-Dichloroethane	1	0.025	0.0	0.0228	91.2	0.0210	84.1	58.5 - 132		8.14	20	
1,1-Dichloroethene	1	0.025	0.0	0.0230	91.9	0.0218	87.1	51.1 - 140		5.39	20.2	
1,2,3-Trichloropropane	1	0.025	0.0	0.0238	95.1	0.0219	87.8	61.4 - 128		7.95	22.4	
1,2,4-Trichlorobenzene	1	0.025	0.0	0.0257	103	0.0253	101	63.6 - 143		1.53	21.9	
1,2,4-Trimethylbenzene	1	0.025	0.0004	0.0247	97.1	0.0217	85	57.4 - 137		13.1	20	
1,2-Dibromo-3-Chloropropane	1	0.025	0.0	0.0221	88.4	0.0229	91.8	57.3 - 136		3.68	27	
1,2-Dibromoethane	1	0.025	0.0	0.0234	93.4	0.0222	88.6	67.1 - 125		5.27	20	
1,2-Dichlorobenzene	1	0.025	0.0	0.0232	92.6	0.0224	89.5	68.2 - 123		3.5	20	
1,2-Dichloroethane	1	0.025	0.0	0.0217	86.8	0.0208	83.2	60 - 126		4.2	20	
1,2-Dichloropropane	1	0.025	0.0	0.0228	91.3	0.0212	84.8	64.2 - 123		7.31	20	
1,3,5-Trimethylbenzene	1	0.025	0.0	0.0255	102	0.0223	89.4	63.6 - 132		13	20.5	
1,3-Dichlorobenzene	1	0.025	0.0	0.0267	107	0.0237	94.9	63.1 - 131		11.7	20	
1,4-Dichlorobenzene	1	0.025	0.0	0.0243	97.4	0.0236	94.5	68.6 - 123		2.98	20	
2-Butanone (MEK)	1	0.125	0.0007	0.0990	78.6	0.1034	82.1	22.4 - 138		4.32	27	
2-Hexanone	1	0.125	0.0	0.1113	89.1	0.1086	86.9	43.3 - 137		2.47	25.5	
4-Methyl-2-pentanone (MIBK)	1	0.125	0.0	0.1117	89.3	0.1134	90.7	60.8 - 140		1.54	25.1	
Acetone	1	0.125	0.0079	0.0923	67.5	0.0949	69.6	10 - 130		2.73	27.9	
Acrylonitrile	1	0.125	0.0	0.1079	86.3	0.1066	85.2	49.4 - 133		1.28	25.3	
Benzene	1	0.025	0.0003	0.0226	89.2	0.0216	85	54.3 - 133		4.78	20	
Bromobenzene	1	0.025	0.0	0.0242	97	0.0217	86.9	63.9 - 124		11	20	
Bromochloromethane	1	0.025	0.0	0.0230	92.2	0.0220	88.2	66.5 - 122		4.45	20.8	
Bromodichloromethane	1	0.025	0.0	0.0214	85.5	0.0203	81.1	63.9 - 121		5.38	20	
Bromoform	1	0.025	0.0	0.0252	101	0.0239	95.8	59.5 - 134		4.99	20.5	
Bromomethane	1	0.025	0.0	0.0374	150	0.0349	139	41.7 - 155		6.99	21.9	
Carbon disulfide	1	0.025	0.0	0.0236	94.5	0.0218	87.3	43.3 - 149		7.92	20.3	
Carbon tetrachloride	1	0.025	0.0	0.0241	96.3	0.0233	93	55.7 - 134		3.52	20	
Chlorobenzene	1	0.025	0.0	0.0242	97	0.0221	88.3	67 - 125		9.39	20	
Chlorodibromomethane	1	0.025	0.0	0.0222	88.8	0.0208	83.3	64.3 - 125		6.34	20.8	
Chloroethane	1	0.025	0.0	0.0247	98.7	0.0226	90.3	51.5 - 136		8.83	40	
Chloroform	1	0.025	0.0	0.0228	91.2	0.0212	84.6	63 - 129		7.47	20	
Chloromethane	1	0.025	0.0	0.0217	87	0.0202	80.7	42.4 - 135		7.48	20	

Parameters in bold text are reported in this SDG

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(800) 767-5859
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Quality Control Summary
SDG: L672140
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Volatile Organic Compounds by Method 8260B		
Project No:	ST010022.0026	Matrix:	Water - mg/L
Project:	KMEP / Silvercroft	EPA ID:	TN00003
Collection Date:	12/3/2013	**Analytic Batch:**	**WG695850**
Analysis Date:	12/6/2013 10:34:00 PM	Analyst:	611
Instrument ID:	VOCMS8		
Sample Numbers:	L672140-01, -02		

Matrix Spike / Matrix Spike Duplicate

L672140-01

Analyte	Dil	Spike Value	Sample	MS	% Rec	MSD	% Rec	Control Limits	% Rec Qual	RPD	Control Limits	RPD Qual
cis-1,2-Dichloroethene	1	0.025	0.0	0.0226	90.6	0.0208	83.1	59.2 - 129		8.64	20	
cis-1,3-Dichloropropene	1	0.025	0.0	0.0235	94.2	0.0220	88.2	66.4 - 125		6.59	20	
Dibromomethane	1	0.025	0.0	0.0219	87.5	0.0216	86.3	68.2 - 124		1.43	20	
Dichlorodifluoromethane	1	0.025	0.0	0.0230	91.9	0.0215	86.2	40.6 - 144		6.44	20.2	
Di-isopropyl ether	1	0.025	0.0	0.0209	83.4	0.0200	80.1	56.9 - 136		4.05	20	
Ethylbenzene	1	0.025	0.0005	0.0243	95.1	0.0214	83.5	61.4 - 133		12.7	20	
Hexachloro-1,3-butadiene	1	0.025	0.0	0.0229	91.5	0.0221	88.4	55.1 - 136		3.49	23.6	
Iodomethane	1	0.125	0.0	0.1203	96.3	0.1120	89.6	49.7 - 132		7.12	20	
Methyl tert-butyl ether	1	0.025	0.0124	0.0336	85	0.0328	81.7	57.7 - 134		2.53	20	
Methylene Chloride	1	0.025	0.0004	0.0217	85.2	0.0203	79.5	58.1 - 122		6.73	20	
Naphthalene	1	0.025	0.0004	0.0225	88.6	0.0243	95.7	58 - 135		7.57	25.5	
n-Butylbenzene	1	0.025	0.0	0.0232	92.9	0.0214	85.6	62.7 - 140		8.08	20.3	
n-Propylbenzene	1	0.025	0.0	0.0249	99.6	0.0219	87.7	65.9 - 131		12.7	20	
sec-Butylbenzene	1	0.025	0.0	0.0261	105	0.0231	92.5	62.2 - 136		12.2	20.3	
Styrene	1	0.025	0.0	0.0249	99.5	0.0226	90.5	66.8 - 133		9.51	20	
tert-Butylbenzene	1	0.025	0.0	0.0258	103	0.0226	90.4	63.3 - 134		13.1	21	
Tetrachloroethene	1	0.025	0.0005	0.0261	103	0.0235	92.1	53 - 139		10.7	20	
Toluene	1	0.025	0.0023	0.0248	89.9	0.0235	84.8	61.4 - 130		5.25	20	
trans-1,2-Dichloroethene	1	0.025	0.0	0.0219	87.6	0.0204	81.8	56.5 - 129		6.9	20	
trans-1,3-Dichloropropene	1	0.025	0.0	0.0233	93.2	0.0221	88.3	64.1 - 128		5.38	20	
trans-1,4-Dichloro-2-butene	1	0.025	0.0	0.0215	85.9	0.0202	80.8	57.1 - 130		6.21	23.9	
Trichloroethene	1	0.025	0.0	0.0249	99.6	0.0231	92.5	44.1 - 149		7.43	20	
Trichlorofluoromethane	1	0.025	0.0	0.0243	97.3	0.0225	90	49.6 - 145		7.79	21.2	
Vinyl acetate	1	0.125	0.0	0.1039	83.1	0.1042	83.3	56.1 - 149		0.24	22.7	
Vinyl chloride	1	0.025	0.0	0.0230	92	0.0213	85.3	47.8 - 137		7.6	20	
Xylenes, Total	1	0.075	0.0022	0.0753	97.4	0.0668	86.1	63.3 - 131		11.9	20	

Parameters in bold text are reported in this SDG

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(615) 758-5858
(800) 767-5859
Fax (615) 758-5859
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Quality Control Summary
SDG: L672140
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Volatile Organic Compounds by Method 8260B		
Project No:	ST010022.0026	Matrix:	Water - mg/L
Project:	KMEP / Silvercroft	EPA ID:	TN00003
Collection Date:	12/3/2013	**Analytic Batch:**	**WG696195**
Analysis Date:	12/9/2013 2:01:00 PM	Analyst:	611
Instrument ID:	VOCMS7		
Sample Numbers:	L672140-01, -02		

Matrix Spike / Matrix Spike Duplicate

L672648-01

Analyte	Dil	Spike Value	Sample	MS	% Rec	MSD	% Rec	Control Limits	% Rec Qual	RPD	Control Limits	RPD Qual
1,1,1,2-Tetrachloroethane	1	0.025	0.0	0.0282	113	0.0264	106	64 - 128		6.48	20	
1,1,1-Trichloroethane	1	0.025	0.0	0.0240	95.9	0.0223	89.2	58.7 - 134		7.21	20	
1,1,2,2-Tetrachloroethane	1	0.025	0.0	0.0260	104	0.0245	98	56 - 132		5.97	22.2	
1,1,2-Trichloroethane	1	0.025	0.0	0.0279	111	0.0256	102	66.3 - 125		8.55	20	
1,1,2-Trichlorotrifluoroethane	1	0.025	0.0	0.0253	101	0.0228	91.1	54.8 - 154		10.5	22.5	
1,1-Dichloroethane	1	0.025	0.0	0.0229	91.8	0.0206	82.3	58.5 - 132		10.9	20	
1,1-Dichloroethene	1	0.025	0.0	0.0247	98.9	0.0222	89	51.1 - 140		10.6	20.2	
1,2,3-Trichloropropane	1	0.025	0.0	0.0280	112	0.0263	105	61.4 - 128		6.34	22.4	
1,2,4-Trichlorobenzene	1	0.025	0.0	0.0221	88.3	0.0195	77.8	63.6 - 143		12.6	21.9	
1,2,4-Trimethylbenzene	1	0.025	0.0009	0.0265	102	0.0237	91.2	57.4 - 137		10.9	20	
1,2-Dibromo-3-Chloropropane	1	0.025	0.0	0.0289	116	0.0255	102	57.3 - 136		12.7	27	
1,2-Dibromoethane	1	0.025	0.0	0.0289	116	0.0269	107	67.1 - 125		7.51	20	
1,2-Dichlorobenzene	1	0.025	0.0	0.0267	107	0.0231	92.4	68.2 - 123		14.4	20	
1,2-Dichloroethane	1	0.025	0.0	0.0224	89.6	0.0201	80.6	60 - 126		10.6	20	
1,2-Dichloropropane	1	0.025	0.0	0.0247	98.9	0.0221	88.3	64.2 - 123		11.3	20	
1,3,5-Trimethylbenzene	1	0.025	0.0	0.0267	107	0.0241	96.2	63.6 - 132		10.5	20.5	
1,3-Dichlorobenzene	1	0.025	0.0	0.0276	110	0.0257	103	63.1 - 131		6.82	20	
1,4-Dichlorobenzene	1	0.025	0.0	0.0260	104	0.0228	91.3	68.6 - 123		13	20	
2-Butanone (MEK)	1	0.125	0.0	0.1113	89	0.1026	82.1	22.4 - 138		8.12	27	
2-Hexanone	1	0.125	0.0	0.1388	111	0.1262	101	43.3 - 137		9.53	25.5	
4-Methyl-2-pentanone (MIBK)	1	0.125	0.0	0.1326	106	0.1191	95.3	60.8 - 140		10.7	25.1	
Acetone	1	0.125	0.0035	0.1006	77.6	0.0883	67.8	10 - 130		13	27.9	
Acrylonitrile	1	0.125	0.0	0.1247	99.7	0.1139	91.1	49.4 - 133		9.03	25.3	
Benzene	1	0.025	0.0	0.0222	88.7	0.0204	81.7	54.3 - 133		8.27	20	
Bromobenzene	1	0.025	0.0	0.0243	97.4	0.0221	88.3	63.9 - 124		9.72	20	
Bromochloromethane	1	0.025	0.0	0.0255	102	0.0241	96.6	66.5 - 122		5.32	20.8	
Bromodichloromethane	1	0.025	0.0	0.0240	96	0.0216	86.3	63.9 - 121		10.6	20	
Bromoform	1	0.025	0.0	0.0319	128	0.0298	119	59.5 - 134		6.89	20.5	
Bromomethane	1	0.025	0.0	0.0156	62.3	0.0146	58.5	41.7 - 155		6.31	21.9	
Carbon disulfide	1	0.025	0.0	0.0247	98.9	0.0225	90	43.3 - 149		9.4	20.3	
Carbon tetrachloride	1	0.025	0.0	0.0261	105	0.0241	96.5	55.7 - 134		7.96	20	
Chlorobenzene	1	0.025	0.0	0.0273	109	0.0253	101	67 - 125		7.26	20	
Chlorodibromomethane	1	0.025	0.0	0.0283	113	0.0264	106	64.3 - 125		6.83	20.8	
Chloroethane	1	0.025	0.0	0.0214	85.5	0.0197	79	51.5 - 136		7.95	40	
Chloroform	1	0.025	0.0	0.0233	93.3	0.0215	86.2	63 - 129		7.97	20	
Chloromethane	1	0.025	0.0	0.0188	75.1	0.0176	70.3	42.4 - 135		6.48	20	

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Fax (615) 758-5859
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Quality Control Summary
SDG: L672140
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Volatile Organic Compounds by Method 8260B		
Project No:	ST010022.0026	Matrix:	Water - mg/L
Project:	KMEP / Silvercroft	EPA ID:	TN00003
Collection Date:	12/3/2013	**Analytic Batch:**	**WG696195**
Analysis Date:	12/9/2013 2:01:00 PM	Analyst:	611
Instrument ID:	VOCMS7		
Sample Numbers:	L672140-01, -02		

Matrix Spike / Matrix Spike Duplicate

L672648-01

Analyte	Dil	Spike Value	Sample	MS	% Rec	MSD	% Rec	Control Limits	% Rec Qual	RPD	Control Limits	RPD Qual
cis-1,2-Dichloroethene	1	0.025	0.0	0.0238	95.1	0.0213	85.2	59.2 - 129		10.9	20	
cis-1,3-Dichloropropene	1	0.025	0.0	0.0245	97.9	0.0216	86.5	66.4 - 125		12.4	20	
Dibromomethane	1	0.025	0.0	0.0264	106	0.0236	94.4	68.2 - 124		11.3	20	
Dichlorodifluoromethane	1	0.025	0.0	0.0235	93.9	0.0220	87.9	40.6 - 144		6.61	20.2	
Di-isopropyl ether	1	0.025	0.0	0.0206	82.6	0.0190	75.8	56.9 - 136		8.51	20	
Ethylbenzene	1	0.025	0.0	0.0271	109	0.0250	100	61.4 - 133		8.28	20	
Hexachloro-1,3-butadiene	1	0.025	0.0	0.0201	80.3	0.0176	70.5	55.1 - 136		13	23.6	
Iodomethane	1	0.125	0.0	0.1240	99.2	0.1112	88.9	49.7 - 132		10.9	20	
Methyl tert-butyl ether	1	0.025	0.0005	0.0224	87.6	0.0199	77.7	57.7 - 134		11.7	20	
Methylene Chloride	1	0.025	0.0	0.0218	87.1	0.0201	80.2	58.1 - 122		8.19	20	
Naphthalene	1	0.025	0.0005	0.0209	81.5	0.0180	69.9	58 - 135		14.9	25.5	
n-Butylbenzene	1	0.025	0.0	0.0239	95.5	0.0204	81.6	62.7 - 140		15.6	20.3	
n-Propylbenzene	1	0.025	0.0	0.0264	106	0.0244	97.6	65.9 - 131		7.9	20	
sec-Butylbenzene	1	0.025	0.0	0.0263	105	0.0239	95.8	62.2 - 136		9.24	20.3	
Styrene	1	0.025	0.0	0.0279	112	0.0257	103	66.8 - 133		8.23	20	
tert-Butylbenzene	1	0.025	0.0	0.0270	108	0.0244	97.6	63.3 - 134		9.98	21	
Tetrachloroethene	1	0.025	0.0	0.0318	127	0.0295	118	53 - 139		7.37	20	
Toluene	1	0.025	0.0	0.0246	98.4	0.0223	89.3	61.4 - 130		9.74	20	
trans-1,2-Dichloroethene	1	0.025	0.0	0.0247	98.7	0.0221	88.3	56.5 - 129		11.1	20	
trans-1,3-Dichloropropene	1	0.025	0.0	0.0263	105	0.0236	94.3	64.1 - 128		11	20	
trans-1,4-Dichloro-2-butene	1	0.025	0.0	0.0244	97.7	0.0225	90.1	57.1 - 130		8.08	23.9	
Trichloroethene	1	0.025	0.0	0.0276	110	0.0252	101	44.1 - 149		9.09	20	
Trichlorofluoromethane	1	0.025	0.0	0.0224	89.5	0.0205	82	49.6 - 145		8.74	21.2	
Vinyl acetate	1	0.125	0.0	0.1062	85	0.0944	75.5	56.1 - 149		11.8	22.7	
Vinyl chloride	1	0.025	0.0	0.0223	89.3	0.0206	82.2	47.8 - 137		8.3	20	
Xylenes, Total	1	0.075	0.0012	0.0803	105	0.0746	98	63.3 - 131		7.28	20	

Parameters in bold text are reported in this SDG

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(800) 767-5859
Fax (615) 758-5859
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Quality Control Summary
SDG: L672140
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Volatile Organic Compounds by Method 8260B		
Project No:	ST010022.0026	Matrix:	Water - mg/L
Project:	KMEP / Silvercroft	EPA ID:	TN00003
Collection Date:	12/3/2013	**Analytic Batch:**	**WG695850**
Analysis Date:	12/6/2013 10:34:00 PM	Analyst:	611
Instrument ID:	VOCMS8		
Sample Numbers:	L672140-01, -02		

Internal Standard Response and Retention Time Summary

File ID: 1206_02
Analyzed: 12/06/13 150400

	DCB		DFB		BCP		PFB	
	Response	**RT**	**Response**	**RT**	**Response**	**RT**	**Response**	**RT**
12 Hr. Std	222217	8.54	420721	4.95	71649	6.13	247945	4.60
Upper Limit	444000	9.04	841000	5.45	143000	6.63	496000	5.10
Lower Limit	111000	8.04	210000	4.45	35800	5.63	124000	4.10
Sample ID	**Response**	**RT**	**Response**	**RT**	**Response**	**RT**	**Response**	**RT**
L672140-01	184485	8.54	391458	4.94	67114	6.14	227803	4.60
L672140-02	181617	8.55	402233	4.94	64322	6.14	236205	4.60
MSD WG695850	219842	8.54	457924	4.95	77326	6.14	258396	4.61
MS WG695850	222602	8.54	443701	4.95	72144	6.14	254642	4.60
LCSD WG695850	210871	8.55	440283	4.95	72454	6.14	256101	4.61
LCS WG695850	219579	8.54	456374	4.94	74925	6.14	262135	4.60
BLANK WG695850	178230	8.54	386290	4.94	64281	6.14	227251	4.60

Legend:
DCB -- 1,4-Dichlorobenzene-d4
DFB -- 1,4-Difluorobenzene
BCP -- 2-Bromo-1-Chloropropane
PFB -- Pentafluorobenzene

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L672140
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Volatile Organic Compounds by Method 8260B		
Project No:	ST010022.0026	Matrix:	Water - mg/L
Project:	KMEP / Silvercroft	EPA ID:	TN00003
Collection Date:	12/3/2013	**Analytic Batch:**	**WG696195**
Analysis Date:	12/9/2013 2:01:00 PM	Analyst:	611
Instrument ID:	VOCMS7		
Sample Numbers:	L672140-01, -02		

Internal Standard Response and Retention Time Summary

File ID: 1209_02
Analyzed: 12/09/13 093500

	DCB		DFB		BCP		PFB	
	Response	**RT**	**Response**	**RT**	**Response**	**RT**	**Response**	**RT**
12 Hr. Std	233661	8.16	485344	4.60	68993	5.76	319778	4.27
Upper Limit	467000	8.66	971000	5.10	138000	6.26	640000	4.77
Lower Limit	117000	7.66	243000	4.10	34500	5.26	160000	3.77
Sample ID	**Response**	**RT**	**Response**	**RT**	**Response**	**RT**	**Response**	**RT**
L672140-01 20X	225343	8.16	468159	4.60	64796	5.76	312998	4.27
L672140-02 10X	221258	8.15	458852	4.60	65781	5.76	306676	4.27
MSD WG696195	190756	8.15	435940	4.60	59504	5.76	285199	4.27
MS WG696195	193080	8.16	435567	4.60	61071	5.76	284666	4.27
LCSD WG696195	229833	8.16	480727	4.60	66730	5.76	315121	4.27
LCS WG696195	228049	8.16	474818	4.60	66862	5.76	310573	4.27
BLANK WG696195	233053	8.15	475748	4.60	66783	5.76	318969	4.27

Legend:
DCB -- 1,4-Dichlorobenzene-d4
DFB -- 1,4-Difluorobenzene
BCP -- 2-Bromo-1-Chloropropane
PFB -- Pentafluorobenzene

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L672140
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Volatile Organic Compounds by Method 8260B		
Project No:	ST010022.0026	Matrix:	Water - mg/L
Project:	KMEP / Silvercroft	EPA ID:	TN00003
Collection Date:	12/3/2013	**Analytic Batch:**	**WG695850**
Analysis Date:	12/6/2013 10:34:00 PM	Analyst:	611
Instrument ID:	VOCMS8		
Sample Numbers:	L672140-01, -02		

Surrogate Summary

			BFB		DFM		TD8		TFT	
Laboratory Sample ID	Instrument	File ID	ppm	% Rec	ppm	% Rec	ppm	% Rec	ppm	% Rec
L672140-01	VOCMS8	1206_11	0.0363	90.8	0.0375	93.8	0.0400	99.9		
L672140-02	VOCMS8	1206_16	0.0372	93.0	0.0362	90.5	0.0398	99.5		
LCS WG695850	VOCMS8	1206_03	0.0385	96.2	0.0368	92.0	0.0405	101	0.0404	101
LCSD WG695850	VOCMS8	1206_04	0.0374	93.6	0.0360	90.1	0.0402	100	0.0403	101
MS WG695850	VOCMS8	1206_06	0.0396	99.0	0.0366	91.5	0.0400	100	0.0397	99.1
MSD WG695850	VOCMS8	1206_07	0.0356	89.1	0.0370	92.5	0.0398	99.4	0.0390	97.6
BLANK WG695850	VOCMS8	1206_09	0.0363	90.8	0.0360	90.0	0.0400	100	0.0407	102

BFB --4-BROMOFLUOROBENZENE	True Value: 0.04 ppm	Limits: 71 - 126
DFM --DIBROMOFLUOROMETHANE	True Value: 0.04 ppm	Limits: 78.3 - 121
TD8 --TOLUENE-D8	True Value: 0.04 ppm	Limits: 88.50 - 111
TFT --A,A,A-TRIFLUOROTOLUENE	True Value: 0.04 ppm	Limits: 85 - 114

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Quality Control Summary
SDG: L672140
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Volatile Organic Compounds by Method 8260B		
Project No:	ST010022.0026	Matrix:	Water - mg/L
Project:	KMEP / Silvercroft	EPA ID:	TN00003
Collection Date:	12/3/2013	**Analytic Batch:**	**WG696195**
Analysis Date:	12/9/2013 2:01:00 PM	Analyst:	611
Instrument ID:	VOCMS7		
Sample Numbers:	L672140-01, -02		

Surrogate Summary

			BFB		DFM		TD8		TFT	
Laboratory Sample ID	Instrument	File ID	ppm	% Rec	ppm	% Rec	ppm	% Rec	ppm	% Rec
L672140-01 20x	VOCMS7	1209_15	0.0422	105	0.0384	95.9	0.0401	100		
L672140-02 10x	VOCMS7	1209_16	0.0413	103	0.0383	95.8	0.0402	100		
LCS WG696195	VOCMS7	1209_03	0.0421	105	0.0383	95.8	0.0400	100	0.0446	112
LCSD WG696195	VOCMS7	1209_04	0.0431	108	0.0378	94.4	0.0404	101	0.0443	111
MS WG696195	VOCMS7	1209_08	0.0413	103	0.0381	95.2	0.0403	101	0.0438	109
MSD WG696195	VOCMS7	1209_09	0.0421	105	0.0384	95.9	0.0405	101	0.0444	111
BLANK WG696195	VOCMS7	1209_11	0.0427	107	0.0376	94.1	0.0406	101	0.0451	113

BFB --4-BROMOFLUOROBENZENE	True Value: 0.04 ppm	Limits: 71 - 126
DFM --DIBROMOFLUOROMETHANE	True Value: 0.04 ppm	Limits: 78.3 - 121
TD8 --TOLUENE-D8	True Value: 0.04 ppm	Limits: 88.50 - 111
TFT --A,A,A-TRIFLUOROTOLUENE	True Value: 0.04 ppm	Limits: 85 - 114

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Quality Control Summary
SDG: L672140
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Diesel Range Organics California by Method 3511/8015		
Project No:	ST010022.0026	Matrix:	Water - mg/L
Project:	KMEP / Silvercroft	EPA ID:	TN00003
Collection Date:	12/3/2013	**Analytic Batch:**	**WG696056**
Analysis Date:	12/9/2013 5:29:00 PM	Analyst:	187
Instrument ID:	SVGC27	Prep Date:	12/7/2013
Sample Numbers:	L672140-01, -02		

Method Blank

Analyte	CAS	RDL	Qualifier
C12-C22 Hydrocarbons		< 0.100	
C22-C32 Hydrocarbons		< 0.100	
C32-C40 Hydrocarbons		< 0.100	

Laboratory Control Sample (LCS)

Analyte	Dil	True Value	Found	% Rec	Control Limits	Qual
C12-C22 Hydrocarbons	1	0.75	0.8093	108	50 - 150	
C22-C32 Hydrocarbons	1	0.75	0.8457	113	50 - 150	

Laboratory Control Sample Duplicate (LCSD)

Analyte	Dil	True Value	Found	% Rec	Control Limits	Qual
C12-C22 Hydrocarbons	1	0.75	0.8178	109	50 - 150	
C22-C32 Hydrocarbons	1	0.75	0.8275	110	50 - 150	

Laboratory Control Sample / Laboratory Control Sample Duplicate

Analyte	Dil	Spike	LCS	% Rec	LCSD	% Rec	Control Limits	% Rec Qual	% RPD	Control Limits	RPD Qual
C12-C22 Hydrocarbons	1	0.75	0.8093	108	0.8178	109	50 - 150		1.04	20	
C22-C32 Hydrocarbons	1	0.75	0.8457	113	0.8275	110	50 - 150		2.19	20	

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L672140
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Diesel Range Organics California by Method 3511/8015		
Project No:	ST010022.0026	Matrix:	Water - mg/L
Project:	KMEP / Silvercroft	EPA ID:	TN00003
Collection Date:	12/3/2013	**Analytic Batch:**	**WG696056**
Analysis Date:	12/9/2013 5:29:00 PM	Analyst:	187
Instrument ID:	SVGC27	Prep Date:	12/7/2013
Sample Numbers:	L672140-01, -02		

Surrogate Summary

Laboratory Sample ID	Instrument	File ID	o-Terphenyl ppb	o-Terphenyl % Rec
L672140-01	SVGC27	1209_16	19.7	98.5
L672140-02	SVGC27	1209_17	19.9	99.6
BLANK WG696056	SVGC27	1209_05	20.0	99.9
LCS WG696056	SVGC27	1209_06	21.4	107
LCSD WG696056	SVGC27	1209_07	19.9	99.4

o-Terphenyl --O-TERPHENYL True Value: 0 ppb Limits: 50 - 150

Company Name/Address:
Kinder Morgan
Attn: Paul Salcido

Billing Information: KMEP / ARCADIS

Report to: SASCHA ARNOLD

Email To: SASCHA.ARNOLD@ARCADIS-US.COM

Project Description: KMEP / SILVERCROFT

City/State Collected: TUCSON, AZ

Phone: 480-905-9311
Fax:

Client Project # ST010022.0026

Lab Project #

Collected by (print): MARK HAMMER

Site/Facility ID #

P.O. #

Collected by (signature): Mark Hammer
Immediately Packed on Ice N ___ Y X
480 236-1292

Rush? (Lab MUST Be Notified)
___ Same Day 200%
___ Next Day 100%
___ Two Day 50%
___ Three Day 25%

Date Results Needed

Email? ___No ___Yes
FAX? ___No ___Yes

Analysis / Container / Preservative

Chain of Custody Page 1 of 1

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Fax: 615-758-5859

L# L672141

Table # E250

Acctnum: KINARCPAZ

Template:

Prelogin:

TSR:

Cooler:

Shipped Via:

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	8260B VOCs +MTBE, TBA, TAME/ 40mL amber/ HCl	8015AZ (C10-C32)/ 40mL amber/ HCl	RCRA8 metals/ 500mL HDPE/ HNO3	pH, Flashpoint/ 250mL amber/ No Pres	Rem./Contaminant	Sample # (lab only)
P-4502	Comp/G	GW		12/3/13	15:15	8	X	X	X	X		01
P-7008	Comp/G	GW		12/3/13	15:35	8	X	X	X	X		02

* Matrix: SS - Soil GW - Groundwater WW - WasteWater DW - Drinking Water OT - Other_____

Remarks: 5040 0635 7575

pH _____ Temp _____
Flow _____ Other _____

Hold #

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)
Mark Hammer	12/4/13	11:45	Emily Vance
Emily Vance	12/4/13	1830	FedEx
			Received for lab by: (Signature)

Samples returned via: ☐ UPS ☑ FedEx ☐ Courier ☐ ____

Temp: 3.1 °C Bottles Received: 16

Date: 12/5/13 Time: 0830

Condition: (lab use only) OK

COC Seal Intact: ___Y ___N ___NA

pH Checked: ✓

NCF:

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Quality Control Summary
SDG: L673687

For: Kinder Morgan - Rocklin, CA-AZ Work
KMEP: Silvercroft

L673687

Lab SampleID.	Client ID
L673687-01	P-4047

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Quality Control Summary
SDG: L673687

For: Kinder Morgan - Rocklin, CA-AZ Work
Project: KMEP: Silvercroft
December 19, 2013

Sample Receiving and Handling

All sample aliquots were received at the correct temperature, in the proper containers, and with the appropriate preservatives. Method specified holding times were not met for analyses on pH samples.

pH by Method 9040C

Laboratory Control Sample

Sample L673687-01 was analyzed in analytical batch WG697432. The laboratory control sample associated with this sample was within the laboratory control limits for all target analytes reported from this batch. The relative percent difference was within laboratory limits for all target analytes reported from this batch.

Sample Duplicate Analysis

For analytical batch WG697432 sample duplicate analysis was performed on sample L673652-01. The relative percent differences were within the method limits for target analytes reported from this batch.

Matrix Spike/Matrix Spike Duplicate

Precision for batch WG697432 was evaluated using the LCS/LCSD. The RPDs were within method limits.

Flashpoint by Method D93/1010A

Laboratory Control Sample

Sample L673687-01 was analyzed in analytical batch WG697782. The laboratory control sample associated with this sample was within the laboratory control limits for all target analytes reported from this batch. The relative percent difference was within laboratory limits for all target analytes reported from this batch.

Sample Duplicate Analysis

For analytical batch WG697782 sample duplicate analysis was performed on sample L673342-01. The relative percent differences were within the method limits for target analytes reported from this batch.

For analytical batch WG697782 sample duplicate analysis was performed on sample L673342-02. The relative percent differences were within the method limits for target analytes reported from this batch.

For analytical batch WG697782 sample duplicate analysis was performed on sample L673342-03. The relative percent differences were within the method limits for target analytes reported from this batch.

Matrix Spike/Matrix Spike Duplicate

Precision for batch WG697782 was evaluated using the LCS/LCSD. The RPDs were within method limits.

Mercury by Method 7470A

Laboratory Control Sample

Sample L673687-01 was analyzed in analytical batch WG697443. The laboratory control sample associated with this sample was within the laboratory control limits for all target analytes reported from this batch.

Sample Duplicate Analysis

For analytical batch WG697443 sample duplicate analysis was performed on sample L673779-01. The relative percent differences were within the method limits for target analytes reported from this batch.

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Quality Control Summary
SDG: L673687
For: Kinder Morgan - Rocklin, CA-AZ Work
Project: KMEP: Silvercroft
December 19, 2013

Matrix Spike/Matrix Spike Duplicate
For analytical batch WG697443 matrix spike/matrix spike duplicate analysis was performed on sample L673779-01. The matrix spike recoveries and relative percent differences were within laboratory control limits for all target analytes reported from this batch.

Blank Analysis
The method blank, the initial, and all continuing calibration blanks contained no analytes at concentrations above the method reporting limit.

Trace Metals by Method 6010B
Laboratory Control Sample
Sample L673687-01 was analyzed in analytical batch WG697230. The laboratory control sample associated with this sample was within the laboratory control limits for all target analytes reported from this batch.

Sample Duplicate Analysis
For analytical batch WG697230 sample duplicate analysis was performed on sample L673645-09. The relative percent differences were within the method limits for target analytes reported from this batch.

Matrix Spike/Matrix Spike Duplicate
For analytical batch WG697230 matrix spike/matrix spike duplicate analysis was performed on sample L673645-09. The matrix spike recoveries and relative percent differences were within laboratory control limits for all target analytes reported from this batch.

Blank Analysis
The method blank, the initial, and all continuing calibration blanks contained no analytes at concentrations above the method reporting limit.

Volatile Organic Compounds by Method 8260B
Laboratory Control Sample
Sample L673687-01 was analyzed in analytical batch WG697169. The laboratory control sample associated with this sample was within the laboratory control limits for all target analytes reported from this batch. The relative percent difference was within laboratory limits for all target analytes reported from this batch.

Sample L673687-01 was analyzed in analytical batch WG697653. The laboratory control sample associated with this sample was within the laboratory control limits for all target analytes reported from this batch. The relative percent difference was within laboratory limits for all target analytes reported from this batch.

Matrix Spike/Matrix Spike Duplicate
For analytical batch WG697169 matrix spike/matrix spike duplicate analysis was performed on sample L673718-02. The matrix spike recoveries were within laboratory control limits for all target analytes reported from this batch. The relative percent difference exceeded laboratory limits for 1,1,1-Trichloroethane, 1,1-Dichloroethane, 1,2-Dichloroethane, 2-Butanone (MEK), 4-Methyl-2-pentanone (MIBK), Acrylonitrile, Benzene, Bromochloromethane, Bromodichloromethane, Bromomethane, Carbon disulfide, Carbon tetrachloride, cis-1,2-Dichloroethene, cis-1,3-Dichloropropene, Dibromomethane, Di-isopropyl ether, Iodomethane, Methyl tert-butyl ether, Methylene Chloride, trans-1,2-Dichloroethene, trans-1,3-Dichloropropene, Trichloroethene, Trichlorofluoromethane, Vinyl acetate, and Vinyl chloride.

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Quality Control Summary
SDG: L673687

For: Kinder Morgan - Rocklin, CA-AZ Work
Project: KMEP: Silvercroft
December 19, 2013

For analytical batch WG697653 matrix spike/matrix spike duplicate analysis was performed on sample L673719-03. The matrix spike recoveries and relative percent differences were within laboratory control limits for all target analytes reported from this batch.

Blank Analysis
The method blank, the initial, and all continuing calibration blanks contained no analytes at concentrations above the method reporting limit.

Diesel Range Organics California by Method 3511/8015
Laboratory Control Sample
Sample L673687-01 was analyzed in analytical batch WG697136. The laboratory control sample associated with this sample was within the laboratory control limits for all target analytes reported from this batch. The relative percent difference was within laboratory limits for all target analytes reported from this batch.

Matrix Spike/Matrix Spike Duplicate
Precision for batch WG697136 was evaluated using the LCS/LCSD. The RPDs were within method limits.

Blank Analysis
The method blank, the initial, and all continuing calibration blanks contained no analytes at concentrations above the method reporting limit.

Nancy F. McLain
ESC Representative
ESC Lab Sciences

12065 Lebanon Rd.
Mt. Juliet, TN 37122
(615) 758-5858
1-800-767-5859
Fax (615) 758-5859

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Bob Forsberg / Sasha Arnold
ARCADIS
14201 N. 87th Street, Suite 135
Scottsdale, AZ 85260

Report Summary

Wednesday December 18, 2013

Report Number: L673687
Samples Received: 12/13/13
Client Project: ST010022.0026

Description: KMEP Silvercroft Wash

The analytical results in this report are based upon information supplied by you, the client, and are for your exclusive use. If you have any questions regarding this data package, please do not hesitate to call.

Entire Report Reviewed By: Jarred Willis , ESC Representative

Laboratory Certification Numbers

A2LA - 1461-01, AIHA - 100789, AL - 40660, CA - 01157CA, CT - PH-0197, FL - E87487, GA - 923, IN - C-TN-01, KY - 90010, KYUST - 0016, NC - ENV375/DW21704/BIO041, ND - R-140. NJ - TN002, NJ NELAP - TN002, SC - 84004, TN - 2006, VA - 460132, WV - 233, AZ - 0612, MN - 047-999-395, NY - 11742, WI - 998093910, NV - TN000032011-1, TX - T104704245-11-3, OK - 9915, PA - 68-02979, IA Lab #364, EPA - TN002

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Note: The use of the preparatory EPA Method 3511 is not approved or endorsed by the CA ELAP.

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Quality Control Summary
SDG: L673687

For: Kinder Morgan - Rocklin, CA-AZ Work
KMEP: Silvercroft

L673687

Lab SampleID.	Client ID
L673687-01	P-4047

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SAMPLE NUMBER
P-4047

Customer :	Kinder Morgan - Rocklin, CA-AZ Work	Project :	ST010022.0026
Source :	SILVERCROFT	Date Sampled :	12/11/2013 3:00 PM
Location :	KMEP: Silvercroft	Sampled By :	SXA
Lab Sample ID :	**L673687-01**	Date Received :	12/13/2013

D93/1010A

Analytic Batch: WG697782 | Analysis Date: 12/18/2013 | Analysis Time: 1:24 PM
Instrument: NONE | Analyst: 599 | Preparation Date: 12/18/2013 11:00
Method: D93/1010A | Dilution: 1

CAS NO	Analyte	RL deg F	RESULTS deg F	FLAG
	Flashpoint		**SEE FOOTNOTE**	

9040C

Analytic Batch: WG697432 | Analysis Date: 12/17/2013 | Analysis Time: 10:15
Instrument: AB15+ ACCU | Analyst: 519 | Preparation Date: 12/17/2013 9:40
Method: 9040C | Dilution: 1

CAS NO	Analyte	RL su	RESULTS su	FLAG
00010-29-7	pH		**7.6**	H3

7470A

Analytic Batch: WG697443 | Analysis Date: 12/17/2013 | Analysis Time: 9:36
Instrument: CVAA3 | Analyst: 572 | Preparation Date: 12/16/2013 12:37
Method: 7470A | Dilution: 1

CAS NO	Analyte	RL mg/l	RESULTS mg/l	FLAG
7439-97-6	Mercury	0.00020	< 0.00020	

Comments:
1) Sample results are reported as rounded values.
2) These results are applicable only to the items tested.

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SAMPLE NUMBER
P-4047

Customer :	Kinder Morgan - Rocklin, CA-AZ Work	Project :	ST010022.0026
Source :	SILVERCROFT	Date Sampled :	12/11/2013 3:00 PM
Location :	KMEP: Silvercroft	Sampled By :	SXA
Lab Sample ID :	**L673687-01**	Date Received :	12/13/2013

6010B

Analytic Batch: WG697230 | Analysis Date: 12/15/2013 | Analysis Time: 4:38
Instrument: ICP5 | Analyst: 178 | Preparation Date: 12/14/2013 3:02
Method: 6010B | Dilution: 1

CAS NO	Analyte	RL mg/l	RESULTS mg/l	FLAG
7440-38-2	Arsenic	0.020	< 0.020	
7440-39-3	Barium	0.0050	**0.052**	
7440-43-9	Cadmium	0.0050	< 0.0050	
7440-47-3	Chromium	0.010	< 0.010	
7439-92-1	Lead	0.0050	< 0.0050	
7782-49-2	Selenium	0.020	< 0.020	
7440-22-4	Silver	0.010	< 0.010	

8260B

Analytic Batch: WG697169 | Analysis Date: 12/14/2013 | Analysis Time: 10:59
Instrument: VOCMS21 | Analyst: 611 | Preparation Date: 12/13/2013 4:38
Method: 8260B | Dilution: 20

CAS NO	Analyte	RL mg/l	RESULTS mg/l	FLAG
67-64-1	Acetone	1.0	< 1.0	
107-13-1	Acrylonitrile	0.20	< 0.20	
71-43-2	Benzene	0.020	**0.18**	
108-86-1	Bromobenzene	0.020	< 0.020	
74-97-5	Bromochloromethane	0.020	< 0.020	
75-27-4	Bromodichloromethane	0.020	< 0.020	
75-25-2	Bromoform	0.020	< 0.020	
74-83-9	Bromomethane	0.10	< 0.10	
104-51-8	n-Butylbenzene	0.020	< 0.020	
135-98-8	sec-Butylbenzene	0.020	< 0.020	
98-06-6	tert-Butylbenzene	0.020	< 0.020	
56-23-5	Carbon tetrachloride	0.020	< 0.020	
75-15-0	Carbon disulfide	0.020	< 0.020	
108-90-7	Chlorobenzene	0.020	< 0.020	
124-48-1	Chlorodibromomethane	0.020	< 0.020	
75-00-3	Chloroethane	0.10	< 0.10	
67-66-3	Chloroform	0.10	< 0.10	
74-87-3	Chloromethane	0.050	< 0.050	

Comments: 1) Sample results are reported as rounded values.
2) These results are applicable only to the items tested.

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SAMPLE NUMBER
P-4047

Customer :	Kinder Morgan - Rocklin, CA-AZ Work	Project :	ST010022.0026
Source :	SILVERCROFT	Date Sampled :	12/11/2013 3:00 PM
Location :	KMEP: Silvercroft	Sampled By :	SXA
Lab Sample ID :	**L673687-01**	Date Received :	12/13/2013

8260B

Analytic Batch: WG697169 | Analysis Date: 12/14/2013 | Analysis Time: 10:59
Instrument: VOCMS21 | Analyst: 611 | Preparation Date: 12/13/2013 4:38
Method: 8260B | Dilution: 20

CAS NO	Analyte	RL mg/l	RESULTS mg/l	FLAG
96-12-8	1,2-Dibromo-3-Chloropropane	0.10	< 0.10	
106-93-4	1,2-Dibromoethane	0.020	< 0.020	
74-95-3	Dibromomethane	0.020	< 0.020	
95-50-1	1,2-Dichlorobenzene	0.020	< 0.020	
541-73-1	1,3-Dichlorobenzene	0.020	< 0.020	
106-46-7	1,4-Dichlorobenzene	0.020	< 0.020	
110-57-6	trans-1,4-Dichloro-2-butene	0.050	< 0.050	
75-71-8	Dichlorodifluoromethane	0.10	< 0.10	
75-34-3	1,1-Dichloroethane	0.020	< 0.020	
107-06-2	1,2-Dichloroethane	0.020	< 0.020	
75-35-4	1,1-Dichloroethene	0.020	< 0.020	
156-59-2	cis-1,2-Dichloroethene	0.020	< 0.020	
156-60-5	trans-1,2-Dichloroethene	0.020	< 0.020	
78-87-5	1,2-Dichloropropane	0.020	< 0.020	
10061-01-5	cis-1,3-Dichloropropene	0.020	< 0.020	
10061-02-6	trans-1,3-Dichloropropene	0.020	< 0.020	
100-41-4	Ethylbenzene	0.020	< 0.020	
87-68-3	Hexachloro-1,3-butadiene	0.020	< 0.020	
591-78-6	2-Hexanone	0.20	< 0.20	
78-93-3	2-Butanone (MEK)	0.20	< 0.20	
74-88-4	Iodomethane	0.20	< 0.20	
75-09-2	Methylene Chloride	0.10	< 0.10	
108-10-1	4-Methyl-2-pentanone (MIBK)	0.20	< 0.20	
91-20-3	Naphthalene	0.10	< 0.10	
103-65-1	n-Propylbenzene	0.020	< 0.020	
100-42-5	Styrene	0.020	< 0.020	
630-20-6	1,1,1,2-Tetrachloroethane	0.020	< 0.020	
79-34-5	1,1,2,2-Tetrachloroethane	0.020	< 0.020	
76-13-1	1,1,2-Trichlorotrifluoroethane	0.020	< 0.020	
127-18-4	Tetrachloroethene	0.020	< 0.020	
108-88-3	Toluene	0.10	< 0.10	
120-82-1	1,2,4-Trichlorobenzene	0.020	< 0.020	
71-55-6	1,1,1-Trichloroethane	0.020	< 0.020	

Comments: 1) Sample results are reported as rounded values.
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SAMPLE NUMBER
P-4047

Customer :	Kinder Morgan - Rocklin, CA-AZ Work	Project :	ST010022.0026
Source :	SILVERCROFT	Date Sampled :	12/11/2013 3:00 PM
Location :	KMEP: Silvercroft	Sampled By :	SXA
Lab Sample ID :	**L673687-01**	Date Received :	12/13/2013

8260B

Analytic Batch: WG697169 | Analysis Date: 12/14/2013 | Analysis Time: 10:59
Instrument: VOCMS21 | Analyst: 611 | Preparation Date: 12/13/2013 4:38
Method: 8260B | Dilution: 20

CAS NO	Analyte	RL mg/l	RESULTS mg/l	FLAG
79-00-5	1,1,2-Trichloroethane	0.020	< 0.020	
79-01-6	Trichloroethene	0.020	< 0.020	
75-69-4	Trichlorofluoromethane	0.10	< 0.10	
96-18-4	1,2,3-Trichloropropane	0.050	< 0.050	
95-63-6	1,2,4-Trimethylbenzene	0.020	< 0.020	
108-67-8	1,3,5-Trimethylbenzene	0.020	< 0.020	
108-05-4	Vinyl acetate	0.20	< 0.20	
75-01-4	Vinyl chloride	0.020	< 0.020	
1330-20-7	Xylenes, Total	0.060	< 0.060	
108-20-3	Di-isopropyl ether	0.020	< 0.020	
64-17-5	Ethanol	2.0	< 2.0	
637-92-3	Ethyl tert-butyl ether	0.020	< 0.020	
1634-04-4	Methyl tert-butyl ether	0.020	**3.5**	

Surrogates

Analyte	PERCENT RECOVERY	QUALIFIERS	FLAG
Toluene-d8	**101**		
Dibromofluoromethane	**104**		
4-Bromofluorobenzene	**93.7**		

Comments: 1) Sample results are reported as rounded values.
2) These results are applicable only to the items tested.

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SAMPLE NUMBER
P-4047

Customer :	Kinder Morgan - Rocklin, CA-AZ Work	Project :	ST010022.0026
Source :	SILVERCROFT	Date Sampled :	12/11/2013 3:00 PM
Location :	KMEP: Silvercroft	Sampled By :	SXA
Lab Sample ID :	**L673687-01**	Date Received :	12/13/2013

8260B

Analytic Batch: WG697653 | Analysis Date: 12/17/2013 | Analysis Time: 6:45 PM
Instrument: VOCMS7 | Analyst: 611 | Preparation Date: 12/17/2013 9:46
Method: 8260B | Dilution: 500

CAS NO	Analyte	RL mg/l	RESULTS mg/l	FLAG
75-65-0	tert-Butyl alcohol	2.5	**11**	
994-05-8	tert-Amyl Methyl Ether	0.50	**0.62**	

3511/8015

Analytic Batch: WG697136 | Analysis Date: 12/16/2013 | Analysis Time: 7:23 PM
Instrument: SVGC27 | Analyst: 187 | Preparation Date: 12/14/2013 1:17
Method: 3511/8015 | Dilution: 1

CAS NO	Analyte	RL mg/l	RESULTS mg/l	FLAG
	C12-C22 Hydrocarbons	0.10	**0.16**	
	C22-C32 Hydrocarbons	0.10	**0.12**	
	C32-C40 Hydrocarbons	0.10	< 0.10	

Surrogates

Analyte	PERCENT RECOVERY	QUALIFIERS	FLAG
o-Terphenyl	**96.6**		

LEGEND

RL - Reporting Limit
Did Not Flash @ 170 F
7.6@10.2c

QUALIFIERS

H3 - Sample was received and / or analysis requested past holding time.

Comments: 1) Sample results are reported as rounded values.
2) These results are applicable only to the items tested.

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Quality Control Summary
SDG: L673687
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Flashpoint by Method D93/1010A		
Project No:	ST010022.0026	Matrix:	Water - mg/L
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	12/11/2013	**Analytic Batch:**	**WG697782**
Analysis Date:	12/18/2013 1:24:00 PM	Analyst:	599
Instrument ID:	NONE		
Sample Numbers:	L673687-01		

Laboratory Control Sample (LCS)

Analyte	Dil	True Value	Found	% Rec	Control Limits	Qual
Flashpoint	1	82	81	98.8	96 - 104	

Laboratory Control Sample Duplicate (LCSD)

Analyte	Dil	True Value	Found	% Rec	Control Limits	Qual
Flashpoint	1	82	81	98.8	96 - 104	

Laboratory Control Sample / Laboratory Control Sample Duplicate

Analyte	Dil	Spike	LCS	% Rec	LCSD	% Rec	Control Limits	% Rec Qual	% RPD	Control Limits	RPD Qual
Flashpoint	1	82	81	98.8	81	98.8	96 - 104		0	7	

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L673687
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Flashpoint by Method D93/1010A		
Project No:	ST010022.0026	Matrix:	Water - mg/L
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	12/11/2013	**Analytic Batch:**	**WG697782**
Analysis Date:	12/18/2013 1:24:00 PM	Analyst:	599
Instrument ID:	NONE		
Sample Numbers:	L673687-01		

Sample Duplicate

L673342-01

Analyte	Dil	Sample Result	DUP Result	% RPD	Limit	Qualifier
Flashpoint	1	0.0	0.0	0	20	

Sample Duplicate

L673342-02

Analyte	Dil	Sample Result	DUP Result	% RPD	Limit	Qualifier
Flashpoint	1	0.0	0.0	0	20	

Sample Duplicate

L673342-03

Analyte	Dil	Sample Result	DUP Result	% RPD	Limit	Qualifier
Flashpoint	1	0.0	0.0	0	20	

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Quality Control Summary
SDG: L673687
Kinder Morgan - Rocklin, CA-AZ Work

Test:	pH by Method 9040C		
Project No:	ST010022.0026	Matrix:	Water - mg/L
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	12/11/2013	**Analytic Batch:**	**WG697432**
Analysis Date:	12/17/2013 10:15:00 AM	Analyst:	519
Instrument ID:	AB15+ ACCU		
Sample Numbers:	L673687-01		

Laboratory Control Sample (LCS)

Analyte	Dil	True Value	Found	% Rec	Control Limits	Qual
pH	1	5.93	5.9	99.5	98.3 - 101.7	

Laboratory Control Sample Duplicate (LCSD)

Analyte	Dil	True Value	Found	% Rec	Control Limits	Qual
pH	1	5.93	5.9	99.5	98.3 - 101.7	

Laboratory Control Sample / Laboratory Control Sample Duplicate

Analyte	Dil	Spike	LCS	% Rec	LCSD	% Rec	Control Limits	% Rec Qual	% RPD	Control Limits	RPD Qual
pH	1	5.93	5.9	99.5	5.9	99.5	98.3 - 101.7		0	20	

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L673687
Kinder Morgan - Rocklin, CA-AZ Work

Test:	pH by Method 9040C		
Project No:	ST010022.0026	Matrix:	Water - mg/L
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	12/11/2013	**Analytic Batch:**	**WG697432**
Analysis Date:	12/17/2013 10:15:00 AM	Analyst:	519
Instrument ID:	AB15+ ACCU		
Sample Numbers:	L673687-01		

Sample Duplicate

L673652-01

Analyte	Dil	Sample Result	DUP Result	% RPD	Limit	Qualifier
pH	1	8.1	8.12	0.25	1	

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L673687
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Mercury by Method 7470A		
Project No:	ST010022.0026	Matrix:	Water - ug/L
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	12/11/2013	**Analytic Batch:**	**WG697443**
Analysis Date:	12/17/2013 9:36:00 AM	Analyst:	572
Instrument ID:	CVAA3	Prep Date:	12/16/2013
Sample Numbers:	L673687-01		

Method Blank

Analyte	CAS	RDL	Qualifier
Mercury	7439-97-6	< 0.200	

Laboratory Control Sample (LCS)

Analyte	Dil	True Value	Found	% Rec	Control Limits	Qual
Mercury	1	3	2.9241	97	85 - 115	

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L673687
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Mercury by Method 7470A		
Project No:	ST010022.0026	Matrix:	Water - ug/L
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	12/11/2013	**Analytic Batch:**	**WG697443**
Analysis Date:	12/17/2013 9:36:00 AM	Analyst:	572
Instrument ID:	CVAA3	Prep Date:	12/16/2013
Sample Numbers:	L673687-01		

Sample Duplicate

L673779-01

Analyte	Dil	Sample Result	DUP Result	% RPD	Limit	Qualifier
Mercury	1	<0.2	<0.2		20	

Serial Dilution

L673779-01

Analyte	Dil	Sample Result	SD Result	% RPD	Limit	Qualifier
Mercury	5	<0.2	<1		10	

Matrix Spike / Matrix Spike Duplicate

L673779-01

Analyte	Dil	Spike Value	Sample	MS	% Rec	MSD	% Rec	Control Limits	% Rec Qual	RPD	Control Limits	RPD Qual
Mercury	1	3	0.0282	3.0538	101	2.9503	97	80 - 120		3	20	

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L673687
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Trace Metals by Method 6010B		
Project No:	ST010022.0026	Matrix:	Water - mg/L
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	12/11/2013	**Analytic Batch:**	**WG697230**
Analysis Date:	12/15/2013 4:38:00 AM	Analyst:	178
Instrument ID:	ICP5	Prep Date:	12/13/2013
Sample Numbers:	L673687-01		

Method Blank

Analyte	CAS	RDL	Qualifier
Arsenic	7440-38-2	< 0.0200	
Barium	7440-39-3	< 0.00500	
Cadmium	7440-43-9	< 0.00500	
Chromium	7440-47-3	< 0.0100	
Lead	7439-92-1	< 0.00500	
Selenium	7782-49-2	< 0.0200	
Silver	7440-22-4	< 0.0100	

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L673687
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Trace Metals by Method 6010B		
Project No:	ST010022.0026	Matrix:	Water - mg/L
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	12/11/2013	**Analytic Batch:**	**WG697230**
Analysis Date:	12/15/2013 4:38:00 AM	Analyst:	178
Instrument ID:	ICP5	Prep Date:	12/13/2013
Sample Numbers:	L673687-01		

Laboratory Control Sample (LCS)

Analyte	Dil	True Value	Found	% Rec	Control Limits	Qual
Arsenic	1	1	1.051	105	85 - 115	
Barium	1	1	1.0941	109	85 - 115	
Cadmium	1	1	1.0900	109	85 - 115	
Chromium	1	1	1.0826	108	85 - 115	
Lead	1	1	1.1051	111	85 - 115	
Selenium	1	1	1.0660	107	85 - 115	
Silver	1	1	1.0295	103	85 - 115	

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L673687
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Trace Metals by Method 6010B		
Project No:	ST010022.0026	Matrix:	Water - mg/L
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	12/11/2013	**Analytic Batch:**	**WG697230**
Analysis Date:	12/15/2013 4:38:00 AM	Analyst:	178
Instrument ID:	ICP5	Prep Date:	12/13/2013
Sample Numbers:	L673687-01		

Sample Duplicate

L673645-09

Analyte	Dil	Sample Result	DUP Result	% RPD	Limit	Qualifier
Arsenic	1	<0.02	<0.02		20	
Barium	1	<0.005	<0.005		20	
Cadmium	1	<0.005	<0.005		20	
Chromium	1	<0.01	<0.01		20	
Lead	1	<0.005	<0.005		20	
Selenium	1	<0.02	<0.02		20	
Silver	1	<0.01	<0.01		20	

Serial Dilution

L673645-09

Analyte	Dil	Sample Result	SD Result	% RPD	Limit	Qualifier
Arsenic	5	<0.02	<0.1		10	
Barium	5	<0.005	<0.025		10	
Cadmium	5	<0.005	<0.025		10	
Chromium	5	<0.01	<0.05		10	
Lead	5	<0.005	<0.025		10	
Selenium	5	<0.02	<0.1		10	
Silver	5	<0.01	<0.05		10	

Matrix Spike / Matrix Spike Duplicate

L673645-09

Analyte	Dil	Spike Value	Sample	MS	% Rec	MSD	% Rec	Control Limits	% Rec Qual	RPD	Control Limits	RPD Qual
Arsenic	1	1	0.0049	1.0148	101	1.0559	105	75 - 125		4	20	
Barium	1	1	0.0003	1.0557	106	1.0727	107	75 - 125		2	20	
Cadmium	1	1	0.0001	1.0524	105	1.0654	107	75 - 125		1	20	
Chromium	1	1	0.000	1.0448	104	1.0736	107	75 - 125		3	20	
Lead	1	1	-0.003	1.0681	107	1.1008	110	75 - 125		3	20	
Selenium	1	1	0.0045	1.0352	103	1.0759	107	75 - 125		4	20	
Silver	1	1	0.0013	0.9905	99	1.0043	100	75 - 125		1	20	

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L673687
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Trace Metals by Method 6010B		
Project No:	ST010022.0026	Matrix:	Water - mg/L
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	12/11/2013	**Analytic Batch:**	**WG697230**
Analysis Date:	12/15/2013 4:38:00 AM	Analyst:	178
Instrument ID:	ICP5	Prep Date:	12/13/2013
Sample Numbers:	L673687-01		

Post Digest Spike

L673645-09

Analyte	Dil	Spike Value	Sample	Result	% Rec	Control Limits	Qualifier
Arsenic	1	1.12	0.0049	1.1270	100	75-125	
Barium	1	1.12	0.0003	1.1745	105	75-125	
Cadmium	1	1.12	0.0001	1.1718	105	75-125	
Chromium	1	1.12	0.000	1.1620	104	75-125	
Lead	1	1.12	-0.003	1.1850	106	75-125	
Selenium	1	1.12	0.0045	1.1452	102	75-125	
Silver	1	1.12	0.0013	1.1061	99	75-125	

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Quality Control Summary
SDG: L673687
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Volatile Organic Compounds by Method 8260B		
Project No:	ST010022.0026	Matrix:	Water - mg/L
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	12/11/2013	**Analytic Batch:**	**WG697169**
Analysis Date:	12/14/2013 10:59:00 PM	Analyst:	611
Instrument ID:	VOCMS21		
Sample Numbers:	L673687-01		

Method Blank

Analyte	CAS	RDL	Qualifier
1,1,1,2-Tetrachloroethane	630-20-6	< 0.00100	
1,1,1-Trichloroethane	71-55-6	< 0.00100	
1,1,2,2-Tetrachloroethane	79-34-5	< 0.00100	
1,1,2-Trichloroethane	79-00-5	< 0.00100	
1,1,2-Trichlorotrifluoroethane	76-13-1	< 0.00100	
1,1-Dichloroethane	75-34-3	< 0.00100	
1,1-Dichloroethene	75-35-4	< 0.00100	
1,2,3-Trichloropropane	96-18-4	< 0.00250	
1,2,4-Trichlorobenzene	120-82-1	< 0.00100	
1,2,4-Trimethylbenzene	95-63-6	< 0.00100	
1,2-Dibromo-3-Chloropropane	96-12-8	< 0.00500	
1,2-Dibromoethane	106-93-4	< 0.00100	
1,2-Dichlorobenzene	95-50-1	< 0.00100	
1,2-Dichloroethane	107-06-2	< 0.00100	
1,2-Dichloropropane	78-87-5	< 0.00100	
1,3,5-Trimethylbenzene	108-67-8	< 0.00100	
1,3-Dichlorobenzene	541-73-1	< 0.00100	
1,4-Dichlorobenzene	106-46-7	< 0.00100	
2-Butanone (MEK)	78-93-3	< 0.0100	
2-Hexanone	591-78-6	< 0.0100	
4-Methyl-2-pentanone (MIBK)	108-10-1	< 0.0100	
Acetone	67-64-1	< 0.0500	
Acrylonitrile	107-13-1	< 0.0100	
Benzene	71-43-2	< 0.00100	
Bromobenzene	108-86-1	< 0.00100	
Bromochloromethane	74-97-5	< 0.00100	
Bromodichloromethane	75-27-4	< 0.00100	
Bromoform	75-25-2	< 0.00100	
Bromomethane	74-83-9	< 0.00500	
Carbon disulfide	75-15-0	< 0.00100	
Carbon tetrachloride	56-23-5	< 0.00100	
Chlorobenzene	108-90-7	< 0.00100	
Chlorodibromomethane	124-48-1	< 0.00100	
Chloroethane	75-00-3	< 0.00500	
Chloroform	67-66-3	< 0.00500	
Chloromethane	74-87-3	< 0.00250	
cis-1,2-Dichloroethene	156-59-2	< 0.00100	

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L673687
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Volatile Organic Compounds by Method 8260B		
Project No:	ST010022.0026	Matrix:	Water - mg/L
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	12/11/2013	**Analytic Batch:**	**WG697169**
Analysis Date:	12/14/2013 10:59:00 PM	Analyst:	611
Instrument ID:	VOCMS21		
Sample Numbers:	L673687-01		

Method Blank

Analyte	CAS	RDL	Qualifier
cis-1,3-Dichloropropene	10061-01-5	< 0.00100	
Dibromomethane	74-95-3	< 0.00100	
Dichlorodifluoromethane	75-71-8	< 0.00500	
Di-isopropyl ether	108-20-3	< 0.00100	
Ethanol	64-17-5	< 0.100	
Ethyl tert-butyl ether	637-92-3	< 0.00100	
Ethylbenzene	100-41-4	< 0.00100	
Hexachloro-1,3-butadiene	87-68-3	< 0.00100	
Iodomethane	74-88-4	< 0.0100	
Methyl tert-butyl ether	1634-04-4	< 0.00100	
Methylene Chloride	75-09-2	< 0.00500	
Naphthalene	91-20-3	< 0.00500	
n-Butylbenzene	104-51-8	< 0.00100	
n-Propylbenzene	103-65-1	< 0.00100	
sec-Butylbenzene	135-98-8	< 0.00100	
Styrene	100-42-5	< 0.00100	
tert-Amyl Methyl Ether	994-05-8	< 0.00100	
tert-Butyl alcohol	75-65-0	< 0.00500	
tert-Butylbenzene	98-06-6	< 0.00100	
Tetrachloroethene	127-18-4	< 0.00100	
Toluene	108-88-3	< 0.00500	
trans-1,2-Dichloroethene	156-60-5	< 0.00100	
trans-1,3-Dichloropropene	10061-02-6	< 0.00100	
trans-1,4-Dichloro-2-butene	110-57-6	< 0.00250	
Trichloroethene	79-01-6	< 0.00100	
Trichlorofluoromethane	75-69-4	< 0.00500	
Vinyl acetate	108-05-4	< 0.0100	
Vinyl chloride	75-01-4	< 0.00100	
Xylenes, Total	1330-20-7	< 0.00300	

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L673687
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Volatile Organic Compounds by Method 8260B		
Project No:	ST010022.0026	Matrix:	Water - mg/L
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	12/11/2013	**Analytic Batch:**	**WG697653**
Analysis Date:	12/17/2013 6:45:00 PM	Analyst:	611
Instrument ID:	VOCMS7		
Sample Numbers:	L673687-01		

Method Blank

Analyte	CAS	RDL	Qualifier
1,1,1,2-Tetrachloroethane	630-20-6	< 0.00100	
1,1,1-Trichloroethane	71-55-6	< 0.00100	
1,1,2,2-Tetrachloroethane	79-34-5	< 0.00100	
1,1,2-Trichloroethane	79-00-5	< 0.00100	
1,1,2-Trichlorotrifluoroethane	76-13-1	< 0.00100	
1,1-Dichloroethane	75-34-3	< 0.00100	
1,1-Dichloroethene	75-35-4	< 0.00100	
1,2,3-Trichloropropane	96-18-4	< 0.00250	
1,2,4-Trichlorobenzene	120-82-1	< 0.00100	
1,2,4-Trimethylbenzene	95-63-6	< 0.00100	
1,2-Dibromo-3-Chloropropane	96-12-8	< 0.00500	
1,2-Dibromoethane	106-93-4	< 0.00100	
1,2-Dichlorobenzene	95-50-1	< 0.00100	
1,2-Dichloroethane	107-06-2	< 0.00100	
1,2-Dichloropropane	78-87-5	< 0.00100	
1,3,5-Trimethylbenzene	108-67-8	< 0.00100	
1,3-Dichlorobenzene	541-73-1	< 0.00100	
1,4-Dichlorobenzene	106-46-7	< 0.00100	
2-Butanone (MEK)	78-93-3	< 0.0100	
2-Hexanone	591-78-6	< 0.0100	
4-Methyl-2-pentanone (MIBK)	108-10-1	< 0.0100	
Acetone	67-64-1	< 0.0500	
Acrylonitrile	107-13-1	< 0.0100	
Benzene	71-43-2	< 0.00100	
Bromobenzene	108-86-1	< 0.00100	
Bromochloromethane	74-97-5	< 0.00100	
Bromodichloromethane	75-27-4	< 0.00100	
Bromoform	75-25-2	< 0.00100	
Bromomethane	74-83-9	< 0.00500	
Carbon disulfide	75-15-0	< 0.00100	
Carbon tetrachloride	56-23-5	< 0.00100	
Chlorobenzene	108-90-7	< 0.00100	
Chlorodibromomethane	124-48-1	< 0.00100	
Chloroethane	75-00-3	< 0.00500	
Chloroform	67-66-3	< 0.00500	
Chloromethane	74-87-3	< 0.00250	
cis-1,2-Dichloroethene	156-59-2	< 0.00100	

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L673687
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Volatile Organic Compounds by Method 8260B		
Project No:	ST010022.0026	Matrix:	Water - mg/L
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	12/11/2013	**Analytic Batch:**	**WG697653**
Analysis Date:	12/17/2013 6:45:00 PM	Analyst:	611
Instrument ID:	VOCMS7		
Sample Numbers:	L673687-01		

Method Blank

Analyte	CAS	RDL	Qualifier
cis-1,3-Dichloropropene	10061-01-5	< 0.00100	
Dibromomethane	74-95-3	< 0.00100	
Dichlorodifluoromethane	75-71-8	< 0.00500	
Di-isopropyl ether	108-20-3	< 0.00100	
Ethanol	64-17-5	< 0.100	
Ethyl tert-butyl ether	637-92-3	< 0.00100	
Ethylbenzene	100-41-4	< 0.00100	
Hexachloro-1,3-butadiene	87-68-3	< 0.00100	
Iodomethane	74-88-4	< 0.0100	
Methyl tert-butyl ether	1634-04-4	< 0.00100	
Methylene Chloride	75-09-2	< 0.00500	
Naphthalene	91-20-3	< 0.00500	
n-Butylbenzene	104-51-8	< 0.00100	
n-Propylbenzene	103-65-1	< 0.00100	
sec-Butylbenzene	135-98-8	< 0.00100	
Styrene	100-42-5	< 0.00100	
tert-Amyl Methyl Ether	994-05-8	< 0.00100	
tert-Butyl alcohol	75-65-0	< 0.00500	
tert-Butylbenzene	98-06-6	< 0.00100	
Tetrachloroethene	127-18-4	< 0.00100	
Toluene	108-88-3	< 0.00500	
trans-1,2-Dichloroethene	156-60-5	< 0.00100	
trans-1,3-Dichloropropene	10061-02-6	< 0.00100	
trans-1,4-Dichloro-2-butene	110-57-6	< 0.00250	
Trichloroethene	79-01-6	< 0.00100	
Trichlorofluoromethane	75-69-4	< 0.00500	
Vinyl acetate	108-05-4	< 0.0100	
Vinyl chloride	75-01-4	< 0.00100	
Xylenes, Total	1330-20-7	< 0.00300	

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L673687
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Volatile Organic Compounds by Method 8260B		
Project No:	ST010022.0026	Matrix:	Water - mg/L
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	12/11/2013	**Analytic Batch:**	**WG697169**
Analysis Date:	12/14/2013 10:59:00 PM	Analyst:	611
Instrument ID:	VOCMS21		
Sample Numbers:	L673687-01		

Laboratory Control Sample (LCS)

Analyte	Dil	True Value	Found	% Rec	Control Limits	Qual
1,1,1,2-Tetrachloroethane	1	0.025	0.0256	103	74.2 - 124	
1,1,1-Trichloroethane	1	0.025	0.0247	98.6	73.2 - 123	
1,1,2,2-Tetrachloroethane	1	0.025	0.0242	96.9	70.7 - 122	
1,1,2-Trichloroethane	1	0.025	0.0255	102	77.7 - 118	
1,1,2-Trichlorotrifluoroethane	1	0.025	0.0247	98.8	67.2 - 143	
1,1-Dichloroethane	1	0.025	0.0251	100	70.7 - 126	
1,1-Dichloroethene	1	0.025	0.0241	96.2	67.8 - 129	
1,2,3-Trichloropropane	1	0.025	0.0251	100	71.8 - 121	
1,2,4-Trichlorobenzene	1	0.025	0.0268	107	69.7 - 136	
1,2,4-Trimethylbenzene	1	0.025	0.0240	95.9	75 - 123	
1,2-Dibromo-3-Chloropropane	1	0.025	0.0223	89.2	65.4 - 128	
1,2-Dibromoethane	1	0.025	0.0256	103	76.6 - 121	
1,2-Dichlorobenzene	1	0.025	0.0244	97.5	78.4 - 117	
1,2-Dichloroethane	1	0.025	0.0236	94.2	68.8 - 124	
1,2-Dichloropropane	1	0.025	0.0252	101	76.5 - 119	
1,3,5-Trimethylbenzene	1	0.025	0.0246	98.4	75.6 - 124	
1,3-Dichlorobenzene	1	0.025	0.0247	98.9	70.8 - 128	
1,4-Dichlorobenzene	1	0.025	0.0246	98.3	78.8 - 115	
2-Butanone (MEK)	1	0.125	0.1138	91.1	55 - 149	
2-Hexanone	1	0.125	0.1255	100	65.6 - 144	
4-Methyl-2-pentanone (MIBK)	1	0.125	0.1277	102	70.5 - 133	
Acetone	1	0.125	0.1146	91.7	35.6 - 163	
Acrylonitrile	1	0.125	0.1244	99.6	55.2 - 130	
Benzene	1	0.025	0.0232	92.9	74.8 - 121	
Bromobenzene	1	0.025	0.0239	95.5	77.5 - 116	
Bromochloromethane	1	0.025	0.0254	101	77.6 - 119	
Bromodichloromethane	1	0.025	0.0241	96.3	75.1 - 116	
Bromoform	1	0.025	0.0262	105	67.5 - 130	
Bromomethane	1	0.025	0.0236	94.5	49.9 - 162	
Carbon disulfide	1	0.025	0.0231	92.4	64.6 - 140	
Carbon tetrachloride	1	0.025	0.0256	102	70.2 - 123	
Chlorobenzene	1	0.025	0.0252	101	78.1 - 119	
Chlorodibromomethane	1	0.025	0.0249	99.6	74 - 121	
Chloroethane	1	0.025	0.0258	103	61.7 - 135	
Chloroform	1	0.025	0.0251	101	76 - 121	
Chloromethane	1	0.025	0.0224	89.6	61.5 - 129	

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L673687
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Volatile Organic Compounds by Method 8260B		
Project No:	ST010022.0026	Matrix:	Water - mg/L
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	12/11/2013	**Analytic Batch:**	**WG697169**
Analysis Date:	12/14/2013 10:59:00 PM	Analyst:	611
Instrument ID:	VOCMS21		
Sample Numbers:	L673687-01		

Laboratory Control Sample (LCS)

Analyte	Dil	True Value	Found	% Rec	Control Limits	Qual
cis-1,2-Dichloroethene	1	0.025	0.0250	99.9	76 - 119	
cis-1,3-Dichloropropene	1	0.025	0.0258	103	78.2 - 120	
Dibromomethane	1	0.025	0.0252	101	79.5 - 118	
Dichlorodifluoromethane	1	0.025	0.0240	95.8	54.8 - 135	
Di-isopropyl ether	1	0.025	0.0232	92.8	65.6 - 132	
Ethylbenzene	1	0.025	0.0251	100	78.8 - 122	
Hexachloro-1,3-butadiene	1	0.025	0.0233	93.1	64.7 - 129	
Iodomethane	1	0.125	0.1265	101	61 - 130	
Methyl tert-butyl ether	1	0.025	0.0232	93	71.2 - 126	
Methylene Chloride	1	0.025	0.0233	93.3	70.3 - 120	
Naphthalene	1	0.025	0.0235	93.9	68.4 - 128	
n-Butylbenzene	1	0.025	0.0251	100	76.2 - 126	
n-Propylbenzene	1	0.025	0.0247	99	78.2 - 122	
sec-Butylbenzene	1	0.025	0.0244	97.7	74.4 - 127	
Styrene	1	0.025	0.0271	108	80.4 - 126	
tert-Butylbenzene	1	0.025	0.0248	99.1	75.3 - 126	
Tetrachloroethene	1	0.025	0.0262	105	72.6 - 126	
Toluene	1	0.025	0.0237	94.8	79.7 - 116	
trans-1,2-Dichloroethene	1	0.025	0.0244	97.6	72.6 - 121	
trans-1,3-Dichloropropene	1	0.025	0.0261	105	74.3 - 123	
trans-1,4-Dichloro-2-butene	1	0.025	0.0227	90.7	65.1 - 123	
Trichloroethene	1	0.025	0.0252	101	77.7 - 118	
Trichlorofluoromethane	1	0.025	0.0254	102	63.5 - 135	
Vinyl acetate	1	0.125	0.1175	94	65 - 138	
Vinyl chloride	1	0.025	0.0244	97.8	65.9 - 128	
Xylenes, Total	1	0.075	0.0741	98.8	78.7 - 121	

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L673687
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Volatile Organic Compounds by Method 8260B		
Project No:	ST010022.0026	Matrix:	Water - mg/L
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	12/11/2013	**Analytic Batch:**	**WG697169**
Analysis Date:	12/14/2013 10:59:00 PM	Analyst:	611
Instrument ID:	VOCMS21		
Sample Numbers:	L673687-01		

Laboratory Control Sample Duplicate (LCSD)

Analyte	Dil	True Value	Found	% Rec	Control Limits	Qual
1,1,1,2-Tetrachloroethane	1	0.025	0.0265	106	74.2 - 124	
1,1,1-Trichloroethane	1	0.025	0.0258	103	73.2 - 123	
1,1,2,2-Tetrachloroethane	1	0.025	0.0259	104	70.7 - 122	
1,1,2-Trichloroethane	1	0.025	0.0264	106	77.7 - 118	
1,1,2-Trichlorotrifluoroethane	1	0.025	0.0261	104	67.2 - 143	
1,1-Dichloroethane	1	0.025	0.0258	103	70.7 - 126	
1,1-Dichloroethene	1	0.025	0.0250	100	67.8 - 129	
1,2,3-Trichloropropane	1	0.025	0.0262	105	71.8 - 121	
1,2,4-Trichlorobenzene	1	0.025	0.0281	112	69.7 - 136	
1,2,4-Trimethylbenzene	1	0.025	0.0251	100	75 - 123	
1,2-Dibromo-3-Chloropropane	1	0.025	0.0236	94.3	65.4 - 128	
1,2-Dibromoethane	1	0.025	0.0261	104	76.6 - 121	
1,2-Dichlorobenzene	1	0.025	0.0246	98.4	78.4 - 117	
1,2-Dichloroethane	1	0.025	0.0239	95.5	68.8 - 124	
1,2-Dichloropropane	1	0.025	0.0254	101	76.5 - 119	
1,3,5-Trimethylbenzene	1	0.025	0.0257	103	75.6 - 124	
1,3-Dichlorobenzene	1	0.025	0.0258	103	70.8 - 128	
1,4-Dichlorobenzene	1	0.025	0.0246	98.6	78.8 - 115	
2-Butanone (MEK)	1	0.125	0.1271	102	55 - 149	
2-Hexanone	1	0.125	0.1356	108	65.6 - 144	
4-Methyl-2-pentanone (MIBK)	1	0.125	0.1390	111	70.5 - 133	
Acetone	1	0.125	0.1244	99.5	35.6 - 163	
Acrylonitrile	1	0.125	0.1338	107	55.2 - 130	
Benzene	1	0.025	0.0239	95.8	74.8 - 121	
Bromobenzene	1	0.025	0.0249	99.8	77.5 - 116	
Bromochloromethane	1	0.025	0.0260	104	77.6 - 119	
Bromodichloromethane	1	0.025	0.0247	99	75.1 - 116	
Bromoform	1	0.025	0.0279	112	67.5 - 130	
Bromomethane	1	0.025	0.0243	97.1	49.9 - 162	
Carbon disulfide	1	0.025	0.0240	95.9	64.6 - 140	
Carbon tetrachloride	1	0.025	0.0263	105	70.2 - 123	
Chlorobenzene	1	0.025	0.0260	104	78.1 - 119	
Chlorodibromomethane	1	0.025	0.0253	101	74 - 121	
Chloroethane	1	0.025	0.0254	102	61.7 - 135	
Chloroform	1	0.025	0.0258	103	76 - 121	
Chloromethane	1	0.025	0.0231	92.3	61.5 - 129	

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Quality Control Summary
SDG: L673687
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Volatile Organic Compounds by Method 8260B		
Project No:	ST010022.0026	Matrix:	Water - mg/L
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	12/11/2013	**Analytic Batch:**	**WG697169**
Analysis Date:	12/14/2013 10:59:00 PM	Analyst:	611
Instrument ID:	VOCMS21		
Sample Numbers:	L673687-01		

Laboratory Control Sample Duplicate (LCSD)

Analyte	Dil	True Value	Found	% Rec	Control Limits	Qual
cis-1,2-Dichloroethene	1	0.025	0.0254	102	76 - 119	
cis-1,3-Dichloropropene	1	0.025	0.0266	106	78.2 - 120	
Dibromomethane	1	0.025	0.0255	102	79.5 - 118	
Dichlorodifluoromethane	1	0.025	0.0250	100	54.8 - 135	
Di-isopropyl ether	1	0.025	0.0234	93.6	65.6 - 132	
Ethylbenzene	1	0.025	0.0266	107	78.8 - 122	
Hexachloro-1,3-butadiene	1	0.025	0.0242	96.7	64.7 - 129	
Iodomethane	1	0.125	0.1295	104	61 - 130	
Methyl tert-butyl ether	1	0.025	0.0239	95.7	71.2 - 126	
Methylene Chloride	1	0.025	0.0242	96.6	70.3 - 120	
Naphthalene	1	0.025	0.0245	98.2	68.4 - 128	
n-Butylbenzene	1	0.025	0.0257	103	76.2 - 126	
n-Propylbenzene	1	0.025	0.0260	104	78.2 - 122	
sec-Butylbenzene	1	0.025	0.0258	103	74.4 - 127	
Styrene	1	0.025	0.0273	109	80.4 - 126	
tert-Butylbenzene	1	0.025	0.0258	103	75.3 - 126	
Tetrachloroethene	1	0.025	0.0278	111	72.6 - 126	
Toluene	1	0.025	0.0245	98.1	79.7 - 116	
trans-1,2-Dichloroethene	1	0.025	0.0255	102	72.6 - 121	
trans-1,3-Dichloropropene	1	0.025	0.0263	105	74.3 - 123	
trans-1,4-Dichloro-2-butene	1	0.025	0.0236	94.4	65.1 - 123	
Trichloroethene	1	0.025	0.0264	106	77.7 - 118	
Trichlorofluoromethane	1	0.025	0.0262	105	63.5 - 135	
Vinyl acetate	1	0.125	0.1207	96.6	65 - 138	
Vinyl chloride	1	0.025	0.0252	101	65.9 - 128	
Xylenes, Total	1	0.075	0.0766	102	78.7 - 121	

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L673687
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Volatile Organic Compounds by Method 8260B		
Project No:	ST010022.0026	Matrix:	Water - mg/L
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	12/11/2013	**Analytic Batch:**	**WG697169**
Analysis Date:	12/14/2013 10:59:00 PM	Analyst:	611
Instrument ID:	VOCMS21		
Sample Numbers:	L673687-01		

Laboratory Control Sample / Laboratory Control Sample Duplicate

Analyte	Dil	Spike	LCS	% Rec	LCSD	% Rec	Control Limits	% Rec Qual	% RPD	Control Limits	RPD Qual
1,1,1,2-Tetrachloroethane	1	0.025	0.0256	103	0.0265	106	74.2 - 124		3.23	20	
1,1,1-Trichloroethane	1	0.025	0.0247	98.6	0.0258	103	73.2 - 123		4.51	20	
1,1,2,2-Tetrachloroethane	1	0.025	0.0242	96.9	0.0259	104	70.7 - 122		6.85	20	
1,1,2-Trichloroethane	1	0.025	0.0255	102	0.0264	106	77.7 - 118		3.58	20	
1,1,2-Trichlorotrifluoroethane	1	0.025	0.0247	98.8	0.0261	104	67.2 - 143		5.58	20	
1,1-Dichloroethane	1	0.025	0.0251	100	0.0258	103	70.7 - 126		2.84	20	
1,1-Dichloroethene	1	0.025	0.0241	96.2	0.0250	100	67.8 - 129		3.86	20	
1,2,3-Trichloropropane	1	0.025	0.0251	100	0.0262	105	71.8 - 121		4.37	20	
1,2,4-Trichlorobenzene	1	0.025	0.0268	107	0.0281	112	69.7 - 136		4.43	20	
1,2,4-Trimethylbenzene	1	0.025	0.0240	95.9	0.0251	100	75 - 123		4.7	20	
1,2-Dibromo-3-Chloropropane	1	0.025	0.0223	89.2	0.0236	94.3	65.4 - 128		5.56	20	
1,2-Dibromoethane	1	0.025	0.0256	103	0.0261	104	76.6 - 121		1.9	20	
1,2-Dichlorobenzene	1	0.025	0.0244	97.5	0.0246	98.4	78.4 - 117		0.9	20	
1,2-Dichloroethane	1	0.025	0.0236	94.2	0.0239	95.5	68.8 - 124		1.38	20	
1,2-Dichloropropane	1	0.025	0.0252	101	0.0254	101	76.5 - 119		0.55	20	
1,3,5-Trimethylbenzene	1	0.025	0.0246	98.4	0.0257	103	75.6 - 124		4.26	20	
1,3-Dichlorobenzene	1	0.025	0.0247	98.9	0.0258	103	70.8 - 128		4.35	20	
1,4-Dichlorobenzene	1	0.025	0.0246	98.3	0.0246	98.6	78.8 - 115		0.27	20	
2-Butanone (MEK)	1	0.125	0.1138	91.1	0.1271	102	55 - 149		11	20	
2-Hexanone	1	0.125	0.1255	100	0.1356	108	65.6 - 144		7.7	20	
4-Methyl-2-pentanone (MIBK)	1	0.125	0.1277	102	0.1390	111	70.5 - 133		8.44	20	
Acetone	1	0.125	0.1146	91.7	0.1244	99.5	35.6 - 163		8.23	23.9	
Acrylonitrile	1	0.125	0.1244	99.6	0.1338	107	55.2 - 130		7.24	20	
Benzene	1	0.025	0.0232	92.9	0.0239	95.8	74.8 - 121		3.08	20	
Bromobenzene	1	0.025	0.0239	95.5	0.0249	99.8	77.5 - 116		4.35	20	
Bromochloromethane	1	0.025	0.0254	101	0.0260	104	77.6 - 119		2.45	20	
Bromodichloromethane	1	0.025	0.0241	96.3	0.0247	99	75.1 - 116		2.7	20	
Bromoform	1	0.025	0.0262	105	0.0279	112	67.5 - 130		6.45	20	
Bromomethane	1	0.025	0.0236	94.5	0.0243	97.1	49.9 - 162		2.73	20	
Carbon disulfide	1	0.025	0.0231	92.4	0.0240	95.9	64.6 - 140		3.69	20	
Carbon tetrachloride	1	0.025	0.0256	102	0.0263	105	70.2 - 123		2.9	20	
Chlorobenzene	1	0.025	0.0252	101	0.0260	104	78.1 - 119		3.02	20	
Chlorodibromomethane	1	0.025	0.0249	99.6	0.0253	101	74 - 121		1.56	20	
Chloroethane	1	0.025	0.0258	103	0.0254	102	61.7 - 135		1.67	20	
Chloroform	1	0.025	0.0251	101	0.0258	103	76 - 121		2.48	20	
Chloromethane	1	0.025	0.0224	89.6	0.0231	92.3	61.5 - 129		3.02	20	

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Quality Control Summary
SDG: L673687
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Volatile Organic Compounds by Method 8260B		
Project No:	ST010022.0026	Matrix:	Water - mg/L
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	12/11/2013	**Analytic Batch:**	**WG697169**
Analysis Date:	12/14/2013 10:59:00 PM	Analyst:	611
Instrument ID:	VOCMS21		
Sample Numbers:	L673687-01		

Laboratory Control Sample / Laboratory Control Sample Duplicate

Analyte	Dil	Spike	LCS	% Rec	LCSD	% Rec	Control Limits	% Rec Qual	% RPD	Control Limits	RPD Qual
cis-1,2-Dichloroethene	1	0.025	0.0250	99.9	0.0254	102	76 - 119		1.78	20	
cis-1,3-Dichloropropene	1	0.025	0.0258	103	0.0266	106	78.2 - 120		2.74	20	
Dibromomethane	1	0.025	0.0252	101	0.0255	102	79.5 - 118		0.98	20	
Dichlorodifluoromethane	1	0.025	0.0240	95.8	0.0250	100	54.8 - 135		4.35	20	
Di-isopropyl ether	1	0.025	0.0232	92.8	0.0234	93.6	65.6 - 132		0.89	20	
Ethylbenzene	1	0.025	0.0251	100	0.0266	107	78.8 - 122		5.86	20	
Hexachloro-1,3-butadiene	1	0.025	0.0233	93.1	0.0242	96.7	64.7 - 129		3.8	20	
Iodomethane	1	0.125	0.1265	101	0.1295	104	61 - 130		2.38	20	
Methyl tert-butyl ether	1	0.025	0.0232	93	0.0239	95.7	71.2 - 126		2.9	20	
Methylene Chloride	1	0.025	0.0233	93.3	0.0242	96.6	70.3 - 120		3.45	20	
Naphthalene	1	0.025	0.0235	93.9	0.0245	98.2	68.4 - 128		4.48	20	
n-Butylbenzene	1	0.025	0.0251	100	0.0257	103	76.2 - 126		2.24	20	
n-Propylbenzene	1	0.025	0.0247	99	0.0260	104	78.2 - 122		5.07	20	
sec-Butylbenzene	1	0.025	0.0244	97.7	0.0258	103	74.4 - 127		5.65	20	
Styrene	1	0.025	0.0271	108	0.0273	109	80.4 - 126		0.72	20	
tert-Butylbenzene	1	0.025	0.0248	99.1	0.0258	103	75.3 - 126		4.13	20	
Tetrachloroethene	1	0.025	0.0262	105	0.0278	111	72.6 - 126		6.03	20	
Toluene	1	0.025	0.0237	94.8	0.0245	98.1	79.7 - 116		3.42	20	
trans-1,2-Dichloroethene	1	0.025	0.0244	97.6	0.0255	102	72.6 - 121		4.32	20	
trans-1,3-Dichloropropene	1	0.025	0.0261	105	0.0263	105	74.3 - 123		0.59	20	
trans-1,4-Dichloro-2-butene	1	0.025	0.0227	90.7	0.0236	94.4	65.1 - 123		3.99	20	
Trichloroethene	1	0.025	0.0252	101	0.0264	106	77.7 - 118		4.87	20	
Trichlorofluoromethane	1	0.025	0.0254	102	0.0262	105	63.5 - 135		3.26	20	
Vinyl acetate	1	0.125	0.1175	94	0.1207	96.6	65 - 138		2.72	20	
Vinyl chloride	1	0.025	0.0244	97.8	0.0252	101	65.9 - 128		3.03	20	
Xylenes, Total	1	0.075	0.0741	98.8	0.0766	102	78.7 - 121		3.32	20	

Parameters in bold text are reported in this SDG

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(800) 767-5859
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Est. 1970

Quality Control Summary
SDG: L673687
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Volatile Organic Compounds by Method 8260B		
Project No:	ST010022.0026	Matrix:	Water - mg/L
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	12/11/2013	**Analytic Batch:**	**WG697653**
Analysis Date:	12/17/2013 6:45:00 PM	Analyst:	611
Instrument ID:	VOCMS7		
Sample Numbers:	L673687-01		

Laboratory Control Sample (LCS)

Analyte	Dil	True Value	Found	% Rec	Control Limits	Qual
1,1,1,2-Tetrachloroethane	1	0.025	0.0259	104	74.2 - 124	
1,1,1-Trichloroethane	1	0.025	0.0259	104	73.2 - 123	
1,1,2,2-Tetrachloroethane	1	0.025	0.0245	97.9	70.7 - 122	
1,1,2-Trichloroethane	1	0.025	0.0254	101	77.7 - 118	
1,1,2-Trichlorotrifluoroethane	1	0.025	0.0280	112	67.2 - 143	
1,1-Dichloroethane	1	0.025	0.0258	103	70.7 - 126	
1,1-Dichloroethene	1	0.025	0.0278	111	67.8 - 129	
1,2,3-Trichloropropane	1	0.025	0.0258	103	71.8 - 121	
1,2,4-Trichlorobenzene	1	0.025	0.0276	110	69.7 - 136	
1,2,4-Trimethylbenzene	1	0.025	0.0240	95.9	75 - 123	
1,2-Dibromo-3-Chloropropane	1	0.025	0.0263	105	65.4 - 128	
1,2-Dibromoethane	1	0.025	0.0266	106	76.6 - 121	
1,2-Dichlorobenzene	1	0.025	0.0260	104	78.4 - 117	
1,2-Dichloroethane	1	0.025	0.0260	104	68.8 - 124	
1,2-Dichloropropane	1	0.025	0.0249	99.8	76.5 - 119	
1,3,5-Trimethylbenzene	1	0.025	0.0250	100	75.6 - 124	
1,3-Dichlorobenzene	1	0.025	0.0258	103	70.8 - 128	
1,4-Dichlorobenzene	1	0.025	0.0249	99.8	78.8 - 115	
2-Butanone (MEK)	1	0.125	0.1265	101	55 - 149	
2-Hexanone	1	0.125	0.1345	108	65.6 - 144	
4-Methyl-2-pentanone (MIBK)	1	0.125	0.1261	101	70.5 - 133	
Acetone	1	0.125	0.1364	109	35.6 - 163	
Acrylonitrile	1	0.125	0.1328	106	55.2 - 130	
Benzene	1	0.025	0.0246	98.2	74.8 - 121	
Bromobenzene	1	0.025	0.0249	99.6	77.5 - 116	
Bromochloromethane	1	0.025	0.0261	105	77.6 - 119	
Bromodichloromethane	1	0.025	0.0231	92.4	75.1 - 116	
Bromoform	1	0.025	0.0267	107	67.5 - 130	
Bromomethane	1	0.025	0.0266	106	49.9 - 162	
Carbon disulfide	1	0.025	0.0281	112	64.6 - 140	
Carbon tetrachloride	1	0.025	0.0281	113	70.2 - 123	
Chlorobenzene	1	0.025	0.0256	102	78.1 - 119	
Chlorodibromomethane	1	0.025	0.0253	101	74 - 121	
Chloroethane	1	0.025	0.0277	111	61.7 - 135	
Chloroform	1	0.025	0.0261	105	76 - 121	
Chloromethane	1	0.025	0.0260	104	61.5 - 129	

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Quality Control Summary
SDG: L673687
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Volatile Organic Compounds by Method 8260B		
Project No:	ST010022.0026	Matrix:	Water - mg/L
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	12/11/2013	**Analytic Batch:**	**WG697653**
Analysis Date:	12/17/2013 6:45:00 PM	Analyst:	611
Instrument ID:	VOCMS7		
Sample Numbers:	L673687-01		

Laboratory Control Sample (LCS)

Analyte	Dil	True Value	Found	% Rec	Control Limits	Qual
cis-1,2-Dichloroethene	1	0.025	0.0265	106	76 - 119	
cis-1,3-Dichloropropene	1	0.025	0.0249	99.4	78.2 - 120	
Dibromomethane	1	0.025	0.0258	103	79.5 - 118	
Dichlorodifluoromethane	1	0.025	0.0283	113	54.8 - 135	
Di-isopropyl ether	1	0.025	0.0245	98	65.6 - 132	
Ethylbenzene	1	0.025	0.0256	103	78.8 - 122	
Hexachloro-1,3-butadiene	1	0.025	0.0244	97.6	64.7 - 129	
Iodomethane	1	0.125	0.1256	100	61 - 130	
Methyl tert-butyl ether	1	0.025	0.0252	101	71.2 - 126	
Methylene Chloride	1	0.025	0.0257	103	70.3 - 120	
Naphthalene	1	0.025	0.0244	97.8	68.4 - 128	
n-Butylbenzene	1	0.025	0.0255	102	76.2 - 126	
n-Propylbenzene	1	0.025	0.0252	101	78.2 - 122	
sec-Butylbenzene	1	0.025	0.0248	99.4	74.4 - 127	
Styrene	1	0.025	0.0271	108	80.4 - 126	
tert-Butylbenzene	1	0.025	0.0256	102	75.3 - 126	
Tetrachloroethene	1	0.025	0.0264	106	72.6 - 126	
Toluene	1	0.025	0.0243	97	79.7 - 116	
trans-1,2-Dichloroethene	1	0.025	0.0262	105	72.6 - 121	
trans-1,3-Dichloropropene	1	0.025	0.0269	107	74.3 - 123	
trans-1,4-Dichloro-2-butene	1	0.025	0.0227	90.6	65.1 - 123	
Trichloroethene	1	0.025	0.0254	101	77.7 - 118	
Trichlorofluoromethane	1	0.025	0.0272	109	63.5 - 135	
Vinyl acetate	1	0.125	0.1231	98.5	65 - 138	
Vinyl chloride	1	0.025	0.0274	109	65.9 - 128	
Xylenes, Total	1	0.075	0.0734	97.8	78.7 - 121	

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L673687
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Volatile Organic Compounds by Method 8260B		
Project No:	ST010022.0026	Matrix:	Water - mg/L
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	12/11/2013	**Analytic Batch:**	**WG697653**
Analysis Date:	12/17/2013 6:45:00 PM	Analyst:	611
Instrument ID:	VOCMS7		
Sample Numbers:	L673687-01		

Laboratory Control Sample Duplicate (LCSD)

Analyte	Dil	True Value	Found	% Rec	Control Limits	Qual
1,1,1,2-Tetrachloroethane	1	0.025	0.0243	97	74.2 - 124	
1,1,1-Trichloroethane	1	0.025	0.0255	102	73.2 - 123	
1,1,2,2-Tetrachloroethane	1	0.025	0.0232	92.8	70.7 - 122	
1,1,2-Trichloroethane	1	0.025	0.0242	96.9	77.7 - 118	
1,1,2-Trichlorotrifluoroethane	1	0.025	0.0270	108	67.2 - 143	
1,1-Dichloroethane	1	0.025	0.0252	101	70.7 - 126	
1,1-Dichloroethene	1	0.025	0.0270	108	67.8 - 129	
1,2,3-Trichloropropane	1	0.025	0.0241	96.4	71.8 - 121	
1,2,4-Trichlorobenzene	1	0.025	0.0266	106	69.7 - 136	
1,2,4-Trimethylbenzene	1	0.025	0.0233	93.2	75 - 123	
1,2-Dibromo-3-Chloropropane	1	0.025	0.0244	97.5	65.4 - 128	
1,2-Dibromoethane	1	0.025	0.0252	101	76.6 - 121	
1,2-Dichlorobenzene	1	0.025	0.0249	99.4	78.4 - 117	
1,2-Dichloroethane	1	0.025	0.0250	99.8	68.8 - 124	
1,2-Dichloropropane	1	0.025	0.0248	99.2	76.5 - 119	
1,3,5-Trimethylbenzene	1	0.025	0.0235	94	75.6 - 124	
1,3-Dichlorobenzene	1	0.025	0.0246	98.5	70.8 - 128	
1,4-Dichlorobenzene	1	0.025	0.0237	94.7	78.8 - 115	
2-Butanone (MEK)	1	0.125	0.1237	98.9	55 - 149	
2-Hexanone	1	0.125	0.1214	97.2	65.6 - 144	
4-Methyl-2-pentanone (MIBK)	1	0.125	0.1208	96.6	70.5 - 133	
Acetone	1	0.125	0.1211	96.9	35.6 - 163	
Acrylonitrile	1	0.125	0.1278	102	55.2 - 130	
Benzene	1	0.025	0.0243	97.1	74.8 - 121	
Bromobenzene	1	0.025	0.0234	93.7	77.5 - 116	
Bromochloromethane	1	0.025	0.0257	103	77.6 - 119	
Bromodichloromethane	1	0.025	0.0231	92.2	75.1 - 116	
Bromoform	1	0.025	0.0249	99.6	67.5 - 130	
Bromomethane	1	0.025	0.0263	105	49.9 - 162	
Carbon disulfide	1	0.025	0.0278	111	64.6 - 140	
Carbon tetrachloride	1	0.025	0.0275	110	70.2 - 123	
Chlorobenzene	1	0.025	0.0244	97.8	78.1 - 119	
Chlorodibromomethane	1	0.025	0.0240	96.2	74 - 121	
Chloroethane	1	0.025	0.0263	105	61.7 - 135	
Chloroform	1	0.025	0.0253	101	76 - 121	
Chloromethane	1	0.025	0.0255	102	61.5 - 129	

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Quality Control Summary
SDG: L673687
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Volatile Organic Compounds by Method 8260B		
Project No:	ST010022.0026	Matrix:	Water - mg/L
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	12/11/2013	**Analytic Batch:**	**WG697653**
Analysis Date:	12/17/2013 6:45:00 PM	Analyst:	611
Instrument ID:	VOCMS7		
Sample Numbers:	L673687-01		

Laboratory Control Sample Duplicate (LCSD)

Analyte	Dil	True Value	Found	% Rec	Control Limits	Qual
cis-1,2-Dichloroethene	1	0.025	0.0257	103	76 - 119	
cis-1,3-Dichloropropene	1	0.025	0.0245	98	78.2 - 120	
Dibromomethane	1	0.025	0.0256	102	79.5 - 118	
Dichlorodifluoromethane	1	0.025	0.0273	109	54.8 - 135	
Di-isopropyl ether	1	0.025	0.0239	95.6	65.6 - 132	
Ethylbenzene	1	0.025	0.0244	97.5	78.8 - 122	
Hexachloro-1,3-butadiene	1	0.025	0.0234	93.4	64.7 - 129	
Iodomethane	1	0.125	0.1275	102	61 - 130	
Methyl tert-butyl ether	1	0.025	0.0244	97.7	71.2 - 126	
Methylene Chloride	1	0.025	0.0248	99	70.3 - 120	
Naphthalene	1	0.025	0.0229	91.7	68.4 - 128	
n-Butylbenzene	1	0.025	0.0248	99.4	76.2 - 126	
n-Propylbenzene	1	0.025	0.0238	95.3	78.2 - 122	
sec-Butylbenzene	1	0.025	0.0243	97	74.4 - 127	
Styrene	1	0.025	0.0256	102	80.4 - 126	
tert-Butylbenzene	1	0.025	0.0243	97.1	75.3 - 126	
Tetrachloroethene	1	0.025	0.0250	100	72.6 - 126	
Toluene	1	0.025	0.0238	95.1	79.7 - 116	
trans-1,2-Dichloroethene	1	0.025	0.0254	102	72.6 - 121	
trans-1,3-Dichloropropene	1	0.025	0.0257	103	74.3 - 123	
trans-1,4-Dichloro-2-butene	1	0.025	0.0219	87.7	65.1 - 123	
Trichloroethene	1	0.025	0.0244	97.5	77.7 - 118	
Trichlorofluoromethane	1	0.025	0.0262	105	63.5 - 135	
Vinyl acetate	1	0.125	0.1218	97.4	65 - 138	
Vinyl chloride	1	0.025	0.0263	105	65.9 - 128	
Xylenes, Total	1	0.075	0.0693	92.4	78.7 - 121	

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L673687
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Volatile Organic Compounds by Method 8260B		
Project No:	ST010022.0026	Matrix:	Water - mg/L
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	12/11/2013	**Analytic Batch:**	**WG697653**
Analysis Date:	12/17/2013 6:45:00 PM	Analyst:	611
Instrument ID:	VOCMS7		
Sample Numbers:	L673687-01		

Laboratory Control Sample / Laboratory Control Sample Duplicate

Analyte	Dil	Spike	LCS	% Rec	LCSD	% Rec	Control Limits	% Rec Qual	% RPD	Control Limits	RPD Qual
1,1,1,2-Tetrachloroethane	1	0.025	0.0259	104	0.0243	97	74.2 - 124		6.62	20	
1,1,1-Trichloroethane	1	0.025	0.0259	104	0.0255	102	73.2 - 123		1.48	20	
1,1,2,2-Tetrachloroethane	1	0.025	0.0245	97.9	0.0232	92.8	70.7 - 122		5.38	20	
1,1,2-Trichloroethane	1	0.025	0.0254	101	0.0242	96.9	77.7 - 118		4.65	20	
1,1,2-Trichlorotrifluoroethane	1	0.025	0.0280	112	0.0270	108	67.2 - 143		3.93	20	
1,1-Dichloroethane	1	0.025	0.0258	103	0.0252	101	70.7 - 126		2.24	20	
1,1-Dichloroethene	1	0.025	0.0278	111	0.0270	108	67.8 - 129		2.66	20	
1,2,3-Trichloropropane	1	0.025	0.0258	103	0.0241	96.4	71.8 - 121		6.98	20	
1,2,4-Trichlorobenzene	1	0.025	0.0276	110	0.0266	106	69.7 - 136		3.56	20	
1,2,4-Trimethylbenzene	1	0.025	0.0240	95.9	0.0233	93.2	75 - 123		2.76	20	
1,2-Dibromo-3-Chloropropane	1	0.025	0.0263	105	0.0244	97.5	65.4 - 128		7.43	20	
1,2-Dibromoethane	1	0.025	0.0266	106	0.0252	101	76.6 - 121		5.24	20	
1,2-Dichlorobenzene	1	0.025	0.0260	104	0.0249	99.4	78.4 - 117		4.58	20	
1,2-Dichloroethane	1	0.025	0.0260	104	0.0250	99.8	68.8 - 124		4.01	20	
1,2-Dichloropropane	1	0.025	0.0249	99.8	0.0248	99.2	76.5 - 119		0.59	20	
1,3,5-Trimethylbenzene	1	0.025	0.0250	100	0.0235	94	75.6 - 124		6.16	20	
1,3-Dichlorobenzene	1	0.025	0.0258	103	0.0246	98.5	70.8 - 128		4.56	20	
1,4-Dichlorobenzene	1	0.025	0.0249	99.8	0.0237	94.7	78.8 - 115		5.23	20	
2-Butanone (MEK)	1	0.125	0.1265	101	0.1237	98.9	55 - 149		2.31	20	
2-Hexanone	1	0.125	0.1345	108	0.1214	97.2	65.6 - 144		10.2	20	
4-Methyl-2-pentanone (MIBK)	1	0.125	0.1261	101	0.1208	96.6	70.5 - 133		4.3	20	
Acetone	1	0.125	0.1364	109	0.1211	96.9	35.6 - 163		11.9	23.9	
Acrylonitrile	1	0.125	0.1328	106	0.1278	102	55.2 - 130		3.86	20	
Benzene	1	0.025	0.0246	98.2	0.0243	97.1	74.8 - 121		1.18	20	
Bromobenzene	1	0.025	0.0249	99.6	0.0234	93.7	77.5 - 116		6.06	20	
Bromochloromethane	1	0.025	0.0261	105	0.0257	103	77.6 - 119		1.79	20	
Bromodichloromethane	1	0.025	0.0231	92.4	0.0231	92.2	75.1 - 116		0.26	20	
Bromoform	1	0.025	0.0267	107	0.0249	99.6	67.5 - 130		7.18	20	
Bromomethane	1	0.025	0.0266	106	0.0263	105	49.9 - 162		0.91	20	
Carbon disulfide	1	0.025	0.0281	112	0.0278	111	64.6 - 140		1.06	20	
Carbon tetrachloride	1	0.025	0.0281	113	0.0275	110	70.2 - 123		2.22	20	
Chlorobenzene	1	0.025	0.0256	102	0.0244	97.8	78.1 - 119		4.71	20	
Chlorodibromomethane	1	0.025	0.0253	101	0.0240	96.2	74 - 121		5.1	20	
Chloroethane	1	0.025	0.0277	111	0.0263	105	61.7 - 135		5.31	20	
Chloroform	1	0.025	0.0261	105	0.0253	101	76 - 121		3.14	20	
Chloromethane	1	0.025	0.0260	104	0.0255	102	61.5 - 129		2.09	20	

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Quality Control Summary
SDG: L673687
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Volatile Organic Compounds by Method 8260B		
Project No:	ST010022.0026	Matrix:	Water - mg/L
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	12/11/2013	**Analytic Batch:**	**WG697653**
Analysis Date:	12/17/2013 6:45:00 PM	Analyst:	611
Instrument ID:	VOCMS7		
Sample Numbers:	L673687-01		

Laboratory Control Sample / Laboratory Control Sample Duplicate

Analyte	Dil	Spike	LCS	% Rec	LCSD	% Rec	Control Limits	% Rec Qual	% RPD	Control Limits	RPD Qual
cis-1,2-Dichloroethene	1	0.025	0.0265	106	0.0257	103	76 - 119		2.83	20	
cis-1,3-Dichloropropene	1	0.025	0.0249	99.4	0.0245	98	78.2 - 120		1.48	20	
Dibromomethane	1	0.025	0.0258	103	0.0256	102	79.5 - 118		0.78	20	
Dichlorodifluoromethane	1	0.025	0.0283	113	0.0273	109	54.8 - 135		3.57	20	
Di-isopropyl ether	1	0.025	0.0245	98	0.0239	95.6	65.6 - 132		2.44	20	
Ethylbenzene	1	0.025	0.0256	103	0.0244	97.5	78.8 - 122		5.05	20	
Hexachloro-1,3-butadiene	1	0.025	0.0244	97.6	0.0234	93.4	64.7 - 129		4.4	20	
Iodomethane	1	0.125	0.1256	100	0.1275	102	61 - 130		1.48	20	
Methyl tert-butyl ether	1	0.025	0.0252	101	0.0244	97.7	71.2 - 126		3.01	20	
Methylene Chloride	1	0.025	0.0257	103	0.0248	99	70.3 - 120		3.87	20	
Naphthalene	1	0.025	0.0244	97.8	0.0229	91.7	68.4 - 128		6.48	20	
n-Butylbenzene	1	0.025	0.0255	102	0.0248	99.4	76.2 - 126		2.71	20	
n-Propylbenzene	1	0.025	0.0252	101	0.0238	95.3	78.2 - 122		5.45	20	
sec-Butylbenzene	1	0.025	0.0248	99.4	0.0243	97	74.4 - 127		2.38	20	
Styrene	1	0.025	0.0271	108	0.0256	102	80.4 - 126		5.72	20	
tert-Butylbenzene	1	0.025	0.0256	102	0.0243	97.1	75.3 - 126		5.28	20	
Tetrachloroethene	1	0.025	0.0264	106	0.0250	100	72.6 - 126		5.37	20	
Toluene	1	0.025	0.0243	97	0.0238	95.1	79.7 - 116		1.96	20	
trans-1,2-Dichloroethene	1	0.025	0.0262	105	0.0254	102	72.6 - 121		2.93	20	
trans-1,3-Dichloropropene	1	0.025	0.0269	107	0.0257	103	74.3 - 123		4.45	20	
trans-1,4-Dichloro-2-butene	1	0.025	0.0227	90.6	0.0219	87.7	65.1 - 123		3.25	20	
Trichloroethene	1	0.025	0.0254	101	0.0244	97.5	77.7 - 118		3.95	20	
Trichlorofluoromethane	1	0.025	0.0272	109	0.0262	105	63.5 - 135		3.6	20	
Vinyl acetate	1	0.125	0.1231	98.5	0.1218	97.4	65 - 138		1.06	20	
Vinyl chloride	1	0.025	0.0274	109	0.0263	105	65.9 - 128		3.85	20	
Xylenes, Total	1	0.075	0.0734	97.8	0.0693	92.4	78.7 - 121		5.66	20	

Parameters in bold text are reported in this SDG

12065 Lebanon Rd
Mt. Juliet, TN 37122
(615) 758-5858
(800) 767-5859
Fax (615) 758-5859
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Est. 1970

Quality Control Summary
SDG: L673687
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Volatile Organic Compounds by Method 8260B		
Project No:	ST010022.0026	Matrix:	Water - mg/L
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	12/11/2013	**Analytic Batch:**	**WG697169**
Analysis Date:	12/14/2013 10:59:00 PM	Analyst:	611
Instrument ID:	VOCMS21		
Sample Numbers:	L673687-01		

Matrix Spike / Matrix Spike Duplicate

L673718-02

Analyte	Dil	Spike Value	Sample	MS	% Rec	MSD	% Rec	Control Limits	% Rec Qual	RPD	Control Limits	RPD Qual
1,1,1,2-Tetrachloroethane	1	0.025	0.0	0.0216	86.5	0.0251	100	64 - 128		14.8	20	
1,1,1-Trichloroethane	1	0.025	0.0	0.0196	78.3	0.0245	98	58.7 - 134		22.4	20	R5
1,1,2,2-Tetrachloroethane	1	0.025	0.0	0.0199	79.6	0.0246	98.4	56 - 132		21.1	22.2	
1,1,2-Trichloroethane	1	0.025	0.0	0.0210	83.9	0.0256	102	66.3 - 125		19.8	20	
1,1,2-Trichlorotrifluoroethane	1	0.025	0.0	0.0197	79	0.0244	97.7	54.8 - 154		21.2	22.5	
1,1-Dichloroethane	1	0.025	0.0	0.0200	80	0.0247	98.8	58.5 - 132		21	20	R5
1,1-Dichloroethene	1	0.025	0.0	0.0194	77.5	0.0236	94.4	51.1 - 140		19.6	20.2	
1,2,3-Trichloropropane	1	0.025	0.0	0.0209	83.6	0.0242	96.7	61.4 - 128		14.6	22.4	
1,2,4-Trichlorobenzene	1	0.025	0.0	0.0208	83.3	0.0242	96.6	63.6 - 143		14.8	21.9	
1,2,4-Trimethylbenzene	1	0.025	0.0	0.0199	79.6	0.0231	92.5	57.4 - 137		14.9	20	
1,2-Dibromo-3-Chloropropane	1	0.025	0.0	0.0181	72.3	0.0212	84.7	57.3 - 136		15.8	27	
1,2-Dibromoethane	1	0.025	0.0	0.0217	86.8	0.0253	101	67.1 - 125		15.3	20	
1,2-Dichlorobenzene	1	0.025	0.0	0.0200	79.9	0.0235	93.9	68.2 - 123		16.1	20	
1,2-Dichloroethane	1	0.025	0.0	0.0193	77	0.0237	94.7	60 - 126		20.6	20	R5
1,2-Dichloropropane	1	0.025	0.0	0.0205	82.1	0.0251	100	64.2 - 123		19.9	20	
1,3,5-Trimethylbenzene	1	0.025	0.0	0.0198	79.1	0.0233	93.3	63.6 - 132		16.5	20.5	
1,3-Dichlorobenzene	1	0.025	0.0	0.0204	81.5	0.0236	94.5	63.1 - 131		14.7	20	
1,4-Dichlorobenzene	1	0.025	0.0	0.0195	78.2	0.0226	90.6	68.6 - 123		14.8	20	
2-Butanone (MEK)	1	0.125	0.0	0.0704	56.3	0.0963	77.1	22.4 - 138		31	27	R5
2-Hexanone	1	0.125	0.0	0.0867	69.4	0.1067	85.4	43.3 - 137		20.7	25.5	
4-Methyl-2-pentanone (MIBK)	1	0.125	0.0	0.0993	79.5	0.1280	102	60.8 - 140		25.2	25.1	R5
Acetone	1	0.125	0.0010	0.0459	35.9	0.0589	46.3	10 - 130		24.8	27.9	
Acrylonitrile	1	0.125	0.0	0.0972	77.7	0.1263	101	49.4 - 133		26.1	25.3	R5
Benzene	1	0.025	0.0	0.0188	75.4	0.0233	93.1	54.3 - 133		21	20	R5
Bromobenzene	1	0.025	0.0	0.0200	79.9	0.0238	95.1	63.9 - 124		17.4	20	
Bromochloromethane	1	0.025	0.0	0.0211	84.6	0.0264	106	66.5 - 122		22	20.8	R5
Bromodichloromethane	1	0.025	0.0	0.0195	78.1	0.0245	98.1	63.9 - 121		22.8	20	R5
Bromoform	1	0.025	0.0	0.0217	86.7	0.0265	106	59.5 - 134		20.2	20.5	
Bromomethane	1	0.025	0.0	0.0193	77	0.0243	97	41.7 - 155		23	21.9	R5
Carbon disulfide	1	0.025	0.0	0.0189	75.5	0.0236	94.3	43.3 - 149		22.1	20.3	R5
Carbon tetrachloride	1	0.025	0.0	0.0199	79.7	0.0248	99.2	55.7 - 134		21.8	20	R5
Chlorobenzene	1	0.025	0.0	0.0210	83.9	0.0247	98.6	67 - 125		16.2	20	
Chlorodibromomethane	1	0.025	0.0	0.0212	84.7	0.0247	99	64.3 - 125		15.6	20.8	
Chloroethane	1	0.025	0.0	0.0199	79.6	0.0253	101	51.5 - 136		23.8	40	
Chloroform	1	0.025	0.0	0.0206	82.3	0.0250	99.8	63 - 129		19.2	20	
Chloromethane	1	0.025	0.0	0.0184	73.8	0.0224	89.4	42.4 - 135		19.2	20	

Parameters in bold text are reported in this SDG

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(800) 767-5859
Fax (615) 758-5859
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Quality Control Summary
SDG: L673687
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Volatile Organic Compounds by Method 8260B		
Project No:	ST010022.0026	Matrix:	Water - mg/L
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	12/11/2013	**Analytic Batch:**	**WG697169**
Analysis Date:	12/14/2013 10:59:00 PM	Analyst:	611
Instrument ID:	VOCMS21		
Sample Numbers:	L673687-01		

Matrix Spike / Matrix Spike Duplicate

L673718-02

Analyte	Dil	Spike Value	Sample	MS	% Rec	MSD	% Rec	Control Limits	% Rec Qual	RPD	Control Limits	RPD Qual
cis-1,2-Dichloroethene	1	0.025	0.0	0.0201	80.4	0.0251	100	59.2 - 129		22.1	20	R5
cis-1,3-Dichloropropene	1	0.025	0.0	0.0201	80.5	0.0247	98.9	66.4 - 125		20.5	20	R5
Dibromomethane	1	0.025	0.0	0.0206	82.5	0.0255	102	68.2 - 124		21.1	20	R5
Dichlorodifluoromethane	1	0.025	0.0	0.0200	80	0.0238	95.3	40.6 - 144		17.4	20.2	
Di-isopropyl ether	1	0.025	0.0	0.0188	75.1	0.0234	93.8	56.9 - 136		22.1	20	R5
Ethylbenzene	1	0.025	0.0	0.0209	83.4	0.0241	96.5	61.4 - 133		14.6	20	
Hexachloro-1,3-butadiene	1	0.025	0.0	0.0180	72	0.0220	87.9	55.1 - 136		19.9	23.6	
Iodomethane	1	0.125	0.0	0.1044	83.5	0.1286	103	49.7 - 132		20.8	20	R5
Methyl tert-butyl ether	1	0.025	0.0	0.0188	75.2	0.0236	94.3	57.7 - 134		22.5	20	R5
Methylene Chloride	1	0.025	0.0	0.0188	75.3	0.0240	95.8	58.1 - 122		23.9	20	R5
Naphthalene	1	0.025	0.0	0.0189	75.7	0.0230	92	58 - 135		19.5	25.5	
n-Butylbenzene	1	0.025	0.0	0.0193	77.3	0.0224	89.5	62.7 - 140		14.6	20.3	
n-Propylbenzene	1	0.025	0.0	0.0200	80.2	0.0237	94.9	65.9 - 131		16.9	20	
sec-Butylbenzene	1	0.025	0.0	0.0200	80	0.0239	95.7	62.2 - 136		17.8	20.3	
Styrene	1	0.025	0.0	0.0221	88.6	0.0261	104	66.8 - 133		16.3	20	
tert-Butylbenzene	1	0.025	0.0	0.0201	80.6	0.0243	97.2	63.3 - 134		18.7	21	
Tetrachloroethene	1	0.025	0.0	0.0205	82.2	0.0245	98.2	53 - 139		17.8	20	
Toluene	1	0.025	0.0	0.0190	76.1	0.0232	92.9	61.4 - 130		19.9	20	
trans-1,2-Dichloroethene	1	0.025	0.0	0.0194	77.7	0.0241	96.4	56.5 - 129		21.5	20	R5
trans-1,3-Dichloropropene	1	0.025	0.0	0.0210	84.1	0.0262	105	64.1 - 128		21.7	20	R5
trans-1,4-Dichloro-2-butene	1	0.025	0.0	0.0179	71.6	0.0218	87	57.1 - 130		19.4	23.9	
Trichloroethene	1	0.025	0.0	0.0199	79.5	0.0247	98.7	44.1 - 149		21.5	20	R5
Trichlorofluoromethane	1	0.025	0.0	0.0200	80.2	0.0248	99.4	49.6 - 145		21.4	21.2	R5
Vinyl acetate	1	0.125	0.0	0.0932	74.5	0.1188	95	56.1 - 149		24.2	22.7	R5
Vinyl chloride	1	0.025	0.0	0.0197	78.8	0.0246	98.4	47.8 - 137		22.1	20	R5
Xylenes, Total	1	0.075	0.0	0.0609	81.2	0.0715	95.3	63.3 - 131		16	20	

Parameters in bold text are reported in this SDG

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(615) 758-5858
(800) 767-5859
Fax (615) 758-5859
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Quality Control Summary
SDG: L673687
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Volatile Organic Compounds by Method 8260B		
Project No:	ST010022.0026	Matrix:	Water - mg/L
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	12/11/2013	**Analytic Batch:**	**WG697653**
Analysis Date:	12/17/2013 6:45:00 PM	Analyst:	611
Instrument ID:	VOCMS7		
Sample Numbers:	L673687-01		

Matrix Spike / Matrix Spike Duplicate

L673719-03

Analyte	Dil	Spike Value	Sample	MS	% Rec	MSD	% Rec	Control Limits	% Rec Qual	RPD	Control Limits	RPD Qual
1,1,1,2-Tetrachloroethane	1	0.025	0.0	0.0242	96.7	0.0233	93.3	64 - 128		3.52	20	
1,1,1-Trichloroethane	1	0.025	0.0	0.0266	106	0.0242	96.9	58.7 - 134		9.33	20	
1,1,2,2-Tetrachloroethane	1	0.025	0.0	0.0234	93.5	0.0218	87.3	56 - 132		6.9	22.2	
1,1,2-Trichloroethane	1	0.025	0.0	0.0246	98.3	0.0232	92.7	66.3 - 125		5.87	20	
1,1,2-Trichlorotrifluoroethane	1	0.025	0.0	0.0278	111	0.0262	105	54.8 - 154		5.96	22.5	
1,1-Dichloroethane	1	0.025	0.0	0.0262	105	0.0237	94.9	58.5 - 132		9.97	20	
1,1-Dichloroethene	1	0.025	0.0	0.0286	114	0.0260	104	51.1 - 140		9.47	20.2	
1,2,3-Trichloropropane	1	0.025	0.0	0.0257	103	0.0245	98	61.4 - 128		4.61	22.4	
1,2,4-Trichlorobenzene	1	0.025	0.0	0.0279	111	0.0254	102	63.6 - 143		9.27	21.9	
1,2,4-Trimethylbenzene	1	0.025	0.0	0.0232	92.9	0.0219	87.7	57.4 - 137		5.78	20	
1,2-Dibromo-3-Chloropropane	1	0.025	0.0	0.0266	106	0.0241	96.5	57.3 - 136		9.7	27	
1,2-Dibromoethane	1	0.025	0.0	0.0252	101	0.0236	94.5	67.1 - 125		6.43	20	
1,2-Dichlorobenzene	1	0.025	0.0	0.0256	102	0.0233	93.3	68.2 - 123		9.28	20	
1,2-Dichloroethane	1	0.025	0.0	0.0260	104	0.0242	96.8	60 - 126		7.11	20	
1,2-Dichloropropane	1	0.025	0.0	0.0255	102	0.0234	93.8	64.2 - 123		8.31	20	
1,3,5-Trimethylbenzene	1	0.025	0.0	0.0242	96.9	0.0226	90.5	63.6 - 132		6.8	20.5	
1,3-Dichlorobenzene	1	0.025	0.0	0.0252	101	0.0237	94.9	63.1 - 131		6.06	20	
1,4-Dichlorobenzene	1	0.025	0.0	0.0251	100	0.0228	91	68.6 - 123		9.8	20	
2-Butanone (MEK)	1	0.125	0.0	0.1099	87.9	0.1080	86.4	22.4 - 138		1.71	27	
2-Hexanone	1	0.125	0.0	0.1138	91.1	0.1059	84.7	43.3 - 137		7.18	25.5	
4-Methyl-2-pentanone (MIBK)	1	0.125	0.0	0.1299	104	0.1204	96.3	60.8 - 140		7.61	25.1	
Acetone	1	0.125	0.0060	0.0701	51.2	0.0649	47.1	10 - 130		7.68	27.9	
Acrylonitrile	1	0.125	0.0	0.1415	113	0.1306	105	49.4 - 133		8	25.3	
Benzene	1	0.025	0.0003	0.0251	99.2	0.0233	91.9	54.3 - 133		7.48	20	
Bromobenzene	1	0.025	0.0	0.0233	93.1	0.0223	89.1	63.9 - 124		4.37	20	
Bromochloromethane	1	0.025	0.0	0.0265	106	0.0243	97.2	66.5 - 122		8.65	20.8	
Bromodichloromethane	1	0.025	0.0	0.0231	92.4	0.0219	87.7	63.9 - 121		5.22	20	
Bromoform	1	0.025	0.0	0.0256	103	0.0243	97.1	59.5 - 134		5.46	20.5	
Bromomethane	1	0.025	0.0	0.0261	104	0.0248	99	41.7 - 155		5.18	21.9	
Carbon disulfide	1	0.025	0.0	0.0283	113	0.0265	106	43.3 - 149		6.54	20.3	
Carbon tetrachloride	1	0.025	0.0	0.0281	112	0.0260	104	55.7 - 134		7.84	20	
Chlorobenzene	1	0.025	0.0	0.0246	98.5	0.0228	91.2	67 - 125		7.68	20	
Chlorodibromomethane	1	0.025	0.0	0.0247	98.6	0.0231	92.2	64.3 - 125		6.71	20.8	
Chloroethane	1	0.025	0.0	0.0274	110	0.0254	102	51.5 - 136		7.48	40	
Chloroform	1	0.025	0.0	0.0264	105	0.0239	95.7	63 - 129		9.78	20	
Chloromethane	1	0.025	0.0	0.0261	105	0.0238	95.1	42.4 - 135		9.49	20	

Parameters in bold text are reported in this SDG

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(800) 767-5859
Fax (615) 758-5859
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Quality Control Summary
SDG: L673687
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Volatile Organic Compounds by Method 8260B		
Project No:	ST010022.0026	Matrix:	Water - mg/L
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	12/11/2013	**Analytic Batch:**	**WG697653**
Analysis Date:	12/17/2013 6:45:00 PM	Analyst:	611
Instrument ID:	VOCMS7		
Sample Numbers:	L673687-01		

Matrix Spike / Matrix Spike Duplicate

L673719-03

Analyte	Dil	Spike Value	Sample	MS	% Rec	MSD	% Rec	Control Limits	% Rec Qual	RPD	Control Limits	RPD Qual
cis-1,2-Dichloroethene	1	0.025	0.0	0.0264	105	0.0248	99.2	59.2 - 129		6.18	20	
cis-1,3-Dichloropropene	1	0.025	0.0	0.0248	99.3	0.0233	93.3	66.4 - 125		6.24	20	
Dibromomethane	1	0.025	0.0	0.0255	102	0.0249	99.5	68.2 - 124		2.39	20	
Dichlorodifluoromethane	1	0.025	0.0	0.0289	115	0.0270	108	40.6 - 144		6.66	20.2	
Di-isopropyl ether	1	0.025	0.0	0.0247	98.6	0.0223	89.2	56.9 - 136		10.1	20	
Ethylbenzene	1	0.025	0.0	0.0248	99.4	0.0236	94.3	61.4 - 133		5.3	20	
Hexachloro-1,3-butadiene	1	0.025	0.0	0.0244	97.7	0.0227	90.8	55.1 - 136		7.26	23.6	
Iodomethane	1	0.125	0.0	0.1301	104	0.1196	95.7	49.7 - 132		8.38	20	
Methyl tert-butyl ether	1	0.025	0.0	0.0252	101	0.0233	93.2	57.7 - 134		7.94	20	
Methylene Chloride	1	0.025	0.0	0.0256	102	0.0237	94.8	58.1 - 122		7.54	20	
Naphthalene	1	0.025	0.0	0.0246	98.4	0.0225	90	58 - 135		8.89	25.5	
n-Butylbenzene	1	0.025	0.0	0.0262	105	0.0239	95.5	62.7 - 140		9.25	20.3	
n-Propylbenzene	1	0.025	0.0	0.0242	96.9	0.0232	92.6	65.9 - 131		4.55	20	
sec-Butylbenzene	1	0.025	0.0	0.0246	98.2	0.0230	92.1	62.2 - 136		6.39	20.3	
Styrene	1	0.025	0.0	0.0258	103	0.0242	96.8	66.8 - 133		6.42	20	
tert-Butylbenzene	1	0.025	0.0	0.0246	98.6	0.0226	90.3	63.3 - 134		8.82	21	
Tetrachloroethene	1	0.025	0.0	0.0256	102	0.0237	94.7	53 - 139		7.67	20	
Toluene	1	0.025	0.0	0.0246	98.3	0.0233	93.2	61.4 - 130		5.32	20	
trans-1,2-Dichloroethene	1	0.025	0.0	0.0268	107	0.0236	94.5	56.5 - 129		12.5	20	
trans-1,3-Dichloropropene	1	0.025	0.0	0.0267	107	0.0245	98	64.1 - 128		8.51	20	
trans-1,4-Dichloro-2-butene	1	0.025	0.0	0.0217	86.8	0.0213	85.2	57.1 - 130		1.82	23.9	
Trichloroethene	1	0.025	0.0	0.0249	99.6	0.0236	94.4	44.1 - 149		5.34	20	
Trichlorofluoromethane	1	0.025	0.0	0.0275	110	0.0256	102	49.6 - 145		7.22	21.2	
Vinyl acetate	1	0.125	0.0	0.1279	102	0.1162	93	56.1 - 149		9.51	22.7	
Vinyl chloride	1	0.025	0.0	0.0275	110	0.0248	99	47.8 - 137		10.5	20	
Xylenes, Total	1	0.075	0.0	0.0707	94.3	0.0663	88.4	63.3 - 131		6.4	20	

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L673687
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Volatile Organic Compounds by Method 8260B		
Project No:	ST010022.0026	Matrix:	Water - mg/L
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	12/11/2013	**Analytic Batch:**	**WG697169**
Analysis Date:	12/14/2013 10:59:00 PM	Analyst:	611
Instrument ID:	VOCMS21		
Sample Numbers:	L673687-01		

Internal Standard Response and Retention Time Summary

File ID: 1214_31
Analyzed: 12/14/13 145300

	DCB		DFB		BCP		PFB	
	Response	**RT**	**Response**	**RT**	**Response**	**RT**	**Response**	**RT**
12 Hr. Std	241130	7.70	602500	4.23	98444	5.35	316364	3.92
Upper Limit	482000	8.20	1210000	4.73	197000	5.85	633000	4.42
Lower Limit	121000	7.20	301000	3.73	49200	4.85	158000	3.42
Sample ID	**Response**	**RT**	**Response**	**RT**	**Response**	**RT**	**Response**	**RT**
L673687-01 20X	218132	7.70	604977	4.23	95624	5.35	306138	3.92
MSD WG697169	247373	7.70	610082	4.23	98524	5.35	326159	3.92
MS WG697169	280130	7.70	708708	4.23	109829	5.35	380120	3.92
LCSD WG697169	224563	7.70	552442	4.23	88304	5.35	299187	3.92
LCS WG697169	235186	7.70	600385	4.23	95829	5.35	323724	3.92
BLANK WG697169	211721	7.70	560456	4.23	90186	5.35	287778	3.92

Legend:

DCB -- 1,4-Dichlorobenzene-d4
DFB -- 1,4-Difluorobenzene
BCP -- 2-Bromo-1-Chloropropane
PFB -- Pentafluorobenzene

Parameters in bold text are reported in this SDG

12065 Lebanon Rd
Mt. Juliet, TN 37122
(615) 758-5858
(800) 767-5859
Fax (615) 758-5859
Tax I.D 62-0814289
Est. 1970

Quality Control Summary
SDG: L673687
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Volatile Organic Compounds by Method 8260B		
Project No:	ST010022.0026	Matrix:	Water - mg/L
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	12/11/2013	**Analytic Batch:**	**WG697653**
Analysis Date:	12/17/2013 6:45:00 PM	Analyst:	611
Instrument ID:	VOCMS7		
Sample Numbers:	L673687-01		

Internal Standard Response and Retention Time Summary

File ID: 1217_02
Analyzed: 12/17/13 094500

	DCB		DFB		BCP		PFB	
	Response	**RT**	**Response**	**RT**	**Response**	**RT**	**Response**	**RT**
12 Hr. Std	175672	8.15	357184	4.60	63943	5.76	211198	4.27
Upper Limit	351000	8.65	714000	5.10	128000	6.26	422000	4.77
Lower Limit	87800	7.65	179000	4.10	32000	5.26	106000	3.77
Sample ID	**Response**	**RT**	**Response**	**RT**	**Response**	**RT**	**Response**	**RT**
L673687-01 500X	166132	8.15	339748	4.60	58919	5.76	210150	4.27
MSD WG697653	184790	8.15	370872	4.60	65893	5.76	217765	4.27
MS WG697653	181870	8.15	379599	4.60	67458	5.76	220040	4.27
LCSD WG697653	186972	8.16	378395	4.60	66457	5.76	219108	4.27
LCS WG697653	178560	8.15	369238	4.60	62973	5.76	215560	4.27
BLANK WG697653	178369	8.15	373204	4.60	65572	5.76	222378	4.27

Legend:

DCB -- 1,4-Dichlorobenzene-d4
DFB -- 1,4-Difluorobenzene
BCP -- 2-Bromo-1-Chloropropane
PFB -- Pentafluorobenzene

Parameters in bold text are reported in this SDG

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Quality Control Summary
SDG: L673687
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Volatile Organic Compounds by Method 8260B		
Project No:	ST010022.0026	Matrix:	Water - mg/L
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	12/11/2013	**Analytic Batch:**	**WG697169**
Analysis Date:	12/14/2013 10:59:00 PM	Analyst:	611
Instrument ID:	VOCMS21		
Sample Numbers:	L673687-01		

Surrogate Summary

			BFB		DFM		TD8		TFT	
Laboratory Sample ID	Instrument	File ID	ppm	% Rec	ppm	% Rec	ppm	% Rec	ppm	% Rec
L673687-01 20x	VOCMS21	1214_51	0.0375	93.7	0.0418	104	0.0405	101		
LCS WG697169	VOCMS21	1214_32	0.0390	97.4	0.0399	99.8	0.0406	101	0.0424	106
LCSD WG697169	VOCMS21	1214_33	0.0394	98.6	0.0401	100	0.0410	103	0.0428	107
MS WG697169	VOCMS21	1214_34	0.0408	102	0.0405	101	0.0399	99.8	0.0420	105
MSD WG697169	VOCMS21	1214_35	0.0400	99.9	0.0406	102	0.0409	102	0.0417	104
BLANK WG697169	VOCMS21	1214_38	0.0374	93.6	0.0419	105	0.0418	104	0.0432	108

BFB --4-BROMOFLUOROBENZENE	True Value: 0.04 ppm	Limits: 71 - 126
DFM --DIBROMOFLUOROMETHANE	True Value: 0.04 ppm	Limits: 78.3 - 121
TD8 --TOLUENE-D8	True Value: 0.04 ppm	Limits: 88.50 - 111
TFT --A,A,A-TRIFLUOROTOLUENE	True Value: 0.04 ppm	Limits: 85 - 114

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Est. 1970

Quality Control Summary
SDG: L673687
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Volatile Organic Compounds by Method 8260B		
Project No:	ST010022.0026	Matrix:	Water - mg/L
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	12/11/2013	**Analytic Batch:**	**WG697653**
Analysis Date:	12/17/2013 6:45:00 PM	Analyst:	611
Instrument ID:	VOCMS7		
Sample Numbers:	L673687-01		

Surrogate Summary

			BFB		DFM		TD8		TFT	
Laboratory Sample ID	Instrument	File ID	ppm	% Rec	ppm	% Rec	ppm	% Rec	ppm	% Rec
L673687-01 500x	VOCMS7	1217_28	0.0414	104	0.0410	103	0.0419	105		
LCS WG697653	VOCMS7	1217_03	0.0417	104	0.0427	107	0.0413	103	0.0410	103
LCSD WG697653	VOCMS7	1217_04	0.0414	103	0.0423	106	0.0413	103	0.0418	105
MS WG697653	VOCMS7	1217_05	0.0402	101	0.0424	106	0.0416	104	0.0416	104
MSD WG697653	VOCMS7	1217_06	0.0409	102	0.0426	106	0.0420	105	0.0421	105
BLANK WG697653	VOCMS7	1217_08	0.0417	104	0.0416	104	0.0418	105	0.0423	106

BFB --4-BROMOFLUOROBENZENE	True Value: 0.04 ppm	Limits: 71 - 126
DFM --DIBROMOFLUOROMETHANE	True Value: 0.04 ppm	Limits: 78.3 - 121
TD8 --TOLUENE-D8	True Value: 0.04 ppm	Limits: 88.50 - 111
TFT --A,A,A-TRIFLUOROTOLUENE	True Value: 0.04 ppm	Limits: 85 - 114

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Quality Control Summary
SDG: L673687
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Diesel Range Organics California by Method 3511/8015		
Project No:	ST010022.0026	Matrix:	Water - mg/L
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	12/11/2013	**Analytic Batch:**	**WG697136**
Analysis Date:	12/16/2013 7:23:00 PM	Analyst:	187
Instrument ID:	SVGC27	Prep Date:	12/13/2013
Sample Numbers:	L673687-01		

Method Blank

Analyte	CAS	RDL	Qualifier
C12-C22 Hydrocarbons		< 0.100	
C22-C32 Hydrocarbons		< 0.100	
C32-C40 Hydrocarbons		< 0.100	

Laboratory Control Sample (LCS)

Analyte	Dil	True Value	Found	% Rec	Control Limits	Qual
C12-C22 Hydrocarbons	1	0.75	0.8532	114	50 - 150	
C22-C32 Hydrocarbons	1	0.75	0.9204	123	50 - 150	

Laboratory Control Sample Duplicate (LCSD)

Analyte	Dil	True Value	Found	% Rec	Control Limits	Qual
C12-C22 Hydrocarbons	1	0.75	0.8930	119	50 - 150	
C22-C32 Hydrocarbons	1	0.75	0.8852	118	50 - 150	

Laboratory Control Sample / Laboratory Control Sample Duplicate

Analyte	Dil	Spike	LCS	% Rec	LCSD	% Rec	Control Limits	% Rec Qual	% RPD	Control Limits	RPD Qual
C12-C22 Hydrocarbons	1	0.75	0.8532	114	0.8930	119	50 - 150		4.56	20	
C22-C32 Hydrocarbons	1	0.75	0.9204	123	0.8852	118	50 - 150		3.89	20	

Parameters in bold text are reported in this SDG

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Est. 1970

Quality Control Summary
SDG: L673687
Kinder Morgan - Rocklin, CA-AZ Work

Test:	Diesel Range Organics California by Method 3511/8015		
Project No:	ST010022.0026	Matrix:	Water - mg/L
Project:	KMEP: Silvercroft	EPA ID:	TN00003
Collection Date:	12/11/2013	**Analytic Batch:**	**WG697136**
Analysis Date:	12/16/2013 7:23:00 PM	Analyst:	187
Instrument ID:	SVGC27	Prep Date:	12/13/2013
Sample Numbers:	L673687-01		

Surrogate Summary

Laboratory Sample ID	Instrument	File ID	o-Terphenyl ppb	o-Terphenyl % Rec
L673687-01	SVGC27	1216_23	19.3	96.6
BLANK WG697136	SVGC27	1216_05	20.8	104
LCS WG697136	SVGC27	1216_06	21.0	105
LCSD WG697136	SVGC27	1216_07	21.6	108

o-Terphenyl --O-TERPHENYL True Value: 0 ppb Limits: 50 - 150

Company Name/Address:
Kinder Morgan : Silvercroft
Attn: Paul Salcido

Billing Information:

Report to: Sacha Arnold

Email To:

Project Description: KME: Silvercroft

City/State Collected: Tucson, AZ

Phone: **480-905-9311**
Fax:

Client Project # STO6022.0026

Lab Project #

Collected by (print): SA

Site/Facility ID # Silvercroft

P.O. #

Collected by (signature):

Immediately Packed on Ice N ___ Y X

Rush? (Lab MUST Be Notified)
___ Same Day 200%
___ Next Day 100%
___ Two Day 50%
X Three Day 25%

Date Results Needed

Email? ___No ___Yes
FAX? ___No ___Yes

Analysis / Container / Preservative

Chain of Custody Page 1 of 1

ESC LAB SCIENCES
12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

L# L673687

G165

Acctnum: **KINARCPAZ**
Template:
Prelogin:
TSR:
Cooler:
Shipped Via:

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	8260B VOCs +MTBE, TBA, TAME/ 40mL amber/ HCl	8015AZ (C10-C32)/ 40mL amber/ HCl	RCRA8 metals/ 500mL HDPE/ HNO3 <2	pH, Flashpoint/ 250mL amber/ No Pres	Rem./Contaminant	Sample # (lab only)
P-4047	Comp	PW	—	12/11/13	1500	8	X	X	X	X		01

* Matrix: SS - Soil GW - Groundwater WW - WasteWater DW - Drinking Water OT - Other PW = purge water from MW-30

Remarks: 3 day TAT

5040 0635734

pH ___ Temp ___
Flow ___ Other ___

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
	12/12/13	1055	
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
	12/12/13	1830	FedEx
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)

Samples returned via: ☐ UPS ☐ FedEx ☐ Courier ☐ ___
Temp: 3.L °C Bottles Received: 8
Date: 12-13-13 Time: 0930

Hold #
Condition: (lab use only)
COC Seal Intact: ___Y ___N ___NA
pH Checked: <2
NCF:

liquid
ENVIRONMENTAL SOLUTIONS
Clean. Reliable. Innovative.

UNIFORM WASTE PROFILE

866-694-7327
www.liquidenviro.com

Internal Use Only:
Profile #:
Account #:
Approved ◉ Non-Approved ○

PROFILE INFORMATION

US EPA ID#: State ID#: TCEQ ID#(TX-Only): ◉ Analytical Attached ○ MSDS Attached

GENERATOR INFORMATION

Name: SFPPP, L.P. - Silvercroft Site
Address: 2905 N. Silver Island Way
City: Tucson State: AZ Zip: 85745
Contact: Paul Salcido Title: Project Manager - Environmental Remediation
Phone: 480-203-9968 Fax: 303-984-3687
Email: paul_salcido@kindermorgan.com

BILLING INFORMATION

Name: MP Environmental Services, Inc.
Address: 3045 South 51st Avenue
City: Phoenix State: AZ Zip: 85043
Contact: Matt Hoffman Title: Project Manager
Phone: 602-278-6233 Fax: 602-278-2884
Email: mhoffman@mpenviro.com

WASTE QUESTIONNAIRE (CHECK ALL THAT APPLY)

Non-hazardous Waste

	Yes	No	Unknown
1. Is this material a hazardous waste (F, K, U, or P listed) as defined by 40 CFR 261 Subpart D? If yes to the above, identify the listing.	○	◉	○
2. Has this material been mixed with a hazardous waste as defined by 40 CFR 261?	○	◉	○
3. Does this material exhibit any of the following hazardous waste characteristics? — Ignitabilty? (40 CFR Part 261.21)	○	◉	○
Corrosivity? (40 CFR Part 261.21)	○	◉	○
Reactivity? (40 CFR Part 261.21)	○	◉	○
Toxicity? (40 CFR Part 261.21)	○	◉	○
4. Does this material contain? — Herbicides, pesticides, insecticides?	○	◉	○
Dioxins?	○	◉	○
Radioactive substances?	○	◉	○
Domestic Wastes?	○	◉	○
Biohazardous materials?	○	◉	○
5 Is the waste derived from an underground storage tank (UST)?	○	◉	○
6. If waste is derived from fuel, is the fuel leaded?	○	◉	○

Used Oil (as defined by CFR 279.1)

1. Is this material Used Oil as defined by 40 CFR 279?	○	○	○
2. Has this Used Oil been mixed with hazardous waste?	○	○	○
3. Is the source of the waste a Conditionally Exempt Small Quantity Generator?	○	○	○
4. Does this Used Oil contain chlorinated paraffins? If yes, attach MSDS	○	○	○
5. Does this Used Oil contain TSCA (40 CFR 761) regulated levels of PCB? If yes, list PCB level:	○	○	○
6. Does this Used Oil contain less (<) than or equal to 1,000 mg/L Total Organic Halogens (TOX)? * If no, rebuttal per 40 CFR 279.10(b)(1)(ii) must be included.	○	○	○
7. Is this Used Oil soluble in water?	○	○	○

Is this a virgin or off-spec product? (If Yes, must include MSDS)

	Yes	No	Unknown
1. Unused Product or Chemical	○	◉	○
2. Waste by-product from process	○	◉	○
3. Spill Clean Up	◉	○	○
4. Planned Site Remediation	◉	○	○
5. Representative Sample Provided.	○	◉	○
Petroleum Contact Water (PCW)/Leaking	◉	○	○
Underground Storage Tank (LUST) Water	○	◉	○
Is the generator a Conditionally Exempt Small Quantity Generator (CESQG)?	○	◉	○

WASTE STREAM COMPOSITION (TOTAL MUST EQUAL 100%)

MajorComponentsConcentrationRange

(Water, Oil, Solid, etc.)	Average	Minumum	Maximum
Water	95	90	100
Sediment	5	0	10

WASTE DESCRIPTION

Common Name of Waste: Well Development Purge Water IDW

Process Generating Waste: Installation of monitoring wells at the KMEP Silvercroft Site in Tucson, AZ.

Physical State

- ○ 100% Solid Without Free Liquid
- ○ 100% Liquid With No Solids
- ◉ Liquid/Solid Mixture

95 % Free Liquid
2 % Settled Solids
3 % Total Suspended Solids

Layers

- ○ Single Phase
- ◉ Bi-Layered
- ○ Multi Layered

ph

- ○ <2
- ○ 2-6
- ◉ 6-8
- ○ 8-12.5
- ○ >12.5
- ○ N/A

Flash Point

- ○ <73 F
- ○ 73-100 F
- ○ 101-140 F
- ○ 141-200 F
- ○ >200 F
- ◉ N/A

Specific Gravity

Range: 1 To: 1

Color

Describe brown

Odor

◉ None ○ Mild ○ Strong

Describe:

Viscosity

- ◉ Low
- ○ High
- ○ Medium

TX-Only Classification

- ○ Class I
- ○ Class II
- ○ Other:

TX-ONLY: PLEASE INDICATE WHETHER ANY OF THE FOLLOWING ARE PRESENT:

- ○ TCLP Metals — Arsenic, Barium, Cadmium, Chromium, Lead, Mercury, Selenium and Silver
- ○ TCLP Semivolitiles — (o-Cresol, m-Cresol, p-Cresol, Cresol (total) 2-4 Dinitrotolune, Hexachlorobenzene, Hexacchlorobutadiene, Hexachlorethane, Nitrobenzene, Pentachchloropherol, Pyridine, 2-4-5 Trichlorophenol, and 2-4-6 Trichlorophenol)
- ○ TCEQ Appendix 1 — (TAC 31, Section 335-Subchapter R) or Total Petroleum Table 1, Constituents Hydrocarbons)
- ○ TCLP Herbicides/ Pesticides — (Chlordane, 2-4 Endrin, Heptachlor, Heptachlor epoxide, Lindane, Methoxyclor, Toxaphene, and 2-4-5 TP/Silvex)
- ○ TCLP Volatiles — (Benzene, Carbon Tetrachloride, Chlorobenzene, Chloroform, Methyl Ethyl Ketone, 1-4 Dichlorobenzene, 1-2 Dichloroethane, 1-1 Dichloroethylene, Trichloroethylene, Tetrachloroethylene, and Vinyl Chloride)
- ○ RCI — (Reactive Cyanide, Reactive Sulfide, Corrosivity, Ignitability

TRANSPORTATION INFORMATION

Method of Shipment: ◉ Bulk Liquid ○ Bulk Sludge ○ Bulk Solid ○ Drum/Box ○ Other:
Shipment Frequency: ◉ One Time ○ Weekly ○ Monthly ○ Quarterly ○ Annually ○ Other:
Anticipated Volume: 8,000 gallons

GENERATOR CERTIFICATION AND GUARANTEE - PLEASE READ AND SIGN BELOW

As the generator of the material (waste) described above, I certify that I have provided all relevant information as required by this profile and that the information provided is, to the best of my knowledge and belief, true, accurate and complete. Generator agrees not to deliver or arrange for delivery of any material that does not conform to the waste characterization contained in this profile. I further certify that this material is not a RCRA hazardous waste pursuant to federal, state or local laws and has not been mixed with any chlorinated solvents or any other contaminants including, without limitation, PCBs, pesticides, or other hazardous wastes. If Liquid Environmental Solutions (LES) accepts the material for processing and the material is later determined by LES or any other person to be or contain hazardous waste within the meaning of any federal, state or local law, or contain PCBs in sufficient quantity to render it a TSCA-regulated material, the generator agrees to pay all costs incurred by LES to properly treat, store, dispose or otherwise handle the material and any fines and penalties resulting from LES's handling of generator's material. Generator agrees to promptly notify LES of any change in the composition of the material or process generating the material, and agrees to provide LES with a new Uniform Waste Profile prior to delivering any material to LES that does not conform to the waste characterization contained in this profile. The undersigned is an authorized representative of the generator.

Paul M Salcido	12-16-13	Paul Salcido, KMEP Project Manager - Environmental Remediation
Generator Authorization Signature	Date	Print Name and Title

LIQUID ENVIRONMENTAL SOLUTIONS

NON-HAZARDOUS WASTE MANIFEST

95191

1138907

Profile Number
205094

Generator Name	Name: SFPP, L.P. - SILVERCROFT SITE Phone: (480) 203-9968	**Generator Address**	Address: 2905 N. SILVER ISLAND WAY City: TUCSON State: AZ Zip: 85745

Check with your state and local regulatory agencies for manifest retention requirements. NOTE: Many regulatory agencies require records to be kept on-site and available to review for up to 3 years.

Waste Type	☐ Grease Trap ☐ Grit Trap ☐ Septic/Chemical Toilet ☒ Non-Industrial ☐ Industrial ☐ Special ☐ Used Cooking Oil ☐ Recyclable Used Oil

I certify that the waste material removed from the above premises does not contain any radioactive, flammable, explosive, toxic or hazardous material ("Excluded Waste"). The term "hazardous material" is defined as any one or more pollutant, toxic substance, hazardous substance, solvent or oil as defined in or pusuant to the Resource Conservation and Recovery Act, the Comprehensive Environmental Response Compensation and Liability Act, the Federal Clean Water Act, or any other federal, state or local environmental law, regulation, ordinance, or rule, whether existing as of the date of this agreement or subsequently enacted. I also acknowledge that the Generator shall be responsible for any costs incurred by the Transporter or Disposal Facility in handling or proper disposal of any hazardous waste and that the Generator expressly agrees to defend, indemnify and hold harmless the Transporter from and against any and all damages, costs, fines and liabilities resulting from or arising out of any such hazardous waste.

Generator Rep. Name (please print)	PAUL SALCIDO	**Generator Rep. Signature**	Paul M Salcido

Transporter Name	Name: MAP ENVIRONMENTAL Phone: (602) 278-6233	**Transporter Address**	Address: 3045 SOUTH 51ST AVENUE City: PHOENIX State: AZ Zip: 85043

Waste Removed (Gallons)	5,000	**Date** 1/15/14	**Time** 1:45 PM

I certify that the information above is accurate, and that only the waste certified for removal by the Generator is contained in the servicing vehicle. I am aware that falsification of this manifest may result in prosecution.

Driver Name (please print)	Mike MacKenzie	**Driver Signature**	Mike Mackenzie

Disposal Facility	Liquid Environmental Solutions of Arizona	**Address**	5159 West Van Buren Street Phoenix, AZ 85043

Waste Received (Gallons)	5000	**Date** 1/15/14	**Time**
Facility Rep. Name (please print)	Scott B	**Facility Rep. Signature**	Scott

WHITE - Generator Final Copy YELLOW - Liquid Environmental Solutions Copy GOLDENROD - Transporter Copy PINK - Generator 1st Copy

Butterfield Station Landfill Original

40404 S. 99th Ave.
Mobile, AZ, 85239
Ph: 602-606-1000

Ticket# 698832

Customer Name MP Environmental MP Environme Carrier MPE MPE
Ticket Date 01/13/2014 Vehicle# 626 Volume
Payment Type Credit Account Container
Manual Ticket# Driver
Hauling Ticket# Check#
Route Billing # 0005803
State Waste Code Gen EPA ID
Manifest 144450
Destination Grid
PO
Profile 439575AZ (NON REGULATED SOIL CUTTINGS)
Generator 160-SFPPPSILVERCROFTSITE SFPPP SILVERROFT SITE

	Time	Scale	Operator	Inbound		
In	01/13/2014 11:05:06	Inbound	cwilso30		Gross	54920 lb
Out	01/13/2014 11:54:43	Outbound	cwilso30		Tare	36900 lb
					Net	18020 lb
					Tons	9.01

Comments

	Product	LD%	Qty	UOM	Rate	Tax	Amount	Origin
1	Cont5oilPet-Tons-C	100	9.01	Tons				AZ
2	FUEL-Fuel Surcharg	100		%				AZ
3	EVF-P-Standard Env	100		%				AZ
4	ADE-ADEQ Fee	100	9.01	Tons				AZ

"This is to certify that the following described merchandise was weighted and counted or measured by a public or deputy weighmaster, and when properly signed and sealed, shall be primafacie evidence of the accuracy of the weight shown prescribed by law"

"I certify that the waste I delivered to this facility on this date does not contain any regulated hazardous, toxic, radioactive waste or subtances, or other non-allowable wastes. I also agree to remove any non-allowable wastes I bring to this facility, or pay all costs for proper removal of such wastes, upon request from this facility."

DRIVER: PLEASE SIGN HERE

Total Tax
Total Ticket

403WMFL-Butter
Driver's Signature

54420-624

WASTE MANAGEMENT

PLEASE CALL LANDFILL 24 HRS. IN ADVANCE WITH SHIPPING NOTICE.

NON-HAZARDOUS WASTE MANIFEST

FOR OFFICE USE ONLY
Customer Acct. No. _____
Ticket No. _____

GENERATOR

WM- 144450

Name: SFPPP, L.P.
Address: 1100 TOWN + COUNTRY ROAD, ORANGE, CA 92868
Phone No.: 480-203-9968

Generating Location: SILVERCROFT SITE, 2905 N. SILVER ISLAND WAY, TUCSON, AZ 85745
I.D. No.: _____

PROFILE APPROVAL NO.	WASTE DESCRIPTION	QUANTITY	UNITS
GFS 439575A2	NON-REGULATED SOIL	20	T

UNIT
D - DRUM
B - BAG
C - CARTON
T - TONS
Y - YARDS
O - OTHER

I hereby certify that the above listed material(s), is (are) not a hazardous waste as defined by 40CFR Part 261: That each waste has been properly described, classified and packaged, and is in proper condition for transportation according to applicable regulation.

PAUL SALCIDO — AUTHORIZED AGENT'S NAME (PRINT)
01/06/14 — DATE
Paul M Salcido — SIGNATURE

CONTRACTOR

Name: MP ENVIRONMENTAL
Phone No.: 602-278-6233
Address: 3045 S. 51ST AVENUE, PHOENIX, AZ 85043

I hereby certify that the above listed material(s), is (are) not a hazardous waste as defined by 40CFR Part 261 or any applicable state law: That each waste has been properly described, classified and packaged, and is in proper condition for transportation according to applicable regulation.

MATT HOFFMAN — AUTHORIZED AGENT'S NAME (PRINT)
12-30-13 — DATE
Matt Hoffman — SIGNATURE

TRANSPORTER

BIN # 6014

Name: MP ENVIRONMENTAL
Phone No.: 602-278-6233
Address: 3045 S. 51ST AVENUE, PHOENIX, AZ 85043
Driver's Name: HECTOR LINARES
Vehicle's No.: 782-(626)

I hereby certify that the above listed material(s), is (are) not a hazardous waste as defined by 40CFR Part 261 or any applicable state law: That each waste has been properly described, classified and packaged, and is in proper condition for transportation according to applicable regulation.

1-10-14 — SHIPMENT DATE
DRIVER'S SIGNATURE
1-13-14 — DELIVERY DATE
DRIVER'S SIGNATURE

DISPOSAL FACILITY

- [x] BUTTERFIELD STATION FACILITY • 40404 South 99th Avenue • Mobile, Arizona 85239 • (602) 256-0630
- [ ] NORTHWEST REGIONAL LANDFILL • 19401 West Deer Valley Road • Surprise, Arizona 85387 • (623) 584-6065
- [ ] PAINTED DESERT LANDFILL • 9001 North Porter Avenue • Joseph City, Arizona 86032 • (928) 288-3605
- [ ] GRAY WOLF LANDFILL • 23355 East Highway 169 • Mile Post 11 • Dewey, Arizona 86327 • (928) 925-6249
- [ ] LONE CACTUS LANDFILL • 21402 North 7th Street • Phoenix Arizona 85024 • (623) 581-0939
- [ ] IRONWOOD LANDFILL • 12720 East Highway 287 • Florence, Arizona 85232 • (520) 868-8778
- [ ] _____

I hereby certify that the above material has been accepted and that information presented on this document are true and accurate.

Carla Walsh — NAME (PRINT)
1/13/14 — DATE
Carla Walsh — SIGNATURE

111-005 / AZ — ORIGINAL - WHITE — DISPOSAL FACILITY - YELLOW — TRANSPORTER - PINK — GENERATOR - GOLDENROD

Driver's Signature

Butterfield Station Landfill

Original

40404 S. 99th Ave.
Mobile, AZ, 85239
Ph: 602-606-1008

Ticket# 698944

Customer Name MP Environmental MP Environme
Ticket Date 01/14/2014
Payment Type Credit Account
Manual Ticket#
Hauling Ticket#
Route
State Waste Code
Manifest 144385
Destination
PO
Profile 439575AZ (NON REGULATED SOIL CUTTINGS)
Generator 160-SFPPPSILVERCROFTSITE SFPPP SILVERROFT SITE

Carrier MPE MPE
Vehicle# 679
Container
Driver
Check#
Billing # 0005803
Gen EPA ID
Grid

Volume

	Time	Scale	Operator	Inbound		
In	01/14/2014 11:51:29	Inbound	sculwell		Gross	48240 lb
Out	01/14/2014 12:31:06	Outbound	sculwell		Tare	37460 lb
					Net	10780 lb
					Tons	5.39

Comments

	Product	LD%	Qty	UOM	Rate	Tax	Amount	Origin
1	ContSoilPet-Tons-C	100	5.39	Tons				AZ
2	FUEL-Fuel Surcharg	100		%				AZ
3	EVF-P-Standard Env	100		%				AZ
4	ADE-ADED Fee	100	5.39	Tons				AZ

"This is to certify that the following described merchandise was weighted and counted or measured by a public or deputy weighmaster, and when properly signed and sealed, shall be primafacie evidence of the accuracy of the weight shown prescribed by law"

"I certify that the waste I delivered to this facility on this date does not contain any regulated hazardous, toxic, radioactive waste or subtances, or other non-allowable wastes. I also agree to remove any non-allowable wastes I bring to this facility, or pay all costs for proper removal of such wastes, upon request from this facility."

DRIVER: PLEASE SIGN HERE

Total Tax
Total Ticket

Driver's Signature

403WMFL-Butter

1107-48240

WASTE MANAGEMENT

PLEASE CALL LANDFILL 24 HRS. IN ADVANCE WITH SHIPPING NOTICE.

NON-HAZARDOUS WASTE MANIFEST

FOR OFFICE USE ONLY
Customer Acct. No.
Ticket No.

GENERATOR

WM- 144385

Name: SF PPP, L.P.
Address: 1100 TOWN + COUNTRY ROAD, ORANGE, CA 92868
Phone No.: 480-203-9968

Generating Location: SILVERCROFT SITE, 2905 N. SILVER ISLAND WAY, TUCSON, AZ 85745
I.D. No.: BIN R 2961 C PL

PROFILE APPROVAL NO.	WASTE DESCRIPTION	QUANTITY	UNITS
BFS 439575AZ	NON-REGULATED SOIL	20	T

UNIT
D - DRUM
B - BAG
C - CARTON
T - TONS
Y - YARDS
O - OTHER

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PAUL SALCIDO — AUTHORIZED AGENT'S NAME (PRINT)
01/06/14 — DATE
SIGNATURE

CONTRACTOR

Name: MP ENVIRONMENTAL
Phone No.: 602-278-6233
Address: 3045 S. 51ST AVENUE, PHOENIX, AZ 85043

I hereby certify that the above listed material(s), is (are) not a hazardous waste as defined by 40CFR Part 261 or any applicable state law: That each waste has been properly described, classified and packaged, and is in proper condition for transportation according to applicable regulation.

MATT HOFFMAN — AUTHORIZED AGENT'S NAME (PRINT)
12-30-13 — DATE
SIGNATURE

TRANSPORTER

Name: MP ENVIRONMENTAL
Phone No.: 602-278-6233
Address: 3045 SOUTH 51ST AVENUE, PHOENIX, AZ 85043
Driver's Name: Robert St John
Vehicle's No.: #679

I hereby certify that the above listed material(s), is (are) not a hazardous waste as defined by 40CFR Part 261 or any applicable state law: That each waste has been properly described, classified and packaged, and is in proper condition for transportation according to applicable regulation.

1-14-14 — SHIPMENT DATE
DRIVER'S SIGNATURE
1-14-14 — DELIVERY DATE
DRIVER'S SIGNATURE

DISPOSAL FACILITY

- [x] BUTTERFIELD STATION FACILITY • 40404 South 99th Avenue • Mobile, Arizona 85239 • (602) 256-0630
- [ ] NORTHWEST REGIONAL LANDFILL • 19401 West Deer Valley Road • Surprise, Arizona 85387 • (623) 584-6065
- [ ] PAINTED DESERT LANDFILL • 9001 North Porter Avenue • Joseph City, Arizona 86032 • (928) 288-3605
- [ ] GRAY WOLF LANDFILL • 23355 East Highway 169 • Mile Post 11 • Dewey, Arizona 86327 • (928) 925-6249
- [ ] LONE CACTUS LANDFILL • 21402 North 7th Street • Phoenix Arizona 85024 • (623) 581-0939
- [ ] IRONWOOD LANDFILL • 12720 East Highway 287 • Florence, Arizona 85232 • (520) 868-8778
- [ ]

I hereby certify that the above material has been accepted and that information presented on this document are true and accurate.

NAME (PRINT)
1/14/14 — DATE
SIGNATURE

111-005 / AZ

ORIGINAL - WHITE DISPOSAL FACILITY - YELLOW TRANSPORTER - PINK GENERATOR - GOLDENROD

Butterfield Station Landfill

Original

40 S. 99th Ave.
Mot , AZ, 85239
Ph: 82-606-1008

Ticket# 698942

Customer Name MP Environme al MP Environme Carrier MPE MPE
Ticket Date 01/14/2014 Vehicle# 610 Volume
Payment Type Credit Account Container
Manual Ticket# Driver
Hauling Ticket# Check#
Route Billing # 0005803
State Waste Code Gen EPA ID
Manifest 134496
Destination Grid
PO
Profile 439575AZ (NON REGULATED SOIL CUTTINGS)
Generator 160-SFPPPSILVERCROFTSITE SFPPP SILVERROFT SITE

	Time	Scale	Operator	Inbound		
In	01/14/2014 11:46:12	Inbound	sculwell		Gross	55360 lb
Out	01/14/2014 12:33:33	Outbound	sculwell		Tare	36860 lb
					Net	18500 lb
					Tons	9.25

Comments

	Product	LD%	Qty	UOM	Rate	Tax	Amount	Origin
1	ContSoilPet-Tons-C	100	9.25	Tons				AZ
2	FUEL-Fuel Surcharg	100		%				AZ
3	EVF-P-Standard Env	100		%				AZ
4	ADE-ADEQ Fee	100	9.25	Tons				AZ

Refino ariz

"This is to certify that the following described merchandise was weighted and counted or measured by a public or deputy weighmaster, and when properly signed and sealed, shall be primafacie evidence of the accuracy of the weight shown prescribed by law"

"I certify that the waste I delivered to this facility on this date does not contain any regulated hazardous, toxic, radioactive waste or subtances, or other non-allowable wastes. I also agree to remove any non-allowable wastes I bring to this facility, or pay all costs for proper removal of such wastes, upon request from this facility."

DRIVER: PLEASE SIGN HERE

Total Tax
Total Ticket

Driver's Signature

403WMFL-Butter

610-55340

WASTE MANAGEMENT

PLEASE CALL LANDFILL 24 HRS. IN ADVANCE WITH SHIPPING NOTICE.

NON-HAZARDOUS WASTE MANIFEST

FOR OFFICE USE ONLY
Customer Acct. No. _____
Ticket No. _____

GENERATOR

WM- 134496

Name SFPPP, L.P.
Address 1100 TOWN + COUNTRY ROAD
ORANGE, CA 92868
Phone No. 480-203-9968

Generating Location SILVERCROFT SITE
2905 N. SILVER ISLAND WAY
TUCSON, AZ 85745
I.D. No. _____

PROFILE APPROVAL NO.	WASTE DESCRIPTION	QUANTITY	UNITS
BFS 439575AZ	NON-REGULATED SOIL	20	T

UNIT
D - DRUM
B - BAG
C - CARTON
T - TONS
Y - YARDS
O - OTHER

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PAUL SALCIDO — AUTHORIZED AGENT'S NAME (PRINT)
01/06/14 — DATE
Paul M Salcido — SIGNATURE

CONTRACTOR

Name MP ENVIRONMENTAL
Phone No. 602-278-6233
Address 3045 S. 51ST AVENUE, PHOENIX, AZ 85043

I hereby certify that the above listed material(s), is (are) not a hazardous waste as defined by 40CFR Part 261 or any applicable state law: That each waste has been properly described, classified and packaged, and is in proper condition for transportation according to applicable regulation.

MATT HOFFMAN — AUTHORIZED AGENT'S NAME (PRINT)
12-30-13 — DATE
Matt Hoffman — SIGNATURE

TRANSPORTER

Name MP ENVIRONMENTAL
Phone No. 602-278-6233
Address 3045 SOUTH 51ST AVENUE
PHOENIX, AZ 85043
Driver's Name RUFINO [illegible]
Vehicle's No. 610

I hereby certify that the above listed material(s), is (are) not a hazardous waste as defined by 40CFR Part 261 or any applicable state law: That each waste has been properly described, classified and packaged, and is in proper condition for transportation according to applicable regulation.

SHIPMENT DATE | DRIVER'S SIGNATURE | DELIVERY DATE | DRIVER'S SIGNATURE

DISPOSAL FACILITY

- [x] BUTTERFIELD STATION FACILITY • 40404 South 99th Avenue • Mobile, Arizona 85239 • (602) 256-0630
- [ ] NORTHWEST REGIONAL LANDFILL • 19401 West Deer Valley Road • Surprise, Arizona 85387 • (623) 584-6065
- [ ] PAINTED DESERT LANDFILL • 9001 North Porter Avenue • Joseph City, Arizona 86032 • (928) 288-3605
- [ ] GRAY WOLF LANDFILL • 23355 East Highway 169 • Mile Post 11 • Dewey, Arizona 86327 • (928) 925-6249
- [ ] LONE CACTUS LANDFILL • 21402 North 7th Street • Phoenix Arizona 85024 • (623) 581-0939
- [ ] IRONWOOD LANDFILL • 12720 East Highway 287 • Florence, Arizona 85232 • (520) 868-8778
- [ ] _____

I hereby certify that the above material has been accepted and that information presented on this document are true and accurate.

Shawna [illegible] — NAME (PRINT)
1/14/14 — DATE
SIGNATURE

111-005 / AZ

ORIGINAL - WHITE | DISPOSAL FACILITY - YELLOW | TRANSPORTER - PINK | GENERATOR - GOLDENROD

Butterfield Station Landfill

Original

40404 S. 99th Ave.
Mobile, AZ, 85239
Ph: 602-606-1008

Ticket# 698726

Customer Name MP Environmental MP Environme
Ticket Date 01/10/2014
Payment Type Credit Account
Manual Ticket#
Hauling Ticket#
Route
State Waste Code
Manifest 144452
Destination
PO
Profile 439575AZ (NON REGULATED SOIL CUTTINGS)
Generator 160-SFPPPSILVERCROFTSITE SFPPP SILVERROFT SITE

Carrier MPE MPE
Vehicle# 683
Container
Driver
Check#
Billing # 0005803
Gen EPA ID
Grid

Volume

	Time	Scale	Operator	Inbound		
In	01/10/2014 12:01:48	Inbound	cwilso30		Gross	55640 lb
Out	01/10/2014 12:44:50	Outbound	cwilso30		Tare	37660 lb
					Net	17980 lb
					Tons	8.99

Comments

	Product	LD%	Qty	UOM	Rate	Tax	Amount	Origin
1	ContSoilPet-Tons-C	100	8.99	Tons				AZ
2	FUEL-Fuel Surcharg	100		%				AZ
3	EVF-P-Standard Env	100		%				AZ
4	ADE-ADEQ Fee	100	8.99	Tons				AZ

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"I certify that the waste I delivered to this facility on this date does not contain any regulated hazardous, toxic, radioactive waste or subtances, or other non-allowable wastes. I also agree to remove any non-allowable wastes I bring to this facility, or pay all costs for proper removal of such wastes, upon request from this facility."

DRIVER: PLEASE SIGN HERE

085-550402

WASTE MANAGEMENT

PLEASE CALL LANDFILL 24 HRS. IN ADVANCE WITH SHIPPING NOTICE.

NON-HAZARDOUS WASTE MANIFEST

FOR OFFICE USE ONLY

Customer Acct. No. _____

Ticket No. _____

GENERATOR

WM- 144452

Name: SFPPP, L.P.

Address: 1100 TOWN & COUNTRY ROAD
ORANGE, CA 92868

Phone No.: 480-203-9968

Generating Location: SILVERCROFT SITE
2905 N. SILVER ISLAND WAY
TUCSON, AZ 85745

I.D. No.: _____

PROFILE APPROVAL NO.	WASTE DESCRIPTION	QUANTITY	UNITS
BFS 439575A2	NON-REGULATED SOIL	20	T

UNIT
D - DRUM
B - BAG
C - CARTON
T - TONS
Y - YARDS
O - OTHER

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PAUL SALCIDO — AUTHORIZED AGENT'S NAME (PRINT)
02/6/14 — DATE
Paul Salcido — SIGNATURE

CONTRACTOR

Name: MP ENVIRONMENTAL

Phone No.: 602-278-6233

Address: 3045 SOUTH 51ST AVENUE, PHOENIX, AZ 85043

I hereby certify that the above listed material(s), is (are) not a hazardous waste as defined by 40CFR Part 261 or any applicable state law: That each waste has been properly described, classified and packaged, and is in proper condition for transportation according to applicable regulation.

MATT HOFFMAN — AUTHORIZED AGENT'S NAME (PRINT)
12-30-13 — DATE
Matt Hoffman — SIGNATURE

TRANSPORTER

BIN #6249

Name: MP ENVIRONMENTAL

Address: 3045 SOUTH 51ST AVENUE
PHOENIX, AZ 85043

Phone No.: 602-278-6233

Driver's Name: RANDY HARTMAN

Vehicle's No.: 683 + 3877

I hereby certify that the above listed material(s), is (are) not a hazardous waste as defined by 40CFR Part 261 or any applicable state law: That each waste has been properly described, classified and packaged, and is in proper condition for transportation according to applicable regulation.

1-10-14 — SHIPMENT DATE
Randy Hartman — DRIVER'S SIGNATURE
DELIVERY DATE
DRIVER'S SIGNATURE

DISPOSAL FACILITY

- [x] BUTTERFIELD STATION FACILITY • 40404 South 99th Avenue • Mobile, Arizona 85239 • (602) 256-0630
- [ ] NORTHWEST REGIONAL LANDFILL • 19401 West Deer Valley Road • Surprise, Arizona 85387 • (623) 584-6065
- [ ] PAINTED DESERT LANDFILL • 9001 North Porter Avenue • Joseph City, Arizona 86032 • (928) 288-3605
- [ ] GRAY WOLF LANDFILL • 23355 East Highway 169 • Mile Post 11 • Dewey, Arizona 86327 • (928) 925-6249
- [ ] LONE CACTUS LANDFILL • 21402 North 7th Street • Phoenix Arizona 85024 • (623) 581-0939
- [ ] IRONWOOD LANDFILL • 12720 East Highway 287 • Florence, Arizona 85232 • (520) 868-8778
- [ ] _____

I hereby certify that the above material has been accepted and that information presented on this document are true and accurate.

Dwayne Caldwell — NAME (PRINT)
1/10/14 — DATE
SIGNATURE

111-005 / AZ

ORIGINAL - WHITE DISPOSAL FACILITY - YELLOW TRANSPORTER - PINK GENERATOR - GOLDENROD

August 29, 2003 014-10022-00-001

Mr. Larry Bogdanski
Arizona Department of Environmental Quality
400 W. Congress, Suite 433
Tucson, Arizona 85701

Subject: Weekly Activity Report (August 29, 2003)
Kinder Morgan Energy Partners – Silvercroft Wash Release Site, Tucson, Arizona

Dear Mr. Bogdanski:

On behalf of Kinder Morgan Energy Partners (KMEP), LFR Levine·Fricke (LFR) is pleased to present this weekly report to the Arizona Department of Environmental Quality (ADEQ) documenting the activities for the KMEP Silvercroft Wash Release site ("the site"). This report includes additional preliminary laboratory analysis results received to date, as well as the activities for the week ending August 29, 2003.

Background

The site is located near a new housing development west of Jackrabbit Avenue in the City of Tucson, in Pima County. A map of the site vicinity is illustrated in Figure 1. Detailed site maps are shown in Figures 2, 3 and 4. Figures 2 and 3 are identical to the site maps submitted in the August 15, and August 22, 2003, weekly activity reports, and show only samples collected in the respective weeks. Figure 4 displays only samples collected during the week of August 29, 2003. LFR has not yet received any analytical results from samples collected this week.

The pipeline release was discovered at approximately 1:00 PM on Wednesday, July 30, 2003. KMEP immediately dispatched emergency response crews to the site, contacted the City of Tucson Fire Department (FD), and shut off valves along the pipeline to cease flow of gasoline through the pipeline. Activities performed on Wednesday, July 30, 2003 included:

- setting up an exclusion zone to prevent unauthorized entry
- continuous air monitoring utilizing Lower Explosive Limit (LEL) meters and photoionization detectors (PIDs)
- barricading by the FD of several houses in the development that had been affected by the release
- development of a site-specific Health and Safety Plan
- application by the FD of approximately 1000 gallons of suppression foam and water on the gasoline to contain vapors
- removal of 7 vacuum truckloads of gasoline and water from Silvercroft Wash

On Thursday, July 31, 2003, KMEP contractors began removing affected soil from Silvercroft Wash. A total of 32 bins of soil and a stockpile of approximately 250 tons of soil were removed. The soil was transported and disposed of at the Sonas facility in Vicksburg, Arizona, beginning Friday afternoon, and continuing through the weekend.

In the period between August 1 and August 15, KMEP performed remedial activities in the following areas:

- In the immediate area of the pipeline release;
- In Silvercroft Wash;
- In the storm-water channel between lots 352 and 353;
- Along the Southwest Gas (natural gas) pipeline right-of-way;
- Along the access road that runs along the top of the eastern side of Silvercroft Wash;
- Along the curbs at the intersection directly east of the storm-water channel;
- Water line junction valve in the intersection directly east of the storm-water channel.

Detailed descriptions of these activities were included in the weekly report dated Friday, August 15, 2003.

In the period between August 15 and August 22, 2003, KMEP performed remedial activities in the following areas:

- Excavated approximately 20 cubic yards of potentially affected soil during the installation of the temporary water line for the ongoing construction of homes in the subdivision.
- Collected additional storm water samples.
- Collected soil samples underneath former location of excavated soil stockpile.
- Collected soil samples and pressure test water samples near and in Silvercroft Wash.

Detailed descriptions of these activities were included in the weekly report dated Friday, August 22, 2003.

Remedial activities conducted during the week ending August 29, 2003:

- **Excavated approximately 100 cubic yards of potentially affected soil during the replacement of water valve junction.** On the day of the release, product had collected on the surface near the location of a buried water valve junction. The water valve junction is buried approximately 5 feet below ground surface (bgs). KMEP was concerned that product may have traveled down a riser pipe leading to the valve junction, so soil around the valve was excavated, and KMEP replaced the valve and associated piping. LFR screened the soil with a photoionization detector (PID). Potentially affected soil was concentrated around the valve junction as shown in Figure 4. The excavated soil was placed in 20-cubic yard bins and transported to the Sonas disposal facility. Once the potentially affected soil was removed, LFR collected confirmation soil samples. The excavation was 16 feet bgs, 15.5 feet north to south and 23 feet east to west at the widest points.

Two samples, collected from the bottom of the excavation and the west wall, were submitted to an onsite mobile laboratory. Both samples showed no detectable concentrations of BTEX and total volatile hydrocarbons (TVH). LFR collected an additional 12 samples from the area surrounding the valve junction and submitted them to Turner laboratories. Table 1 includes the sample names, with samples collected near the valve junction denoted with a WV. The locations are illustrated on Figure 4. Analytical results have not yet been received; they will be included in a future weekly report as soon as they are available.

- **Replaced approximately 315 feet of water lines.** Along with replacement of the water valve junction, approximately 300 feet of the 8-inch water main running north to south were replaced as shown in Figure 4. Approximately 15' of 4" water line that will service houses east of the junction was also replaced. Throughout the trench excavation LFR field screened soils with a PID. Once the 2 foot wide trench was completed to required depth (approximately 4 to 5 feet bgs), LFR collected soil samples from the bottom and both side walls, and submitted them to Turner Laboratories. Table 1 and Figure 4 include sample names and locations. Samples collected throughout the water line trench are denoted with a WL. Analytical results have not yet been received; they will be included in a future weekly report as soon as they are available.

- **Collected soil samples near housing foundations**

  On behalf of Monterrey Homes, ATC Environmental advanced 16 soil borings close to house foundations in the following lots: 321, 328, 350, 351, 353, 354, 355, and 356. LFR personnel observed ATC and collected split samples. The borings were advanced utilizing hand augers and post holes diggers. ATC submitted up to 3 samples from each boring to an onsite, mobile laboratory. LFR collected 26 samples from the 16 borings and submitted them to Turner Laboratories for analysis of BTEX, MTBE and TPH. A map showing the precise locations of each boring, and a list of samples submitted will be included in next week's report.

<u>Analytical results received during the week ending August 29, 2003:</u>

Table 1 includes all soil analytical results that have been received to date. Results denoted in *italics* were received during the week of August 22, 2003, and were not included in the previous weekly report.

- **Discussion of Results and Regulatory Guidelines**

The ADEQ regulatory guideline concentrations will be used to evaluate soil concentrations beneath the site. To assist the reader in understanding the analytical results shown in Table 1, the applicable ADEQ regulatory guidelines are presented in table shown below. Minimum Groundwater Protection Levels (GPLs) are concentrations of hydrocarbons that can remain in soil yet be protective of groundwater quality. Soil Remediation Levels (SRLs) are cleanup levels

based on ingestion, inhalation, and dermal contact risk criteria determined by the Arizona Department of Health Services (Arizona Administrative Code, Title 18, Chapter 7, Article 2). A more thorough discussion of the guidelines and the laboratory analytical results will be included in the final summary report of remedial activities.

Regulatory Guidelines for Soil Concentrations

Petroleum Hydrocarbon Constituent	Minimum GPLs (mg/kg)	SRLs Residential (mg/kg)	SRLs Non-Residential (mg/kg)
TPH	NA	NA	NA
TPH (C_{10-32})	NA	4,000	18,000
Benzene	0.71	0.62	1.4
Toluene	400	790	2,700
Ethylbenzene	120	1,500	2,700
Total Xylenes	2,200	2,800	2,800
MTBE (proposed)	NA	320	3,300

Minimum GPL = ADEQ Minimum Groundwater Protection Level
SRL = ADEQ Soil Remediation Level
NA = not applicable
Source: Arizona Department of Environmental Quality, December 1, 1999. *Corrective Action Plan Guidance.* Underground Storage Tank Program.

Table 2 presents updated results for soil samples from bins of soil that were shipped to Sonas for disposal. These analyses are used for profiling the soil for compliance with Sonas' permitting requirements, and do not represent concentrations of soil remaining at the site.

In summary, comparison of the preliminary soil analytical results in Table 1 and 2 to the above guidelines indicates that all analytical results from native soils beneath the excavated areas are below ADEQ residential SRLs and GPLs.

- **Stormwater**

Preliminary results for the stormwater runoff samples (designated K-M Loc. #1 through K-M Loc. #4) collected on August 14, 2003 showed no detectable concentrations of MTBE and BTEX (Table 3). Stormwater runoff samples collected from the same locations on August 18, 2003, also showed no detectable concentrations of BTEX. MTBE was detected in 3 of the 4 samples, the highest concentration of which was 1.3 micrograms per liter (µg/l). These results are displayed in Table 3. Final laboratory analysis reports will be included in the final remediation summary report.

- **Pressure Test Water**

KMEP performed a hydrostatic pressure test on a 12-mile long section of the 8-inch diameter pipeline on August 19, 2003. An 8-mile long portion passed the test, but the remaining 4-mile long portion failed, with a rupture occurring approximately 35 feet north of the original July 30, 2003 release. Approximately 1000 gallons of water was released. Most of the water ponded in the immediate vicinity of the pipe, with a smaller portion ponding in Silvercroft wash. None of the released water traveled past the bridge that is located approximately 170 feet north (and downstream) of the August 19, 2003, release. URS collected 3 samples of the released water, and 5 soil samples beneath where the pressure test water flowed. These sample locations are shown on Figure 3. Preliminary soil sample results are well below residential soil remediation levels, and are included in Table 1, denoted as #1 through #7. The results of the 3 pressure test water samples are included in Table 3; BTEX and MTBE were detected in each of these samples.

Meetings/Communication

KMEP is continuing to work with the City of Tucson, Monterey Homes, and Borderland Construction to address additional remediation and reconstruction activities in the green shaded area shown in Figure 4.

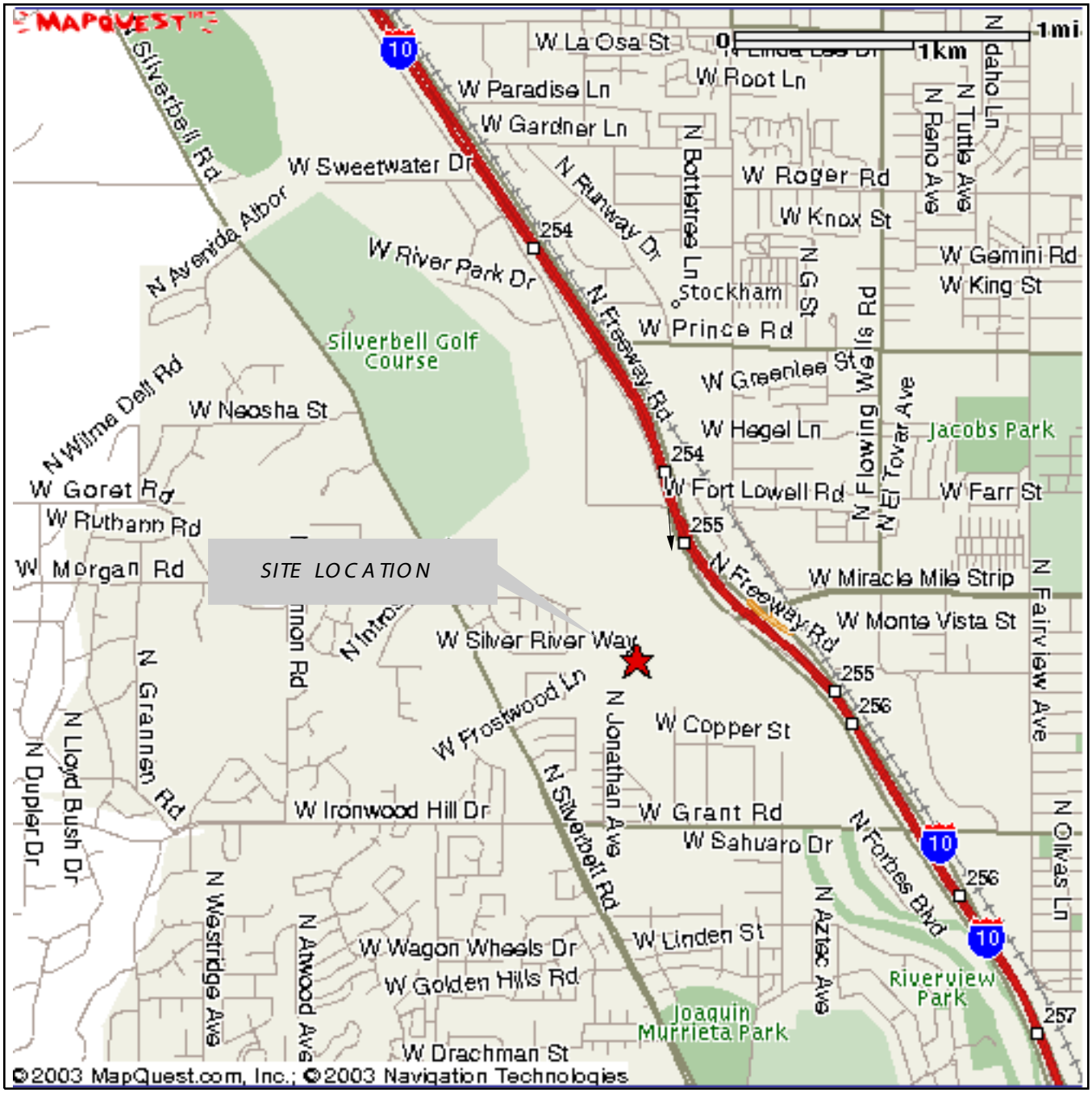
If you have any questions or require additional information, please contact Mark Sandon, Director of the Environmental Health & Safety Group for KMEP, at 714-560-4867, or Hayden Truscott, KMEP Environmental Project Manager, at 303-914-7805.

Sincerely,

Ned Overs, P.E.
Principal Engineer
Operations Manager

Eric Rogoff, R.G., C.E.G.
Senior Associate Hydrogeologist

cc: Ron Ravago, City of Tucson Department of Transportation/Stormwater Runoff Section
Lorenzo M. Hernandez, P.E., City of Tucson Construction Section Manager
Captain Michael Jones, City of Tucson Fire Department
Ron Teaney, VP Construction, Monterey Homes
William D. Buntin, Pima County, Department of Transportation & Flood Control District
Brad Lewis, KMEP



Tucson, Arizona

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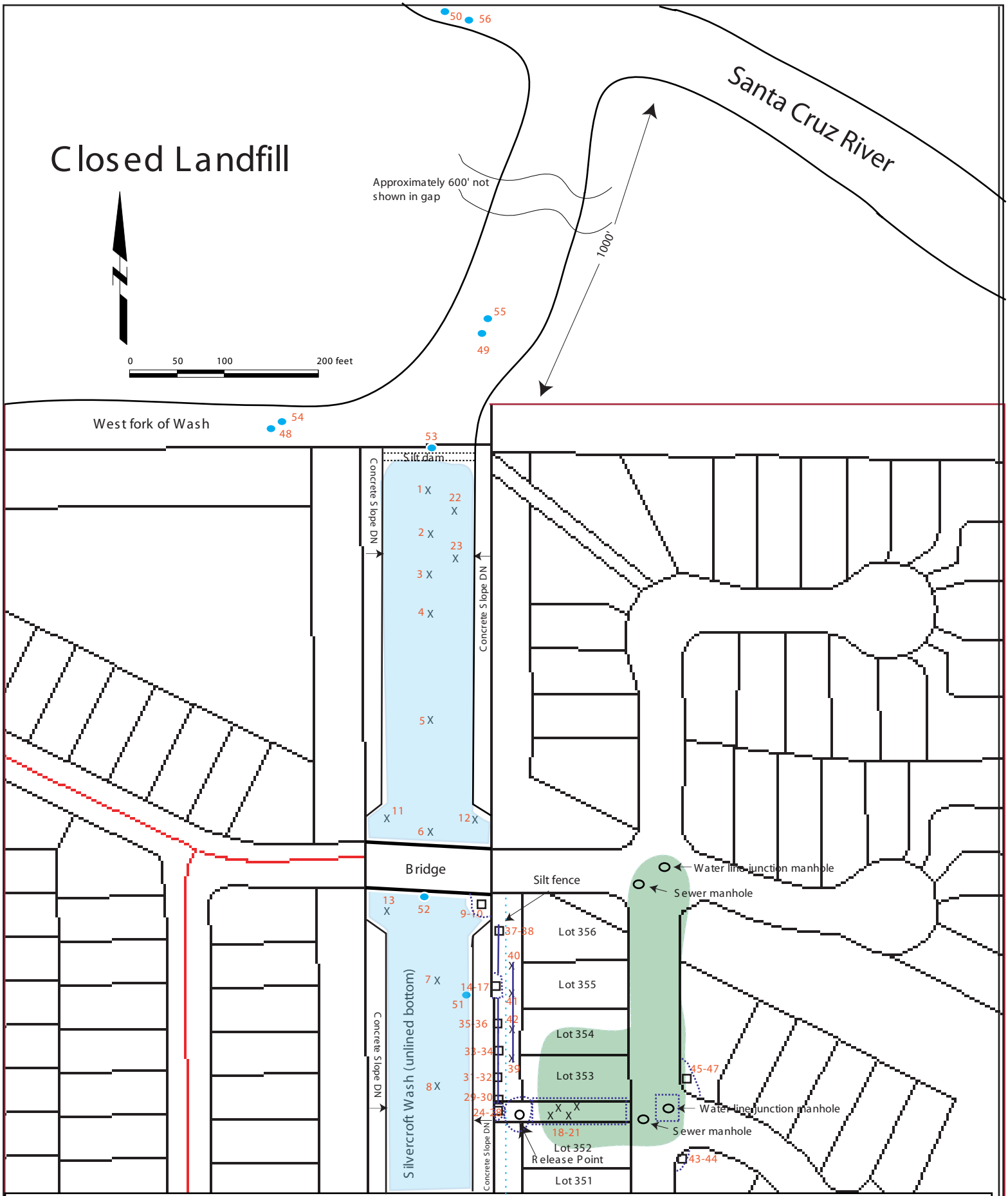
Site Vicinity-Silvercroft Wash

Figure 1

Project No. 014-10022-00



8329-002 04102000DGH/dgh

Base Map source: Pima County

Phoenix, Arizona

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Excavation Limit

Trench Excavation with 2' bucket

Surface Water Sample Location

Mulitple Soil Sample Location

X Single Soil Sample Location

1 Sample ID #

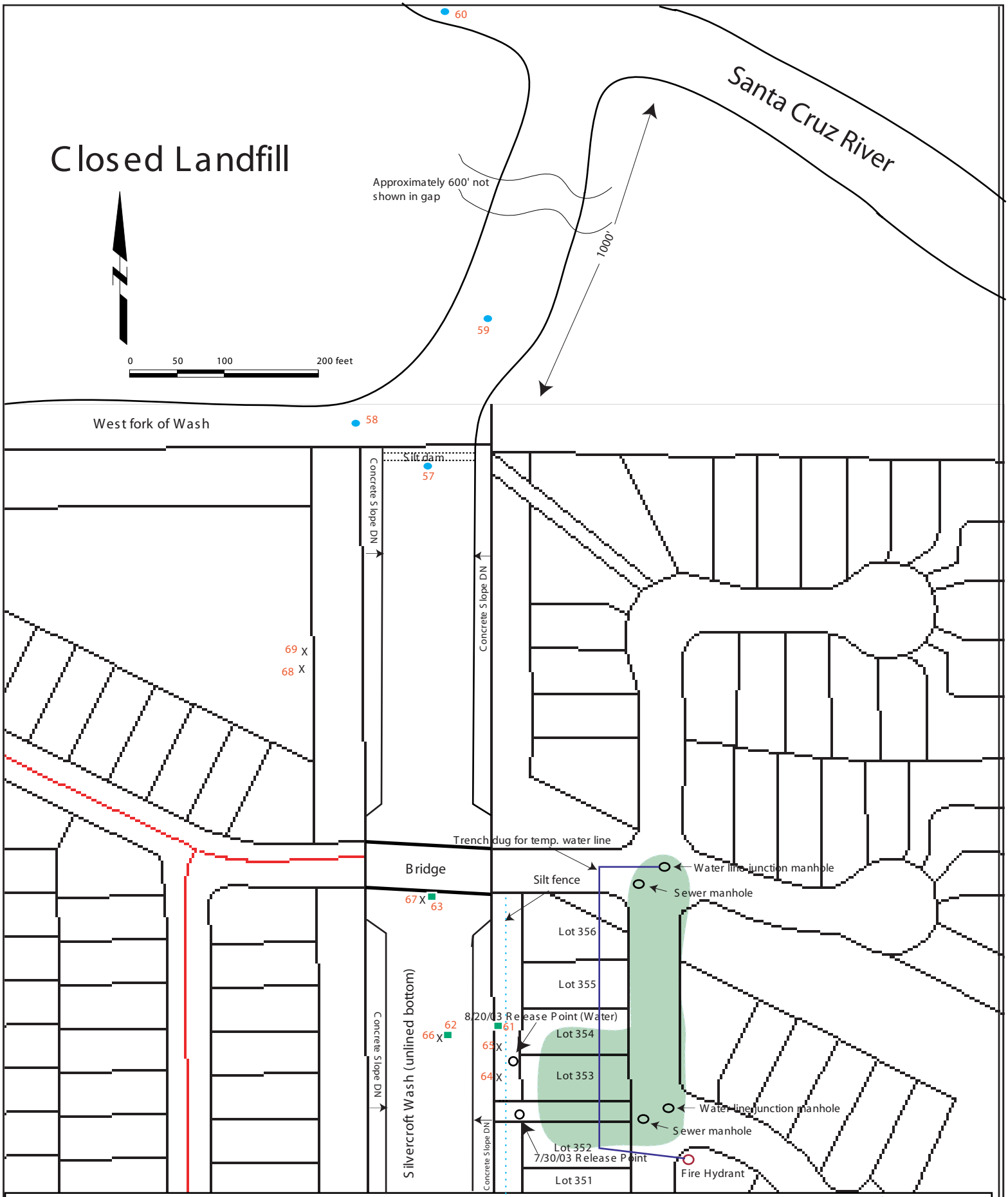
Area to be addressed

Area that was turned, and excavated as needed

Site Map-Silvercroft Wash Release Site

Figure 2

Project No. 014-10022-00



8329-002 04102000DGH/dgh

Base Map source: Pima County

Phoenix, Arizona

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Trench Excavation with 2' bucket

Storm Water Sample Location 8/18/03

Pressure Test Water Sample Location 8/20/03

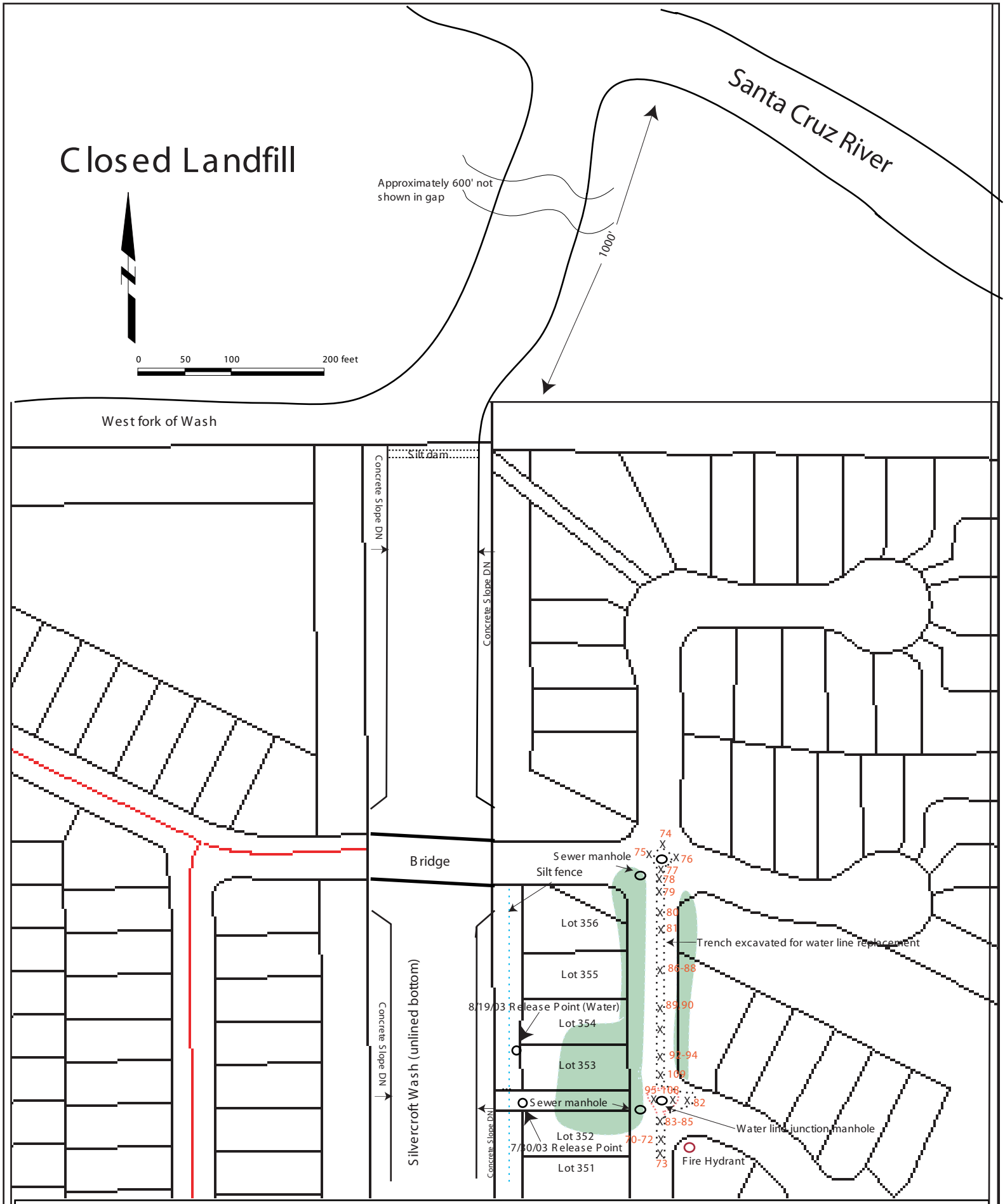
X Soil Sample Location 8/20/03

Area to be addressed

Site Map-Silvercroft Wash Release Site

Figure 3

Project No. 014-10022-00



8329-002 04102000DGH/dgh

Base Map source: Pima County

Phoenix, Arizona

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Area of potential affected soils that were transported offsite

Trench excavated for water line replacement

Soil Sample Location

Area to be addressed

Site Map-Silvercroft Wash Release Site

Figure 4

Project No. 014-10022-00

Table 1: Soil Samples results of Initial Investigation and Excavation
Silvercroft Wash Release Site

Map ID #	Sample ID	Location	Depth (feet)	Sample Date	Collection Method	Benzene	Toluene	Ethyl-Benzene	Xylenes, Total	MtBE	TPH (C6-C10)	TPH (C10-C32)
1	JRR-HA1-1'	Wash, north of bridge	1.0	8/1/2003	Hand auger	<0.050	<0.050	<0.050	<0.20	<0.050	NA	NA
2	JRR-HA2-1.5'	Wash, north of bridge	1.5	8/1/2003	Hand auger	<0.050	<0.050	<0.050	<0.20	<0.050	NA	NA
3	JRR-HA3-1.2'	Wash, north of bridge	1.2	8/1/2003	Hand auger	<0.050	<0.050	<0.050	<0.20	<0.050	NA	NA
4	JRR-HA4-1'	Wash, north of bridge	1.0	8/1/2003	Hand auger	<0.050	<0.050	<0.050	<0.20	<0.050	NA	NA
5	JRR-HA5-1.5'	Wash, north of bridge	1.5	8/1/2003	Hand auger	<0.050	<0.050	<0.050	<0.20	<0.050	NA	NA
6	JRR-HA6	Wash, north of bridge	1.5	8/1/2003	Hand auger	<0.050	<0.050	0.067	<0.20	<0.050	<20	<130
7	JRR-HA7	Wash, south of bridge	1.5	8/1/2003	Hand auger	<0.050	<0.050	<0.050	<0.20	<0.050	<20	<130
8	JRR-HA8	Wash, south of bridge	1.5	8/1/2003	Hand auger	<0.050	<0.050	<0.050	<0.20	<0.050	<20	<130
9	Bridge-SEC-6.5'	Wash, south of bridge	6.5	8/4/2003	excavator bucket/shovel	<0.050	<0.050	<0.050	<0.20	<0.050	NA	NA
10	Bridge-SEC-S.Wall 4.5'	Wash, south of bridge	4.5	8/4/2003	excavator bucket/shovel	<0.050	<0.050	<0.050	<0.20	0.058	NA	NA
11	HA-9-1.5'	Wash, north of bridge	1.5	8/4/2003	Hand auger	<0.050	<0.050	<0.050	<0.20	<0.050	NA	NA
12	HA-10-1'	Wash, north of bridge	1.0	8/4/2003	Hand auger	<0.050	0.076	0.12	0.66	0.1	NA	NA
13	HA-11-1.5'	Wash, south of bridge	1.5	8/4/2003	Hand auger	0.32	pending	pending	pending	7.1	NA	NA
14	HA-20-6.5'	Along SW gas line, 120' N. or release pt.	6.5	8/5/2003	excavator bucket/shovel	<0.050	<0.050	<0.050	<0.20	<0.050	<20	<130
15	HA-21-6'	Along SW gas line, 120' N. or release pt.	6.0	8/5/2003	excavator bucket/shovel	<0.050	<0.050	<0.050	<0.20	<0.050	<20	<130
16	HA-22-6'	Along SW gas line, 120' N. or release pt.	6.0	8/5/2003	excavator bucket/shovel	<0.050	<0.050	<0.050	<0.20	0.08	<20	<130
17	HA-23-4'	Along SW gas line, 120' N. or release pt.	4.0	8/5/2003	excavator bucket/shovel	<0.050	<0.050	<0.050	<0.20	0.053	<20	<130
18	HA-30-1.5'	Western bottom of excavation in drainage channel	1.5	8/5/2003	Hand auger	<0.050	<0.050	<0.050	<0.20	<0.050	<20	<130
19	HA-31-2'	Western bottom of excavation in drainage channel	2.0	8/5/2003	Hand auger	<0.050	<0.050	<0.050	<0.20	0.36	<20	<130
20	HA-32-2'	Western bottom of excavation in drainage channel	2.0	8/5/2003	Hand auger	0.074	0.27	0.052	<0.20	3.2	<20	<130
21	HA-33-2'	Western bottom of excavation in drainage channel	2.0	8/5/2003	Hand auger	<0.050	<0.050	<0.050	<0.20	1.7	<20	<130
22	JRR-HA-40-2'	Wash, north of bridge	2.0	8/7/2003	Hand auger	<0.050	<0.050	<0.050	<0.20	<0.050	<20	<130
23	JRR-HA-41-1'	Wash, north of bridge	1.0	8/7/2003	Hand auger	<0.050	<0.050	<0.050	<0.20	<0.050	29	<130
24	EXV-50-S,Wall-4'	Along SW gas line, flush with release pt.	4.0	8/7/2003	excavator bucket/shovel	*<0.050*	*<0.050*	*<0.050*	*<0.20*	*3.6*	*26*	*<130*
25	EXV-51-E.Wall-1'	Along SW gas line, flush with release pt.	1.0	8/7/2003	excavator bucket/shovel	*<0.050*	*<0.050*	*<0.050*	*<0.20*	*1.2*	*27*	*<130*
26	EXV-52-N.Wall-4'	Along SW gas line, flush with release pt.	4.0	8/7/2003	excavator bucket/shovel	*<0.050*	*<0.050*	*<0.050*	*<0.20*	*0.13*	*26*	*<130*
27	EXV-Bot-53-6'	Along SW gas line, flush with release pt.	6.0	8/7/2003	excavator bucket/shovel	*<0.050*	*<0.050*	*<0.050*	*<0.20*	*0.13*	*<20*	*<130*
28	EXV-54-SWgas-2'	Along SW gas line, flush with release pt.	2.0	8/7/2003	excavator bucket/shovel	*<0.050*	*0.056*	*<0.050*	*<0.20*	*1.9*	*<20*	*<130*
29	TRCH-60-Bot-7'	Excavation atop SW gas line	7.0	8/7/2003	excavator bucket/shovel	*<0.050*	*<0.050*	*<0.050*	*<0.20*	*0.25*	*<20*	*<130*
30	TRCH-62-E.Wall-3'	Excavation atop SW gas line	3.0	8/7/2003	excavator bucket/shovel	*<0.050*	*<0.050*	*<0.050*	*<0.20*	*0.16*	*<20*	*<130*
31	TRCH-61-Bot-3.5'	Excavation atop SW gas line	3.5	8/7/2003	excavator bucket/shovel	*<0.050*	*<0.050*	*<0.050*	*<0.20*	*0.8*	*<20*	*<130*
32	TRCH-63-E.Wall-2'	Excavation atop SW gas line	2.0	8/7/2003	excavator bucket/shovel	*<0.050*	*<0.050*	*<0.050*	*<0.20*	*0.12*	*<20*	*<130*
33	TRCH-64-E.Wall-0'	Excavation atop SW gas line	0.0	8/7/2003	excavator bucket/shovel	*<0.050*	*<0.050*	*<0.050*	*<0.20*	*0.6*	*<20*	*<130*
34	TRCH-65-Bot-3.5'	Excavation atop SW gas line	3.5	8/7/2003	excavator bucket/shovel	*<0.050*	*0.076*	*0.16*	*<0.20*	*1.5*	*<20*	*<130*
35	TRCH-66-E.Wall-3'	Excavation atop SW gas line	3.0	8/7/2003	excavator bucket/shovel	*<0.050*	*<0.050*	*<0.050*	*<0.20*	*0.072*	*<20*	*<130*
36	TRCH-67-Bot-4'	Excavation atop SW gas line	4.0	8/7/2003	excavator bucket/shovel	*<0.050*	*<0.050*	*<0.050*	*<0.20*	*0.19*	*<20*	*<130*
37	TRCH-68-Bot-3.5	Excavation atop SW gas line	3.5	8/7/2003	excavator bucket/shovel	*<0.050*	*<0.050*	*<0.050*	*<0.20*	*0.29*	*<20*	*<130*
38	TRCH-69-E.Side-0'	Excavation atop SW gas line	0.0	8/7/2003	excavator bucket/shovel	*<0.050*	*<0.050*	*<0.050*	*<0.20*	*0.072*	*<20*	*<130*
39	SiltIne-Bot-70-1.3'	Excavation along siltline, located in access rd adjacent to wash	1.3	8/8/2003	shovel	*<0.050*	*<0.050*	*<0.050*	*<0.20*	*0.17*	*<20*	*<130*
40	SiltIne-71-Bot-1.3'	Excavation along siltline, located in access rd adjacent to wash	1.3	8/8/2003	shovel	*<0.050*	*<0.050*	*<0.050*	*<0.20*	*<0.050*	*<20*	*<130*
41	SiltIne-W.Side-72-6'	Excavation along siltline, located in access rd adjacent to wash	6.0	8/8/2003	shovel	*<0.050*	*<0.050*	*<0.050*	*<0.20*	*0.052*	*<20*	*<130*
42	SiltIne-73-E.Wall-7'	Excavation along siltline, located in access rd adjacent to wash	7.0	8/8/2003	shovel	*<0.050*	*<0.050*	*<0.050*	*<0.20*	*0.49*	*<20*	*<130*
43	SE-Curb-NW-Comp	Excavation at southeast curb of intersection	1.0	8/8/2003	shovel	*<0.050*	*<0.050*	*<0.050*	*<0.20*	*<0.050*	*<20*	*<130*
44	SE-Curb-SE-Comp	Excavation at southeast curb of intersection	1.0	8/8/2003	shovel	*<0.050*	*<0.050*	*<0.050*	*<0.20*	*<0.050*	*<20*	*<130*
45	NE Curb-SEC-80-4'	Excavation at northeast curb of intersection	4.0	8/8/2003	excavator bucket/shovel	*<0.050*	*<0.050*	*<0.050*	*<0.20*	*<0.050*	*<20*	*<130*
46	NE Curb-Bot-81-3'	Excavation at northeast curb of intersection	3.0	8/8/2003	excavator bucket/shovel	*<0.050*	*0.79*	*1.4*	*4.8*	*0.67*	*46*	*<130*
47	NE Curb-N.Bot-82-4'	Excavation at northeast curb of intersection	4.0	8/8/2003	excavator bucket/shovel	*0.76*	*14*	*9.2*	*27*	*12*	*240*	*<130*
64	#1	Top of concrete embankment approximately 20' N. of release pt	0.3	8/20/2003	hand trowel	*<0.050*	*<0.050*	*<0.050*	*<0.20*	*<0.050*	*NA*	*NA*
65	#3	Top of concrete embankment approximatley 60' N. of release pt	0.3	8/20/2003	hand trowel	*<0.050*	*<0.050*	*<0.050*	*<0.20*	*0.17*	*NA*	*NA*
66	#4	In Silvercroft Wash, approximately 75' N. of release pt.	0.3	8/20/2003	hand trowel	*<0.050*	*<0.050*	*<0.050*	*0.58*	*0.057*	*NA*	*NA*
67	#5	In Silvercroft Wash along S. side of bridge	0.3	8/20/2003	hand trowel	*<0.050*	*<0.050*	*<0.050*	*0.37*	*<0.050*	*NA*	*NA*
68	#6	West of Wash, former location of excavated, stockpiled soil	0.3	8/20/2003	hand trowel	*<0.050*	*<0.050*	*<0.050*	*<0.20*	*<0.050*	*NA*	*NA*
69	#7	West of Wash, former location of excavated, stockpiled soil	0.3	8/20/2003	hand trowel	*<0.050*	*<0.050*	*<0.050*	*<0.20*	*<0.050*	*NA*	*NA*
70	Wtrline-1-Bot-4.5'	In trench for new water line	4.5	8/22/2003	excavator bucket/shovel	*pending*	*pending*	*pending*	*pending*	*pending*	*pending*	*pending*
71	Wtrline-2-E.Wall-3'	In trench for new water line	3.0	8/22/2003	excavator bucket/shovel	*pending*	*pending*	*pending*	*pending*	*pending*	*pending*	*pending*
72	Wtrline-3-W.Wall-2'	In trench for new water line	2.0	8/22/2003	excavator bucket/shovel	*pending*	*pending*	*pending*	*pending*	*pending*	*pending*	*pending*
73	Wtrline-4-S.Wall-4.5'	In trench for new water line	4.5	8/22/2003	excavator bucket/shovel	*pending*	*pending*	*pending*	*pending*	*pending*	*pending*	*pending*

Table 1: Soil Samples results of Initial Investigation and Excavation
Silvercroft Wash Release Site

Map ID #	Sample ID	Location	Depth (feet)	Sample Date	Collection Method	Benzene	Toluene	Ethyl-Benzene	Xylenes, Total	MtBE	TPH (C6-C10)	TPH (C10-C32)
74	WtrIne-5-Bot-8'	In trench for new water line	8.0	8/25/2003	excavator bucket/shovel	pending	pending	pending	pending	pending	pending	pending
75	WtrIne-6-W.Wall-6'	In trench for new water line	6.0	8/25/2003	excavator bucket/shovel	pending	pending	pending	pending	pending	pending	pending
76	WtrIne-7-E.Wall-6'	In trench for new water line	6.0	8/25/2003	excavator bucket/shovel	pending	pending	pending	pending	pending	pending	pending
77	WtrIne-8-N.Wall-4.7'	In trench for new water line	4.7	8/25/2003	excavator bucket/shovel	pending	pending	pending	pending	pending	pending	pending
78	WtrIne-9-Bot-6'	In trench for new water line	6.0	8/25/2003	excavator bucket/shovel	pending	pending	pending	pending	pending	pending	pending
79	WtrIne-10-W.Wall-3'	In trench for new water line	3.0	8/25/2003	excavator bucket/shovel	pending	pending	pending	pending	pending	pending	pending
80	WtrIne-11-E.Wall-4'	In trench for new water line	4.0	8/25/2003	excavator bucket/shovel	pending	pending	pending	pending	pending	pending	pending
81	WtrIne-12-Bot-6'	In trench for new water line	6.0	8/25/2003	excavator bucket/shovel	pending	pending	pending	pending	pending	pending	pending
82	WL-20-E.Pt.-4'	In trench for new water line	4.0	8/26/2003	excavator bucket/shovel	pending	pending	pending	pending	pending	pending	pending
83	WL-21-E.Wall-3'	In trench for new water line	3.0	8/26/2003	excavator bucket/shovel	pending	pending	pending	pending	pending	pending	pending
84	WL-22-W.Wall-3'	In trench for new water line	3.0	8/26/2003	excavator bucket/shovel	pending	pending	pending	pending	pending	pending	pending
85	WL-SWR-23-5.7'	In trench for new water line	5.7	8/26/2003	excavator bucket/shovel	pending	pending	pending	pending	pending	pending	pending
86	WL-30-3.5'-E.Wall	In trench for new water line	3.5	8/26/2003	excavator bucket/shovel	pending	pending	pending	pending	pending	pending	pending
87	WL-31-Bot-5.5'	In trench for new water line	5.5	8/26/2003	excavator bucket/shovel	pending	pending	pending	pending	pending	pending	pending
88	WL-32-W.Wall-3'	In trench for new water line	3.0	8/26/2003	excavator bucket/shovel	pending	pending	pending	pending	pending	pending	pending
89	WL-33-W.Wall-3.7'	In excavation around water valve junction	3.7	8/27/2003	excavator bucket/shovel	pending	pending	pending	pending	pending	pending	pending
90	WL-34-E.Wall-4.3'	In excavation around water valve junction	4.3	8/27/2003	excavator bucket/shovel	pending	pending	pending	pending	pending	pending	pending
91	WL-35-Bot-5.5'	In excavation around water valve junction	5.5	8/27/2003	excavator bucket/shovel	pending	pending	pending	pending	pending	pending	pending
92	WL-38-E.Wall-3'	In trench for new water line	3.0	8/27/2003	excavator bucket/shovel	pending	pending	pending	pending	pending	pending	pending
93	WL-36-Bot-6'	In trench for new water line	6.0	8/27/2003	excavator bucket/shovel	pending	pending	pending	pending	pending	pending	pending
94	WL-37-W.Wall-2.5'	In trench for new water line	2.5	8/27/2003	excavator bucket/shovel	pending	pending	pending	pending	pending	pending	pending
95	WV-40-S.Wall-14'	In excavation around water valve junction	14.0	8/27/2003	excavator bucket/shovel	pending	pending	pending	pending	pending	pending	pending
96	WV-41-N.Wall-12'	In excavation around water valve junction	12.0	8/27/2003	excavator bucket/shovel	pending	pending	pending	pending	pending	pending	pending
97	WV-W.Bot-42-16'	In excavation around water valve junction	16.0	8/27/2003	excavator bucket/shovel	pending	pending	pending	pending	pending	pending	pending
98	WV-43-S.Side-7'	In excavation around water valve junction	7.0	8/27/2003	excavator bucket/shovel	pending	pending	pending	pending	pending	pending	pending
99	WV-44-N.Side-6'	In excavation around water valve junction	6.0	8/27/2003	excavator bucket/shovel	pending	pending	pending	pending	pending	pending	pending
100	WV-45-E.Wall-7'	In excavation around water valve junction	7.0	8/27/2003	excavator bucket/shovel	pending	pending	pending	pending	pending	pending	pending
101	WV-46-E.Wall-15'	In excavation around water valve junction	15.0	8/27/2003	excavator bucket/shovel	pending	pending	pending	pending	pending	pending	pending
102	WV-47-W.Bot-16'	In excavation around water valve junction	16.0	8/27/2003	excavator bucket/shovel	pending	pending	pending	pending	pending	pending	pending
103	WV-47-W.Bot-16' (mobile lab)	In excavation around water valve junction	16.0	8/27/2003	excavator bucket/shovel	<0.050	<0.10	<0.10	<0.15	NA	<10	NA
104	WV-48-W.Wall-14'	In excavation around water valve junction	14.0	8/27/2003	excavator bucket/shovel	pending	pending	pending	pending	pending	pending	pending
105	WV-49-W.Wall-7'	In excavation around water valve junction	7.0	8/27/2003	excavator bucket/shovel	pending	pending	pending	pending	pending	pending	pending
106	WV-49-W.Wall-7' (mobile lab)	In excavation around water valve junction	7.0	8/27/2003	excavator bucket/shovel	<0.050	<0.10	<0.10	<0.15	NA	<10	NA
107	WV-50-NWSide-3'	In excavation around water valve junction	3.0	8/27/2003	excavator bucket/shovel	pending	pending	pending	pending	pending	pending	pending
108	WV-51-SESide-3'	In excavation around water valve junction	3.0	8/27/2003	excavator bucket/shovel	pending	pending	pending	pending	pending	pending	pending
109	WtrIn-Bot-5'	In trench for new water line	5.0	8/28/2003	excavator bucket/shovel	pending	pending	pending	pending	pending	pending	pending
110	HA-328-N1-2.5	Lot 328	2.5	8/27/2003	Hand auger-drive samples	pending	pending	pending	pending	pending	pending	pending
111	HA-321-1-3	Lot 321	3.0	8/27/2003	Hand auger-drive samples	pending	pending	pending	pending	pending	pending	pending
112	HA-321-2-3	Lot 321	3.0	8/27/2003	Hand auger-drive samples	pending	pending	pending	pending	pending	pending	pending
113	HA-321-3-4	Lot 321	4.0	8/27/2003	Hand auger-drive samples	pending	pending	pending	pending	pending	pending	pending
114	HA-321-4-4	Lot 321	4.0	8/27/2003	Hand auger-drive samples	pending	pending	pending	pending	pending	pending	pending
115	HA-351-1-4	Lot 351	4.0	8/27/2003	Hand auger-drive samples	pending	pending	pending	pending	pending	pending	pending
116	HA-351-2-4	Lot 351	4.0	8/27/2003	Hand auger-drive samples	pending	pending	pending	pending	pending	pending	pending
117	HA-351-3-0	Lot 351	Surface	8/28/2003	Hand auger-drive samples	pending	pending	pending	pending	pending	pending	pending
118	HA-351-3-5	Lot 351	5.0	8/28/2003	Hand auger-drive samples	pending	pending	pending	pending	pending	pending	pending
119	HA-350-1-0	Lot 350	Surface	8/28/2003	Hand auger-drive samples	pending	pending	pending	pending	pending	pending	pending
120	HA-350-1-5	Lot 350	5.0	8/28/2003	Hand auger-drive samples	pending	pending	pending	pending	pending	pending	pending
121	HA-350-2-0	Lot 350	Surface	8/28/2003	Hand auger-drive samples	pending	pending	pending	pending	pending	pending	pending
122	HA-350-2-5	Lot 350	5.0	8/28/2003	Hand auger-drive samples	pending	pending	pending	pending	pending	pending	pending
123	HA-350-1-0	Lot 350	Surface	8/28/2003	Hand auger-drive samples	pending	pending	pending	pending	pending	pending	pending
124	HA-350-1-5	Lot 350	5.0	8/28/2003	Hand auger-drive samples	pending	pending	pending	pending	pending	pending	pending
125	HA-350-2-0	Lot 350	Surface	8/28/2003	Hand auger-drive samples	pending	pending	pending	pending	pending	pending	pending
126	HA-350-2-5	Lot 350	5.0	8/28/2003	Hand auger-drive samples	pending	pending	pending	pending	pending	pending	pending
127	HA-356-1-0	Lot 356	Surface	8/28/2003	Hand auger-drive samples	pending	pending	pending	pending	pending	pending	pending
128	HA-356-1-5	Lot 356	5.0	8/28/2003	Hand auger-drive samples	pending	pending	pending	pending	pending	pending	pending
129	HA-356-2-0	Lot 356	Surface	8/28/2003	Hand auger-drive samples	pending	pending	pending	pending	pending	pending	pending
130	HA-356-2-5	Lot 356	5.0	8/28/2003	Hand auger-drive samples	pending	pending	pending	pending	pending	pending	pending
131	HA-355-1-0	Lot 355	Surface	8/28/2003	Hand auger-drive samples	pending	pending	pending	pending	pending	pending	pending
132	HA-355-1-5	Lot 355	5.0	8/28/2003	Hand auger-drive samples	pending	pending	pending	pending	pending	pending	pending
133	HA-354-1-0	Lot 354	Surface	8/28/2003	Hand auger-drive samples	pending	pending	pending	pending	pending	pending	pending
134	HA-354-1-5	Lot 354	5.0	8/28/2003	Hand auger-drive samples	pending	pending	pending	pending	pending	pending	pending
135	HA-353-1-0	Lot 353	Surface	8/28/2003	Hand auger-drive samples	pending	pending	pending	pending	pending	pending	pending
136	HA-353-SW-1	Lot 353	1.0	8/28/2003	Grab	pending	pending	pending	pending	pending	pending	pending
137	HA-353-1-5	Lot 353	5.0	8/28/2003	Hand auger-drive samples	pending	pending	pending	pending	pending	pending	pending
138	HA-352-1-0	Lot 352	0.0	8/28/2003	Hand auger-drive samples	pending	pending	pending	pending	pending	pending	pending
140	HA-352-1-5	Lot 352	5.0	8/28/2003	Hand auger-drive samples	pending	pending	pending	pending	pending	pending	pending
	Arizona Soil Remediation Levels (Residential)					**0.62**	**790**	**1500**	**2800**	**(proposed) 320**	**N/A**	**4100**

Note: All results in milligrams per kilogram
< = nondetectable, less than the detection limit shown
NA = Not Analyzed
N/A = Not Applicable
Mobile lab (Transwest Geochem) was provided by ATC Environmental

Table 2
Soil Sample Results of Bins Shipped to Sonas
Silvercroft Wash Release Site

Sample ID	Sample Date	Benzene	Toluene	Ethyl-Benzene	Xylenes, Total	MtBE	Hydrocarbons (C6-C10)	Hydrocarbons (C10-C32)
JRR-RB-4782-948-982	8/1/2003	<0.050	<0.050	0.054	0.37	0.06	21	<130
JRR-RB-942-1064-1123	8/1/2003	<0.050	0.35	0.42	1.8	0.28	26	<130
JRR-RB-4781-5051-4637	8/1/2003	<0.050	<0.050	0.054	0.33	<0.050	34	<130
RB-1037+870-KMEP-JRR	8/6/2003	<0.050	0.46	0.89	3.4	2.00	NA	NA
RB-4177-4141	8/7/2003	<0.050	<0.050	<0.050	<0.20	0.13	<20	<130
RB 967	8/26/2003	pending	pending	pending	pending	pending	pending	pending
Arizona Soil Remediation Levels (Residential)		**0.62**	**790**	**1500**	**2800**	**320 (proposed)**	**None**	**4100**

Note: All results in milligrams per kilogram
NA = Not Analyzed

Table 3
Surface Water and Stormwater Runoff Samples
Silvercroft Release Site

Map ID #	Sample ID	Sample Date	Benzene	Toluene	Ethyl-benzene	Xylenes, Total	MtBE
48	JRR-SW.W.Fork 72' W. of Confluence	8/1/2003	ND<5.0	ND<5.0	ND<5.0	ND<5.0	1.4
49	JRR-SW-CTR 72' N. of Confluence	8/1/2003	ND<5.0	ND<5.0	ND<5.0	ND<5.0	3.9
50	JRR-RW-W.Bank 70' N. of Confluence	8/1/2003	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
51	JRR-SW-E.Side 108' S. of Bridge	8/1/2003	ND<5.0	53	ND<5.0	140	47
52	JRR-SW-CTR-1' S. of Bridge	8/1/2003	ND<5.0	220	180	610	280
53	KM-Loc-#1	8/14/2003	ND<25	ND<25	ND<25	ND<25	ND<2.5
54	KM-Loc-#2	8/14/2003	ND<25	ND<25	ND<25	ND<25	ND<2.5
55	KM-Loc-#3	8/14/2003	ND<25	ND<25	ND<25	ND<25	ND<2.5
56	KM-Loc-#4	8/14/2003	ND<25	ND<25	ND<25	ND<25	ND<2.5
57	KM-Loc-#1	8/18/2003	ND<5.0	ND<5.0	ND<5.0	ND<5.0	1.3
58	KM-Loc-#2	8/18/2003	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
59	KM-Loc-#3	8/18/2003	ND<5.0	ND<5.0	ND<5.0	ND<5.0	0.9
60	KM-Loc-#4	8/18/2003	ND<5.0	ND<5.0	ND<5.0	ND<5.0	0.56
61	#2 (pressure test water)	8/20/2003	ND<5.0	37	28	250	29
62	#4 (pressure test water)	8/20/2003	7.4	77	63	540	67
63	#5 (pressure test water)	8/20/2003	7.9	110	73	600	84

ND< = nondedectable concentration, less than the detection limit shown.
Note: All results in micrograms per liter

LFR ENVIRONMENTAL MANAGEMENT & CONSULTING ENGINEERING

February 8, 2007 014-10022-13-008

Mr. Thomas DiDomizio
Arizona Department of Environmental Quality
1110 West Washington Street
Phoenix, Arizona 85007

Subject: Completion of Free Product Removal and Reduction of Groundwater Monitoring Frequency from Monthly to Quarterly
SFPP, L.P. – Silvercroft Wash Release Site, Tucson, Arizona

Dear Mr. DiDomizio:

On behalf of SFPP, L.P. (SFPP), an operating partnership of Kinder Morgan Energy Partners (KMEP), LFR Inc. (LFR) is writing to inform the Arizona Department of Environmental Quality (ADEQ) Voluntary Remediation Program (VRP) that free product extraction has been successfully completed at the site, and that we will be changing the groundwater sampling frequency from monthly to quarterly. These steps were set forth as follows in the *Consolidated and Updated Proposed Remediation Work Plan* (LFR, January 6, 2005):

> *Section 9.4 - In addition, once free product is removed to the extent practicable from the wells identified in Section 9.1, these wells will be added to the groundwater-monitoring network. SFPP proposes to conduct the groundwater sampling monthly until practicable free product recovery is complete throughout the Site, at which time SFPP will switch to quarterly groundwater sampling.*

An abundance of evidence supports the conclusion that free product removal has reached the practicable extent:

- Product recovery rates had fallen to 10 gallons per week for the week ending July 14, 2006, from a maximum of 1640 gallons during the week ending December 12, 2003 (Figure 1). The 10-gallon per week rate occurred using a combination of Blackhawk pumps and hand-bailing. Using either method, product which had gathered in the well was removed within minutes, and no further removal could be accomplished until product had migrated back into the well (typically over 24 hours or more). This behavior is typical of wells at residual saturation (the percentage of petroleum saturation at which petroleum will not flow into wells).

- The cumulative total product extracted by the end of the third quarter of 2006 was approximately 48,112 gallons. A total of 10.67 gallons of free product was extracted in the third quarter of 2006 (Figure 2). Product extraction halted after the second week in July due to the start of construction of the soil vapor extraction and treatment system (SVETS) and associated buildings.

- Figures1 and 2 illustrate the reduction in the extractable volume of product through time. These dramatic reductions over time result from the hydrocarbon saturation in the formation progressing toward residual saturation due to the product removal efforts. The asymptotic behavior of both figures illustrates that well over 99% of the extractable product has been removed. Additional product

480.905.9311 m
480.905.9353 f
14201 N. 87th Street, Suite 135
Scottsdale, Arizona 85260-3683
Offices Nationwide
www.lfr.com

removal efforts would not be practicable and would require the re-installation of numerous Blackhawk pumps in wells outside the compound. Without the presence of the Blackhawk pumps outside the compound, all active remedial equipment and activities would be limited to secure subsurface vaults and areas within the walled compound.

- The free product plume footprint has been both stable (i.e., stationary) and gradually shrinking since the installation and operation of the product recovery system, throughout periods of rising and falling groundwater levels. Apparent product thicknesses are currently similar to those measured when the product removal efforts were discontinued in July 2006, indicating that the product thicknesses are not increasing or rebounding.

- Active remedial efforts will continue with the operation of the SVETS. Start-up and shakedown activities for the SVETS are currently anticipated to begin in late March or early April 2007 with routine operation to follow.

LFR collected groundwater samples monthly through 2006. The first quarter 2007 groundwater monitoring event was performed January 29 through January 31, with the second quarter event scheduled for April 2007. Groundwater and product levels will continue to be collected monthly. Monthly groundwater and product level measurements will allow potential changes in groundwater flow directions or the plume footprint to be detected. However, we do not anticipate significant changes based on the stability of the groundwater flow field and the free product plume footprint since wells were first installed in 2003, and the stability of apparent free product thicknesses since product removal was completed.

If you have any questions or require additional information, please contact me at (480) 905-9311.

Sincerely,

Eric Rogoff

Eric Rogoff, R.G., P.G., C.E.G.
Senior Associate Hydrogeologist
Enclosures

cc: Paul Salcido, KMEP

Figure 1 - Approximate Product Extracted per Week

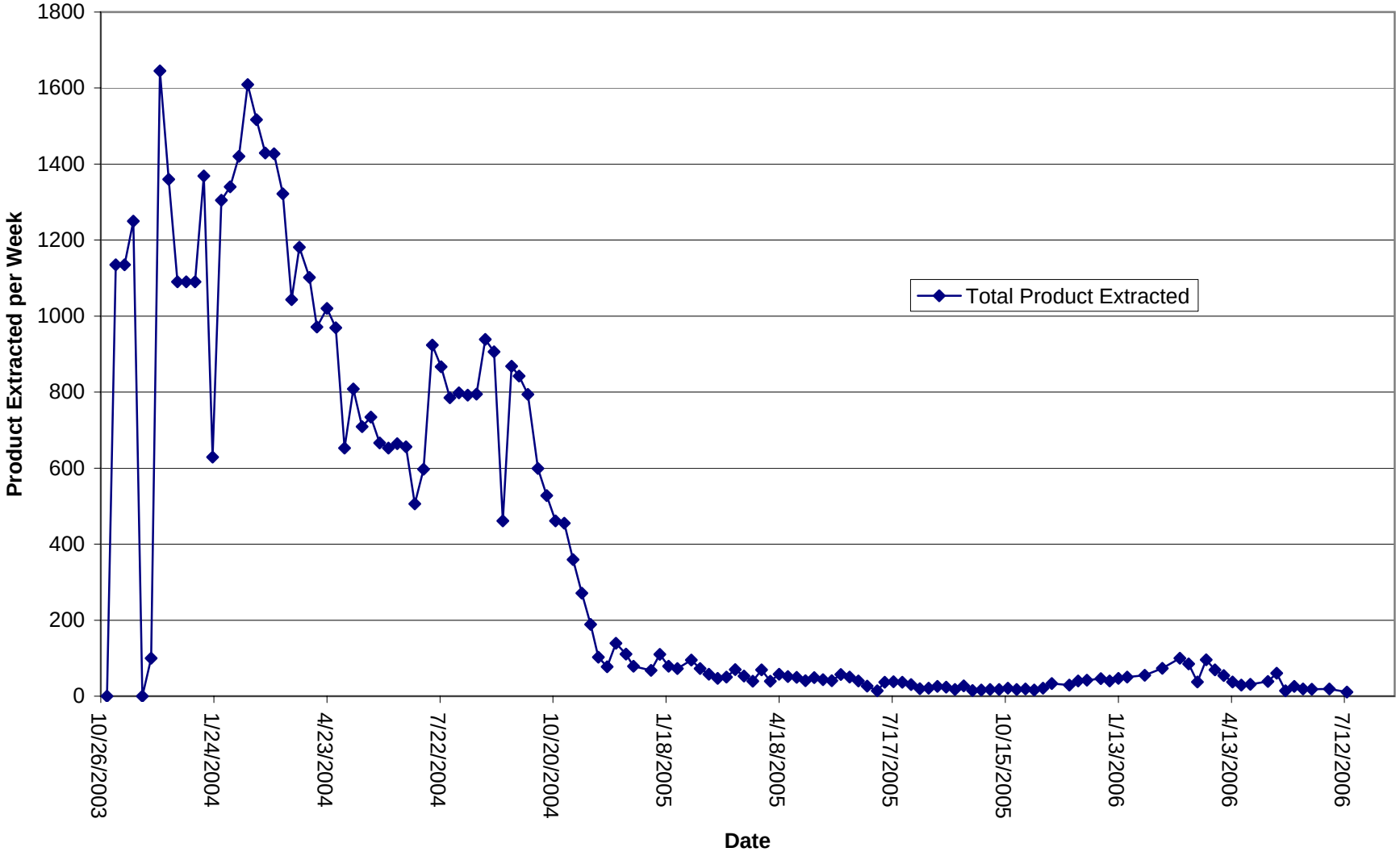
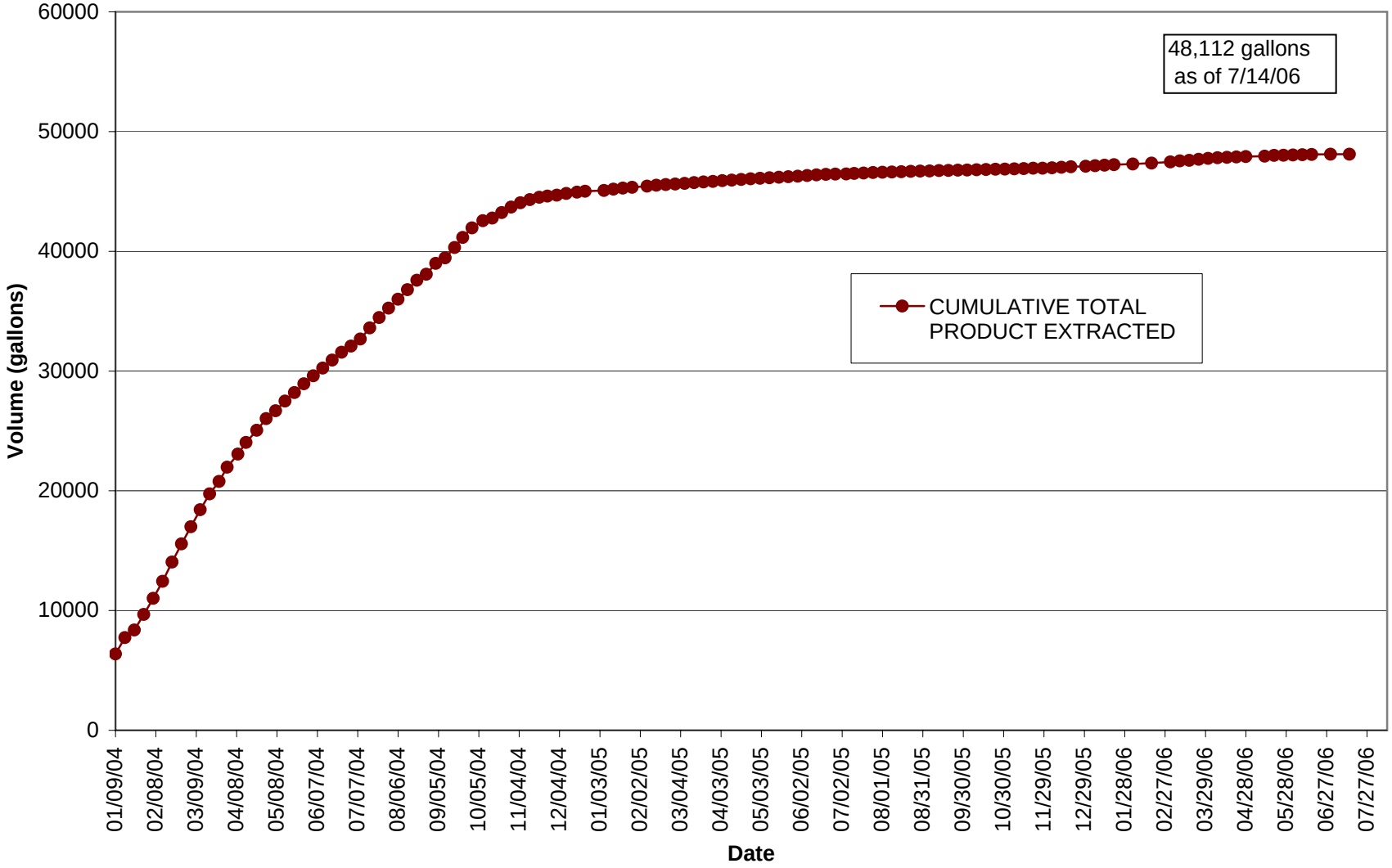


Figure 2 - Cumulative Free Product Volume Extracted
Silvercroft Wash Release Site
Tucson, Arizona



From: Ned Overs [mailto:ned.overs@lfr.com]
Sent: Tuesday, February 13, 2007 1:32 PM
To: 'Salcido, Paul'; 'Ryan, Kevin'
Cc: 'Michael Nesky'; 'Eric Rogoff'; John Pearce
Subject: FW: Letter Notifying VRP of Product Recovery Termination and Change to GW Monitoring Frequency at SFPP Silvercroft Wash, Tucson, AZ

Good news gentlemen. I have left him a message to discuss the SVETS.

From: Thomas Didomizio [mailto:Didomizio.Thomas@azdeq.gov]
Sent: Tuesday, February 13, 2007 1:39 PM
To: ned.overs@lfr.com
Subject: RE: Letter Notifying VRP of Product Recovery Termination and Change to GW Monitoring Frequency at SFPP Silvercroft Wash, Tucson, AZ

Ned,
I received the hard copy in the mail. I have no problem with discontinuing active free product removal and changing the groundwater sampling frequency from monthly to quarterly since the conditions to do this (established in with the Consolidate and Updated Proposed Remediation Work Plan) have been met. I will send out a formal letter approving this change within the next week or two.
Could you give me an update for the cause for the delays in start-up of the SVE system?
Thanks,
Tom
ADEQ
(602) 771-4229

From: Ned Overs [mailto:ned.overs@lfr.com]
Sent: Thursday, February 08, 2007 1:55 PM
To: Thomas Didomizio
Cc: 'Salcido, Paul'; 'Ryan, Kevin'; 'Eric Rogoff'; 'Nesky, Michael'
Subject: Letter Notifying VRP of Product Recovery Termination and Change to GW Monitoring Frequency at SFPP Silvercroft Wash, Tucson, AZ

Tom,

Please review the attached letter. A hard copy has been placed in the mail.

Thanks,

Ned Overs, P.E.
Operations Manager/Principal Engineer
LFR, Inc.

14201 N. 87th St., #135
Scottsdale, AZ 85260
Phone 480-905-9311
Fax 480-905-9353
Cell 602-763-6009

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from your computer. Thank you.

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-01	10/17/2003	2294.48	144.24	147.38	3.14	2147.10	2149.46
MW-01	10/21/2003	2294.48	144.28	147.39	3.11	2147.09	2149.42
MW-01	10/23/2003	2294.48	144.25	147.55	3.30	2146.93	2149.41
MW-01	10/27/2003	2294.48	144.39	147.42	3.03	2147.06	2149.33
MW-01	10/28/2003	2294.48	144.40	147.42	3.02	2147.06	2149.33
MW-01	11/24/2003	2294.48	144.83	147.01	2.18	2147.47	2149.11
MW-01	11/26/2003	2294.48	146.96	149.18	2.22	2145.30	2146.97
MW-01	12/1/2003	2294.48	146.91	149.10	2.19	2145.38	2147.02
MW-01	1/26/2004	2294.48	146.71	147.34	0.63	2147.14	2147.61
MW-01	2/5/2004	2294.48	146.79	147.31	0.52	2147.17	2147.56
MW-01	2/19/2004	2294.48	146.88	147.22	0.34	2147.26	2147.52
MW-01	3/8/2004	2294.48	146.85	147.69	0.84	2146.79	2147.42
MW-01	3/15/2004	2294.48	146.92	147.75	0.83	2146.73	2147.35
MW-01	3/22/2004	2294.48	146.92	147.72	0.80	2146.76	2147.36
MW-01	3/29/2004	2294.48	146.99	147.80	0.81	2146.68	2147.29
MW-01	4/5/2004	2294.48	147.00	147.80	0.80	2146.68	2147.28
MW-01	4/12/2004	2294.48	147.05	147.84	0.79	2146.64	2147.23
MW-01	4/19/2004	2294.48	147.06	147.86	0.80	2146.62	2147.22
MW-01	4/26/2004	2294.48	147.09	147.88	0.79	2146.60	2147.19
MW-01	5/3/2004	2294.48	147.09	147.86	0.77	2146.62	2147.20
MW-01	5/10/2004	2294.48	147.14	147.90	0.76	2146.58	2147.15
MW-01	5/17/2004	2294.48	147.18	147.97	0.79	2146.51	2147.10
MW-01	5/24/2004	2294.48	147.22	148.03	0.81	2146.45	2147.06
MW-01	5/31/2004	2294.48	147.21	148.06	0.85	2146.42	2147.06
MW-01	6/7/2004	2294.48	147.28	148.15	0.87	2146.33	2146.98
MW-01	6/14/2004	2294.48	147.37	148.29	0.92	2146.19	2146.88
MW-01	6/21/2004	2294.48	147.47	148.47	1.00	2146.01	2146.76
MW-01	6/28/2004	2294.48	147.55	148.63	1.08	2145.85	2146.66
MW-01	7/6/2004	2294.48	147.63	148.94	1.31	2145.54	2146.52
MW-01	7/12/2004	2294.48	147.71	149.08	1.37	2145.40	2146.43
MW-01	7/19/2004	2294.48	147.82	149.21	1.39	2145.27	2146.31
MW-01	7/26/2004	2294.48	147.89	149.41	1.52	2145.07	2146.21
MW-01	8/2/2004	2294.48	148.03	149.48	1.45	2145.00	2146.09
MW-01	8/9/2004	2294.48	148.16	149.56	1.40	2144.92	2145.97
MW-01	8/16/2004	2294.48	148.29	149.65	1.36	2144.83	2145.85
MW-01	8/23/2004	2294.48	148.41	149.75	1.34	2144.73	2145.74
MW-01	8/30/2004	2294.48	148.64	149.60	0.96	2144.88	2145.60
MW-01	9/8/2004	2294.48	148.66	150.04	1.38	2144.44	2145.48
MW-01	9/13/2004	2294.48	148.72	150.04	1.32	2144.44	2145.43
MW-01	9/20/2004	2294.48	148.83	150.16	1.33	2144.32	2145.32
MW-01	9/27/2004	2294.48	148.92	150.26	1.34	2144.22	2145.23
MW-01	10/4/2004	2294.48	149.00	150.33	1.33	2144.15	2145.15
MW-01	10/11/2004	2294.48	149.09	150.40	1.31	2144.08	2145.06
MW-01	10/18/2004	2294.48	149.16	150.44	1.28	2144.04	2145.00
MW-01	10/25/2004	2294.48	149.24	150.50	1.26	2143.98	2144.93
MW-01	11/1/2004	2294.48	149.36	150.54	1.18	2143.94	2144.83

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-01	11/8/2004	2294.48	149.45	150.53	1.08	2143.95	2144.76
MW-01	11/15/2004	2294.48	149.50	150.67	1.17	2143.81	2144.69
MW-01	11/30/2004	2294.48	149.65	150.91	1.26	2143.57	2144.52
MW-01	12/6/2004	2294.48	149.71	150.91	1.20	2143.57	2144.47
MW-01	12/13/2004	2294.48	149.86	150.86	1.00	2143.62	2144.37
MW-01	12/20/2004	2294.48	149.94	150.74	0.80	2143.74	2144.34
MW-01	1/4/2005	2294.48	149.92	151.21	1.29	2143.27	2144.24
MW-01	1/10/2005	2294.48	150.25	150.44	0.19	2144.04	2144.18
MW-01	1/17/2005	2294.48	150.28	150.47	0.19	2144.01	2144.15
MW-01	1/24/2005	2294.48	150.40	150.52	0.12	2143.96	2144.05
MW-01	1/31/2005	2294.48	150.31	150.46	0.15	2144.02	2144.13
MW-01	2/7/2005	2294.48	150.39	150.59	0.20	2143.89	2144.04
MW-01	2/14/2005	2294.48	150.39	150.61	0.22	2143.87	2144.04
MW-01	2/21/2005	2294.48	150.43	150.57	0.14	2143.91	2144.02
MW-01	2/28/2005	2294.48	150.38	150.58	0.20	2143.90	2144.05
MW-01	3/7/2005	2294.48	150.31	150.58	0.27	2143.90	2144.10
MW-01	3/14/2005	2294.48	150.17	150.63	0.46	2143.85	2144.20
MW-01	3/21/2005	2294.48	150.05	150.74	0.69	2143.74	2144.26
MW-01	3/27/2005	2294.48	149.92	150.82	0.90	2143.66	2144.34
MW-01	4/4/2005	2294.48	149.92	150.88	0.96	2143.60	2144.32
MW-01	4/11/2005	2294.48	150.05	150.81	0.76	2143.67	2144.24
MW-01	4/18/2005	2294.48	150.17	150.68	0.51	2143.80	2144.18
MW-01	4/25/2005	2294.48	150.16	150.45	0.29	2144.03	2144.25
MW-01	5/2/2005	2294.48	150.21	150.45	0.24	2144.03	2144.21
MW-01	5/10/2005	2294.48	150.26	150.49	0.23	2143.99	2144.16
MW-01	5/16/2005	2294.48	150.35	150.46	0.11	2144.02	2144.10
MW-01	5/23/2005	2294.48	150.44	150.53	0.09	2143.95	2144.02
MW-01	5/30/2005	2294.48	150.50	150.62	0.12	2143.86	2143.95
MW-01	6/6/2005	2294.48	150.56	150.69	0.13	2143.79	2143.89
MW-01	6/13/2005	2294.48	150.63	150.74	0.11	2143.74	2143.82
MW-01	6/20/2005	2294.48	150.65	150.86	0.21	2143.62	2143.78
MW-01	6/27/2005	2294.48	150.71	150.96	0.25	2143.52	2143.71
MW-01	7/5/2005	2294.48	150.78	151.06	0.28	2143.42	2143.63
MW-01	7/11/2005	2294.48	150.85	151.14	0.29	2143.34	2143.56
MW-01	7/18/2005	2294.48	150.97	151.13	0.16	2143.35	2143.47
MW-01	7/25/2005	2294.48	151.03	151.26	0.23	2143.22	2143.39
MW-01	8/1/2005	2294.48	151.08	151.42	0.34	2143.06	2143.32
MW-01	8/8/2005	2294.48	151.09	151.56	0.47	2142.92	2143.27
MW-01	8/15/2005	2294.48	151.11	151.70	0.59	2142.78	2143.22
MW-01	8/22/2005	2294.48	151.13	151.75	0.62	2142.73	2143.20
MW-01	8/29/2005	2294.48	151.15	151.80	0.65	2142.68	2143.17
MW-01	9/7/2005	2294.48	150.63	151.04	0.41	2143.44	2143.75
MW-01	9/12/2005	2294.48	150.43	150.62	0.19	2143.86	2144.00
MW-01	9/19/2005	2294.48	150.18	150.44	0.26	2144.04	2144.24
MW-01	9/26/2005	2294.48	150.09	150.38	0.29	2144.10	2144.32
MW-01	10/3/2005	2294.48	150.11	150.46	0.35	2144.02	2144.28

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-01	10/10/2005	2294.48	150.27	150.56	0.29	2143.92	2144.14
MW-01	10/17/2005	2294.48	150.40	150.63	0.23	2143.85	2144.02
MW-01	10/24/2005	2294.48	150.59	150.73	0.14	2143.75	2143.86
MW-01	10/31/2005	2294.48	150.72	150.85	0.13	2143.63	2143.73
MW-01	11/7/2005	2294.48	150.87	150.99	0.12	2143.49	2143.58
MW-01	11/14/2005	2294.48	150.95	151.24	0.29	2143.24	2143.46
MW-01	11/21/2005	2294.48	151.05	151.42	0.37	2143.06	2143.34
MW-01	12/5/2005	2294.48	151.19	151.99	0.80	2142.49	2143.09
MW-01	12/5/2005	2294.48	151.05	151.90	0.85	2142.58	2143.22
MW-01	12/12/2005	2294.48	151.08	152.02	0.94	2142.46	2143.17
MW-01	12/19/2005	2294.48	151.13	152.09	0.96	2142.39	2143.11
MW-01	12/28/2005	2294.48	151.31	151.70	0.39	2142.78	2143.07
MW-01	1/9/2006	2294.48	151.45	151.58	0.13	2142.90	2143.00
MW-01	1/16/2006	2294.48	151.51	151.59	0.08	2142.89	2142.95
MW-01	1/30/2006	2294.48	151.56	151.67	0.11	2142.81	2142.89
MW-01	2/13/2006	2294.48	151.63	151.75	0.12	2142.73	2142.82
MW-01	2/27/2006	2294.48	151.65	151.90	0.25	2142.58	2142.77
MW-01	3/6/2006	2294.48	151.70	151.86	0.16	2142.62	2142.74
MW-01	3/13/2006	2294.48	151.75	151.81	0.06	2142.67	2142.72
MW-01	3/20/2006	2294.48	151.71	151.96	0.25	2142.52	2142.71
MW-01	3/27/2006	2294.48	151.77	151.95	0.18	2142.53	2142.67
MW-01	4/3/2006	2294.48	151.83	151.90	0.07	2142.58	2142.63
MW-01	4/10/2006	2294.48	151.91	151.99	0.08	2142.49	2142.55
MW-01	4/17/2006	2294.48	151.95	151.97	0.02	2142.51	2142.53
MW-01	4/24/2006	2294.48	151.96	152.11	0.15	2142.37	2142.48
MW-01	5/1/2006	2294.48	151.98	152.20	0.22	2142.28	2142.45
MW-01	5/15/2006	2294.48	151.99	152.20	0.21	2142.28	2142.44
MW-01	5/22/2006	2294.48	152.03	152.37	0.34	2142.11	2142.37
MW-01	5/30/2006	2294.48	152.05	152.70	0.65	2141.78	2142.27
MW-01	6/5/2006	2294.48	152.11	152.94	0.83	2141.54	2142.16
MW-01	6/12/2006	2294.48	152.15	153.19	1.04	2141.29	2142.07
MW-01	6/26/2006	2294.48	152.42	152.85	0.43	2141.63	2141.95
MW-01	7/10/2006	2294.48	152.60	152.87	0.27	2141.61	2141.81
MW-01	8/4/2006	2294.48	152.20	152.40	0.20	2142.08	2142.23
MW-01	8/14/2006	2294.48	152.85	153.21	0.36	2141.27	2141.54
MW-01	8/23/2006	2294.48	152.66	152.89	0.23	2141.59	2141.76
MW-01	9/19/2006	2294.48	151.45	151.80	0.35	2142.68	2142.94
MW-01	10/20/2006	2294.48	150.76	151.00	0.24	2143.48	2143.66
MW-01	10/30/2006	2294.48	150.90	151.21	0.31	2143.27	2143.50
MW-01	11/17/2006	2294.48	151.17	151.69	0.52	2142.79	2143.18
MW-01	1/29/2007	2294.48	152.20	153.03	0.83	2141.45	2142.07
MW-01	3/1/2007	2294.48	152.54	153.32	0.78	2141.16	2141.75
MW-01	3/28/2007	2294.48	152.62	153.49	0.87	2140.99	2141.64
MW-01	4/24/2007	2294.48	152.80	153.65	0.85	2140.83	2141.47
MW-01	5/28/2007	2294.48	152.89	153.80	0.91	2140.68	2141.36
MW-01	6/27/2007	2294.48	153.15	154.35	1.20	2140.13	2141.03

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-01	7/23/2007	2294.48	153.45	154.57	1.12	2139.91	2140.75
MW-01	8/25/2007	2294.48	152.73	153.71	0.98	2140.77	2141.51
MW-01	9/25/2007	2294.48	152.06	153.35	1.29	2141.13	2142.10
MW-01	10/22/2007	2294.48	152.45	152.72	0.27	2141.76	2141.96
MW-01	11/28/2007	2294.48	153.44	154.62	1.18	2139.86	2140.75
MW-01	12/31/2007	2294.48	153.55	154.59	1.04	2139.89	2140.67
MW-01	1/26/2008	2294.48	153.28	154.36	1.08	2140.12	2140.93
MW-01	2/29/2008	2294.48	153.44	154.57	1.13	2139.91	2140.76
MW-01	3/31/2008	2294.48	152.98	154.12	1.14	2140.36	2141.22
MW-01	4/21/2008	2294.48	153.13	154.36	1.23	2140.12	2141.04
MW-01	5/23/2008	2294.48	153.59	154.78	1.19	2139.70	2140.59
MW-01	6/25/2008	2294.48	153.83	154.95	1.12	2139.53	2140.37
MW-01	7/28/2008	2294.48	154.08	155.22	1.14	2139.26	2140.12
MW-01	8/25/2008	2294.48	152.79	153.56	0.77	2140.92	2141.50
MW-01	9/30/2008	2294.48	151.43	151.59	0.16	2142.89	2143.01
MW-01	10/13/2008	2294.48	151.38	151.43	0.05	2143.05	2143.09
MW-01	11/26/2008	2294.48	152.03	152.83	0.80	2141.65	2142.25
MW-01	12/23/2008	2294.48	152.49	153.25	0.76	2141.23	2141.80
MW-01	1/26/2009	2294.48	152.70	153.47	0.77	2141.01	2141.59
MW-01	2/27/2009	2294.48	152.67	153.36	0.69	2141.12	2141.64
MW-01	3/26/2009	2294.48	152.89	153.64	0.75	2140.84	2141.40
MW-01	4/27/2009	2294.48	152.99	153.77	0.78	2140.71	2141.30
MW-01	5/20/2009	2294.48	153.24	154.23	0.99	2140.25	2140.99
MW-01	6/16/2009	2294.48	153.77	155.06	1.29	2139.42	2140.39
MW-01	7/20/2009	2294.48	154.25	155.30	1.05	2139.18	2139.97
MW-01	8/31/2009	2294.48	154.65	155.45	0.80	2139.03	2139.63
MW-01	9/29/2009	2294.48	154.81	155.46	0.65	2139.02	2139.51
MW-01	10/22/2009	2294.48	154.87	155.42	0.55	2139.06	2139.47
MW-01	11/25/2009	2294.48	155.35	156.02	0.67	2138.46	2138.96
MW-01	12/14/2009	2294.48	155.49	155.57	0.08	2138.91	2138.97
MW-01	1/18/2010	2294.48	155.42	156.05	0.63	2138.43	2138.90
MW-01	2/26/2010	2294.48	155.46	156.05	0.59	2138.43	2138.87
MW-01	3/22/2010	2294.48	154.90	154.92	0.02	2139.56	2139.58
MW-01	4/12/2010	2294.48	154.82	154.84	0.02	2139.64	2139.66
MW-01	5/27/2010	2294.48	155.12	155.55	0.43	2138.93	2139.25
MW-01	6/22/2010	2294.48	155.45	156.00	0.55	2138.48	2138.89
MW-01	7/12/2010	2294.48	155.65	155.81	0.16	2138.67	2138.79
MW-01	8/26/2010	2294.48	NP	155.78	NP	2138.70	2138.70
MW-01	9/22/2010	2294.48	NP	155.57	NP	2138.91	2138.91
MW-01	10/5/2010	2294.48	NP	155.27	NP	2139.21	2139.21
MW-01	10/18/2010	2294.48	NP	155.31	NP	2139.17	2139.17
MW-01	11/30/2010	2294.48	NP	155.82	NP	2138.66	2138.66
MW-01	12/21/2010	2294.48	NP	155.89	NP	2138.59	2138.59
MW-01	1/10/2011	2294.48	NP	155.82	NP	2138.66	2138.66
MW-01	2/17/2011	2294.48	NP	155.78	NP	2138.70	2138.70
MW-01	3/25/2011	2294.48	NP	156.23	NP	2138.25	2138.25

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-01	4/11/2011	2294.48	NP	156.41	NP	2138.07	2138.07
MW-01	5/9/2011	2294.48	NP	156.42	NP	2138.06	2138.06
MW-01	6/29/2011	2294.48	NP	157.27	NP	2137.21	2137.21
MW-01	7/11/2011	2294.48	157.50	157.51	0.01	2136.97	2136.98
MW-01	8/31/2011	2294.48	NP	158.01	NP	2136.47	2136.47
MW-01	9/28/2011	2294.48	NP	157.91	NP	2136.57	2136.57
MW-01	11/16/2011	2294.48	NP	157.23	NP	2137.25	2137.25
MW-01	12/29/2011	2294.48	NP	157.27	NP	2137.21	2137.21
MW-01	1/16/2012	2294.48	NP	157.30	NP	2137.18	2137.18
MW-01	2/28/2012	2294.48	NP	157.06	NP	2137.42	2137.42
MW-01	3/30/2012	2294.48	NP	157.28	NP	2137.20	2137.20
MW-01	5/30/2012	2294.48	NP	158.17	NP	2136.31	2136.31
MW-01	6/29/2012	2294.48	NP	158.45	NP	2136.03	2136.03
MW-01	7/9/2012	2294.48	NP	158.48	NP	2136.00	2136.00
MW-01	8/29/2012	2294.48	NP	158.12	NP	2136.36	2136.36
MW-01	9/25/2012	2294.48	NP	157.71	NP	2136.77	2136.77
MW-01	10/22/2012	2294.48	NP	157.87	NP	2136.61	2136.61
MW-01	11/15/2012	2294.48	NP	158.22	NP	2136.26	2136.26
MW-01	12/13/2012	2294.48	NP	158.57	NP	2135.91	2135.91
MW-01	1/21/2013	2294.48	NP	158.71	NP	2135.77	2135.77
MW-01	2/13/2013	2294.48	NP	158.70	NP	2135.78	2135.78
MW-01	3/21/2013	2294.48	NP	158.77	NP	2135.71	2135.71
MW-01	4/15/2013	2294.48	NP	158.88	NP	2135.60	2135.60
MW-01	5/23/2013	2294.48	NP	159.09	NP	2135.39	2135.39
MW-01	6/26/2013	2294.48	NP	159.41	NP	2135.07	2135.07
MW-01	7/8/2013	2294.48	NP	159.50	NP	2134.98	2134.98
MW-01	8/8/2013	2294.48	NP	159.67	NP	2134.81	2134.81
MW-01	9/5/2013	2294.48	NP	159.56	NP	2134.92	2134.92
MW-01	10/3/2013	2294.48	NP	159.73	NP	2134.75	2134.75
MW-01	11/27/2013	2294.48	NP	159.91	NP	2134.57	2134.57
MW-01	12/31/2013	2294.48	NP	159.89	NP	2134.59	2134.59
MW-01	1/10/2014	2294.48	NP	160.06	NP	2134.42	2134.42
MW-01	2/18/2014	2294.48	NP	160.18	NP	2134.30	2134.30
MW-01	3/12/2014	2294.48	NP	160.22	NP	2134.26	2134.26
MW-01	4/17/2014	2294.48	NP	160.41	NP	2134.07	2134.07
MW-01	5/22/2014	2294.48	NP	160.69	NP	2133.79	2133.79
MW-01	6/20/2014	2294.48	NP	160.99	NP	2133.49	2133.49
MW-01	7/15/2014	2294.48	NP	161.28	NP	2133.20	2133.20
MW-01	8/14/2014	2294.48	NP	161.61	NP	2132.87	2132.87
MW-01	9/9/2014	2294.48	NP	161.44	NP	2133.04	2133.04
MW-01	10/1/2014	2294.48	NP	160.72	NP	2133.76	2133.76
MW-01	11/18/2014	2294.48	NP	160.49	NP	2133.99	2133.99
MW-01	12/16/2014	2294.48	NP	160.50	NP	2133.98	2133.98
MW-01	1/19/2015	2294.48	NP	160.28	NP	2134.20	2134.20
MW-01	2/19/2015	2294.48	NP	160.05	NP	2134.43	2134.43
MW-01	3/26/2015	2294.48	NP	159.74	NP	2134.74	2134.74

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-01	4/16/2015	2294.48	NP	159.60	NP	2134.88	2134.88
MW-01	5/19/2015	2294.48	NP	159.87	NP	2134.61	2134.61
MW-01	6/22/2015	2294.48	NP	160.46	NP	2134.02	2134.02
MW-02	10/10/2003	2293.35	143.92	147.55	3.63	2145.80	2148.52
MW-02	10/13/2003	2293.35	142.63	146.11	3.48	2147.24	2149.85
MW-02	10/14/2003	2293.35	142.57	146.33	3.76	2147.02	2149.84
MW-02	10/15/2003	2293.35	142.63	146.13	3.50	2147.22	2149.85
MW-02	10/16/2003	2293.35	142.68	146.14	3.46	2147.21	2149.81
MW-02	10/17/2003	2293.35	142.67	146.13	3.46	2147.22	2149.82
MW-02	10/21/2003	2293.35	142.72	146.07	3.35	2147.28	2149.79
MW-02	10/23/2003	2293.35	142.58	146.37	3.79	2146.98	2149.82
MW-02	10/27/2003	2293.35	142.79	146.24	3.45	2147.11	2149.70
MW-02	10/28/2003	2293.35	142.81	146.19	3.38	2147.16	2149.70
MW-02	10/29/2003	2293.35	142.80	146.20	3.40	2147.15	2149.70
MW-02	10/30/2003	2293.35	141.36	145.47	4.11	2147.88	2150.96
MW-02	11/24/2003	2293.35	143.23	145.80	2.57	2147.55	2149.48
MW-02	11/26/2003	2293.35	145.16	147.73	2.57	2145.62	2147.55
MW-02	12/1/2003	2293.35	143.21	145.84	2.63	2147.51	2149.48
MW-02	12/1/2003	2293.35	143.21	145.84	2.63	2147.51	2149.48
MW-02	12/1/2003	2293.35	143.21	145.84	2.63	2147.51	2149.48
MW-02	7/12/2004	2293.35	146.46	148.21	1.75	2145.14	2146.45
MW-02	7/19/2004	2293.35	146.57	148.27	1.70	2145.08	2146.36
MW-02	7/26/2004	2293.35	146.11	147.80	1.69	2145.55	2146.82
MW-02	8/2/2004	2293.35	146.26	147.91	1.65	2145.44	2146.68
MW-02	8/9/2004	2293.35	146.40	148.02	1.62	2145.33	2146.55
MW-02	8/16/2004	2293.35	146.52	148.12	1.60	2145.23	2146.43
MW-02	8/23/2004	2293.35	146.63	148.21	1.58	2145.14	2146.33
MW-02	8/30/2004	2293.35	146.75	148.28	1.53	2145.07	2146.22
MW-02	9/8/2004	2293.35	146.86	148.55	1.69	2144.80	2146.07
MW-02	9/13/2004	2293.35	146.90	148.59	1.69	2144.76	2146.03
MW-02	9/20/2004	2293.35	147.03	148.68	1.65	2144.67	2145.91
MW-02	9/27/2004	2293.35	147.14	148.74	1.60	2144.61	2145.81
MW-02	10/4/2004	2293.35	147.21	148.82	1.61	2144.53	2145.74
MW-02	10/11/2004	2293.35	147.30	148.91	1.61	2144.44	2145.65
MW-02	10/18/2004	2293.35	147.38	148.93	1.55	2144.42	2145.58
MW-02	10/25/2004	2293.35	147.45	148.96	1.51	2144.39	2145.52
MW-02	11/1/2004	2293.35	147.55	149.09	1.54	2144.26	2145.42
MW-02	11/8/2004	2293.35	147.62	149.13	1.51	2144.22	2145.35
MW-02	11/15/2004	2293.35	147.71	149.18	1.47	2144.17	2145.27
MW-02	11/30/2004	2293.35	147.86	149.38	1.52	2143.97	2145.11
MW-02	12/6/2004	2293.35	147.96	149.39	1.43	2143.96	2145.03
MW-02	12/13/2004	2293.35	148.04	149.45	1.41	2143.90	2144.96
MW-02	12/20/2004	2293.35	148.08	149.45	1.37	2143.90	2144.93
MW-02	1/4/2005	2293.35	148.18	149.62	1.44	2143.73	2144.81
MW-02	1/10/2005	2293.35	148.25	149.54	1.29	2143.81	2144.78
MW-02	1/17/2005	2293.35	148.32	149.47	1.15	2143.88	2144.74

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-02	1/24/2005	2293.35	148.41	149.51	1.10	2143.84	2144.67
MW-02	1/31/2005	2293.35	148.38	149.40	1.02	2143.95	2144.72
MW-02	2/7/2005	2293.35	148.46	149.50	1.04	2143.85	2144.63
MW-02	2/14/2005	2293.35	148.48	149.47	0.99	2143.88	2144.62
MW-02	2/21/2005	2293.35	148.51	149.45	0.94	2143.90	2144.61
MW-02	2/28/2005	2293.35	148.48	149.40	0.92	2143.95	2144.64
MW-02	3/7/2005	2293.35	148.45	149.32	0.87	2144.03	2144.68
MW-02	3/14/2005	2293.35	148.38	149.15	0.77	2144.20	2144.78
MW-02	3/21/2005	2293.35	148.29	149.10	0.81	2144.25	2144.86
MW-02	3/27/2005	2293.35	148.23	149.07	0.84	2144.28	2144.91
MW-02	4/4/2005	2293.35	148.21	149.13	0.92	2144.22	2144.91
MW-02	4/11/2005	2293.35	148.28	149.25	0.97	2144.10	2144.83
MW-02	4/18/2005	2293.35	148.89	149.78	0.89	2143.57	2144.24
MW-02	4/25/2005	2293.35	148.83	149.76	0.93	2143.59	2144.29
MW-02	5/2/2005	2293.35	148.87	149.79	0.92	2143.56	2144.25
MW-02	5/10/2005	2293.35	148.91	149.85	0.94	2143.50	2144.21
MW-02	5/16/2005	2293.35	148.95	149.95	1.00	2143.40	2144.15
MW-02	5/23/2005	2293.35	149.00	150.05	1.05	2143.30	2144.09
MW-02	5/30/2005	2293.35	148.55	149.54	0.99	2143.81	2144.55
MW-02	6/6/2005	2293.35	148.64	149.53	0.89	2143.82	2144.49
MW-02	6/13/2005	2293.35	148.72	149.56	0.84	2143.79	2144.42
MW-02	6/20/2005	2293.35	149.34	150.11	0.77	2143.24	2143.82
MW-02	6/27/2005	2293.35	149.40	150.19	0.79	2143.16	2143.75
MW-02	7/5/2005	2293.35	149.49	150.21	0.72	2143.14	2143.68
MW-02	7/11/2005	2293.35	149.58	150.24	0.66	2143.11	2143.61
MW-02	7/18/2005	2293.35	149.69	150.25	0.56	2143.10	2143.52
MW-02	7/25/2005	2293.35	149.80	150.30	0.50	2143.05	2143.43
MW-02	8/1/2005	2293.35	149.85	150.40	0.55	2142.95	2143.36
MW-02	8/8/2005	2293.35	149.90	150.45	0.55	2142.90	2143.31
MW-02	8/15/2005	2293.35	149.95	150.55	0.60	2142.80	2143.25
MW-02	8/22/2005	2293.35	149.96	150.56	0.60	2142.79	2143.24
MW-02	8/29/2005	2293.35	149.83	150.30	0.47	2143.05	2143.40
MW-02	9/7/2005	2293.35	149.51	149.75	0.24	2143.60	2143.78
MW-02	9/12/2005	2293.35	149.29	149.32	0.03	2144.03	2144.05
MW-02	9/19/2005	2293.35	NP	149.06	NP	2144.29	2144.29
MW-02	9/26/2005	2293.35	NP	148.98	NP	2144.37	2144.37
MW-02	10/3/2005	2293.35	148.99	149.15	0.16	2144.20	2144.32
MW-02	10/10/2005	2293.35	149.10	149.43	0.33	2143.92	2144.17
MW-02	10/17/2005	2293.35	149.17	149.61	0.44	2143.74	2144.07
MW-02	10/24/2005	2293.35	149.36	149.75	0.39	2143.60	2143.89
MW-02	10/31/2005	2293.35	149.48	149.89	0.41	2143.46	2143.77
MW-02	11/7/2005	2293.35	149.65	149.94	0.29	2143.41	2143.63
MW-02	11/14/2005	2293.35	149.75	150.08	0.33	2143.27	2143.52
MW-02	11/21/2005	2293.35	149.86	150.29	0.43	2143.06	2143.38
MW-02	12/5/2005	2293.35	149.95	150.60	0.65	2142.75	2143.24
MW-02	12/12/2005	2293.35	149.98	150.69	0.71	2142.66	2143.19

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-02	12/19/2005	2293.35	150.02	150.80	0.78	2142.55	2143.14
MW-02	12/28/2005	2293.35	150.05	150.80	0.75	2142.55	2143.11
MW-02	1/9/2006	2293.35	150.10	151.01	0.91	2142.34	2143.02
MW-02	1/16/2006	2293.35	150.15	151.09	0.94	2142.26	2142.97
MW-02	1/30/2006	2293.35	150.37	150.55	0.18	2142.80	2142.94
MW-02	2/16/2006	2293.35	150.48	150.51	0.03	2142.84	2142.86
MW-02	2/27/2006	2293.35	150.49	150.68	0.19	2142.67	2142.81
MW-02	3/6/2006	2293.35	150.55	150.64	0.09	2142.71	2142.78
MW-02	3/13/2006	2293.35	150.60	150.63	0.03	2142.72	2142.74
MW-02	3/20/2006	2293.35	150.63	150.65	0.02	2142.70	2142.72
MW-02	3/27/2006	2293.35	150.62	150.70	0.08	2142.65	2142.71
MW-02	4/3/2006	2293.35	150.68	150.73	0.05	2142.62	2142.66
MW-02	4/10/2006	2293.35	150.75	150.78	0.03	2142.57	2142.59
MW-02	4/17/2006	2293.35	150.78	150.84	0.06	2142.51	2142.56
MW-02	4/24/2006	2293.35	150.79	150.91	0.12	2142.44	2142.53
MW-02	5/1/2006	2293.35	150.80	151.02	0.22	2142.33	2142.50
MW-02	5/15/2006	2293.35	150.81	151.07	0.26	2142.28	2142.48
MW-02	5/22/2006	2293.35	150.88	151.11	0.23	2142.24	2142.41
MW-02	5/30/2006	2293.35	150.95	151.31	0.36	2142.04	2142.31
MW-02	6/5/2006	2293.35	151.04	151.44	0.40	2141.91	2142.21
MW-02	6/12/2006	2293.35	151.13	151.51	0.38	2141.84	2142.13
MW-02	6/26/2006	2293.35	151.30	151.58	0.28	2141.77	2141.98
MW-02	7/10/2006	2293.35	151.44	151.74	0.30	2141.61	2141.84
MW-02	8/4/2006	2293.35	150.89	151.60	0.71	2141.75	2142.28
MW-02	8/14/2006	2293.35	151.59	152.31	0.72	2141.04	2141.58
MW-02	8/23/2006	2293.35	151.39	151.98	0.59	2141.37	2141.81
MW-02	9/19/2006	2293.35	150.20	150.65	0.45	2142.70	2143.04
MW-02	10/20/2006	2293.35	149.63	149.70	0.07	2143.65	2143.70
MW-02	10/30/2006	2293.35	149.74	150.00	0.26	2143.35	2143.55
MW-02	11/17/2006	2293.35	150.01	150.45	0.44	2142.90	2143.23
MW-02	1/29/2007	2293.35	151.04	151.80	0.76	2141.55	2142.12
MW-02	3/1/2007	2293.35	151.23	152.27	1.04	2141.08	2141.86
MW-02	3/28/2007	2293.35	151.39	152.45	1.06	2140.90	2141.70
MW-02	4/24/2007	2293.35	151.55	152.58	1.03	2140.77	2141.54
MW-02	5/28/2007	2293.35	151.68	152.68	1.00	2140.67	2141.42
MW-02	6/27/2007	2293.35	152.03	152.97	0.94	2140.38	2141.09
MW-02	7/23/2007	2293.35	152.32	153.23	0.91	2140.12	2140.80
MW-02	8/25/2007	2293.35	151.67	152.33	0.66	2141.02	2141.52
MW-02	9/25/2007	2293.35	151.05	151.77	0.72	2141.58	2142.12
MW-02	10/22/2007	2293.35	151.43	152.09	0.66	2141.26	2141.76
MW-02	11/28/2007	2293.35	152.37	153.11	0.74	2140.24	2140.80
MW-02	12/31/2007	2293.35	152.46	153.15	0.69	2140.20	2140.72
MW-02	1/26/2008	2293.35	152.21	152.92	0.71	2140.43	2140.96
MW-02	2/29/2008	2293.35	152.33	153.18	0.85	2140.17	2140.81
MW-02	3/31/2008	2293.35	151.83	152.86	1.03	2140.49	2141.26
MW-02	4/21/2008	2293.35	151.92	153.27	1.35	2140.08	2141.09

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-02	5/23/2008	2293.35	152.31	153.87	1.56	2139.48	2140.65
MW-02	6/25/2008	2293.35	152.59	153.97	1.38	2139.38	2140.42
MW-02	7/28/2008	2293.35	152.82	154.22	1.40	2139.13	2140.18
MW-02	8/25/2008	2293.35	151.52	152.74	1.22	2140.61	2141.53
MW-02	9/30/2008	2293.35	150.21	150.41	0.20	2142.94	2143.09
MW-02	10/13/2008	2293.35	150.18	150.18	0.00	2143.17	2143.17
MW-02	11/26/2008	2293.35	151.00	151.25	0.25	2142.10	2142.29
MW-02	12/23/2008	2293.35	151.36	151.68	0.32	2141.67	2141.91
MW-02	1/26/2009	2293.35	151.60	152.00	0.40	2141.35	2141.65
MW-02	2/27/2009	2293.35	151.59	151.94	0.35	2141.41	2141.67
MW-02	3/26/2009	2293.35	151.80	152.18	0.38	2141.17	2141.46
MW-02	4/27/2009	2293.35	151.91	152.28	0.37	2141.07	2141.35
MW-02	5/20/2009	2293.35	152.15	152.59	0.44	2140.76	2141.09
MW-02	6/16/2009	2293.35	152.78	153.21	0.43	2140.14	2140.46
MW-02	7/20/2009	2293.35	153.21	153.77	0.56	2139.58	2140.00
MW-02	8/31/2009	2293.35	153.33	154.64	1.31	2138.71	2139.69
MW-02	9/29/2009	2293.35	153.50	154.68	1.18	2138.67	2139.56
MW-02	10/22/2009	2293.35	153.46	154.83	1.37	2138.52	2139.55
MW-02	11/25/2009	2293.35	NP	154.15	NP	2139.20	2139.20
MW-02	12/14/2009	2293.35	154.06	155.01	0.95	2138.34	2139.05
MW-02	1/18/2010	2293.35	154.23	154.85	0.62	2138.50	2138.97
MW-02	2/26/2010	2293.35	154.26	154.91	0.65	2138.44	2138.93
MW-02	3/22/2010	2293.35	153.56	154.34	0.78	2139.01	2139.60
MW-02	4/12/2010	2293.35	153.44	154.27	0.83	2139.08	2139.70
MW-02	5/27/2010	2293.35	153.85	154.65	0.80	2138.70	2139.30
MW-02	6/22/2010	2293.35	154.25	154.85	0.60	2138.50	2138.95
MW-02	7/12/2010	2293.35	154.37	155.47	1.10	2137.88	2138.71
MW-02	8/26/2010	2293.35	154.25	155.70	1.45	2137.65	2138.74
MW-02	9/22/2010	2293.35	154.06	155.55	1.49	2137.80	2138.92
MW-02	10/5/2010	2293.35	153.86	155.92	2.06	2137.43	2138.98
MW-02	10/18/2010	2293.35	153.79	155.32	1.53	2138.03	2139.18
MW-02	11/30/2010	2293.35	154.45	155.35	0.90	2138.00	2138.68
MW-02	12/21/2010	2293.35	155.00	155.68	0.68	2137.67	2138.18
MW-02	1/10/2011	2293.35	154.44	155.43	0.99	2137.92	2138.66
MW-02	2/17/2011	2293.35	154.80	155.20	0.40	2138.15	2138.45
MW-02	3/25/2011	2293.35	154.86	155.88	1.02	2137.47	2138.24
MW-02	4/11/2011	2293.35	155.05	155.06	0.01	2138.29	2138.30
MW-02	5/9/2011	2293.35	154.99	156.05	1.06	2137.30	2138.10
MW-02	6/29/2011	2293.35	155.82	157.03	1.21	2136.32	2137.23
MW-02	7/11/2011	2293.35	156.03	157.09	1.06	2136.26	2137.06
MW-02	8/31/2011	2293.35	156.71	157.40	0.69	2135.95	2136.47
MW-02	9/28/2011	2293.35	156.58	157.23	0.65	2136.12	2136.61
MW-02	11/16/2011	2293.35	156.06	156.15	0.09	2137.20	2137.27
MW-02	12/29/2011	2293.35	NP	156.07	NP	2137.28	2137.28
MW-02	1/16/2012	2293.35	156.12	156.14	0.02	2137.21	2137.23
MW-02	2/28/2012	2293.35	NP	155.88	NP	2137.47	2137.47

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-02	3/30/2012	2293.35	NP	156.16	NP	2137.19	2137.19
MW-02	4/2/2012	2293.35	NP	155.95	NP	2137.40	2137.40
MW-02	5/30/2012	2293.35	157.00	157.13	0.13	2136.22	2136.32
MW-02	6/29/2012	2293.35	157.27	157.39	0.12	2135.96	2136.05
MW-02	7/9/2012	2293.35	157.30	157.42	0.12	2135.93	2136.02
MW-02	8/29/2012	2293.35	156.98	157.01	0.03	2136.34	2136.36
MW-02	9/25/2012	2293.35	156.57	157.60	1.03	2135.75	2136.52
MW-02	10/22/2012	2293.35	156.70	156.75	0.05	2136.60	2136.64
MW-02	11/15/2012	2293.35	157.05	157.10	0.05	2136.25	2136.29
MW-02	12/13/2012	2293.35	152.42	152.47	0.05	2140.88	2140.92
MW-02	1/21/2013	2293.35	157.52	157.54	0.02	2135.81	2135.83
MW-02	2/13/2013	2293.35	NP	157.55	NP	2135.80	2135.80
MW-02	3/21/2013	2293.35	NP	157.61	NP	2135.74	2135.74
MW-02	4/15/2013	2293.35	NP	157.73	NP	2135.62	2135.62
MW-02	5/23/2013	2293.35	NP	157.94	NP	2135.41	2135.41
MW-02	6/26/2013	2293.35	NP	158.25	NP	2135.10	2135.10
MW-02	7/8/2013	2293.35	NP	158.33	NP	2135.02	2135.02
MW-02	8/8/2013	2293.35	NP	158.50	NP	2134.85	2134.85
MW-02	9/5/2013	2293.35	NP	158.42	NP	2134.93	2134.93
MW-02	10/3/2013	2293.35	NP	158.58	NP	2134.77	2134.77
MW-02	11/27/2013	2290.25	NP	155.66	NP	2134.59	2134.59
MW-02	12/31/2013	2290.25	NP	155.64	NP	2134.61	2134.61
MW-02	1/10/2014	2290.25	NP	155.80	NP	2134.45	2134.45
MW-02	2/18/2014	2290.25	NP	155.93	NP	2134.32	2134.32
MW-02	3/12/2014	2290.25	NP	155.96	NP	2134.29	2134.29
MW-02	4/17/2014	2290.25	NP	156.13	NP	2134.12	2134.12
MW-02	5/22/2014	2290.25	NP	156.42	NP	2133.83	2133.83
MW-02	6/20/2014	2290.25	NP	156.72	NP	2133.53	2133.53
MW-02	7/15/2014	2290.25	NP	157.04	NP	2133.21	2133.21
MW-02	8/14/2014	2290.25	NP	157.36	NP	2132.89	2132.89
MW-02	9/9/2014	2290.25	NP	157.20	NP	2133.05	2133.05
MW-02	10/1/2014	2290.25	NP	156.48	NP	2133.77	2133.77
MW-02	11/18/2014	2290.25	NP	156.23	NP	2134.02	2134.02
MW-02	12/16/2014	2290.25	NP	156.20	NP	2134.05	2134.05
MW-02	1/19/2015	2290.25	NP	155.92	NP	2134.33	2134.33
MW-02	2/19/2015	2290.25	NP	155.80	NP	2134.45	2134.45
MW-02	3/26/2015	2290.25	NP	155.48	NP	2134.77	2134.77
MW-02	4/16/2015	2290.25	NP	155.33	NP	2134.92	2134.92
MW-02	5/19/2015	2290.25	NP	155.59	NP	2134.66	2134.66
MW-02	6/22/2015	2290.25	NP	156.20	NP	2134.05	2134.05
MW-03	10/23/2003	2295.19	144.45	145.51	1.06	2149.68	2150.48
MW-03	10/27/2003	2295.19	144.45	145.50	1.05	2149.69	2150.48
MW-03	10/28/2003	2295.19	144.48	145.58	1.10	2149.61	2150.44
MW-03	10/29/2003	2295.19	144.50	145.60	1.10	2149.59	2150.42
MW-03	10/30/2003	2295.19	144.49	145.66	1.17	2149.53	2150.41
MW-03	10/31/2003	2295.19	144.45	145.66	1.21	2149.53	2150.44

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-03	11/3/2003	2295.19	144.56	145.65	1.09	2149.54	2150.36
MW-03	11/4/2003	2295.19	144.53	145.67	1.14	2149.52	2150.38
MW-03	11/24/2003	2295.19	144.65	145.84	1.19	2149.35	2150.24
MW-03	11/26/2003	2295.19	146.48	147.65	1.17	2147.54	2148.42
MW-03	12/1/2003	2295.19	146.35	147.54	1.19	2147.65	2148.54
MW-03	1/26/2004	2295.19	146.36	146.62	0.26	2148.57	2148.77
MW-03	2/5/2004	2295.19	146.61	147.04	0.43	2148.15	2148.47
MW-03	2/19/2004	2295.19	146.51	146.63	0.12	2148.56	2148.65
MW-03	3/8/2004	2295.19	146.58	146.95	0.37	2148.24	2148.52
MW-03	3/15/2004	2295.19	146.63	147.03	0.40	2148.16	2148.46
MW-03	3/22/2004	2295.19	146.64	147.00	0.36	2148.19	2148.46
MW-03	3/29/2004	2295.19	146.71	147.06	0.35	2148.13	2148.39
MW-03	4/5/2004	2295.19	146.73	147.05	0.32	2148.14	2148.38
MW-03	4/12/2004	2295.19	146.78	147.12	0.34	2148.07	2148.33
MW-03	4/19/2004	2295.19	146.79	147.15	0.36	2148.04	2148.31
MW-03	4/26/2004	2295.19	146.84	147.15	0.31	2148.04	2148.27
MW-03	5/3/2004	2295.19	146.83	147.15	0.32	2148.04	2148.28
MW-03	5/10/2004	2295.19	146.87	147.18	0.31	2148.01	2148.24
MW-03	5/17/2004	2295.19	146.93	147.27	0.34	2147.92	2148.18
MW-03	5/24/2004	2295.19	146.99	147.28	0.29	2147.91	2148.13
MW-03	5/31/2004	2295.19	147.01	147.19	0.18	2148.00	2148.14
MW-03	6/7/2004	2295.19	147.08	147.29	0.21	2147.90	2148.06
MW-03	6/14/2004	2295.19	147.19	147.34	0.15	2147.85	2147.96
MW-03	6/21/2004	2295.19	NP	147.33	NP	2147.86	2147.86
MW-03	6/28/2004	2295.19	NP	147.56	NP	2147.63	2147.63
MW-03	7/6/2004	2295.19	147.57	147.60	0.03	2147.59	2147.61
MW-03	7/12/2004	2295.19	147.64	147.65	0.01	2147.54	2147.55
MW-03	7/19/2004	2295.19	147.74	147.76	0.02	2147.43	2147.45
MW-03	7/26/2004	2295.19	147.84	147.90	0.06	2147.29	2147.34
MW-03	8/2/2004	2295.19	147.95	148.05	0.10	2147.14	2147.22
MW-03	8/9/2004	2295.19	148.06	148.17	0.11	2147.02	2147.10
MW-03	8/16/2004	2295.19	148.18	148.30	0.12	2146.89	2146.98
MW-03	8/23/2004	2295.19	148.28	148.40	0.12	2146.79	2146.88
MW-03	8/30/2004	2295.19	148.39	148.54	0.15	2146.65	2146.76
MW-03	9/8/2004	2295.19	148.51	148.67	0.16	2146.52	2146.64
MW-03	9/13/2004	2295.19	148.58	148.74	0.16	2146.45	2146.57
MW-03	9/20/2004	2295.19	148.67	148.83	0.16	2146.36	2146.48
MW-03	9/27/2004	2295.19	148.76	148.91	0.15	2146.28	2146.39
MW-03	10/4/2004	2295.19	148.86	148.92	0.06	2146.27	2146.32
MW-03	10/11/2004	2295.19	148.92	149.01	0.09	2146.18	2146.25
MW-03	10/18/2004	2295.19	148.98	149.07	0.09	2146.12	2146.19
MW-03	10/25/2004	2295.19	149.03	149.11	0.08	2146.08	2146.14
MW-03	11/1/2004	2295.19	149.14	149.24	0.10	2145.95	2146.03
MW-03	11/8/2004	2295.19	149.21	149.25	0.04	2145.94	2145.97
MW-03	11/15/2004	2295.19	149.28	149.32	0.04	2145.87	2145.90
MW-03	11/30/2004	2295.19	149.44	149.48	0.04	2145.71	2145.74

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-03	12/6/2004	2295.19	149.54	149.57	0.03	2145.62	2145.64
MW-03	12/13/2004	2295.19	149.60	149.62	0.02	2145.57	2145.59
MW-03	12/20/2004	2295.19	149.64	149.67	0.03	2145.52	2145.54
MW-03	1/4/2005	2295.19	149.74	149.77	0.03	2145.42	2145.44
MW-03	1/10/2005	2295.19	149.79	149.82	0.03	2145.37	2145.39
MW-03	1/17/2005	2295.19	149.82	149.84	0.02	2145.35	2145.37
MW-03	1/24/2005	2295.19	149.88	149.91	0.03	2145.28	2145.30
MW-03	1/31/2005	2295.19	149.83	149.86	0.03	2145.33	2145.35
MW-03	2/7/2005	2295.19	149.88	149.91	0.03	2145.28	2145.30
MW-03	2/14/2005	2295.19	149.94	149.96	0.02	2145.23	2145.25
MW-03	2/21/2005	2295.19	149.95	149.97	0.02	2145.22	2145.24
MW-03	2/28/2005	2295.19	149.93	149.94	0.01	2145.25	2145.26
MW-03	3/7/2005	2295.19	NP	149.89	NP	2145.30	2145.30
MW-03	3/14/2005	2295.19	NP	149.79	NP	2145.40	2145.40
MW-03	3/21/2005	2295.19	NP	149.74	NP	2145.45	2145.45
MW-03	3/27/2005	2295.19	NP	149.69	NP	2145.50	2145.50
MW-03	4/4/2005	2295.19	NP	149.70	NP	2145.49	2145.49
MW-03	4/11/2005	2295.19	NP	149.71	NP	2145.48	2145.48
MW-03	4/18/2005	2295.19	NP	149.84	NP	2145.35	2145.35
MW-03	4/25/2005	2295.19	NP	149.80	NP	2145.39	2145.39
MW-03	5/10/2005	2295.19	NP	149.86	NP	2145.33	2145.33
MW-03	5/16/2005	2295.19	NP	149.90	NP	2145.29	2145.29
MW-03	5/23/2005	2295.19	NP	149.98	NP	2145.21	2145.21
MW-03	5/30/2005	2295.19	NP	150.05	NP	2145.14	2145.14
MW-03	6/6/2005	2295.19	NP	150.10	NP	2145.09	2145.09
MW-03	6/13/2005	2295.19	NP	150.19	NP	2145.00	2145.00
MW-03	6/20/2005	2295.19	NP	150.21	NP	2144.98	2144.98
MW-03	6/27/2005	2295.19	NP	150.29	NP	2144.90	2144.90
MW-03	7/4/2005	2295.19	NP	150.37	NP	2144.82	2144.82
MW-03	7/11/2005	2295.19	NP	150.45	NP	2144.74	2144.74
MW-03	7/18/2005	2295.19	NP	150.55	NP	2144.64	2144.64
MW-03	7/25/2005	2295.19	NP	150.60	NP	2144.59	2144.59
MW-03	8/1/2005	2295.19	NP	150.68	NP	2144.51	2144.51
MW-03	8/8/2005	2295.19	NP	150.77	NP	2144.42	2144.42
MW-03	8/15/2005	2295.19	NP	150.79	NP	2144.40	2144.40
MW-03	8/22/2005	2295.19	NP	150.80	NP	2144.39	2144.39
MW-03	8/29/2005	2295.19	NP	150.56	NP	2144.63	2144.63
MW-03	9/7/2005	2295.19	NP	150.14	NP	2145.05	2145.05
MW-03	9/12/2005	2295.19	NP	149.89	NP	2145.30	2145.30
MW-03	9/19/2005	2295.19	NP	149.69	NP	2145.50	2145.50
MW-03	9/26/2005	2295.19	NP	149.64	NP	2145.55	2145.55
MW-03	10/3/2005	2295.19	NP	149.72	NP	2145.47	2145.47
MW-03	10/10/2005	2295.19	NP	149.88	NP	2145.31	2145.31
MW-03	10/17/2005	2295.19	NP	149.97	NP	2145.22	2145.22
MW-03	10/24/2005	2295.19	NP	150.14	NP	2145.05	2145.05
MW-03	10/31/2005	2295.19	NP	150.28	NP	2144.91	2144.91

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-03	11/7/2005	2295.19	NP	150.40	NP	2144.79	2144.79
MW-03	11/14/2005	2295.19	NP	150.53	NP	2144.66	2144.66
MW-03	11/21/2005	2295.19	NP	150.65	NP	2144.54	2144.54
MW-03	12/5/2005	2295.19	NP	150.78	NP	2144.41	2144.41
MW-03	12/19/2005	2295.19	NP	150.81	NP	2144.38	2144.38
MW-03	1/6/2006	2295.19	NP	150.98	NP	2144.21	2144.21
MW-03	1/16/2006	2295.19	NP	151.05	NP	2144.14	2144.14
MW-03	1/30/2006	2295.19	NP	151.08	NP	2144.11	2144.11
MW-03	2/13/2006	2295.19	NP	151.16	NP	2144.03	2144.03
MW-03	2/27/2006	2295.19	NP	151.23	NP	2143.96	2143.96
MW-03	3/6/2006	2295.19	NP	151.25	NP	2143.94	2143.94
MW-03	3/13/2006	2295.19	NP	151.29	NP	2143.90	2143.90
MW-03	3/20/2006	2295.19	NP	151.31	NP	2143.88	2143.88
MW-03	3/27/2006	2295.19	NP	151.33	NP	2143.86	2143.86
MW-03	4/3/2006	2295.19	NP	151.36	NP	2143.83	2143.83
MW-03	4/10/2006	2295.19	NP	151.42	NP	2143.77	2143.77
MW-03	4/17/2006	2295.19	NP	151.45	NP	2143.74	2143.74
MW-03	4/24/2006	2295.19	NP	151.50	NP	2143.69	2143.69
MW-03	5/1/2006	2295.19	NP	151.52	NP	2143.67	2143.67
MW-03	5/15/2006	2295.19	NP	151.57	NP	2143.62	2143.62
MW-03	5/22/2006	2295.19	NP	151.61	NP	2143.58	2143.58
MW-03	5/30/2006	2295.19	NP	151.72	NP	2143.47	2143.47
MW-03	6/5/2006	2295.19	NP	151.81	NP	2143.38	2143.38
MW-03	6/12/2006	2295.19	NP	151.90	NP	2143.29	2143.29
MW-03	6/26/2006	2295.19	NP	152.04	NP	2143.15	2143.15
MW-03	7/10/2006	2295.19	NP	152.17	NP	2143.02	2143.02
MW-03	8/2/2006	2295.19	NP	152.34	NP	2142.85	2142.85
MW-03	8/14/2006	2295.19	NP	152.42	NP	2142.77	2142.77
MW-03	8/23/2006	2295.19	NP	152.14	NP	2143.05	2143.05
MW-03	9/19/2006	2295.19	NP	150.90	NP	2144.29	2144.29
MW-03	10/20/2006	2295.19	NP	150.21	NP	2144.98	2144.98
MW-03	10/30/2006	2295.19	NP	150.51	NP	2144.68	2144.68
MW-03	11/17/2006	2295.19	NP	150.82	NP	2144.37	2144.37
MW-03	1/30/2007	2295.19	NP	151.94	NP	2143.25	2143.25
MW-03	3/1/2007	2295.19	NP	152.14	NP	2143.05	2143.05
MW-03	3/28/2007	2295.19	NP	152.32	NP	2142.87	2142.87
MW-03	4/24/2007	2295.19	NP	152.48	NP	2142.71	2142.71
MW-03	5/28/2007	2295.19	NP	152.60	NP	2142.59	2142.59
MW-03	6/27/2007	2295.19	NP	152.95	NP	2142.24	2142.24
MW-03	7/23/2007	2295.19	NP	153.20	NP	2141.99	2141.99
MW-03	8/25/2007	2295.19	NP	152.16	NP	2143.03	2143.03
MW-03	9/25/2007	2295.19	NP	151.75	NP	2143.44	2143.44
MW-03	10/22/2007	2295.19	NP	152.16	NP	2143.03	2143.03
MW-03	11/28/2007	2295.19	NP	153.17	NP	2142.02	2142.02
MW-03	12/31/2007	2295.19	NP	153.24	NP	2141.95	2141.95
MW-03	1/26/2008	2295.19	NP	152.98	NP	2142.21	2142.21

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-03	2/29/2008	2295.19	NP	153.19	NP	2142.00	2142.00
MW-03	3/31/2008	2295.19	NP	152.74	NP	2142.45	2142.45
MW-03	4/21/2008	2295.19	NP	152.95	NP	2142.24	2142.24
MW-03	5/23/2008	2295.19	NP	153.39	NP	2141.80	2141.80
MW-03	6/25/2008	2295.19	NP	153.55	NP	2141.64	2141.64
MW-03	7/28/2008	2295.19	NP	153.79	NP	2141.40	2141.40
MW-03	8/25/2008	2295.19	NP	152.24	NP	2142.95	2142.95
MW-03	9/30/2008	2295.19	NP	150.80	NP	2144.39	2144.39
MW-03	10/13/2008	2295.19	NP	150.81	NP	2144.38	2144.38
MW-03	11/26/2008	2295.19	NP	151.66	NP	2143.53	2143.53
MW-03	12/23/2008	2295.19	NP	152.40	NP	2142.79	2142.79
MW-03	1/26/2009	2295.19	NP	152.30	NP	2142.89	2142.89
MW-03	2/27/2009	2295.19	NP	152.29	NP	2142.90	2142.90
MW-03	3/26/2009	2295.19	NP	152.52	NP	2142.67	2142.67
MW-03	4/27/2009	2295.19	NP	152.64	NP	2142.55	2142.55
MW-03	5/20/2009	2295.19	NP	153.00	NP	2142.19	2142.19
MW-03	6/16/2009	2295.19	NP	153.58	NP	2141.61	2141.61
MW-03	7/20/2009	2295.19	NP	153.97	NP	2141.22	2141.22
MW-03	8/31/2009	2295.19	NP	154.27	NP	2140.92	2140.92
MW-03	9/29/2009	2295.19	NP	154.44	NP	2140.75	2140.75
MW-03	10/22/2009	2295.19	NP	154.56	NP	2140.63	2140.63
MW-03	11/25/2009	2295.19	NP	154.91	NP	2140.28	2140.28
MW-03	12/14/2009	2295.19	NP	154.95	NP	2140.24	2140.24
MW-03	1/18/2010	2295.19	NP	154.95	NP	2140.24	2140.24
MW-03	2/26/2010	2295.19	NP	154.96	NP	2140.23	2140.23
MW-03	3/22/2010	2295.19	NP	154.27	NP	2140.92	2140.92
MW-03	4/12/2010	2295.19	NP	154.21	NP	2140.98	2140.98
MW-03	5/27/2010	2295.19	NP	154.65	NP	2140.54	2140.54
MW-03	6/22/2010	2295.19	NP	155.00	NP	2140.19	2140.19
MW-03	7/12/2010	2295.19	NP	155.30	NP	2139.89	2139.89
MW-03	8/26/2010	2295.19	NP	155.28	NP	2139.91	2139.91
MW-03	9/22/2010	2295.19	NP	155.06	NP	2140.13	2140.13
MW-03	10/5/2010	2295.19	NP	154.92	NP	2140.27	2140.27
MW-03	10/18/2010	2295.19	NP	154.85	NP	2140.34	2140.34
MW-03	11/30/2010	2295.19	NP	155.23	NP	2139.96	2139.96
MW-03	12/21/2010	2295.19	NP	155.34	NP	2139.85	2139.85
MW-03	1/10/2011	2295.19	NP	155.31	NP	2139.88	2139.88
MW-03	2/17/2011	2295.19	NP	155.68	NP	2139.51	2139.51
MW-03	3/25/2011	2295.19	NP	155.71	NP	2139.48	2139.48
MW-03	4/11/2011	2295.19	NP	155.83	NP	2139.36	2139.36
MW-03	5/9/2011	2295.19	NP	156.10	NP	2139.09	2139.09
MW-03	7/11/2011	2295.19	NP	156.85	NP	2138.34	2138.34
MW-03	8/31/2011	2295.19	NP	157.38	NP	2137.81	2137.81
MW-03	9/28/2011	2295.19	NP	157.30	NP	2137.89	2137.89
MW-03	10/10/2011	2295.19	NP	156.62	NP	2138.57	2138.57
MW-03	11/16/2011	2295.19	NP	156.58	NP	2138.61	2138.61

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-03	12/29/2011	2295.19	NP	156.78	NP	2138.41	2138.41
MW-03	1/16/2012	2295.19	NP	156.63	NP	2138.56	2138.56
MW-03	2/28/2012	2295.19	NP	156.47	NP	2138.72	2138.72
MW-03	3/30/2012	2295.19	NP	156.67	NP	2138.52	2138.52
MW-03	4/2/2012	2295.19	NP	156.76	NP	2138.43	2138.43
MW-03	5/30/2012	2295.19	NP	157.51	NP	2137.68	2137.68
MW-03	6/29/2012	2295.19	NP	157.80	NP	2137.39	2137.39
MW-03	7/9/2012	2295.19	NP	157.82	NP	2137.37	2137.37
MW-03	8/29/2012	2295.19	NP	157.33	NP	2137.86	2137.86
MW-03	9/25/2012	2295.19	NP	156.85	NP	2138.34	2138.34
MW-03	10/22/2012	2295.19	NP	157.09	NP	2138.10	2138.10
MW-03	11/15/2012	2295.19	NP	157.48	NP	2137.71	2137.71
MW-03	12/13/2012	2295.19	NP	157.88	NP	2137.31	2137.31
MW-03	1/21/2013	2295.19	NP	158.04	NP	2137.15	2137.15
MW-03	2/13/2013	2295.19	NP	158.04	NP	2137.15	2137.15
MW-03	3/21/2013	2295.19	NP	158.11	NP	2137.08	2137.08
MW-03	4/15/2013	2295.19	NP	158.23	NP	2136.96	2136.96
MW-03	5/23/2013	2295.19	NP	158.45	NP	2136.74	2136.74
MW-03	6/26/2013	2295.19	NP	158.76	NP	2136.43	2136.43
MW-03	7/8/2013	2295.19	NP	158.83	NP	2136.36	2136.36
MW-03	8/8/2013	2295.19	NP	159.04	NP	2136.15	2136.15
MW-03	9/5/2013	2295.19	NP	158.84	NP	2136.35	2136.35
MW-03	10/3/2013	2295.19	NP	159.01	NP	2136.18	2136.18
MW-03	11/27/2013	2295.19	NP	159.25	NP	2135.94	2135.94
MW-03	12/31/2013	2295.19	NP	159.25	NP	2135.94	2135.94
MW-03	1/10/2014	2295.19	NP	159.39	NP	2135.80	2135.80
MW-03	2/18/2014	2295.19	NP	159.52	NP	2135.67	2135.67
MW-03	3/12/2014	2295.19	NP	159.55	NP	2135.64	2135.64
MW-03	4/17/2014	2295.19	NP	159.76	NP	2135.43	2135.43
MW-03	5/22/2014	2295.19	NP	160.06	NP	2135.13	2135.13
MW-03	6/20/2014	2295.19	NP	160.35	NP	2134.84	2134.84
MW-03	7/14/2014	2295.19	NP	160.59	NP	2134.60	2134.60
MW-03	8/14/2014	2295.19	NP	160.93	NP	2134.26	2134.26
MW-03	9/9/2014	2295.19	NP	160.60	NP	2134.59	2134.59
MW-03	10/1/2014	2295.19	NP	159.81	NP	2135.38	2135.38
MW-03	11/18/2014	2295.19	NP	159.70	NP	2135.49	2135.49
MW-03	12/16/2014	2295.19	NP	159.75	NP	2135.44	2135.44
MW-03	1/19/2015	2295.19	NP	159.57	NP	2135.62	2135.62
MW-03	2/19/2015	2295.19	NP	159.42	NP	2135.77	2135.77
MW-03	3/26/2015	2295.19	NP	159.12	NP	2136.07	2136.07
MW-03	4/16/2015	2295.19	NP	159.02	NP	2136.17	2136.17
MW-03	5/19/2015	2295.19	NP	159.30	NP	2135.89	2135.89
MW-03	6/22/2015	2295.19	NP	159.90	NP	2135.29	2135.29
MW-04	11/3/2003	2294.09	144.15	147.25	3.10	2146.84	2149.17
MW-04	11/4/2003	2294.09	144.15	147.51	3.36	2146.58	2149.10
MW-04	11/24/2003	2294.09	144.42	147.00	2.58	2147.09	2149.03

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-04	11/26/2003	2294.09	146.17	148.79	2.62	2145.30	2147.27
MW-04	12/1/2003	2294.09	144.43	147.04	2.61	2147.05	2149.01
MW-04	1/26/2004	2294.09	146.50	147.05	0.55	2147.04	2147.45
MW-04	2/5/2004	2294.09	146.46	146.64	0.18	2147.45	2147.59
MW-04	2/19/2004	2294.09	146.31	147.88	1.57	2146.21	2147.39
MW-04	3/8/2004	2294.09	146.45	147.89	1.44	2146.20	2147.28
MW-04	3/15/2004	2294.09	146.72	147.45	0.73	2146.64	2147.19
MW-04	3/22/2004	2294.09	146.72	147.38	0.66	2146.71	2147.21
MW-04	3/29/2004	2294.09	146.81	148.45	1.64	2145.64	2146.87
MW-04	4/5/2004	2294.09	146.84	147.40	0.56	2146.69	2147.11
MW-04	4/12/2004	2294.09	146.88	147.45	0.57	2146.64	2147.07
MW-04	4/19/2004	2294.09	146.89	147.42	0.53	2146.67	2147.07
MW-04	4/26/2004	2294.09	146.95	147.44	0.49	2146.65	2147.02
MW-04	5/3/2004	2294.09	146.92	147.45	0.53	2146.64	2147.04
MW-04	5/10/2004	2294.09	146.96	147.47	0.51	2146.62	2147.00
MW-04	5/17/2004	2294.09	147.00	147.56	0.56	2146.53	2146.95
MW-04	5/24/2004	2294.09	147.04	147.64	0.60	2146.45	2146.90
MW-04	5/31/2004	2294.09	147.03	147.74	0.71	2146.35	2146.88
MW-04	6/7/2004	2294.09	147.16	147.79	0.63	2146.30	2146.77
MW-04	6/14/2004	2294.09	147.11	148.15	1.04	2145.94	2146.72
MW-04	6/21/2004	2294.09	147.17	148.39	1.22	2145.70	2146.62
MW-04	6/28/2004	2294.09	147.25	148.66	1.41	2145.43	2146.49
MW-04	7/6/2004	2294.09	147.33	148.91	1.58	2145.18	2146.37
MW-04	7/12/2004	2294.09	147.41	148.99	1.58	2145.10	2146.29
MW-04	7/19/2004	2294.09	147.54	149.14	1.60	2144.95	2146.15
MW-04	7/26/2004	2294.09	147.81	149.20	1.39	2144.89	2145.93
MW-04	8/2/2004	2294.09	147.75	149.37	1.62	2144.72	2145.94
MW-04	8/9/2004	2294.09	147.87	149.46	1.59	2144.63	2145.82
MW-04	8/16/2004	2294.09	148.00	149.57	1.57	2144.52	2145.70
MW-04	8/23/2004	2294.09	148.11	149.62	1.51	2144.47	2145.60
MW-04	8/30/2004	2294.09	148.25	149.75	1.50	2144.34	2145.47
MW-04	9/8/2004	2294.09	148.35	149.95	1.60	2144.14	2145.34
MW-04	9/13/2004	2294.09	148.41	149.99	1.58	2144.10	2145.29
MW-04	9/20/2004	2294.09	148.55	150.07	1.52	2144.02	2145.16
MW-04	9/27/2004	2294.09	148.63	150.18	1.55	2143.91	2145.07
MW-04	10/4/2004	2294.09	148.72	150.23	1.51	2143.86	2144.99
MW-04	10/11/2004	2294.09	148.80	150.33	1.53	2143.76	2144.91
MW-04	10/18/2004	2294.09	148.86	150.31	1.45	2143.78	2144.87
MW-04	10/25/2004	2294.09	148.94	150.39	1.45	2143.70	2144.79
MW-04	11/1/2004	2294.09	149.05	150.52	1.47	2143.57	2144.67
MW-04	11/8/2004	2294.09	149.10	150.56	1.46	2143.53	2144.63
MW-04	11/15/2004	2294.09	149.20	150.65	1.45	2143.44	2144.53
MW-04	11/30/2004	2294.09	149.39	150.81	1.42	2143.28	2144.35
MW-04	12/6/2004	2294.09	149.41	150.96	1.55	2143.13	2144.29
MW-04	12/13/2004	2294.09	149.51	150.89	1.38	2143.20	2144.24
MW-04	12/20/2004	2294.09	149.59	150.93	1.34	2143.16	2144.17

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-04	1/4/2005	2294.09	149.70	151.06	1.36	2143.03	2144.05
MW-04	1/10/2005	2294.09	149.79	150.87	1.08	2143.22	2144.03
MW-04	1/17/2005	2294.09	149.84	150.80	0.96	2143.29	2144.01
MW-04	1/24/2005	2294.09	149.90	151.02	1.12	2143.07	2143.91
MW-04	1/31/2005	2294.09	149.88	150.81	0.93	2143.28	2143.98
MW-04	2/7/2005	2294.09	149.91	151.06	1.15	2143.03	2143.89
MW-04	2/14/2005	2294.09	149.92	151.01	1.09	2143.08	2143.90
MW-04	2/21/2005	2294.09	149.50	150.92	1.42	2143.17	2144.24
MW-04	2/28/2005	2294.09	149.94	150.84	0.90	2143.25	2143.93
MW-04	3/7/2005	2294.09	149.49	150.72	1.23	2143.37	2144.29
MW-04	3/14/2005	2294.09	149.84	150.59	0.75	2143.50	2144.06
MW-04	3/21/2005	2294.09	149.80	150.53	0.73	2143.56	2144.11
MW-04	3/27/2005	2294.09	149.72	150.45	0.73	2143.64	2144.19
MW-04	4/4/2005	2294.09	149.71	150.50	0.79	2143.59	2144.18
MW-04	4/11/2005	2294.09	149.77	150.62	0.85	2143.47	2144.11
MW-04	4/18/2005	2294.09	149.85	150.69	0.84	2143.40	2144.03
MW-04	4/25/2005	2294.09	149.80	150.62	0.82	2143.47	2144.09
MW-04	5/2/2005	2294.09	149.85	150.59	0.74	2143.50	2144.06
MW-04	5/10/2005	2294.09	149.86	150.69	0.83	2143.40	2144.02
MW-04	5/16/2005	2294.09	149.91	150.69	0.78	2143.40	2143.99
MW-04	5/23/2005	2294.09	149.98	150.94	0.96	2143.15	2143.87
MW-04	5/30/2005	2294.09	150.03	150.99	0.96	2143.10	2143.82
MW-04	6/6/2005	2294.09	150.10	151.00	0.90	2143.09	2143.77
MW-04	6/13/2005	2294.09	150.18	151.09	0.91	2143.00	2143.68
MW-04	6/20/2005	2294.09	150.21	151.13	0.92	2142.96	2143.65
MW-04	6/27/2005	2294.09	150.29	151.19	0.90	2142.90	2143.58
MW-04	7/5/2005	2294.09	150.35	151.35	1.00	2142.74	2143.49
MW-04	7/11/2005	2294.09	150.40	151.38	0.98	2142.71	2143.45
MW-04	7/18/2005	2294.09	150.53	151.41	0.88	2142.68	2143.34
MW-04	7/25/2005	2294.09	150.56	151.45	0.89	2142.64	2143.31
MW-04	8/1/2005	2294.09	150.75	151.47	0.72	2142.62	2143.16
MW-04	8/8/2005	2294.09	150.82	151.53	0.71	2142.56	2143.09
MW-04	8/15/2005	2294.09	150.85	151.55	0.70	2142.54	2143.07
MW-04	8/22/2005	2294.09	150.89	151.45	0.56	2142.64	2143.06
MW-04	8/29/2005	2294.09	150.77	151.15	0.38	2142.94	2143.23
MW-04	9/7/2005	2294.09	150.32	150.81	0.49	2143.28	2143.65
MW-04	9/12/2005	2294.09	150.17	150.36	0.19	2143.73	2143.87
MW-04	9/19/2005	2294.09	149.95	150.06	0.11	2144.03	2144.11
MW-04	9/26/2005	2294.09	149.82	150.10	0.28	2143.99	2144.20
MW-04	10/3/2005	2294.09	149.84	150.60	0.76	2143.49	2144.06
MW-04	10/10/2005	2294.09	149.97	150.55	0.58	2143.54	2143.98
MW-04	10/17/2005	2294.09	150.07	150.66	0.59	2143.43	2143.87
MW-04	10/24/2005	2294.09	150.21	150.88	0.67	2143.21	2143.71
MW-04	10/31/2005	2294.09	150.20	151.13	0.93	2142.96	2143.66
MW-04	11/7/2005	2294.09	150.39	151.43	1.04	2142.66	2143.44
MW-04	11/14/2005	2294.09	150.56	151.50	0.94	2142.59	2143.30

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-04	11/21/2005	2294.09	150.71	151.52	0.81	2142.57	2143.18
MW-04	12/5/2005	2294.09	150.85	151.56	0.71	2142.53	2143.06
MW-04	12/12/2005	2294.09	150.93	151.59	0.66	2142.50	2143.00
MW-04	12/19/2005	2294.09	151.03	151.56	0.53	2142.53	2142.93
MW-04	12/28/2005	2294.09	151.00	151.69	0.69	2142.40	2142.92
MW-04	1/9/2006	2294.09	151.08	151.80	0.72	2142.29	2142.83
MW-04	1/16/2006	2294.09	151.16	151.75	0.59	2142.34	2142.78
MW-04	1/30/2006	2294.09	151.21	151.81	0.60	2142.28	2142.73
MW-04	2/13/2006	2294.09	151.27	151.91	0.64	2142.18	2142.66
MW-04	2/27/2006	2294.09	151.34	152.02	0.68	2142.07	2142.58
MW-04	3/6/2006	2294.09	151.40	151.91	0.51	2142.18	2142.56
MW-04	3/13/2006	2294.09	151.45	151.97	0.52	2142.12	2142.51
MW-04	3/20/2006	2294.09	151.45	152.04	0.59	2142.05	2142.49
MW-04	3/27/2006	2294.09	151.43	152.04	0.61	2142.05	2142.51
MW-04	4/3/2006	2294.09	151.47	152.11	0.64	2141.98	2142.46
MW-04	4/10/2006	2294.09	151.52	152.15	0.63	2141.94	2142.41
MW-04	4/17/2006	2294.09	151.56	152.15	0.59	2141.94	2142.38
MW-04	4/24/2006	2294.09	151.60	152.19	0.59	2141.90	2142.34
MW-04	5/1/2006	2294.09	151.65	152.25	0.60	2141.84	2142.29
MW-04	5/15/2006	2294.09	151.74	152.40	0.66	2141.69	2142.19
MW-04	5/22/2006	2294.09	151.87	151.94	0.07	2142.15	2142.20
MW-04	5/30/2006	2294.09	151.97	152.10	0.13	2141.99	2142.09
MW-04	6/5/2006	2294.09	152.05	152.24	0.19	2141.85	2141.99
MW-04	6/12/2006	2294.09	152.16	152.22	0.06	2141.87	2141.92
MW-04	6/26/2006	2294.09	152.31	152.39	0.08	2141.70	2141.76
MW-04	7/10/2006	2294.09	152.47	152.52	0.05	2141.57	2141.61
MW-04	8/4/2006	2294.09	151.90	152.40	0.50	2141.69	2142.07
MW-04	8/14/2006	2294.09	152.48	153.45	0.97	2140.64	2141.37
MW-04	8/23/2006	2294.09	152.33	152.98	0.65	2141.11	2141.60
MW-04	9/19/2006	2294.09	151.17	151.31	0.14	2142.78	2142.89
MW-04	10/20/2006	2294.09	150.46	150.88	0.42	2143.21	2143.53
MW-04	10/30/2006	2294.09	150.56	151.18	0.62	2142.91	2143.38
MW-04	11/17/2006	2294.09	150.88	151.57	0.69	2142.52	2143.04
MW-04	1/29/2007	2294.09	151.94	152.89	0.95	2141.20	2141.91
MW-04	3/1/2007	2294.09	152.14	153.08	0.94	2141.01	2141.72
MW-04	3/28/2007	2294.09	152.28	153.46	1.18	2140.63	2141.52
MW-04	4/24/2007	2294.09	152.45	153.61	1.16	2140.48	2141.35
MW-04	5/28/2007	2294.09	152.60	153.71	1.11	2140.38	2141.21
MW-04	6/27/2007	2294.09	152.89	154.16	1.27	2139.93	2140.88
MW-04	7/23/2007	2294.09	153.19	154.44	1.25	2139.65	2140.59
MW-04	8/25/2007	2294.09	152.55	153.06	0.51	2141.03	2141.41
MW-04	9/25/2007	2294.09	151.98	152.94	0.96	2141.15	2141.87
MW-04	10/22/2007	2294.09	NP	152.33	NP	2141.76	2141.76
MW-04	11/28/2007	2294.09	153.20	154.46	1.26	2139.63	2140.58
MW-04	12/31/2007	2294.09	153.52	154.40	0.88	2139.69	2140.35
MW-04	1/26/2008	2294.09	153.11	153.90	0.79	2140.19	2140.78

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-04	2/29/2008	2294.09	153.23	154.32	1.09	2139.77	2140.59
MW-04	3/31/2008	2294.09	152.83	153.65	0.82	2140.44	2141.06
MW-04	4/21/2008	2294.09	152.94	154.02	1.08	2140.07	2140.88
MW-04	5/23/2008	2294.09	153.31	154.79	1.48	2139.30	2140.41
MW-04	6/25/2008	2294.09	153.67	154.62	0.95	2139.47	2140.18
MW-04	8/25/2008	2294.09	152.45	152.88	0.43	2141.21	2141.53
MW-04	12/23/2008	2294.09	152.05	152.70	0.65	2141.39	2141.88
MW-04	2/27/2009	2294.09	152.27	152.83	0.56	2141.26	2141.68
MW-04	3/26/2009	2294.09	152.49	153.18	0.69	2140.91	2141.43
MW-04	7/20/2009	2294.09	153.84	155.06	1.22	2139.03	2139.95
MW-04	9/29/2009	2294.09	154.27	155.40	1.13	2138.69	2139.54
MW-04	11/25/2009	2294.09	154.89	155.58	0.69	2138.51	2139.03
MW-04	2/26/2010	2294.09	155.11	155.41	0.30	2138.68	2138.91
MW-04	3/22/2010	2294.09	154.43	154.48	0.05	2139.61	2139.65
MW-04	4/12/2010	2294.09	154.37	154.38	0.01	2139.71	2139.72
MW-04	5/27/2010	2294.09	154.76	155.03	0.27	2139.06	2139.26
MW-04	6/22/2010	2294.09	155.05	155.46	0.41	2138.63	2138.94
MW-04	8/26/2010	2294.09	NP	155.28	NP	2138.81	2138.81
MW-04	9/22/2010	2294.09	NP	155.04	NP	2139.05	2139.05
MW-04	10/18/2010	2294.09	NP	154.81	NP	2139.28	2139.28
MW-04	11/30/2010	2294.09	NP	155.41	NP	2138.68	2138.68
MW-04	12/21/2010	2294.09	NP	155.49	NP	2138.60	2138.60
MW-04	3/25/2011	2294.09	NP	154.89	NP	2139.20	2139.20
MW-04	4/11/2011	2294.09	NP	155.04	NP	2139.05	2139.05
MW-04	5/9/2011	2294.09	NP	155.00	NP	2139.09	2139.09
MW-04	6/29/2011	2294.09	155.85	156.20	0.35	2137.89	2138.15
MW-04	7/11/2011	2294.09	156.03	156.04	0.01	2138.05	2138.06
MW-04	9/28/2011	2294.09	156.52	156.53	0.01	2137.56	2137.57
MW-04	11/16/2011	2294.09	NP	157.87	NP	2136.22	2136.22
MW-04	1/16/2012	2294.09	NP	155.95	NP	2138.14	2138.14
MW-04	2/28/2012	2294.09	NP	155.65	NP	2138.44	2138.44
MW-04	5/30/2012	2294.09	NP	156.81	NP	2137.28	2137.28
MW-04	6/29/2012	2294.09	157.07	157.23	0.16	2136.86	2136.98
MW-04	7/9/2012	2294.09	157.10	157.28	0.18	2136.81	2136.95
MW-04	8/29/2012	2294.09	NP	156.78	NP	2137.31	2137.31
MW-04	9/25/2012	2294.09	NP	156.38	NP	2137.71	2137.71
MW-04	10/22/2012	2294.09	NP	156.54	NP	2137.55	2137.55
MW-04	11/15/2012	2294.09	NP	156.90	NP	2137.19	2137.19
MW-04	12/13/2012	2294.09	NP	157.25	NP	2136.84	2136.84
MW-04	1/21/2013	2294.09	NP	157.33	NP	2136.76	2136.76
MW-04	2/13/2013	2294.09	NP	157.36	NP	2136.73	2136.73
MW-04	3/21/2013	2294.09	NP	157.43	NP	2136.66	2136.66
MW-04	4/15/2013	2294.09	NP	157.58	NP	2136.51	2136.51
MW-04	5/23/2013	2294.09	NP	157.75	NP	2136.34	2136.34
MW-04	6/26/2013	2294.09	NP	158.08	NP	2136.01	2136.01
MW-04	7/8/2013	2294.09	NP	158.15	NP	2135.94	2135.94

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-04	8/8/2013	2294.09	NP	158.35	NP	2135.74	2135.74
MW-04	9/5/2013	2294.09	NP	158.24	NP	2135.85	2135.85
MW-04	10/3/2013	2294.09	NP	158.37	NP	2135.72	2135.72
MW-04	11/27/2013	2295.26	NP	158.58	NP	2136.68	2136.68
MW-04	12/31/2013	2295.26	NP	160.68	NP	2134.58	2134.58
MW-04	1/10/2014	2295.26	NP	160.88	NP	2134.38	2134.38
MW-04	2/18/2014	2295.26	NP	160.99	NP	2134.27	2134.27
MW-04	3/12/2014	2295.26	NP	161.03	NP	2134.23	2134.23
MW-04	4/17/2014	2295.26	NP	161.21	NP	2134.05	2134.05
MW-04	5/22/2014	2295.26	NP	161.49	NP	2133.77	2133.77
MW-04	6/20/2014	2295.26	NP	161.80	NP	2133.46	2133.46
MW-04	7/15/2014	2295.26	NP	162.40	NP	2132.86	2132.86
MW-04	8/14/2014	2295.26	NP	162.42	NP	2132.84	2132.84
MW-04	9/9/2014	2295.26	NP	162.25	NP	2133.01	2133.01
MW-04	10/1/2014	2295.26	NP	161.50	NP	2133.76	2133.76
MW-04	11/18/2014	2295.26	NP	161.23	NP	2134.03	2134.03
MW-04	12/16/2014	2295.26	NP	161.31	NP	2133.95	2133.95
MW-04	1/19/2015	2295.26	NP	161.06	NP	2134.20	2134.20
MW-04	2/19/2015	2295.26	NP	160.86	NP	2134.40	2134.40
MW-04	3/26/2015	2295.26	NP	160.54	NP	2134.72	2134.72
MW-04	4/16/2015	2295.26	NP	160.42	NP	2134.84	2134.84
MW-04	5/19/2015	2295.26	NP	160.69	NP	2134.57	2134.57
MW-04	6/22/2015	2295.26	NP	161.27	NP	2133.99	2133.99
MW-05	10/27/2003	2294.61	144.90	148.91	4.01	2145.70	2148.71
MW-05	10/28/2003	2294.61	144.96	148.93	3.97	2145.68	2148.66
MW-05	10/29/2003	2294.61	144.98	148.88	3.90	2145.73	2148.66
MW-05	10/30/2003	2294.61	144.93	148.43	3.50	2146.18	2148.81
MW-05	10/31/2003	2294.61	144.25	148.19	3.94	2146.42	2149.38
MW-05	11/3/2003	2294.61	144.32	148.10	3.78	2146.51	2149.35
MW-05	11/4/2003	2294.61	144.30	148.02	3.72	2146.59	2149.38
MW-05	11/24/2003	2294.61	144.49	148.03	3.54	2146.58	2149.24
MW-05	11/26/2003	2294.61	146.31	149.81	3.50	2144.80	2147.43
MW-05	12/1/2003	2294.61	144.54	148.00	3.46	2146.61	2149.21
MW-05	1/26/2004	2294.61	146.86	147.11	0.25	2147.50	2147.69
MW-05	2/5/2004	2294.61	146.86	147.11	0.25	2147.50	2147.69
MW-05	3/29/2004	2294.61	146.65	148.45	1.80	2146.16	2147.51
MW-05	4/5/2004	2294.61	146.66	148.40	1.74	2146.21	2147.52
MW-05	4/12/2004	2294.61	146.75	148.39	1.64	2146.22	2147.45
MW-05	4/19/2004	2294.61	146.75	148.42	1.67	2146.19	2147.44
MW-05	4/26/2004	2294.61	146.78	148.39	1.61	2146.22	2147.43
MW-05	5/3/2004	2294.61	146.76	148.37	1.61	2146.24	2147.45
MW-05	5/10/2004	2294.61	146.81	148.42	1.61	2146.19	2147.40
MW-05	5/17/2004	2294.61	146.87	148.46	1.59	2146.15	2147.34
MW-05	5/24/2004	2294.61	146.91	148.55	1.64	2146.06	2147.29
MW-05	5/31/2004	2294.61	146.92	148.55	1.63	2146.06	2147.28
MW-05	6/7/2004	2294.61	147.18	148.11	0.93	2146.50	2147.20

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-05	6/14/2004	2294.61	147.10	148.75	1.65	2145.86	2147.10
MW-05	6/21/2004	2294.61	147.21	148.85	1.64	2145.76	2146.99
MW-05	6/28/2004	2294.61	147.35	149.01	1.66	2145.60	2146.85
MW-05	7/6/2004	2294.61	147.37	149.37	2.00	2145.24	2146.74
MW-05	7/12/2004	2294.61	147.50	149.34	1.84	2145.27	2146.65
MW-05	7/19/2004	2294.61	147.63	149.45	1.82	2145.16	2146.53
MW-05	7/26/2004	2294.61	147.75	149.56	1.81	2145.05	2146.41
MW-05	8/2/2004	2294.61	147.88	149.66	1.78	2144.95	2146.29
MW-05	8/9/2004	2294.61	148.00	149.72	1.72	2144.89	2146.18
MW-05	8/16/2004	2294.61	148.15	149.81	1.66	2144.80	2146.05
MW-05	8/23/2004	2294.61	148.24	149.90	1.66	2144.71	2145.96
MW-05	8/30/2004	2294.61	148.38	149.99	1.61	2144.62	2145.83
MW-05	9/8/2004	2294.61	148.51	150.20	1.69	2144.41	2145.68
MW-05	9/13/2004	2294.61	148.68	149.91	1.23	2144.70	2145.62
MW-05	9/20/2004	2294.61	148.84	149.86	1.02	2144.75	2145.52
MW-05	9/27/2004	2294.61	148.95	149.94	0.99	2144.67	2145.41
MW-05	10/4/2004	2294.61	149.04	149.91	0.87	2144.70	2145.35
MW-05	10/11/2004	2294.61	149.15	149.92	0.77	2144.69	2145.27
MW-05	10/18/2004	2294.61	149.20	149.93	0.73	2144.68	2145.23
MW-05	10/25/2004	2294.61	149.27	150.06	0.79	2144.55	2145.14
MW-05	11/1/2004	2294.61	149.38	150.05	0.67	2144.56	2145.06
MW-05	11/8/2004	2294.61	149.51	150.00	0.49	2144.61	2144.98
MW-05	11/15/2004	2294.61	149.57	150.16	0.59	2144.45	2144.89
MW-05	11/30/2004	2294.61	149.60	150.64	1.04	2143.97	2144.75
MW-05	12/6/2004	2294.61	149.78	150.54	0.76	2144.07	2144.64
MW-05	12/13/2004	2294.61	149.89	150.45	0.56	2144.16	2144.58
MW-05	12/20/2004	2294.61	149.94	150.46	0.52	2144.15	2144.54
MW-05	1/4/2005	2294.61	149.90	150.97	1.07	2143.64	2144.44
MW-05	1/10/2005	2294.61	149.98	150.90	0.92	2143.71	2144.40
MW-05	1/17/2005	2294.61	150.13	150.59	0.46	2144.02	2144.37
MW-05	1/24/2005	2294.61	150.23	150.66	0.43	2143.95	2144.27
MW-05	1/31/2005	2294.61	150.15	150.57	0.42	2144.04	2144.36
MW-05	2/7/2005	2294.61	150.21	150.78	0.57	2143.83	2144.26
MW-05	2/14/2005	2294.61	150.15	150.93	0.78	2143.68	2144.27
MW-05	2/21/2005	2294.61	150.16	150.98	0.82	2143.63	2144.25
MW-05	2/28/2005	2294.61	150.09	150.98	0.89	2143.63	2144.30
MW-05	3/7/2005	2294.61	150.03	150.90	0.87	2143.71	2144.36
MW-05	3/14/2005	2294.61	149.97	150.79	0.82	2143.82	2144.44
MW-05	3/21/2005	2294.61	149.88	150.73	0.85	2143.88	2144.52
MW-05	3/27/2005	2294.61	149.79	150.79	1.00	2143.82	2144.57
MW-05	4/4/2005	2294.61	150.34	151.45	1.11	2143.16	2143.99
MW-05	4/11/2005	2294.61	150.34	151.75	1.41	2142.86	2143.92
MW-05	4/18/2005	2294.61	149.88	151.06	1.18	2143.55	2144.44
MW-05	4/25/2005	2294.61	149.89	150.81	0.92	2143.80	2144.49
MW-05	5/2/2005	2294.61	149.87	150.98	1.11	2143.63	2144.46
MW-05	5/10/2005	2294.61	149.92	151.06	1.14	2143.55	2144.41

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-05	5/16/2005	2294.61	149.99	151.10	1.11	2143.51	2144.34
MW-05	5/23/2005	2294.61	150.10	151.11	1.01	2143.50	2144.26
MW-05	5/30/2005	2294.61	150.19	151.17	0.98	2143.44	2144.18
MW-05	6/6/2005	2294.61	150.26	151.25	0.99	2143.36	2144.10
MW-05	6/13/2005	2294.61	150.35	151.21	0.86	2143.40	2144.05
MW-05	6/20/2005	2294.61	151.01	151.65	0.64	2142.96	2143.44
MW-05	6/27/2005	2294.61	150.56	151.08	0.52	2143.53	2143.92
MW-05	7/5/2005	2294.61	150.59	151.24	0.65	2143.37	2143.86
MW-05	7/11/2005	2294.61	150.67	151.31	0.64	2143.30	2143.78
MW-05	7/18/2005	2294.61	150.81	151.29	0.48	2143.32	2143.68
MW-05	7/25/2005	2294.61	151.43	151.99	0.56	2142.62	2143.04
MW-05	8/1/2005	2294.61	151.47	152.11	0.64	2142.50	2142.98
MW-05	8/8/2005	2294.61	151.49	152.21	0.72	2142.40	2142.94
MW-05	8/15/2005	2294.61	151.49	152.44	0.95	2142.17	2142.88
MW-05	8/22/2005	2294.61	151.47	152.51	1.04	2142.10	2142.88
MW-05	8/29/2005	2294.61	151.33	152.32	0.99	2142.29	2143.03
MW-05	9/7/2005	2294.61	151.09	151.49	0.40	2143.12	2143.42
MW-05	9/12/2005	2294.61	150.30	150.55	0.25	2144.06	2144.25
MW-05	9/19/2005	2294.61	150.02	150.29	0.27	2144.32	2144.52
MW-05	9/26/2005	2294.61	149.95	150.18	0.23	2144.43	2144.60
MW-05	10/3/2005	2294.61	149.99	150.04	0.05	2144.57	2144.61
MW-05	10/10/2005	2294.61	150.10	150.64	0.54	2143.97	2144.38
MW-05	10/17/2005	2294.61	150.25	150.65	0.40	2143.96	2144.26
MW-05	10/24/2005	2294.61	150.43	150.85	0.42	2143.76	2144.08
MW-05	10/31/2005	2294.61	150.57	150.92	0.35	2143.69	2143.95
MW-05	11/7/2005	2294.61	150.72	151.05	0.33	2143.56	2143.81
MW-05	11/14/2005	2294.61	150.86	151.13	0.27	2143.48	2143.68
MW-05	11/21/2005	2294.61	150.89	151.52	0.63	2143.09	2143.56
MW-05	12/5/2005	2294.61	150.89	152.00	1.11	2142.61	2143.44
MW-05	12/12/2005	2294.61	150.90	152.14	1.24	2142.47	2143.40
MW-05	12/19/2005	2294.61	150.95	152.24	1.29	2142.37	2143.34
MW-05	12/28/2005	2294.61	151.54	152.87	1.33	2141.74	2142.74
MW-05	1/9/2006	2294.61	151.63	152.91	1.28	2141.70	2142.66
MW-05	1/16/2006	2294.61	151.70	152.80	1.10	2141.81	2142.64
MW-05	1/30/2006	2294.61	151.75	152.95	1.20	2141.66	2142.56
MW-05	2/13/2006	2294.61	151.80	152.99	1.19	2141.62	2142.51
MW-05	2/27/2006	2294.61	151.88	153.03	1.15	2141.58	2142.44
MW-05	3/6/2006	2294.61	151.98	152.86	0.88	2141.75	2142.41
MW-05	3/13/2006	2294.61	152.05	152.80	0.75	2141.81	2142.37
MW-05	3/20/2006	2294.61	152.09	152.81	0.72	2141.80	2142.34
MW-05	3/27/2006	2294.61	152.10	152.81	0.71	2141.80	2142.33
MW-05	4/3/2006	2294.61	152.11	152.95	0.84	2141.66	2142.29
MW-05	4/10/2006	2294.61	152.14	153.07	0.93	2141.54	2142.24
MW-05	4/17/2006	2294.61	152.21	153.12	0.91	2141.49	2142.17
MW-05	4/24/2006	2294.61	152.33	152.86	0.53	2141.75	2142.15
MW-05	5/1/2006	2294.61	152.46	152.58	0.12	2142.03	2142.12

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-05	5/15/2006	2294.61	152.29	153.21	0.92	2141.40	2142.09
MW-05	5/22/2006	2294.61	152.34	153.11	0.77	2141.50	2142.08
MW-05	5/30/2006	2294.61	152.45	153.42	0.97	2141.19	2141.92
MW-05	6/5/2006	2294.61	152.59	153.41	0.82	2141.20	2141.82
MW-05	6/12/2006	2294.61	152.70	153.42	0.72	2141.19	2141.73
MW-05	6/26/2006	2294.61	152.85	153.58	0.73	2141.03	2141.58
MW-05	7/10/2006	2294.61	152.99	153.70	0.71	2140.91	2141.44
MW-05	8/4/2006	2294.61	152.71	152.80	0.09	2141.81	2141.88
MW-05	8/14/2006	2294.61	153.25	153.85	0.60	2140.76	2141.21
MW-05	8/23/2006	2294.61	153.09	153.50	0.41	2141.11	2141.42
MW-05	9/19/2006	2294.61	151.90	151.91	0.01	2142.70	2142.71
MW-05	10/20/2006	2294.61	151.20	151.37	0.17	2143.24	2143.37
MW-05	10/30/2006	2294.61	151.29	151.75	0.46	2142.86	2143.21
MW-05	11/17/2006	2294.61	151.57	152.25	0.68	2142.36	2142.87
MW-05	1/29/2007	2294.61	152.66	153.46	0.80	2141.15	2141.75
MW-05	3/1/2007	2294.61	152.82	153.81	0.99	2140.80	2141.54
MW-05	3/28/2007	2294.61	153.01	154.04	1.03	2140.57	2141.34
MW-05	4/24/2007	2294.61	153.19	154.21	1.02	2140.40	2141.17
MW-05	5/28/2007	2294.61	153.30	154.35	1.05	2140.26	2141.05
MW-05	6/27/2007	2294.61	153.64	154.70	1.06	2139.91	2140.71
MW-05	7/23/2007	2294.61	153.97	154.91	0.94	2139.70	2140.41
MW-05	8/25/2007	2294.61	153.31	153.79	0.48	2140.82	2141.18
MW-05	9/25/2007	2294.61	152.75	153.08	0.33	2141.53	2141.78
MW-05	10/22/2007	2294.61	153.06	153.77	0.71	2140.84	2141.37
MW-05	11/28/2007	2294.61	NP	154.02	NP	2140.59	2140.59
MW-05	12/31/2007	2294.61	154.09	154.89	0.80	2139.72	2140.32
MW-05	1/26/2008	2294.61	153.81	154.60	0.79	2140.01	2140.60
MW-05	2/29/2008	2294.61	154.00	154.75	0.75	2139.86	2140.42
MW-05	3/31/2008	2294.61	153.55	154.28	0.73	2140.33	2140.88
MW-05	4/21/2008	2294.61	153.71	154.75	1.04	2139.86	2140.64
MW-05	5/23/2008	2294.61	154.12	155.23	1.11	2139.38	2140.21
MW-05	6/25/2008	2294.61	NP	154.38	NP	2140.23	2140.23
MW-05	7/28/2008	2294.61	154.60	155.71	1.11	2138.90	2139.73
MW-05	8/25/2008	2294.61	153.26	154.07	0.81	2140.54	2141.15
MW-05	9/30/2008	2294.61	NP	151.91	NP	2142.70	2142.70
MW-05	10/13/2008	2294.61	NP	151.84	NP	2142.77	2142.77
MW-05	11/26/2008	2294.61	152.60	153.00	0.40	2141.61	2141.91
MW-05	12/23/2008	2294.61	152.93	153.49	0.56	2141.12	2141.54
MW-05	1/26/2009	2294.61	153.19	153.86	0.67	2140.75	2141.25
MW-05	2/27/2009	2294.61	153.11	153.75	0.64	2140.86	2141.34
MW-05	3/26/2009	2294.61	153.36	154.09	0.73	2140.52	2141.07
MW-05	4/27/2009	2294.61	153.47	154.13	0.66	2140.48	2140.98
MW-05	5/20/2009	2294.61	153.81	154.51	0.70	2140.10	2140.63
MW-05	6/16/2009	2294.61	153.39	154.39	1.00	2140.22	2140.97
MW-05	7/20/2009	2294.61	154.66	156.08	1.42	2138.53	2139.60
MW-05	8/31/2009	2294.61	155.06	156.41	1.35	2138.20	2139.21

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-05	9/29/2009	2294.61	155.20	156.51	1.31	2138.10	2139.08
MW-05	10/22/2009	2294.61	155.41	156.40	0.99	2138.21	2138.95
MW-05	11/25/2009	2294.61	155.69	156.91	1.22	2137.70	2138.62
MW-05	12/14/2009	2294.61	155.82	156.83	1.01	2137.78	2138.54
MW-05	1/18/2010	2294.61	155.77	156.90	1.13	2137.71	2138.56
MW-05	2/26/2010	2294.61	155.88	156.89	1.01	2137.72	2138.48
MW-05	3/22/2010	2294.61	NP	155.37	NP	2139.24	2139.24
MW-05	4/12/2010	2294.61	NP	155.27	NP	2139.34	2139.34
MW-05	5/27/2010	2294.61	155.62	156.09	0.47	2138.52	2138.87
MW-05	6/22/2010	2294.61	155.86	156.78	0.92	2137.83	2138.52
MW-05	7/12/2010	2294.61	156.19	157.11	0.92	2137.50	2138.19
MW-05	8/26/2010	2294.61	156.20	157.06	0.86	2137.55	2138.20
MW-05	9/22/2010	2294.61	NP	156.15	NP	2138.46	2138.46
MW-05	10/5/2010	2294.61	NP	156.05	NP	2138.56	2138.56
MW-05	10/18/2010	2294.61	NP	155.98	NP	2138.63	2138.63
MW-05	11/30/2010	2294.61	NP	156.31	NP	2138.30	2138.30
MW-05	12/21/2010	2294.61	NP	156.40	NP	2138.21	2138.21
MW-05	1/10/2011	2294.61	NP	156.32	NP	2138.29	2138.29
MW-05	3/25/2011	2294.61	NP	156.71	NP	2137.90	2137.90
MW-05	4/11/2011	2294.61	156.85	156.86	0.01	2137.75	2137.76
MW-05	5/9/2011	2294.61	NP	156.89	NP	2137.72	2137.72
MW-05	6/29/2011	2294.61	NP	157.78	NP	2136.83	2136.83
MW-05	7/11/2011	2294.61	NP	158.01	NP	2136.60	2136.60
MW-05	8/31/2011	2294.61	NP	158.60	NP	2136.01	2136.01
MW-05	9/28/2011	2294.61	NP	158.42	NP	2136.19	2136.19
MW-05	11/16/2011	2294.61	NP	157.71	NP	2136.90	2136.90
MW-05	1/16/2012	2294.61	NP	157.80	NP	2136.81	2136.81
MW-05	2/28/2012	2294.61	NP	157.51	NP	2137.10	2137.10
MW-05	5/30/2012	2294.61	NP	158.73	NP	2135.88	2135.88
MW-05	6/29/2012	2294.61	NP	158.99	NP	2135.62	2135.62
MW-05	7/9/2012	2294.61	NP	158.99	NP	2135.62	2135.62
MW-05	8/29/2012	2294.61	NP	159.00	NP	2135.61	2135.61
MW-05	9/25/2012	2294.61	NP	158.60	NP	2136.01	2136.01
MW-05	10/22/2012	2294.61	NP	158.79	NP	2135.82	2135.82
MW-05	11/15/2012	2294.61	NP	159.11	NP	2135.50	2135.50
MW-05	12/13/2012	2294.61	NP	159.38	NP	2135.23	2135.23
MW-05	1/21/2013	2294.61	NP	159.44	NP	2135.17	2135.17
MW-05	2/13/2013	2294.61	NP	159.48	NP	2135.13	2135.13
MW-05	3/21/2013	2294.61	NP	159.56	NP	2135.05	2135.05
MW-05	4/15/2013	2294.61	NP	159.70	NP	2134.91	2134.91
MW-05	5/23/2013	2294.61	NP	159.88	NP	2134.73	2134.73
MW-05	6/26/2013	2294.61	NP	160.21	NP	2134.40	2134.40
MW-05	7/8/2013	2294.61	NP	160.30	NP	2134.31	2134.31
MW-05	8/8/2013	2294.61	NP	160.48	NP	2134.13	2134.13
MW-05	9/5/2013	2294.61	NP	160.38	NP	2134.23	2134.23
MW-05	10/3/2013	2294.61	NP	160.51	NP	2134.10	2134.10

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-05	11/27/2013	2294.61	NP	160.72	NP	2133.89	2133.89
MW-05	12/31/2013	2294.61	NP	160.65	NP	2133.96	2133.96
MW-05	1/10/2014	2294.61	NP	160.89	NP	2133.72	2133.72
MW-05	3/12/2014	2294.61	NP	161.02	NP	2133.59	2133.59
MW-05	4/17/2014	2294.61	NP	161.20	NP	2133.41	2133.41
MW-05	5/22/2014	2294.61	NP	161.48	NP	2133.13	2133.13
MW-05	6/20/2014	2294.61	NP	161.79	NP	2132.82	2132.82
MW-05	7/15/2014	2294.61	NP	162.03	NP	2132.58	2132.58
MW-05	8/14/2014	2294.61	NP	162.41	NP	2132.20	2132.20
MW-05	9/9/2014	2294.61	NP	162.26	NP	2132.35	2132.35
MW-05	10/1/2014	2294.61	NP	161.53	NP	2133.08	2133.08
MW-05	11/18/2014	2294.61	NP	161.26	NP	2133.35	2133.35
MW-05	12/16/2014	2294.61	NP	161.31	NP	2133.30	2133.30
MW-05	1/19/2015	2294.61	NP	161.02	NP	2133.59	2133.59
MW-05	2/19/2015	2294.61	NP	160.83	NP	2133.78	2133.78
MW-05	3/26/2015	2294.61	NP	160.50	NP	2134.11	2134.11
MW-05	4/16/2015	2294.61	NP	160.38	NP	2134.23	2134.23
MW-05	5/19/2015	2294.61	NP	160.66	NP	2133.95	2133.95
MW-05	6/22/2015	2294.61	NP	161.24	NP	2133.37	2133.37
MW-06	10/28/2003	2293.24	NP	144.39	NP	2148.85	2148.85
MW-06	10/29/2003	2293.24	NP	145.32	NP	2147.92	2147.92
MW-06	10/30/2003	2293.24	NP	144.26	NP	2148.98	2148.98
MW-06	10/31/2003	2293.24	NP	144.36	NP	2148.88	2148.88
MW-06	11/3/2003	2293.24	NP	144.42	NP	2148.82	2148.82
MW-06	11/4/2003	2293.24	NP	144.38	NP	2148.86	2148.86
MW-06	11/5/2003	2293.24	NP	144.43	NP	2148.81	2148.81
MW-06	11/6/2003	2293.24	NP	144.35	NP	2148.89	2148.89
MW-06	11/7/2003	2293.24	NP	144.44	NP	2148.80	2148.80
MW-06	11/10/2003	2293.24	NP	144.44	NP	2148.80	2148.80
MW-06	11/11/2003	2293.24	NP	144.47	NP	2148.77	2148.77
MW-06	11/12/2003	2293.24	NP	144.48	NP	2148.76	2148.76
MW-06	11/13/2003	2293.24	NP	144.51	NP	2148.73	2148.73
MW-06	11/14/2003	2293.24	NP	144.46	NP	2148.78	2148.78
MW-06	11/17/2003	2293.24	NP	144.46	NP	2148.78	2148.78
MW-06	11/18/2003	2293.24	NP	144.47	NP	2148.77	2148.77
MW-06	11/19/2003	2293.24	NP	144.46	NP	2148.78	2148.78
MW-06	11/20/2003	2293.24	NP	144.55	NP	2148.69	2148.69
MW-06	11/24/2003	2293.24	NP	144.51	NP	2148.73	2148.73
MW-06	11/26/2003	2293.24	144.58	144.59	0.01	2148.65	2148.66
MW-06	12/1/2003	2293.24	144.39	144.39	0.00	2148.85	2148.85
MW-06	8/16/2004	2293.24	148.60	149.13	0.53	2144.11	2144.51
MW-06	8/16/2004	2293.24	148.60	149.13	0.53	2144.11	2144.51
MW-06	9/8/2004	2293.24	148.91	149.40	0.49	2143.84	2144.21
MW-06	9/13/2004	2293.24	148.42	148.78	0.36	2144.46	2144.73
MW-06	9/20/2004	2293.24	148.40	149.24	0.84	2144.00	2144.63
MW-06	9/27/2004	2293.24	148.41	149.52	1.11	2143.72	2144.55

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-06	10/4/2004	2293.24	148.66	149.78	1.12	2143.46	2144.30
MW-06	10/11/2004	2293.24	148.69	149.39	0.70	2143.85	2144.38
MW-06	10/18/2004	2293.24	148.80	149.26	0.46	2143.98	2144.33
MW-06	10/25/2004	2293.24	148.63	149.90	1.27	2143.34	2144.29
MW-06	11/1/2004	2293.24	148.67	150.31	1.64	2142.93	2144.16
MW-06	11/8/2004	2293.24	148.73	150.37	1.64	2142.87	2144.10
MW-06	11/15/2004	2293.24	148.85	150.34	1.49	2142.90	2144.02
MW-06	11/30/2004	2293.24	148.94	150.60	1.66	2142.64	2143.89
MW-06	12/6/2004	2293.24	149.26	150.78	1.52	2142.46	2143.60
MW-06	12/13/2004	2293.24	149.32	150.16	0.84	2143.08	2143.71
MW-06	12/20/2004	2293.24	149.37	150.22	0.85	2143.02	2143.66
MW-06	1/4/2005	2293.24	149.28	150.83	1.55	2142.41	2143.57
MW-06	1/10/2005	2293.24	149.31	150.83	1.52	2142.41	2143.55
MW-06	1/17/2005	2293.24	149.36	150.85	1.49	2142.39	2143.51
MW-06	1/24/2005	2293.24	149.63	150.40	0.77	2142.84	2143.42
MW-06	1/31/2005	2293.24	148.85	150.35	1.50	2142.89	2144.02
MW-06	2/7/2005	2293.24	148.93	150.49	1.56	2142.75	2143.92
MW-06	2/14/2005	2293.24	149.47	150.92	1.45	2142.32	2143.41
MW-06	2/21/2005	2293.24	149.69	151.12	1.43	2142.12	2143.19
MW-06	2/28/2005	2293.24	149.66	151.06	1.40	2142.18	2143.23
MW-06	3/7/2005	2293.24	149.62	150.95	1.33	2142.29	2143.29
MW-06	3/14/2005	2293.24	149.39	150.67	1.28	2142.57	2143.53
MW-06	3/21/2005	2293.24	149.30	150.55	1.25	2142.69	2143.63
MW-06	3/27/2005	2293.24	149.23	150.52	1.29	2142.72	2143.69
MW-06	4/4/2005	2293.24	149.20	150.46	1.26	2142.78	2143.73
MW-06	4/11/2005	2293.24	149.26	150.53	1.27	2142.71	2143.66
MW-06	4/18/2005	2293.24	149.32	150.64	1.32	2142.60	2143.59
MW-06	4/25/2005	2293.24	149.47	150.77	1.30	2142.47	2143.45
MW-06	5/2/2005	2293.24	149.50	150.79	1.29	2142.45	2143.42
MW-06	5/10/2005	2293.24	149.92	151.06	1.14	2142.18	2143.04
MW-06	5/16/2005	2293.24	149.99	151.10	1.11	2142.14	2142.97
MW-06	5/23/2005	2293.24	149.68	150.97	1.29	2142.27	2143.24
MW-06	5/30/2005	2293.24	149.75	151.10	1.35	2142.14	2143.15
MW-06	6/6/2005	2293.24	149.80	151.15	1.35	2142.09	2143.10
MW-06	6/13/2005	2293.24	149.88	151.19	1.31	2142.05	2143.03
MW-06	6/20/2005	2293.24	149.93	151.24	1.31	2142.00	2142.98
MW-06	6/27/2005	2293.24	150.00	151.25	1.25	2141.99	2142.93
MW-06	7/5/2005	2293.24	150.07	151.34	1.27	2141.90	2142.85
MW-06	7/11/2005	2293.24	150.19	151.32	1.13	2141.92	2142.77
MW-06	7/18/2005	2293.24	150.33	151.26	0.93	2141.98	2142.68
MW-06	7/25/2005	2293.24	150.41	151.36	0.95	2141.88	2142.59
MW-06	8/1/2005	2293.24	150.47	151.47	1.00	2141.77	2142.52
MW-06	8/8/2005	2293.24	150.51	151.51	1.00	2141.73	2142.48
MW-06	8/15/2005	2293.24	150.54	151.64	1.10	2141.60	2142.43
MW-06	8/22/2005	2293.24	150.57	151.67	1.10	2141.57	2142.40
MW-06	8/29/2005	2293.24	150.41	151.50	1.09	2141.74	2142.56

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-06	9/7/2005	2293.24	150.10	150.96	0.86	2142.28	2142.93
MW-06	9/12/2005	2293.24	149.98	150.29	0.31	2142.95	2143.18
MW-06	9/19/2005	2293.24	149.64	150.18	0.54	2143.06	2143.47
MW-06	9/26/2005	2293.24	149.57	150.01	0.44	2143.23	2143.56
MW-06	10/3/2005	2293.24	149.64	150.05	0.41	2143.19	2143.50
MW-06	10/10/2005	2293.24	149.76	150.24	0.48	2143.00	2143.36
MW-06	10/17/2005	2293.24	149.85	150.44	0.59	2142.80	2143.24
MW-06	10/24/2005	2293.24	150.01	150.66	0.65	2142.58	2143.07
MW-06	10/31/2005	2293.24	150.17	150.71	0.54	2142.53	2142.94
MW-06	11/7/2005	2293.24	150.40	150.60	0.20	2142.64	2142.79
MW-06	11/14/2005	2293.24	150.47	150.89	0.42	2142.35	2142.67
MW-06	11/21/2005	2293.24	150.51	151.26	0.75	2141.98	2142.54
MW-06	12/5/2005	2293.24	150.54	151.64	1.10	2141.60	2142.43
MW-06	12/12/2005	2293.24	150.58	151.72	1.14	2141.52	2142.38
MW-06	12/19/2005	2293.24	150.65	151.77	1.12	2141.47	2142.31
MW-06	12/28/2005	2293.24	150.65	151.87	1.22	2141.37	2142.29
MW-06	1/9/2006	2293.24	150.73	151.95	1.22	2141.29	2142.21
MW-06	1/16/2006	2293.24	150.80	151.97	1.17	2141.27	2142.15
MW-06	1/30/2006	2293.24	150.82	152.07	1.25	2141.17	2142.11
MW-06	2/13/2006	2293.24	150.90	152.15	1.25	2141.09	2142.03
MW-06	2/27/2006	2293.24	150.95	152.12	1.17	2141.12	2142.00
MW-06	3/6/2006	2293.24	150.99	152.04	1.05	2141.20	2141.99
MW-06	3/13/2006	2293.24	151.03	152.15	1.12	2141.09	2141.93
MW-06	3/20/2006	2293.24	151.06	152.16	1.10	2141.08	2141.91
MW-06	3/27/2006	2293.24	151.07	152.15	1.08	2141.09	2141.90
MW-06	4/3/2006	2293.24	151.12	152.16	1.04	2141.08	2141.86
MW-06	4/10/2006	2293.24	151.19	152.19	1.00	2141.05	2141.80
MW-06	4/17/2006	2293.24	151.24	152.21	0.97	2141.03	2141.76
MW-06	4/24/2006	2293.24	151.31	152.14	0.83	2141.10	2141.72
MW-06	5/1/2006	2293.24	151.35	152.12	0.77	2141.12	2141.70
MW-06	5/15/2006	2293.24	151.34	152.22	0.88	2141.02	2141.68
MW-06	5/22/2006	2293.24	151.53	151.99	0.46	2141.25	2141.60
MW-06	5/30/2006	2293.24	151.61	152.07	0.46	2141.17	2141.52
MW-06	6/5/2006	2293.24	151.81	151.98	0.17	2141.26	2141.39
MW-06	6/12/2006	2293.24	NP	151.93	NP	2141.31	2141.31
MW-06	6/26/2006	2293.24	151.95	152.50	0.55	2140.74	2141.15
MW-06	7/10/2006	2293.24	151.99	152.88	0.89	2140.36	2141.03
MW-06	8/4/2006	2293.24	151.50	152.20	0.70	2141.04	2141.57
MW-06	8/14/2006	2293.24	152.04	152.97	0.93	2140.27	2140.97
MW-06	8/23/2006	2293.24	151.94	152.65	0.71	2140.59	2141.12
MW-06	9/19/2006	2293.24	150.73	151.20	0.47	2142.04	2142.39
MW-06	10/20/2006	2293.24	149.99	150.66	0.67	2142.58	2143.08
MW-06	10/30/2006	2293.24	150.12	150.94	0.82	2142.30	2142.92
MW-06	11/17/2006	2293.24	150.40	151.35	0.95	2141.89	2142.60
MW-06	1/29/2007	2293.24	151.50	152.49	0.99	2140.75	2141.49
MW-06	3/1/2007	2293.24	151.76	152.64	0.88	2140.60	2141.26

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-06	3/28/2007	2293.24	151.93	152.87	0.94	2140.37	2141.08
MW-06	4/24/2007	2293.24	152.08	153.05	0.97	2140.19	2140.92
MW-06	5/28/2007	2293.24	152.21	153.19	0.98	2140.05	2140.79
MW-06	6/27/2007	2293.24	152.57	153.53	0.96	2139.71	2140.43
MW-06	7/23/2007	2293.24	152.86	153.79	0.93	2139.45	2140.15
MW-06	8/25/2007	2293.24	152.32	152.87	0.55	2140.37	2140.78
MW-06	9/25/2007	2293.24	151.50	152.64	1.14	2140.60	2141.46
MW-06	10/22/2007	2293.24	151.88	152.98	1.10	2140.26	2141.09
MW-06	11/28/2007	2293.24	NP	152.95	NP	2140.29	2140.29
MW-06	12/31/2007	2293.24	153.01	153.70	0.69	2139.54	2140.06
MW-06	1/26/2008	2293.24	152.80	153.42	0.62	2139.82	2140.29
MW-06	2/29/2008	2293.24	152.92	153.55	0.63	2139.69	2140.16
MW-06	3/31/2008	2293.24	152.48	153.07	0.59	2140.17	2140.61
MW-06	4/21/2008	2293.24	152.69	153.28	0.59	2139.96	2140.40
MW-06	5/23/2008	2293.24	153.04	153.94	0.90	2139.30	2139.98
MW-06	6/25/2008	2293.24	153.26	154.11	0.85	2139.13	2139.77
MW-06	7/28/2008	2293.24	153.60	154.50	0.90	2138.74	2139.42
MW-06	8/25/2008	2293.24	152.33	152.65	0.32	2140.59	2140.83
MW-06	9/30/2008	2293.24	NP	150.85	NP	2142.39	2142.39
MW-06	10/13/2008	2293.24	NP	150.76	NP	2142.48	2142.48
MW-06	11/26/2008	2293.24	151.52	151.66	0.14	2141.58	2141.69
MW-06	12/23/2008	2293.24	151.90	152.14	0.24	2141.10	2141.28
MW-06	1/26/2009	2293.24	152.03	152.27	0.24	2140.97	2141.15
MW-06	2/27/2009	2293.24	152.10	152.32	0.22	2140.92	2141.09
MW-06	3/26/2009	2293.24	152.30	152.75	0.45	2140.49	2140.83
MW-06	4/27/2009	2293.24	152.41	152.85	0.44	2140.39	2140.72
MW-06	5/20/2009	2293.24	152.76	153.18	0.42	2140.06	2140.38
MW-06	6/16/2009	2293.24	153.38	153.83	0.45	2139.41	2139.75
MW-06	7/20/2009	2293.24	153.75	154.34	0.59	2138.90	2139.34
MW-06	8/31/2009	2293.24	154.10	154.57	0.47	2138.67	2139.02
MW-06	9/29/2009	2293.24	154.32	154.77	0.45	2138.47	2138.81
MW-06	10/22/2009	2293.24	154.45	154.47	0.02	2138.77	2138.79
MW-06	11/25/2009	2293.24	154.82	155.18	0.36	2138.06	2138.33
MW-06	12/14/2009	2293.24	NP	155.30	NP	2137.94	2137.94
MW-06	1/18/2010	2293.24	154.85	155.11	0.26	2138.13	2138.33
MW-06	2/26/2010	2293.24	154.95	155.14	0.19	2138.10	2138.24
MW-06	3/22/2010	2293.24	NP	154.28	NP	2138.96	2138.96
MW-06	4/12/2010	2293.24	NP	154.23	NP	2139.01	2139.01
MW-06	5/27/2010	2293.24	154.58	154.63	0.05	2138.61	2138.65
MW-06	6/22/2010	2293.24	154.95	154.98	0.03	2138.26	2138.28
MW-06	7/12/2010	2293.24	155.19	155.21	0.02	2138.03	2138.05
MW-06	8/26/2010	2293.24	155.34	155.37	0.03	2137.87	2137.89
MW-06	9/22/2010	2293.24	155.04	155.05	0.01	2138.19	2138.20
MW-06	10/5/2010	2293.24	154.96	155.00	0.04	2138.24	2138.27
MW-06	10/18/2010	2293.24	NP	154.76	NP	2138.48	2138.48
MW-06	11/30/2010	2293.24	NP	155.22	NP	2138.02	2138.02

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-06	12/21/2010	2293.24	NP	155.55	NP	2137.69	2137.69
MW-06	1/10/2011	2293.24	NP	155.22	NP	2138.02	2138.02
MW-06	2/17/2011	2293.24	NP	155.60	NP	2137.64	2137.64
MW-06	3/25/2011	2293.24	NP	155.83	NP	2137.41	2137.41
MW-06	4/11/2011	2293.24	NP	155.79	NP	2137.45	2137.45
MW-06	5/9/2011	2293.24	NP	156.87	NP	2136.37	2136.37
MW-06	6/29/2011	2293.24	NP	156.69	NP	2136.55	2136.55
MW-06	7/11/2011	2293.24	NP	156.89	NP	2136.35	2136.35
MW-06	8/31/2011	2293.24	157.38	157.96	0.58	2135.28	2135.72
MW-06	9/28/2011	2293.24	NP	157.53	NP	2135.71	2135.71
MW-06	10/10/2011	2293.24	NP	157.02	NP	2136.22	2136.22
MW-06	11/16/2011	2293.24	NP	156.67	NP	2136.57	2136.57
MW-06	12/29/2011	2293.24	NP	156.83	NP	2136.41	2136.41
MW-06	1/16/2012	2293.24	NP	156.76	NP	2136.48	2136.48
MW-06	2/28/2012	2293.24	NP	156.48	NP	2136.76	2136.76
MW-06	3/30/2012	2293.24	NP	156.72	NP	2136.52	2136.52
MW-06	4/2/2012	2293.24	NP	156.82	NP	2136.42	2136.42
MW-06	5/30/2012	2293.24	NP	157.64	NP	2135.60	2135.60
MW-06	6/29/2012	2293.24	NP	157.92	NP	2135.32	2135.32
MW-06	7/9/2012	2293.24	NP	157.94	NP	2135.30	2135.30
MW-06	8/29/2012	2293.24	NP	157.65	NP	2135.59	2135.59
MW-06	9/25/2012	2293.24	NP	157.23	NP	2136.01	2136.01
MW-06	10/22/2012	2293.24	NP	157.39	NP	2135.85	2135.85
MW-06	11/15/2012	2293.24	NP	157.75	NP	2135.49	2135.49
MW-06	12/13/2012	2293.24	NP	158.05	NP	2135.19	2135.19
MW-06	1/21/2013	2293.24	NP	158.10	NP	2135.14	2135.14
MW-06	2/13/2013	2293.24	NP	158.15	NP	2135.09	2135.09
MW-06	3/21/2013	2293.24	NP	158.22	NP	2135.02	2135.02
MW-06	4/15/2013	2293.24	NP	158.34	NP	2134.90	2134.90
MW-06	5/23/2013	2293.24	NP	158.53	NP	2134.71	2134.71
MW-06	6/26/2013	2293.24	NP	158.87	NP	2134.37	2134.37
MW-06	7/8/2013	2293.24	NP	158.94	NP	2134.30	2134.30
MW-06	8/8/2013	2293.24	NP	159.13	NP	2134.11	2134.11
MW-06	9/5/2013	2293.24	NP	159.05	NP	2134.19	2134.19
MW-06	10/3/2013	2293.24	NP	159.20	NP	2134.04	2134.04
MW-06	12/31/2013	2289.63	NP	156.10	NP	2133.53	2133.53
MW-06	1/10/2014	2289.63	NP	155.97	NP	2133.66	2133.66
MW-06	2/18/2014	2289.63	NP	156.06	NP	2133.57	2133.57
MW-06	3/12/2014	2289.63	NP	156.09	NP	2133.54	2133.54
MW-06	4/17/2014	2289.63	NP	156.24	NP	2133.39	2133.39
MW-06	5/22/2014	2289.63	NP	156.56	NP	2133.07	2133.07
MW-06	6/20/2014	2289.63	NP	156.89	NP	2132.74	2132.74
MW-06	7/15/2014	2289.63	NP	157.20	NP	2132.43	2132.43
MW-06	8/14/2014	2289.63	NP	157.48	NP	2132.15	2132.15
MW-06	9/9/2014	2289.63	NP	157.42	NP	2132.21	2132.21
MW-06	10/1/2014	2289.63	NP	156.68	NP	2132.95	2132.95

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-06	11/18/2014	2289.63	NP	156.43	NP	2133.20	2133.20
MW-06	12/16/2014	2289.63	NP	156.42	NP	2133.21	2133.21
MW-06	1/19/2015	2289.63	NP	156.21	NP	2133.42	2133.42
MW-06	2/19/2015	2289.63	NP	155.95	NP	2133.68	2133.68
MW-06	3/26/2015	2289.63	NP	155.64	NP	2133.99	2133.99
MW-06	4/16/2015	2289.63	NP	155.52	NP	2134.11	2134.11
MW-06	5/19/2015	2289.63	NP	155.79	NP	2133.84	2133.84
MW-06	6/22/2015	2289.63	NP	156.37	NP	2133.26	2133.26
MW-07	10/29/2003	2292.16	NP	142.46	NP	2149.70	2149.70
MW-07	10/30/2003	2292.16	NP	142.45	NP	2149.71	2149.71
MW-07	10/31/2003	2292.16	NP	142.40	NP	2149.76	2149.76
MW-07	11/3/2003	2292.16	NP	142.55	NP	2149.61	2149.61
MW-07	11/4/2003	2292.16	NP	142.50	NP	2149.66	2149.66
MW-07	11/5/2003	2292.16	NP	142.54	NP	2149.62	2149.62
MW-07	11/6/2003	2292.16	NP	142.47	NP	2149.69	2149.69
MW-07	11/7/2003	2292.16	NP	142.56	NP	2149.60	2149.60
MW-07	11/10/2003	2292.16	NP	142.57	NP	2149.59	2149.59
MW-07	11/11/2003	2292.16	NP	142.61	NP	2149.55	2149.55
MW-07	11/12/2003	2292.16	NP	142.59	NP	2149.57	2149.57
MW-07	11/13/2003	2292.16	NP	142.63	NP	2149.53	2149.53
MW-07	11/14/2003	2292.16	NP	142.58	NP	2149.58	2149.58
MW-07	11/17/2003	2292.16	NP	142.61	NP	2149.55	2149.55
MW-07	11/18/2003	2292.16	NP	142.59	NP	2149.57	2149.57
MW-07	11/19/2003	2292.16	NP	142.57	NP	2149.59	2149.59
MW-07	11/20/2003	2292.16	NP	142.67	NP	2149.49	2149.49
MW-07	11/24/2003	2292.16	NP	142.63	NP	2149.53	2149.53
MW-07	11/26/2003	2292.16	NP	142.71	NP	2149.45	2149.45
MW-07	12/1/2003	2292.16	NP	142.63	NP	2149.53	2149.53
MW-07	1/19/2004	2292.16	NP	143.00	NP	2149.16	2149.16
MW-07	1/26/2004	2292.16	NP	143.12	NP	2149.04	2149.04
MW-07	1/29/2004	2292.16	NP	143.15	NP	2149.01	2149.01
MW-07	2/5/2004	2292.16	NP	143.00	NP	2149.16	2149.16
MW-07	2/12/2004	2292.16	NP	143.26	NP	2148.90	2148.90
MW-07	2/23/2004	2292.16	NP	143.31	NP	2148.85	2148.85
MW-07	3/2/2004	2292.16	NP	143.31	NP	2148.85	2148.85
MW-07	3/8/2004	2292.16	NP	143.31	NP	2148.85	2148.85
MW-07	3/15/2004	2292.16	NP	143.45	NP	2148.71	2148.71
MW-07	3/22/2004	2292.16	NP	143.48	NP	2148.68	2148.68
MW-07	3/29/2004	2292.16	NP	143.51	NP	2148.65	2148.65
MW-07	4/5/2004	2292.16	NP	143.55	NP	2148.61	2148.61
MW-07	4/12/2004	2292.16	NP	143.58	NP	2148.58	2148.58
MW-07	4/19/2004	2292.16	NP	143.63	NP	2148.53	2148.53
MW-07	4/26/2004	2292.16	NP	143.66	NP	2148.50	2148.50
MW-07	5/3/2004	2292.16	NP	143.64	NP	2148.52	2148.52
MW-07	5/10/2004	2292.16	NP	143.65	NP	2148.51	2148.51
MW-07	5/17/2004	2292.16	NP	143.75	NP	2148.41	2148.41

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-07	5/24/2004	2292.16	NP	143.78	NP	2148.38	2148.38
MW-07	5/31/2004	2292.16	NP	143.78	NP	2148.38	2148.38
MW-07	6/7/2004	2292.16	NP	143.83	NP	2148.33	2148.33
MW-07	6/14/2004	2292.16	NP	143.91	NP	2148.25	2148.25
MW-07	6/21/2004	2292.16	NP	144.05	NP	2148.11	2148.11
MW-07	6/28/2004	2292.16	NP	144.18	NP	2147.98	2147.98
MW-07	7/6/2004	2292.16	NP	144.26	NP	2147.90	2147.90
MW-07	7/12/2004	2292.16	NP	144.40	NP	2147.76	2147.76
MW-07	8/2/2004	2292.16	NP	144.69	NP	2147.47	2147.47
MW-07	8/9/2004	2292.16	NP	144.83	NP	2147.33	2147.33
MW-07	8/16/2004	2292.16	NP	144.93	NP	2147.23	2147.23
MW-07	8/16/2004	2292.16	NP	145.03	NP	2147.13	2147.13
MW-07	8/30/2004	2292.16	NP	145.15	NP	2147.01	2147.01
MW-07	9/8/2004	2292.16	NP	145.21	NP	2146.95	2146.95
MW-07	9/13/2004	2292.16	NP	145.38	NP	2146.78	2146.78
MW-07	9/20/2004	2292.16	NP	145.43	NP	2146.73	2146.73
MW-07	9/27/2004	2292.16	NP	145.53	NP	2146.63	2146.63
MW-07	10/4/2004	2292.16	NP	145.59	NP	2146.57	2146.57
MW-07	10/11/2004	2292.16	NP	145.67	NP	2146.49	2146.49
MW-07	10/18/2004	2292.16	NP	145.73	NP	2146.43	2146.43
MW-07	10/25/2004	2292.16	NP	145.76	NP	2146.40	2146.40
MW-07	11/1/2004	2292.16	NP	145.88	NP	2146.28	2146.28
MW-07	11/8/2004	2292.16	NP	145.98	NP	2146.18	2146.18
MW-07	11/15/2004	2292.16	NP	146.01	NP	2146.15	2146.15
MW-07	11/30/2004	2292.16	NP	146.12	NP	2146.04	2146.04
MW-07	12/6/2004	2292.16	NP	146.31	NP	2145.85	2145.85
MW-07	12/13/2004	2292.16	NP	146.35	NP	2145.81	2145.81
MW-07	12/20/2004	2292.16	NP	146.34	NP	2145.82	2145.82
MW-07	1/4/2005	2292.16	NP	146.53	NP	2145.63	2145.63
MW-07	1/10/2005	2292.16	NP	146.53	NP	2145.63	2145.63
MW-07	1/17/2005	2292.16	NP	146.20	NP	2145.96	2145.96
MW-07	1/24/2005	2292.16	NP	146.36	NP	2145.80	2145.80
MW-07	1/31/2005	2292.16	NP	146.59	NP	2145.57	2145.57
MW-07	2/23/2005	2292.16	NP	146.51	NP	2145.65	2145.65
MW-07	3/2/2005	2292.16	NP	146.68	NP	2145.48	2145.48
MW-07	3/7/2005	2292.16	NP	146.69	NP	2145.47	2145.47
MW-07	3/14/2005	2292.16	NP	146.69	NP	2145.47	2145.47
MW-07	3/21/2005	2292.16	NP	146.49	NP	2145.67	2145.67
MW-07	3/27/2005	2292.16	NP	146.39	NP	2145.77	2145.77
MW-07	4/11/2005	2292.16	NP	146.41	NP	2145.75	2145.75
MW-07	4/18/2005	2292.16	NP	146.58	NP	2145.58	2145.58
MW-07	4/25/2005	2292.16	NP	146.54	NP	2145.62	2145.62
MW-07	5/2/2005	2292.16	NP	146.59	NP	2145.57	2145.57
MW-07	5/10/2005	2292.16	NP	146.81	NP	2145.35	2145.35
MW-07	5/16/2005	2292.16	NP	146.69	NP	2145.47	2145.47
MW-07	5/23/2005	2292.16	NP	146.73	NP	2145.43	2145.43

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-07	5/30/2005	2292.16	NP	146.81	NP	2145.35	2145.35
MW-07	6/6/2005	2292.16	NP	146.85	NP	2145.31	2145.31
MW-07	6/13/2005	2292.16	NP	146.92	NP	2145.24	2145.24
MW-07	6/20/2005	2292.16	NP	146.93	NP	2145.23	2145.23
MW-07	6/27/2005	2292.16	NP	147.03	NP	2145.13	2145.13
MW-07	7/11/2005	2292.16	NP	147.19	NP	2144.97	2144.97
MW-07	7/18/2005	2292.16	NP	147.28	NP	2144.88	2144.88
MW-07	7/25/2005	2292.16	NP	147.33	NP	2144.83	2144.83
MW-07	8/1/2005	2292.16	NP	147.41	NP	2144.75	2144.75
MW-07	8/8/2005	2292.16	NP	147.49	NP	2144.67	2144.67
MW-07	8/15/2005	2292.16	NP	147.54	NP	2144.62	2144.62
MW-07	8/22/2005	2292.16	NP	147.54	NP	2144.62	2144.62
MW-07	8/29/2005	2292.16	NP	147.31	NP	2144.85	2144.85
MW-07	9/7/2005	2292.16	NP	146.92	NP	2145.24	2145.24
MW-07	9/12/2005	2292.16	NP	146.67	NP	2145.49	2145.49
MW-07	9/19/2005	2292.16	NP	146.48	NP	2145.68	2145.68
MW-07	9/26/2005	2292.16	NP	146.43	NP	2145.73	2145.73
MW-07	10/3/2005	2292.16	NP	146.51	NP	2145.65	2145.65
MW-07	10/10/2005	2292.16	NP	146.65	NP	2145.51	2145.51
MW-07	10/17/2005	2292.16	NP	146.74	NP	2145.42	2145.42
MW-07	10/24/2005	2292.16	NP	146.89	NP	2145.27	2145.27
MW-07	10/31/2005	2292.16	NP	147.03	NP	2145.13	2145.13
MW-07	11/7/2005	2292.16	NP	147.15	NP	2145.01	2145.01
MW-07	11/14/2005	2292.16	NP	147.28	NP	2144.88	2144.88
MW-07	11/21/2005	2292.16	NP	147.40	NP	2144.76	2144.76
MW-07	12/5/2005	2292.16	NP	147.53	NP	2144.63	2144.63
MW-07	12/19/2005	2292.16	NP	147.59	NP	2144.57	2144.57
MW-07	1/9/2006	2292.16	NP	147.72	NP	2144.44	2144.44
MW-07	1/16/2006	2292.16	NP	147.81	NP	2144.35	2144.35
MW-07	1/30/2006	2292.16	NP	147.83	NP	2144.33	2144.33
MW-07	2/13/2006	2292.16	NP	147.92	NP	2144.24	2144.24
MW-07	2/27/2006	2292.16	NP	148.00	NP	2144.16	2144.16
MW-07	3/6/2006	2292.16	NP	148.02	NP	2144.14	2144.14
MW-07	3/13/2006	2292.16	NP	148.04	NP	2144.12	2144.12
MW-07	3/20/2006	2292.16	NP	148.07	NP	2144.09	2144.09
MW-07	3/27/2006	2292.16	NP	148.09	NP	2144.07	2144.07
MW-07	4/3/2006	2292.16	NP	148.13	NP	2144.03	2144.03
MW-07	4/10/2006	2292.16	NP	148.19	NP	2143.97	2143.97
MW-07	4/17/2006	2292.16	NP	148.22	NP	2143.94	2143.94
MW-07	4/24/2006	2292.16	NP	148.25	NP	2143.91	2143.91
MW-07	5/1/2006	2292.16	NP	148.27	NP	2143.89	2143.89
MW-07	5/15/2006	2292.16	NP	148.32	NP	2143.84	2143.84
MW-07	5/22/2006	2292.16	NP	148.36	NP	2143.80	2143.80
MW-07	5/30/2006	2292.16	NP	148.50	NP	2143.66	2143.66
MW-07	6/5/2006	2292.16	NP	148.59	NP	2143.57	2143.57
MW-07	6/12/2006	2292.16	NP	148.65	NP	2143.51	2143.51

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-07	6/26/2006	2292.16	NP	148.81	NP	2143.35	2143.35
MW-07	7/10/2006	2292.16	NP	148.94	NP	2143.22	2143.22
MW-07	8/2/2006	2292.16	NP	149.08	NP	2143.08	2143.08
MW-07	8/14/2006	2292.16	NP	149.18	NP	2142.98	2142.98
MW-07	8/23/2006	2292.16	NP	148.90	NP	2143.26	2143.26
MW-07	9/19/2006	2292.16	NP	147.70	NP	2144.46	2144.46
MW-07	10/20/2006	2292.16	NP	147.11	NP	2145.05	2145.05
MW-07	10/30/2006	2292.16	NP	147.30	NP	2144.86	2144.86
MW-07	11/17/2006	2292.16	NP	147.59	NP	2144.57	2144.57
MW-07	1/31/2007	2292.16	NP	148.72	NP	2143.44	2143.44
MW-07	3/1/2007	2292.16	NP	148.91	NP	2143.25	2143.25
MW-07	3/28/2007	2292.16	NP	149.08	NP	2143.08	2143.08
MW-07	4/24/2007	2292.16	NP	149.89	NP	2142.27	2142.27
MW-07	5/28/2007	2292.16	NP	149.35	NP	2142.81	2142.81
MW-07	6/27/2007	2292.16	NP	149.69	NP	2142.47	2142.47
MW-07	7/23/2007	2292.16	NP	150.59	NP	2141.57	2141.57
MW-07	8/25/2007	2292.16	NP	148.94	NP	2143.22	2143.22
MW-07	9/25/2007	2292.16	NP	148.55	NP	2143.61	2143.61
MW-07	10/22/2007	2292.16	NP	148.94	NP	2143.22	2143.22
MW-07	11/28/2007	2292.16	NP	149.91	NP	2142.25	2142.25
MW-07	12/31/2007	2292.16	NP	150.02	NP	2142.14	2142.14
MW-07	1/26/2008	2292.16	NP	149.77	NP	2142.39	2142.39
MW-07	2/29/2008	2292.16	NP	149.94	NP	2142.22	2142.22
MW-07	3/31/2008	2292.16	NP	149.51	NP	2142.65	2142.65
MW-07	4/21/2008	2292.16	NP	149.73	NP	2142.43	2142.43
MW-07	5/23/2008	2292.16	NP	150.14	NP	2142.02	2142.02
MW-07	6/25/2008	2292.16	NP	150.30	NP	2141.86	2141.86
MW-07	7/28/2008	2292.16	NP	150.50	NP	2141.66	2141.66
MW-07	8/25/2008	2292.16	NP	149.03	NP	2143.13	2143.13
MW-07	9/30/2008	2292.16	NP	147.62	NP	2144.54	2144.54
MW-07	10/13/2008	2292.16	NP	148.29	NP	2143.87	2143.87
MW-07	11/26/2008	2292.16	NP	148.44	NP	2143.72	2143.72
MW-07	12/23/2008	2292.16	NP	148.82	NP	2143.34	2143.34
MW-07	1/26/2009	2292.16	NP	149.11	NP	2143.05	2143.05
MW-07	2/27/2009	2292.16	NP	149.06	NP	2143.10	2143.10
MW-07	3/26/2009	2292.16	NP	149.28	NP	2142.88	2142.88
MW-07	4/27/2009	2292.16	NP	149.41	NP	2142.75	2142.75
MW-07	5/20/2009	2292.16	NP	149.76	NP	2142.40	2142.40
MW-07	6/16/2009	2292.16	NP	150.32	NP	2141.84	2141.84
MW-07	7/20/2009	2292.16	NP	150.71	NP	2141.45	2141.45
MW-07	8/31/2009	2292.16	NP	151.03	NP	2141.13	2141.13
MW-07	9/29/2009	2292.16	NP	151.21	NP	2140.95	2140.95
MW-07	10/22/2009	2292.16	NP	151.32	NP	2140.84	2140.84
MW-07	11/25/2009	2292.16	NP	151.68	NP	2140.48	2140.48
MW-07	12/14/2009	2292.16	NP	151.71	NP	2140.45	2140.45
MW-07	1/18/2010	2292.16	NP	151.75	NP	2140.41	2140.41

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-07	2/26/2010	2292.16	NP	151.75	NP	2140.41	2140.41
MW-07	3/22/2010	2292.16	NP	151.05	NP	2141.11	2141.11
MW-07	4/12/2010	2292.16	NP	151.01	NP	2141.15	2141.15
MW-07	5/27/2010	2292.16	NP	151.43	NP	2140.73	2140.73
MW-07	6/22/2010	2292.16	NP	151.78	NP	2140.38	2140.38
MW-07	7/12/2010	2292.16	NP	152.06	NP	2140.10	2140.10
MW-07	8/26/2010	2292.16	NP	152.07	NP	2140.09	2140.09
MW-07	9/22/2010	2292.16	NP	151.86	NP	2140.30	2140.30
MW-07	10/5/2010	2292.16	NP	151.71	NP	2140.45	2140.45
MW-07	10/18/2010	2292.16	NP	151.66	NP	2140.50	2140.50
MW-07	11/30/2010	2292.16	NP	152.02	NP	2140.14	2140.14
MW-07	12/21/2010	2292.16	NP	152.13	NP	2140.03	2140.03
MW-07	1/10/2011	2292.16	NP	152.12	NP	2140.04	2140.04
MW-07	2/17/2011	2292.16	NP	152.45	NP	2139.71	2139.71
MW-07	3/25/2011	2292.16	NP	152.47	NP	2139.69	2139.69
MW-07	4/11/2011	2292.16	NP	152.71	NP	2139.45	2139.45
MW-07	5/9/2011	2292.16	NP	152.87	NP	2139.29	2139.29
MW-07	7/11/2011	2292.16	NP	153.64	NP	2138.52	2138.52
MW-07	8/31/2011	2292.16	NP	154.13	NP	2138.03	2138.03
MW-07	9/28/2011	2292.16	NP	154.04	NP	2138.12	2138.12
MW-07	10/10/2011	2292.16	NP	153.41	NP	2138.75	2138.75
MW-07	11/16/2011	2292.16	NP	153.53	NP	2138.63	2138.63
MW-07	12/29/2011	2292.16	NP	153.56	NP	2138.60	2138.60
MW-07	1/16/2012	2292.16	NP	153.63	NP	2138.53	2138.53
MW-07	2/28/2012	2292.16	NP	153.26	NP	2138.90	2138.90
MW-07	3/30/2012	2292.16	NP	153.45	NP	2138.71	2138.71
MW-07	4/2/2012	2292.16	NP	153.54	NP	2138.62	2138.62
MW-07	5/30/2012	2292.16	NP	154.26	NP	2137.90	2137.90
MW-07	6/29/2012	2292.16	NP	154.55	NP	2137.61	2137.61
MW-07	7/9/2012	2292.16	NP	154.61	NP	2137.55	2137.55
MW-07	8/29/2012	2292.16	NP	154.11	NP	2138.05	2138.05
MW-07	9/25/2012	2292.16	NP	153.64	NP	2138.52	2138.52
MW-07	10/22/2012	2292.16	NP	153.82	NP	2138.34	2138.34
MW-07	11/15/2012	2292.16	NP	154.24	NP	2137.92	2137.92
MW-07	12/13/2012	2292.16	NP	154.64	NP	2137.52	2137.52
MW-07	1/21/2013	2292.16	NP	154.79	NP	2137.37	2137.37
MW-07	2/13/2013	2292.16	NP	154.81	NP	2137.35	2137.35
MW-07	3/21/2013	2292.16	NP	154.88	NP	2137.28	2137.28
MW-07	4/15/2013	2292.16	NP	154.98	NP	2137.18	2137.18
MW-07	5/23/2013	2292.16	NP	155.19	NP	2136.97	2136.97
MW-07	6/26/2013	2292.16	NP	155.51	NP	2136.65	2136.65
MW-07	7/8/2013	2292.16	NP	155.60	NP	2136.56	2136.56
MW-07	8/8/2013	2292.16	NP	155.79	NP	2136.37	2136.37
MW-07	9/5/2013	2292.16	NP	155.60	NP	2136.56	2136.56
MW-07	10/3/2013	2292.16	NP	155.78	NP	2136.38	2136.38
MW-07	11/27/2013	2292.16	NP	155.98	NP	2136.18	2136.18

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-07	12/31/2013	2292.16	NP	156.03	NP	2136.13	2136.13
MW-07	1/10/2014	2292.16	NP	156.15	NP	2136.01	2136.01
MW-07	2/18/2014	2292.16	NP	156.28	NP	2135.88	2135.88
MW-07	3/12/2014	2292.16	NP	156.33	NP	2135.83	2135.83
MW-07	4/17/2014	2292.16	NP	156.51	NP	2135.65	2135.65
MW-07	5/22/2014	2292.16	NP	156.83	NP	2135.33	2135.33
MW-07	6/20/2014	2292.16	NP	157.10	NP	2135.06	2135.06
MW-07	7/14/2014	2292.16	NP	157.37	NP	2134.79	2134.79
MW-07	8/14/2014	2292.16	NP	157.68	NP	2134.48	2134.48
MW-07	9/9/2014	2292.16	NP	157.38	NP	2134.78	2134.78
MW-07	10/1/2014	2292.16	NP	156.62	NP	2135.54	2135.54
MW-07	11/18/2014	2292.16	NP	156.50	NP	2135.66	2135.66
MW-07	12/16/2014	2292.16	NP	156.55	NP	2135.61	2135.61
MW-07	1/19/2015	2292.16	NP	156.36	NP	2135.80	2135.80
MW-07	2/19/2015	2292.16	NP	156.22	NP	2135.94	2135.94
MW-07	3/26/2015	2292.16	NP	155.91	NP	2136.25	2136.25
MW-07	4/16/2015	2292.16	NP	155.81	NP	2136.35	2136.35
MW-07	5/19/2015	2292.16	NP	156.07	NP	2136.09	2136.09
MW-07	6/22/2015	2292.16	NP	156.65	NP	2135.51	2135.51
MW-08	11/10/2003	2294.90	144.27	146.52	2.25	2148.38	2150.07
MW-08	11/11/2003	2294.90	144.31	146.42	2.11	2148.48	2150.06
MW-08	11/24/2003	2294.90	144.57	146.99	2.42	2147.91	2149.73
MW-08	11/26/2003	2294.90	144.69	147.08	2.39	2147.82	2149.61
MW-08	12/1/2003	2294.90	144.61	146.99	2.38	2147.91	2149.70
MW-08	1/26/2004	2294.90	146.36	146.62	0.26	2148.28	2148.48
MW-08	2/5/2004	2294.90	146.36	146.62	0.26	2148.28	2148.48
MW-08	2/5/2004	2294.90	146.36	146.62	0.26	2148.28	2148.48
MW-08	7/12/2004	2294.90	147.63	147.88	0.25	2147.02	2147.21
MW-08	7/19/2004	2294.90	147.70	148.11	0.41	2146.79	2147.10
MW-08	7/26/2004	2294.90	NP	147.90	NP	2147.00	2147.00
MW-08	8/2/2004	2294.90	147.99	148.11	0.12	2146.79	2146.88
MW-08	8/9/2004	2294.90	147.99	148.63	0.64	2146.27	2146.75
MW-08	8/16/2004	2294.90	148.04	148.93	0.89	2145.97	2146.64
MW-08	8/23/2004	2294.90	148.03	149.37	1.34	2145.53	2146.54
MW-08	8/30/2004	2294.90	148.23	149.25	1.02	2145.65	2146.42
MW-08	9/8/2004	2294.90	148.32	149.54	1.22	2145.36	2146.28
MW-08	9/13/2004	2294.90	148.38	149.55	1.17	2145.35	2146.23
MW-08	9/20/2004	2294.90	148.47	149.70	1.23	2145.20	2146.12
MW-08	9/27/2004	2294.90	148.57	149.76	1.19	2145.14	2146.03
MW-08	10/4/2004	2294.90	148.66	149.78	1.12	2145.12	2145.96
MW-08	10/11/2004	2294.90	148.81	149.67	0.86	2145.23	2145.88
MW-08	10/18/2004	2294.90	148.98	149.35	0.37	2145.55	2145.83
MW-08	10/25/2004	2294.90	148.97	149.53	0.56	2145.37	2145.79
MW-08	11/1/2004	2294.90	149.15	149.44	0.29	2145.46	2145.68
MW-08	11/8/2004	2294.90	149.27	149.41	0.14	2145.49	2145.60
MW-08	11/15/2004	2294.90	149.35	149.47	0.12	2145.43	2145.52

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-08	11/30/2004	2294.90	149.46	149.70	0.24	2145.20	2145.38
MW-08	12/6/2004	2294.90	149.59	149.87	0.28	2145.03	2145.24
MW-08	12/13/2004	2294.90	149.61	149.99	0.38	2144.91	2145.20
MW-08	12/20/2004	2294.90	149.70	149.79	0.09	2145.11	2145.18
MW-08	1/4/2005	2294.90	149.77	150.03	0.26	2144.87	2145.07
MW-08	1/10/2005	2294.90	149.86	149.91	0.05	2144.99	2145.03
MW-08	1/17/2005	2294.90	149.91	149.95	0.04	2144.95	2144.98
MW-08	1/24/2005	2294.90	149.98	150.02	0.04	2144.88	2144.91
MW-08	1/31/2005	2294.90	149.92	149.98	0.06	2144.92	2144.97
MW-08	2/7/2005	2294.90	150.00	150.08	0.08	2144.82	2144.88
MW-08	2/14/2005	2294.90	150.03	150.05	0.02	2144.85	2144.87
MW-08	2/21/2005	2294.90	150.03	150.10	0.07	2144.80	2144.85
MW-08	2/28/2005	2294.90	149.99	150.09	0.10	2144.81	2144.89
MW-08	3/7/2005	2294.90	149.94	150.04	0.10	2144.86	2144.94
MW-08	3/14/2005	2294.90	149.87	149.93	0.06	2144.97	2145.02
MW-08	3/21/2005	2294.90	149.78	149.93	0.15	2144.97	2145.08
MW-08	3/27/2005	2294.90	149.68	149.98	0.30	2144.92	2145.15
MW-08	4/4/2005	2294.90	149.67	150.12	0.45	2144.78	2145.12
MW-08	4/11/2005	2294.90	149.84	149.96	0.12	2144.94	2145.03
MW-08	4/18/2005	2294.90	149.89	150.03	0.14	2144.87	2144.98
MW-08	4/25/2005	2294.90	149.85	149.97	0.12	2144.93	2145.02
MW-08	5/2/2005	2294.90	149.87	149.99	0.12	2144.91	2145.00
MW-08	5/10/2005	2294.90	149.93	150.15	0.22	2144.75	2144.92
MW-08	5/16/2005	2294.90	149.95	150.10	0.15	2144.80	2144.91
MW-08	5/23/2005	2294.90	150.05	150.20	0.15	2144.70	2144.81
MW-08	5/30/2005	2294.90	150.04	150.49	0.45	2144.41	2144.75
MW-08	6/6/2005	2294.90	150.03	150.95	0.92	2143.95	2144.64
MW-08	6/13/2005	2294.90	150.10	150.90	0.80	2144.00	2144.60
MW-08	6/20/2005	2294.90	150.13	151.02	0.89	2143.88	2144.55
MW-08	6/27/2005	2294.90	150.19	151.09	0.90	2143.81	2144.49
MW-08	7/5/2005	2294.90	150.42	150.66	0.24	2144.24	2144.42
MW-08	7/11/2005	2294.90	150.54	150.57	0.03	2144.33	2144.35
MW-08	7/18/2005	2294.90	150.61	150.68	0.07	2144.22	2144.27
MW-08	7/25/2005	2294.90	150.70	150.80	0.10	2144.10	2144.18
MW-08	8/1/2005	2294.90	150.76	150.93	0.17	2143.97	2144.10
MW-08	8/8/2005	2294.90	150.78	151.15	0.37	2143.75	2144.03
MW-08	8/15/2005	2294.90	150.85	151.10	0.25	2143.80	2143.99
MW-08	8/22/2005	2294.90	150.84	151.03	0.19	2143.87	2144.01
MW-08	8/29/2005	2294.90	150.63	150.75	0.12	2144.15	2144.24
MW-08	9/7/2005	2294.90	150.08	150.60	0.52	2144.30	2144.69
MW-08	9/12/2005	2294.90	149.86	150.08	0.22	2144.82	2144.99
MW-08	9/19/2005	2294.90	149.66	149.79	0.13	2145.11	2145.21
MW-08	9/26/2005	2294.90	149.58	149.85	0.27	2145.05	2145.25
MW-08	10/3/2005	2294.90	149.60	150.11	0.51	2144.79	2145.17
MW-08	10/10/2005	2294.90	150.70	150.79	0.09	2144.11	2144.18
MW-08	10/17/2005	2294.90	149.86	150.51	0.65	2144.39	2144.88

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-08	10/24/2005	2294.90	150.04	150.71	0.67	2144.19	2144.69
MW-08	10/31/2005	2294.90	150.26	150.55	0.29	2144.35	2144.57
MW-08	11/7/2005	2294.90	150.45	150.56	0.11	2144.34	2144.42
MW-08	11/14/2005	2294.90	150.58	150.64	0.06	2144.26	2144.31
MW-08	11/21/2005	2294.90	150.72	150.76	0.04	2144.14	2144.17
MW-08	12/5/2005	2294.90	150.83	150.99	0.16	2143.91	2144.03
MW-08	12/12/2005	2294.90	150.88	151.08	0.20	2143.82	2143.97
MW-08	12/19/2005	2294.90	150.94	151.09	0.15	2143.81	2143.92
MW-08	12/28/2005	2294.90	150.94	151.15	0.21	2143.75	2143.91
MW-08	1/9/2006	2294.90	151.03	151.37	0.34	2143.53	2143.79
MW-08	1/16/2006	2294.90	151.02	151.47	0.45	2143.43	2143.77
MW-08	1/30/2006	2294.90	150.85	152.11	1.26	2142.79	2143.74
MW-08	2/13/2006	2294.90	150.92	152.16	1.24	2142.74	2143.67
MW-08	2/27/2006	2294.90	151.03	152.19	1.16	2142.71	2143.58
MW-08	3/6/2006	2294.90	151.08	152.08	1.00	2142.82	2143.57
MW-08	3/13/2006	2294.90	151.03	152.08	1.05	2142.82	2143.61
MW-08	3/20/2006	2294.90	151.19	152.15	0.96	2142.75	2143.47
MW-08	3/27/2006	2294.90	151.23	151.95	0.72	2142.95	2143.49
MW-08	4/3/2006	2294.90	151.29	151.87	0.58	2143.03	2143.47
MW-08	4/10/2006	2294.90	151.38	151.99	0.61	2142.91	2143.37
MW-08	4/17/2006	2294.90	151.43	151.97	0.54	2142.93	2143.34
MW-08	4/24/2006	2294.90	151.45	152.11	0.66	2142.79	2143.29
MW-08	5/1/2006	2294.90	151.49	152.08	0.59	2142.82	2143.26
MW-08	5/15/2006	2294.90	151.52	152.04	0.52	2142.86	2143.25
MW-08	5/22/2006	2294.90	151.65	151.91	0.26	2142.99	2143.19
MW-08	5/30/2006	2294.90	151.75	152.08	0.33	2142.82	2143.07
MW-08	6/5/2006	2294.90	151.86	152.09	0.23	2142.81	2142.98
MW-08	6/12/2006	2294.90	151.95	152.18	0.23	2142.72	2142.89
MW-08	6/26/2006	2294.90	152.10	152.34	0.24	2142.56	2142.74
MW-08	7/10/2006	2294.90	152.24	152.45	0.21	2142.45	2142.61
MW-08	8/4/2006	2294.90	NP	152.68	NP	2142.22	2142.22
MW-08	8/14/2006	2294.90	152.50	152.71	0.21	2142.19	2142.35
MW-08	8/23/2006	2294.90	NP	152.25	NP	2142.65	2142.65
MW-08	9/19/2006	2294.90	NP	150.88	NP	2144.02	2144.02
MW-08	10/20/2006	2294.90	NP	150.31	NP	2144.59	2144.59
MW-08	10/30/2006	2294.90	NP	150.51	NP	2144.39	2144.39
MW-08	11/17/2006	2294.90	NP	150.85	NP	2144.05	2144.05
MW-08	1/29/2007	2294.90	NP	152.00	NP	2142.90	2142.90
MW-08	3/1/2007	2294.90	NP	152.21	NP	2142.69	2142.69
MW-08	3/28/2007	2294.90	NP	152.40	NP	2142.50	2142.50
MW-08	4/24/2007	2294.90	152.54	153.76	1.22	2141.14	2142.06
MW-08	5/28/2007	2294.90	152.64	152.86	0.22	2142.04	2142.21
MW-08	6/27/2007	2294.90	152.99	153.21	0.22	2141.69	2141.86
MW-08	7/23/2007	2294.90	153.27	153.52	0.25	2141.38	2141.57
MW-08	8/25/2007	2294.90	NP	152.22	NP	2142.68	2142.68
MW-08	9/25/2007	2294.90	NP	151.77	NP	2143.13	2143.13

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-08	10/22/2007	2294.90	NP	152.25	NP	2142.65	2142.65
MW-08	11/28/2007	2294.90	NP	153.33	NP	2141.57	2141.57
MW-08	12/31/2007	2294.90	NP	153.36	NP	2141.54	2141.54
MW-08	1/26/2008	2294.90	NP	153.07	NP	2141.83	2141.83
MW-08	2/29/2008	2294.90	NP	153.30	NP	2141.60	2141.60
MW-08	3/31/2008	2294.90	152.83	153.26	0.43	2141.64	2141.96
MW-08	4/21/2008	2294.90	NP	153.09	NP	2141.81	2141.81
MW-08	5/23/2008	2294.90	NP	153.54	NP	2141.36	2141.36
MW-08	6/25/2008	2294.90	153.70	153.72	0.02	2141.18	2141.20
MW-08	7/28/2008	2294.90	153.97	153.99	0.02	2140.91	2140.93
MW-08	8/25/2008	2294.90	NP	152.29	NP	2142.61	2142.61
MW-08	9/30/2008	2294.90	NP	150.78	NP	2144.12	2144.12
MW-08	11/26/2008	2294.90	NP	151.72	NP	2143.18	2143.18
MW-08	12/23/2008	2294.90	NP	152.12	NP	2142.78	2142.78
MW-08	1/26/2009	2294.90	NP	152.41	NP	2142.49	2142.49
MW-08	2/27/2009	2294.90	NP	152.33	NP	2142.57	2142.57
MW-08	3/26/2009	2294.90	NP	152.63	NP	2142.27	2142.27
MW-08	4/27/2009	2294.90	NP	152.73	NP	2142.17	2142.17
MW-08	5/20/2009	2294.90	NP	153.09	NP	2141.81	2141.81
MW-08	6/16/2009	2294.90	NP	153.73	NP	2141.17	2141.17
MW-08	7/20/2009	2294.90	NP	154.10	NP	2140.80	2140.80
MW-08	8/31/2009	2294.90	154.23	155.03	0.80	2139.87	2140.47
MW-08	9/29/2009	2294.90	154.35	155.17	0.82	2139.73	2140.35
MW-08	10/22/2009	2294.90	154.45	155.30	0.85	2139.60	2140.24
MW-08	11/25/2009	2294.90	154.81	155.52	0.71	2139.38	2139.91
MW-08	12/14/2009	2294.90	154.87	155.61	0.74	2139.29	2139.85
MW-08	1/18/2010	2294.90	154.90	155.59	0.69	2139.31	2139.83
MW-08	2/26/2010	2294.90	154.91	155.48	0.57	2139.42	2139.85
MW-08	3/22/2010	2294.90	154.28	154.47	0.19	2140.43	2140.57
MW-08	4/12/2010	2294.90	154.21	154.46	0.25	2140.44	2140.63
MW-08	5/27/2010	2294.90	154.68	155.23	0.55	2139.67	2140.08
MW-08	6/22/2010	2294.90	154.97	155.58	0.61	2139.32	2139.78
MW-08	7/12/2010	2294.90	155.27	155.92	0.65	2138.98	2139.47
MW-08	8/26/2010	2294.90	155.32	155.62	0.30	2139.28	2139.51
MW-08	9/22/2010	2294.90	155.06	155.32	0.26	2139.58	2139.78
MW-08	10/5/2010	2294.90	154.97	155.08	0.11	2139.82	2139.90
MW-08	10/18/2010	2294.90	NP	154.86	NP	2140.04	2140.04
MW-08	11/30/2010	2294.90	NP	155.31	NP	2139.59	2139.59
MW-08	12/21/2010	2294.90	NP	155.51	NP	2139.39	2139.39
MW-08	1/10/2011	2294.90	NP	155.41	NP	2139.49	2139.49
MW-08	2/17/2011	2294.90	NP	155.77	NP	2139.13	2139.13
MW-08	3/25/2011	2294.90	NP	155.86	NP	2139.04	2139.04
MW-08	4/11/2011	2294.90	NP	155.95	NP	2138.95	2138.95
MW-08	5/9/2011	2294.90	156.21	156.22	0.01	2138.68	2138.69
MW-08	6/29/2011	2294.90	NP	156.83	NP	2138.07	2138.07
MW-08	7/11/2011	2294.90	157.03	157.04	0.01	2137.86	2137.87

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-08	8/31/2011	2294.90	NP	157.56	NP	2137.34	2137.34
MW-08	9/28/2011	2294.90	NP	157.49	NP	2137.41	2137.41
MW-08	10/10/2011	2294.90	NP	156.75	NP	2138.15	2138.15
MW-08	11/16/2011	2294.90	NP	156.68	NP	2138.22	2138.22
MW-08	12/29/2011	2294.90	NP	156.86	NP	2138.04	2138.04
MW-08	1/16/2012	2294.90	NP	156.75	NP	2138.15	2138.15
MW-08	2/28/2012	2294.90	NP	156.53	NP	2138.37	2138.37
MW-08	3/30/2012	2294.90	NP	156.79	NP	2138.11	2138.11
MW-08	4/2/2012	2294.90	NP	156.89	NP	2138.01	2138.01
MW-08	5/30/2012	2294.90	NP	157.69	NP	2137.21	2137.21
MW-08	6/29/2012	2294.90	NP	157.96	NP	2136.94	2136.94
MW-08	7/9/2012	2294.90	NP	157.99	NP	2136.91	2136.91
MW-08	8/29/2012	2294.90	NP	157.46	NP	2137.44	2137.44
MW-08	9/25/2012	2294.90	NP	156.98	NP	2137.92	2137.92
MW-08	10/22/2012	2294.90	NP	157.25	NP	2137.65	2137.65
MW-08	11/15/2012	2294.90	NP	157.64	NP	2137.26	2137.26
MW-08	12/13/2012	2294.90	NP	158.03	NP	2136.87	2136.87
MW-08	1/21/2013	2294.90	NP	158.13	NP	2136.77	2136.77
MW-08	2/13/2013	2294.90	NP	158.17	NP	2136.73	2136.73
MW-08	3/21/2013	2294.90	NP	158.26	NP	2136.64	2136.64
MW-08	4/15/2013	2294.90	NP	158.42	NP	2136.48	2136.48
MW-08	5/23/2013	2294.90	NP	158.60	NP	2136.30	2136.30
MW-08	6/26/2013	2294.90	NP	158.94	NP	2135.96	2135.96
MW-08	7/8/2013	2294.90	NP	159.02	NP	2135.88	2135.88
MW-08	8/8/2013	2294.90	NP	159.21	NP	2135.69	2135.69
MW-08	9/5/2013	2294.90	NP	159.00	NP	2135.90	2135.90
MW-08	10/3/2013	2294.90	NP	159.16	NP	2135.74	2135.74
MW-08	11/27/2013	2294.90	NP	159.40	NP	2135.50	2135.50
MW-08	12/31/2013	2294.90	NP	159.36	NP	2135.54	2135.54
MW-08	1/10/2014	2294.90	NP	159.57	NP	2135.33	2135.33
MW-08	2/18/2014	2294.90	NP	161.00	NP	2133.90	2133.90
MW-08	2/18/2014	2294.90	NP	159.67	NP	2135.23	2135.23
MW-08	3/12/2014	2294.90	NP	159.72	NP	2135.18	2135.18
MW-08	4/17/2014	2294.90	NP	159.94	NP	2134.96	2134.96
MW-08	5/22/2014	2294.90	NP	160.23	NP	2134.67	2134.67
MW-08	6/20/2014	2294.90	NP	160.54	NP	2134.36	2134.36
MW-08	7/15/2014	2294.90	NP	160.75	NP	2134.15	2134.15
MW-08	8/14/2014	2294.90	NP	161.10	NP	2133.80	2133.80
MW-08	9/9/2014	2294.90	NP	160.77	NP	2134.13	2134.13
MW-08	10/1/2014	2294.90	NP	159.98	NP	2134.92	2134.92
MW-08	11/18/2014	2294.90	NP	159.84	NP	2135.06	2135.06
MW-08	12/16/2014	2294.90	NP	159.94	NP	2134.96	2134.96
MW-08	1/19/2015	2294.90	NP	159.69	NP	2135.21	2135.21
MW-08	2/19/2015	2294.90	NP	159.55	NP	2135.35	2135.35
MW-08	3/26/2015	2294.90	NP	159.24	NP	2135.66	2135.66
MW-08	4/16/2015	2294.90	NP	159.14	NP	2135.76	2135.76

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-08	5/19/2015	2294.90	NP	159.47	NP	2135.43	2135.43
MW-08	6/22/2015	2294.90	NP	160.04	NP	2134.86	2134.86
MW-09	11/4/2003	2294.12	144.49	146.44	1.95	2147.68	2149.14
MW-09	11/5/2003	2294.12	144.50	146.46	1.96	2147.66	2149.13
MW-09	11/6/2003	2294.12	144.46	146.43	1.97	2147.69	2149.17
MW-09	11/7/2003	2294.12	144.54	146.57	2.03	2147.55	2149.07
MW-09	11/24/2003	2294.12	144.70	146.53	1.83	2147.59	2148.96
MW-09	11/26/2003	2294.12	144.47	146.66	2.19	2147.46	2149.10
MW-09	12/1/2003	2294.12	144.60	146.74	2.14	2147.38	2148.99
MW-09	8/16/2004	2294.12	148.88	150.15	1.27	2143.97	2144.92
MW-09	9/8/2004	2294.12	149.34	150.18	0.84	2143.94	2144.57
MW-09	9/13/2004	2294.12	148.92	150.12	1.20	2144.00	2144.90
MW-09	9/20/2004	2294.12	149.06	150.12	1.06	2144.00	2144.80
MW-09	9/27/2004	2294.12	149.15	150.15	1.00	2143.97	2144.72
MW-09	10/4/2004	2294.12	149.27	150.17	0.90	2143.95	2144.63
MW-09	10/11/2004	2294.12	149.47	149.85	0.38	2144.27	2144.56
MW-09	10/18/2004	2294.12	149.55	149.87	0.32	2144.25	2144.49
MW-09	10/25/2004	2294.12	149.65	149.76	0.11	2144.36	2144.44
MW-09	11/1/2004	2294.12	149.77	149.79	0.02	2144.33	2144.35
MW-09	11/8/2004	2294.12	149.82	149.95	0.13	2144.17	2144.27
MW-09	11/15/2004	2294.12	149.90	150.05	0.15	2144.07	2144.18
MW-09	11/30/2004	2294.12	149.95	150.52	0.57	2143.60	2144.03
MW-09	12/6/2004	2294.12	150.11	150.35	0.24	2143.77	2143.95
MW-09	12/13/2004	2294.12	150.20	150.40	0.20	2143.72	2143.87
MW-09	12/20/2004	2294.12	150.22	150.48	0.26	2143.64	2143.84
MW-09	1/4/2005	2294.12	150.19	150.92	0.73	2143.20	2143.75
MW-09	1/10/2005	2294.12	150.36	150.64	0.28	2143.48	2143.69
MW-09	1/17/2005	2294.12	150.45	150.51	0.06	2143.61	2143.66
MW-09	1/24/2005	2294.12	150.50	150.58	0.08	2143.54	2143.60
MW-09	1/31/2005	2294.12	150.47	150.52	0.05	2143.60	2143.64
MW-09	2/7/2005	2294.12	150.47	150.81	0.34	2143.31	2143.57
MW-09	2/14/2005	2294.12	150.53	150.68	0.15	2143.44	2143.55
MW-09	2/21/2005	2294.12	150.42	150.96	0.54	2143.16	2143.57
MW-09	2/28/2005	2294.12	150.40	150.89	0.49	2143.23	2143.60
MW-09	3/7/2005	2294.12	150.34	150.79	0.45	2143.33	2143.67
MW-09	3/14/2005	2294.12	150.29	150.63	0.34	2143.49	2143.75
MW-09	3/21/2005	2294.12	150.17	150.68	0.51	2143.44	2143.82
MW-09	3/27/2005	2294.12	150.22	150.37	0.15	2143.75	2143.86
MW-09	4/4/2005	2294.12	150.15	150.66	0.51	2143.46	2143.84
MW-09	4/11/2005	2294.12	150.29	150.45	0.16	2143.67	2143.79
MW-09	4/18/2005	2294.12	150.31	150.68	0.37	2143.44	2143.72
MW-09	4/25/2005	2294.12	150.21	150.69	0.48	2143.43	2143.79
MW-09	5/2/2005	2294.12	150.21	150.84	0.63	2143.28	2143.75
MW-09	5/10/2005	2294.12	150.27	150.89	0.62	2143.23	2143.70
MW-09	5/16/2005	2294.12	150.33	150.95	0.62	2143.17	2143.64
MW-09	5/23/2005	2294.12	150.40	151.12	0.72	2143.00	2143.54

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-09	5/30/2005	2294.12	150.41	151.31	0.90	2142.81	2143.49
MW-09	6/6/2005	2294.12	150.52	151.24	0.72	2142.88	2143.42
MW-09	6/13/2005	2294.12	150.70	151.03	0.33	2143.09	2143.34
MW-09	6/20/2005	2294.12	150.79	150.95	0.16	2143.17	2143.29
MW-09	6/27/2005	2294.12	150.87	150.97	0.10	2143.15	2143.23
MW-09	7/5/2005	2294.12	150.98	150.99	0.01	2143.13	2143.14
MW-09	7/11/2005	2294.12	151.04	151.05	0.01	2143.07	2143.08
MW-09	7/18/2005	2294.12	NP	151.15	NP	2142.97	2142.97
MW-09	7/25/2005	2294.12	NP	151.23	NP	2142.89	2142.89
MW-09	8/1/2005	2294.12	151.30	151.31	0.01	2142.81	2142.82
MW-09	8/8/2005	2294.12	151.12	151.14	0.02	2142.98	2143.00
MW-09	8/15/2005	2294.12	151.17	151.20	0.03	2142.92	2142.94
MW-09	8/22/2005	2294.12	151.19	151.22	0.03	2142.90	2142.92
MW-09	8/29/2005	2294.12	151.00	151.02	0.02	2143.10	2143.12
MW-09	9/7/2005	2294.12	NP	150.57	NP	2143.55	2143.55
MW-09	9/12/2005	2294.12	NP	150.29	NP	2143.83	2143.83
MW-09	9/19/2005	2294.12	NP	150.02	NP	2144.10	2144.10
MW-09	9/26/2005	2294.12	149.92	149.96	0.04	2144.16	2144.19
MW-09	10/3/2005	2294.12	150.00	150.06	0.06	2144.06	2144.11
MW-09	10/10/2005	2294.12	150.15	150.20	0.05	2143.92	2143.96
MW-09	10/17/2005	2294.12	150.29	150.34	0.05	2143.78	2143.82
MW-09	10/24/2005	2294.12	150.45	150.56	0.11	2143.56	2143.64
MW-09	10/31/2005	2294.12	150.59	150.67	0.08	2143.45	2143.51
MW-09	11/7/2005	2294.12	150.75	150.82	0.07	2143.30	2143.35
MW-09	11/14/2005	2294.12	150.88	150.93	0.05	2143.19	2143.23
MW-09	11/21/2005	2294.12	151.01	151.09	0.08	2143.03	2143.09
MW-09	12/5/2005	2294.12	151.11	151.35	0.24	2142.77	2142.95
MW-09	12/12/2005	2294.12	151.18	151.31	0.13	2142.81	2142.91
MW-09	12/19/2005	2294.12	151.23	151.40	0.17	2142.72	2142.85
MW-09	12/28/2005	2294.12	151.26	151.42	0.16	2142.70	2142.82
MW-09	1/9/2006	2294.12	151.31	151.57	0.26	2142.55	2142.75
MW-09	1/16/2006	2294.12	151.36	151.62	0.26	2142.50	2142.70
MW-09	1/30/2006	2294.12	151.40	151.71	0.31	2142.41	2142.64
MW-09	2/13/2006	2294.12	151.49	151.70	0.21	2142.42	2142.58
MW-09	2/27/2006	2294.12	151.42	152.14	0.72	2141.98	2142.52
MW-09	3/6/2006	2294.12	151.47	152.10	0.63	2142.02	2142.49
MW-09	3/13/2006	2294.12	151.52	152.10	0.58	2142.02	2142.46
MW-09	3/20/2006	2294.12	151.54	152.10	0.56	2142.02	2142.44
MW-09	3/27/2006	2294.12	151.61	151.98	0.37	2142.14	2142.42
MW-09	4/3/2006	2294.12	151.66	152.00	0.34	2142.12	2142.38
MW-09	4/10/2006	2294.12	151.75	152.02	0.27	2142.10	2142.30
MW-09	4/17/2006	2294.12	151.82	151.97	0.15	2142.15	2142.26
MW-09	4/24/2006	2294.12	151.86	151.97	0.11	2142.15	2142.23
MW-09	5/1/2006	2294.12	151.90	152.00	0.10	2142.12	2142.20
MW-09	5/15/2006	2294.12	151.93	152.03	0.10	2142.09	2142.17
MW-09	5/22/2006	2294.12	151.99	152.00	0.01	2142.12	2142.13

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-09	5/30/2006	2294.12	152.11	152.12	0.01	2142.00	2142.01
MW-09	6/5/2006	2294.12	152.23	152.24	0.01	2141.88	2141.89
MW-09	6/12/2006	2294.12	152.30	152.31	0.01	2141.81	2141.82
MW-09	6/26/2006	2294.12	152.46	152.47	0.01	2141.65	2141.66
MW-09	7/10/2006	2294.12	NP	152.59	NP	2141.53	2141.53
MW-09	8/4/2006	2294.12	152.19	152.21	0.02	2141.91	2141.93
MW-09	8/14/2006	2294.12	152.84	152.98	0.14	2141.14	2141.25
MW-09	8/23/2006	2294.12	152.66	152.72	0.06	2141.40	2141.45
MW-09	9/19/2006	2294.12	NP	151.29	NP	2142.83	2142.83
MW-09	10/20/2006	2294.12	NP	150.62	NP	2143.50	2143.50
MW-09	10/30/2006	2294.12	NP	150.82	NP	2143.30	2143.30
MW-09	11/17/2006	2294.12	NP	151.17	NP	2142.95	2142.95
MW-09	1/29/2007	2294.12	NP	152.32	NP	2141.80	2141.80
MW-09	3/1/2007	2294.12	NP	152.52	NP	2141.60	2141.60
MW-09	3/28/2007	2294.12	NP	152.73	NP	2141.39	2141.39
MW-09	4/24/2007	2294.12	152.91	152.94	0.03	2141.18	2141.20
MW-09	5/28/2007	2294.12	153.03	153.06	0.03	2141.06	2141.08
MW-09	6/27/2007	2294.12	153.37	153.41	0.04	2140.71	2140.74
MW-09	7/23/2007	2294.12	153.69	153.72	0.03	2140.40	2140.42
MW-09	8/25/2007	2294.12	NP	152.84	NP	2141.28	2141.28
MW-09	9/25/2007	2294.12	NP	152.19	NP	2141.93	2141.93
MW-09	10/22/2007	2294.12	NP	152.65	NP	2141.47	2141.47
MW-09	11/28/2007	2294.12	NP	153.41	NP	2140.71	2140.71
MW-09	12/31/2007	2294.12	153.73	153.74	0.01	2140.38	2140.39
MW-09	1/26/2008	2294.12	NP	153.45	NP	2140.67	2140.67
MW-09	2/29/2008	2294.12	NP	153.65	NP	2140.47	2140.47
MW-09	3/31/2008	2294.12	NP	153.18	NP	2140.94	2140.94
MW-09	4/21/2008	2294.12	NP	153.40	NP	2140.72	2140.72
MW-09	5/23/2008	2294.12	NP	153.86	NP	2140.26	2140.26
MW-09	6/25/2008	2294.12	153.85	154.64	0.79	2139.48	2140.07
MW-09	7/28/2008	2294.12	154.09	155.23	1.14	2138.89	2139.75
MW-09	8/25/2008	2294.12	152.80	152.81	0.01	2141.31	2141.32
MW-09	9/30/2008	2294.12	NP	151.21	NP	2142.91	2142.91
MW-09	10/13/2008	2294.12	NP	151.17	NP	2142.95	2142.95
MW-09	11/26/2008	2294.12	NP	152.07	NP	2142.05	2142.05
MW-09	12/23/2008	2294.12	NP	152.47	NP	2141.65	2141.65
MW-09	1/26/2009	2294.12	NP	152.77	NP	2141.35	2141.35
MW-09	2/27/2009	2294.12	NP	152.67	NP	2141.45	2141.45
MW-09	3/26/2009	2294.12	152.97	152.98	0.01	2141.14	2141.15
MW-09	4/27/2009	2294.12	153.07	153.09	0.02	2141.03	2141.05
MW-09	5/20/2009	2294.12	153.41	153.43	0.02	2140.69	2140.71
MW-09	6/16/2009	2294.12	154.06	154.07	0.01	2140.05	2140.06
MW-09	7/20/2009	2294.12	154.26	155.05	0.79	2139.07	2139.66
MW-09	8/31/2009	2294.12	154.68	155.55	0.87	2138.57	2139.22
MW-09	9/29/2009	2294.12	154.77	155.53	0.76	2138.59	2139.16
MW-09	10/22/2009	2294.12	154.91	155.58	0.67	2138.54	2139.04

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-09	11/25/2009	2294.12	155.24	155.93	0.69	2138.19	2138.71
MW-09	12/14/2009	2294.12	155.36	156.06	0.70	2138.06	2138.59
MW-09	1/18/2010	2294.12	155.33	155.91	0.58	2138.21	2138.65
MW-09	2/26/2010	2294.12	155.41	155.78	0.37	2138.34	2138.62
MW-09	3/22/2010	2294.12	NP	154.76	NP	2139.36	2139.36
MW-09	4/12/2010	2294.12	NP	154.67	NP	2139.45	2139.45
MW-09	5/27/2010	2294.12	NP	155.13	NP	2138.99	2138.99
MW-09	6/22/2010	2294.12	NP	155.48	NP	2138.64	2138.64
MW-09	7/12/2010	2294.12	155.84	155.85	0.01	2138.27	2138.28
MW-09	8/26/2010	2294.12	NP	155.75	NP	2138.37	2138.37
MW-09	9/22/2010	2294.12	NP	155.51	NP	2138.61	2138.61
MW-09	10/5/2010	2294.12	NP	155.42	NP	2138.70	2138.70
MW-09	10/18/2010	2294.12	155.15	155.16	0.01	2138.96	2138.97
MW-09	11/30/2010	2294.12	NP	155.71	NP	2138.41	2138.41
MW-09	12/21/2010	2294.12	NP	155.83	NP	2138.29	2138.29
MW-09	1/10/2011	2294.12	155.78	155.79	0.01	2138.33	2138.34
MW-09	2/17/2011	2294.12	NP	156.11	NP	2138.01	2138.01
MW-09	3/25/2011	2294.12	NP	156.59	NP	2137.53	2137.53
MW-09	4/11/2011	2294.12	NP	156.31	NP	2137.81	2137.81
MW-09	5/9/2011	2294.12	NP	156.25	NP	2137.87	2137.87
MW-09	6/29/2011	2294.12	NP	157.23	NP	2136.89	2136.89
MW-09	7/11/2011	2294.12	NP	157.42	NP	2136.70	2136.70
MW-09	8/31/2011	2294.12	NP	158.03	NP	2136.09	2136.09
MW-09	9/28/2011	2294.12	NP	157.99	NP	2136.13	2136.13
MW-09	10/10/2011	2294.12	NP	157.40	NP	2136.72	2136.72
MW-09	11/16/2011	2294.12	NP	157.08	NP	2137.04	2137.04
MW-09	12/29/2011	2294.12	NP	157.22	NP	2136.90	2136.90
MW-09	1/16/2012	2294.12	NP	157.18	NP	2136.94	2136.94
MW-09	2/28/2012	2294.12	NP	156.86	NP	2137.26	2137.26
MW-09	3/30/2012	2294.12	NP	157.19	NP	2136.93	2136.93
MW-09	4/2/2012	2294.12	NP	157.30	NP	2136.82	2136.82
MW-09	5/30/2012	2294.12	NP	158.17	NP	2135.95	2135.95
MW-09	6/29/2012	2294.12	NP	158.43	NP	2135.69	2135.69
MW-09	7/9/2012	2294.12	NP	158.46	NP	2135.66	2135.66
MW-09	8/29/2012	2294.12	NP	158.06	NP	2136.06	2136.06
MW-09	9/25/2012	2294.12	NP	157.62	NP	2136.50	2136.50
MW-09	10/22/2012	2294.12	NP	157.81	NP	2136.31	2136.31
MW-09	11/15/2012	2294.12	NP	158.19	NP	2135.93	2135.93
MW-09	12/13/2012	2294.12	NP	158.53	NP	2135.59	2135.59
MW-09	1/21/2013	2294.12	NP	158.60	NP	2135.52	2135.52
MW-09	2/13/2013	2294.12	NP	158.62	NP	2135.50	2135.50
MW-09	3/21/2013	2294.12	NP	158.70	NP	2135.42	2135.42
MW-09	4/15/2013	2294.12	NP	158.86	NP	2135.26	2135.26
MW-09	5/23/2013	2294.12	NP	159.06	NP	2135.06	2135.06
MW-09	6/26/2013	2294.12	NP	159.39	NP	2134.73	2134.73
MW-09	7/8/2013	2294.12	NP	159.49	NP	2134.63	2134.63

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-09	8/8/2013	2294.12	NP	159.65	NP	2134.47	2134.47
MW-09	9/5/2013	2294.12	NP	159.53	NP	2134.59	2134.59
MW-09	10/3/2013	2294.12	NP	159.68	NP	2134.44	2134.44
MW-09	11/27/2013	2294.12	NP	159.86	NP	2134.26	2134.26
MW-09	12/31/2013	2294.12	NP	159.80	NP	2134.32	2134.32
MW-09	1/10/2014	2294.12	NP	160.06	NP	2134.06	2134.06
MW-09	2/18/2014	2294.12	NP	160.16	NP	2133.96	2133.96
MW-09	3/12/2014	2294.12	NP	160.19	NP	2133.93	2133.93
MW-09	4/17/2014	2294.12	NP	160.35	NP	2133.77	2133.77
MW-09	5/22/2014	2294.12	NP	160.97	NP	2133.15	2133.15
MW-09	6/20/2014	2294.12	NP	160.98	NP	2133.14	2133.14
MW-09	7/15/2014	2294.12	NP	161.70	NP	2132.42	2132.42
MW-09	8/14/2014	2294.12	NP	161.58	NP	2132.54	2132.54
MW-09	9/9/2014	2294.12	NP	161.41	NP	2132.71	2132.71
MW-09	10/1/2014	2294.12	NP	160.65	NP	2133.47	2133.47
MW-09	11/18/2014	2294.12	NP	160.40	NP	2133.72	2133.72
MW-09	12/16/2014	2294.12	NP	160.45	NP	2133.67	2133.67
MW-09	1/19/2015	2294.12	NP	160.21	NP	2133.91	2133.91
MW-09	2/19/2015	2294.12	NP	159.99	NP	2134.13	2134.13
MW-09	3/26/2015	2294.12	NP	159.67	NP	2134.45	2134.45
MW-09	4/16/2015	2294.12	NP	159.53	NP	2134.59	2134.59
MW-09	5/19/2015	2294.12	NP	159.85	NP	2134.27	2134.27
MW-09	6/22/2015	2294.12	NP	160.44	NP	2133.68	2133.68
MW-10	11/6/2003	2294.55	144.66	148.14	3.48	2146.41	2149.02
MW-10	11/7/2003	2294.55	144.74	148.21	3.47	2146.34	2148.94
MW-10	11/10/2003	2294.55	144.75	148.19	3.44	2146.36	2148.94
MW-10	11/24/2003	2294.55	144.56	147.85	3.29	2146.70	2149.17
MW-10	11/26/2003	2294.55	146.72	149.81	3.09	2144.74	2147.06
MW-10	12/1/2003	2294.55	144.92	148.00	3.08	2146.55	2148.86
MW-10	3/29/2004	2294.55	146.61	148.19	1.58	2146.36	2147.55
MW-10	4/5/2004	2294.55	146.68	148.17	1.49	2146.38	2147.50
MW-10	4/12/2004	2294.55	146.73	148.09	1.36	2146.46	2147.48
MW-10	4/19/2004	2294.55	146.76	148.08	1.32	2146.47	2147.46
MW-10	4/26/2004	2294.55	146.79	148.14	1.35	2146.41	2147.42
MW-10	5/3/2004	2294.55	146.79	147.99	1.20	2146.56	2147.46
MW-10	5/10/2004	2294.55	146.85	148.13	1.28	2146.42	2147.38
MW-10	5/17/2004	2294.55	146.90	148.11	1.21	2146.44	2147.35
MW-10	5/24/2004	2294.55	146.95	148.18	1.23	2146.37	2147.29
MW-10	5/31/2004	2294.55	146.95	148.20	1.25	2146.35	2147.29
MW-10	6/7/2004	2294.55	146.91	148.81	1.90	2145.74	2147.17
MW-10	6/14/2004	2294.55	147.02	148.75	1.73	2145.80	2147.10
MW-10	6/21/2004	2294.55	147.12	148.90	1.78	2145.65	2146.99
MW-10	6/28/2004	2294.55	147.27	148.92	1.65	2145.63	2146.87
MW-10	7/6/2004	2294.55	147.40	149.04	1.64	2145.51	2146.74
MW-10	7/12/2004	2294.55	147.55	148.99	1.44	2145.56	2146.64
MW-10	7/19/2004	2294.55	147.69	148.99	1.30	2145.56	2146.54

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-10	7/26/2004	2294.55	147.71	149.21	1.50	2145.34	2146.47
MW-10	8/2/2004	2294.55	147.95	149.17	1.22	2145.38	2146.30
MW-10	8/9/2004	2294.55	148.13	149.14	1.01	2145.41	2146.17
MW-10	8/16/2004	2294.55	148.22	149.51	1.29	2145.04	2146.01
MW-10	8/23/2004	2294.55	148.23	149.76	1.53	2144.79	2145.94
MW-10	8/30/2004	2294.55	148.33	150.00	1.67	2144.55	2145.80
MW-10	9/8/2004	2294.55	148.43	150.12	1.69	2144.43	2145.70
MW-10	9/13/2004	2294.55	148.49	150.20	1.71	2144.35	2145.63
MW-10	9/20/2004	2294.55	149.16	150.88	1.72	2143.67	2144.96
MW-10	9/27/2004	2294.55	149.24	150.97	1.73	2143.58	2144.88
MW-10	10/4/2004	2294.55	149.31	151.07	1.76	2143.48	2144.80
MW-10	10/11/2004	2294.55	149.49	150.83	1.34	2143.72	2144.73
MW-10	10/18/2004	2294.55	149.49	150.72	1.23	2143.83	2144.75
MW-10	10/25/2004	2294.55	149.66	150.78	1.12	2143.77	2144.61
MW-10	11/1/2004	2294.55	149.80	150.78	0.98	2143.77	2144.51
MW-10	11/8/2004	2294.55	149.96	150.57	0.61	2143.98	2144.44
MW-10	11/15/2004	2294.55	150.12	150.45	0.33	2144.10	2144.35
MW-10	11/30/2004	2294.55	150.26	150.70	0.44	2143.85	2144.18
MW-10	12/6/2004	2294.55	150.41	150.59	0.18	2143.96	2144.10
MW-10	12/13/2004	2294.55	150.44	150.82	0.38	2143.73	2144.02
MW-10	12/20/2004	2294.55	150.45	150.88	0.43	2143.67	2143.99
MW-10	1/4/2005	2294.55	150.34	151.58	1.24	2142.97	2143.90
MW-10	1/10/2005	2294.55	150.54	151.16	0.62	2143.39	2143.86
MW-10	1/17/2005	2294.55	151.86	152.46	0.60	2142.09	2142.54
MW-10	1/24/2005	2294.55	150.61	151.41	0.80	2143.14	2143.74
MW-10	1/31/2005	2294.55	150.62	150.92	0.30	2143.63	2143.86
MW-10	2/7/2005	2294.55	150.76	151.11	0.35	2143.44	2143.70
MW-10	2/14/2005	2294.55	150.79	151.08	0.29	2143.47	2143.69
MW-10	2/21/2005	2294.55	150.82	150.98	0.16	2143.57	2143.69
MW-10	2/28/2005	2294.55	150.79	150.94	0.15	2143.61	2143.72
MW-10	3/7/2005	2294.55	150.73	150.91	0.18	2143.64	2143.78
MW-10	3/14/2005	2294.55	150.17	150.63	0.46	2143.92	2144.27
MW-10	3/21/2005	2294.55	150.55	150.80	0.25	2143.75	2143.94
MW-10	3/27/2005	2294.55	150.50	150.69	0.19	2143.86	2144.00
MW-10	4/4/2005	2294.55	150.48	150.84	0.36	2143.71	2143.98
MW-10	4/11/2005	2294.55	150.60	150.74	0.14	2143.81	2143.92
MW-10	4/18/2005	2294.55	150.69	150.82	0.13	2143.73	2143.83
MW-10	4/25/2005	2294.55	150.64	150.74	0.10	2143.81	2143.89
MW-10	5/2/2005	2294.55	150.66	150.77	0.11	2143.78	2143.86
MW-10	5/10/2005	2294.55	150.71	150.86	0.15	2143.69	2143.80
MW-10	5/16/2005	2294.55	150.77	150.85	0.08	2143.70	2143.76
MW-10	5/23/2005	2294.55	150.86	150.97	0.11	2143.58	2143.66
MW-10	5/30/2005	2294.55	150.90	151.11	0.21	2143.44	2143.60
MW-10	6/6/2005	2294.55	150.99	151.08	0.09	2143.47	2143.54
MW-10	6/13/2005	2294.55	151.07	151.18	0.11	2143.37	2143.45
MW-10	6/20/2005	2294.55	151.05	151.39	0.34	2143.16	2143.42

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-10	6/27/2005	2294.55	150.99	151.86	0.87	2142.69	2143.34
MW-10	7/5/2005	2294.55	151.20	151.57	0.37	2142.98	2143.26
MW-10	7/11/2005	2294.55	151.36	151.41	0.05	2143.14	2143.18
MW-10	7/18/2005	2294.55	151.44	151.52	0.08	2143.03	2143.09
MW-10	7/25/2005	2294.55	151.48	151.71	0.23	2142.84	2143.01
MW-10	8/15/2005	2294.55	151.69	151.79	0.10	2142.76	2142.84
MW-10	8/22/2005	2294.55	151.68	151.84	0.16	2142.71	2142.83
MW-10	8/29/2005	2294.55	151.51	151.64	0.13	2142.91	2143.01
MW-10	9/7/2005	2294.55	151.08	151.15	0.07	2143.40	2143.45
MW-10	9/12/2005	2294.55	150.76	150.98	0.22	2143.57	2143.74
MW-10	9/19/2005	2294.55	NP	150.67	NP	2143.88	2143.88
MW-10	9/26/2005	2294.55	150.47	150.56	0.09	2143.99	2144.06
MW-10	10/3/2005	2294.55	150.55	150.59	0.04	2143.96	2143.99
MW-10	10/10/2005	2294.55	150.70	150.79	0.09	2143.76	2143.83
MW-10	10/17/2005	2294.55	150.81	150.97	0.16	2143.58	2143.70
MW-10	10/24/2005	2294.55	150.98	151.16	0.18	2143.39	2143.53
MW-10	10/31/2005	2294.55	151.11	151.27	0.16	2143.28	2143.40
MW-10	11/7/2005	2294.55	151.29	151.36	0.07	2143.19	2143.24
MW-10	11/14/2005	2294.55	151.41	151.49	0.08	2143.06	2143.12
MW-10	11/21/2005	2294.55	151.55	151.59	0.04	2142.96	2142.99
MW-10	12/5/2005	2294.55	151.63	151.92	0.29	2142.63	2142.85
MW-10	12/12/2005	2294.55	151.68	151.98	0.30	2142.57	2142.80
MW-10	12/19/2005	2294.55	151.73	152.08	0.35	2142.47	2142.73
MW-10	12/28/2005	2294.55	151.71	152.21	0.50	2142.34	2142.72
MW-10	1/9/2006	2294.55	151.76	152.39	0.63	2142.16	2142.63
MW-10	1/16/2006	2294.55	151.88	152.25	0.37	2142.30	2142.58
MW-10	1/30/2006	2294.55	151.87	152.41	0.54	2142.14	2142.55
MW-10	2/13/2006	2294.55	151.94	152.53	0.59	2142.02	2142.46
MW-10	2/27/2006	2294.55	151.92	152.83	0.91	2141.72	2142.40
MW-10	3/6/2006	2294.55	151.91	152.91	1.00	2141.64	2142.39
MW-10	3/13/2006	2294.55	151.95	152.87	0.92	2141.68	2142.37
MW-10	3/20/2006	2294.55	151.97	152.99	1.02	2141.56	2142.33
MW-10	3/27/2006	2294.55	152.05	152.81	0.76	2141.74	2142.31
MW-10	4/3/2006	2294.55	152.06	153.00	0.94	2141.55	2142.26
MW-10	4/10/2006	2294.55	152.12	153.05	0.93	2141.50	2142.20
MW-10	4/17/2006	2294.55	152.19	153.04	0.85	2141.51	2142.15
MW-10	4/24/2006	2294.55	152.25	153.00	0.75	2141.55	2142.11
MW-10	5/1/2006	2294.55	152.29	153.00	0.71	2141.55	2142.08
MW-10	5/15/2006	2294.55	152.24	153.29	1.05	2141.26	2142.05
MW-10	5/22/2006	2294.55	152.28	153.39	1.11	2141.16	2141.99
MW-10	5/30/2006	2294.55	152.38	153.61	1.23	2140.94	2141.86
MW-10	6/5/2006	2294.55	152.45	153.76	1.31	2140.79	2141.77
MW-10	6/12/2006	2294.55	152.54	153.84	1.30	2140.71	2141.69
MW-10	6/26/2006	2294.55	152.45	153.76	1.31	2140.79	2141.77
MW-10	7/10/2006	2294.55	152.95	153.58	0.63	2140.97	2141.44
MW-10	8/4/2006	2294.55	152.50	153.21	0.71	2141.34	2141.87

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-10	8/14/2006	2294.55	153.27	153.72	0.45	2140.83	2141.17
MW-10	8/23/2006	2294.55	153.09	153.41	0.32	2141.14	2141.38
MW-10	9/19/2006	2294.55	151.55	152.55	1.00	2142.00	2142.75
MW-10	10/20/2006	2294.55	150.90	151.87	0.97	2142.68	2143.41
MW-10	10/30/2006	2294.55	151.06	152.12	1.06	2142.43	2143.23
MW-10	11/17/2006	2294.55	151.39	152.50	1.11	2142.05	2142.88
MW-10	1/29/2007	2294.55	152.56	153.60	1.04	2140.95	2141.73
MW-10	3/1/2007	2294.55	152.77	153.81	1.04	2140.74	2141.52
MW-10	3/28/2007	2294.55	152.95	154.09	1.14	2140.46	2141.32
MW-10	4/24/2007	2294.55	153.15	154.26	1.11	2140.29	2141.12
MW-10	5/28/2007	2294.55	153.30	154.27	0.97	2140.28	2141.01
MW-10	6/27/2007	2294.55	153.70	154.51	0.81	2140.04	2140.65
MW-10	7/23/2007	2294.55	154.00	154.75	0.75	2139.80	2140.36
MW-10	8/25/2007	2294.55	NP	153.62	NP	2140.93	2140.93
MW-10	9/25/2007	2294.55	152.54	153.24	0.70	2141.31	2141.84
MW-10	10/22/2007	2294.55	152.92	153.92	1.00	2140.63	2141.38
MW-10	11/28/2007	2294.55	153.96	155.03	1.07	2139.52	2140.32
MW-10	12/31/2007	2294.55	154.05	154.89	0.84	2139.66	2140.29
MW-10	1/26/2008	2294.55	153.77	154.55	0.78	2140.00	2140.59
MW-10	2/29/2008	2294.55	153.92	154.92	1.00	2139.63	2140.38
MW-10	3/31/2008	2294.55	153.47	154.37	0.90	2140.18	2140.86
MW-10	4/21/2008	2294.55	153.66	154.74	1.08	2139.81	2140.62
MW-10	5/23/2008	2294.55	154.09	155.24	1.15	2139.31	2140.17
MW-10	6/25/2008	2294.55	154.40	155.11	0.71	2139.44	2139.97
MW-10	7/28/2008	2294.55	154.71	155.47	0.76	2139.08	2139.65
MW-10	8/25/2008	2294.55	153.21	153.69	0.48	2140.86	2141.22
MW-10	9/30/2008	2294.55	151.70	151.84	0.14	2142.71	2142.82
MW-10	10/13/2008	2294.55	151.68	151.71	0.03	2142.84	2142.86
MW-10	11/26/2008	2294.55	152.52	152.84	0.32	2141.71	2141.95
MW-10	12/23/2008	2294.55	152.87	153.48	0.61	2141.07	2141.53
MW-10	1/26/2009	2294.55	153.08	154.00	0.92	2140.55	2141.24
MW-10	2/27/2009	2294.55	153.04	153.78	0.74	2140.77	2141.33
MW-10	3/26/2009	2294.55	153.32	154.10	0.78	2140.45	2141.04
MW-10	4/27/2009	2294.55	153.41	154.21	0.80	2140.34	2140.94
MW-10	5/20/2009	2294.55	153.77	154.55	0.78	2140.00	2140.59
MW-10	6/16/2009	2294.55	154.42	155.27	0.85	2139.28	2139.92
MW-10	7/20/2009	2294.55	154.82	155.56	0.74	2138.99	2139.55
MW-10	8/31/2009	2294.55	155.36	155.83	0.47	2138.72	2139.07
MW-10	9/29/2009	2294.55	155.37	155.71	0.34	2138.84	2139.10
MW-10	11/25/2009	2294.55	155.89	156.10	0.21	2138.45	2138.61
MW-10	12/14/2009	2294.55	156.07	156.36	0.29	2138.19	2138.41
MW-10	1/18/2010	2294.55	155.90	156.30	0.40	2138.25	2138.55
MW-10	2/26/2010	2294.55	155.97	156.11	0.14	2138.44	2138.55
MW-10	3/22/2010	2294.55	NP	155.27	NP	2139.28	2139.28
MW-10	4/12/2010	2294.55	NP	155.19	NP	2139.36	2139.36
MW-10	5/27/2010	2294.55	NP	155.67	NP	2138.88	2138.88

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-10	6/22/2010	2294.55	NP	156.02	NP	2138.53	2138.53
MW-10	7/12/2010	2294.55	156.37	156.38	0.01	2138.17	2138.18
MW-10	8/26/2010	2294.55	NP	156.19	NP	2138.36	2138.36
MW-10	9/22/2010	2294.55	NP	155.96	NP	2138.59	2138.59
MW-10	10/5/2010	2294.55	NP	155.98	NP	2138.57	2138.57
MW-10	10/18/2010	2294.55	155.65	155.66	0.01	2138.89	2138.90
MW-10	11/30/2010	2294.55	NP	156.25	NP	2138.30	2138.30
MW-10	12/21/2010	2294.55	NP	156.38	NP	2138.17	2138.17
MW-10	1/10/2011	2294.55	NP	156.25	NP	2138.30	2138.30
MW-10	2/17/2011	2294.55	NP	156.66	NP	2137.89	2137.89
MW-10	3/25/2011	2294.55	NP	157.08	NP	2137.47	2137.47
MW-10	4/11/2011	2294.55	NP	156.86	NP	2137.69	2137.69
MW-10	6/29/2011	2294.55	NP	157.78	NP	2136.77	2136.77
MW-10	7/11/2011	2294.55	NP	157.97	NP	2136.58	2136.58
MW-10	8/31/2011	2294.55	NP	158.56	NP	2135.99	2135.99
MW-10	9/28/2011	2294.55	NP	158.47	NP	2136.08	2136.08
MW-10	10/10/2011	2294.55	NP	157.89	NP	2136.66	2136.66
MW-10	11/16/2011	2294.55	NP	157.61	NP	2136.94	2136.94
MW-10	12/29/2011	2294.55	NP	157.66	NP	2136.89	2136.89
MW-10	1/16/2012	2294.55	NP	156.69	NP	2137.86	2137.86
MW-10	2/28/2012	2294.55	NP	157.40	NP	2137.15	2137.15
MW-10	3/30/2012	2294.55	NP	157.74	NP	2136.81	2136.81
MW-10	4/2/2012	2294.55	NP	157.81	NP	2136.74	2136.74
MW-10	5/30/2012	2294.55	NP	158.72	NP	2135.83	2135.83
MW-10	6/29/2012	2294.55	NP	158.97	NP	2135.58	2135.58
MW-10	7/9/2012	2294.55	NP	159.00	NP	2135.55	2135.55
MW-10	8/29/2012	2294.55	NP	158.58	NP	2135.97	2135.97
MW-10	9/25/2012	2294.55	NP	158.14	NP	2136.41	2136.41
MW-10	10/22/2012	2294.55	NP	158.34	NP	2136.21	2136.21
MW-10	11/15/2012	2294.55	NP	158.72	NP	2135.83	2135.83
MW-10	12/13/2012	2294.55	NP	159.08	NP	2135.47	2135.47
MW-10	1/21/2013	2294.55	NP	159.14	NP	2135.41	2135.41
MW-10	2/13/2013	2294.55	NP	159.18	NP	2135.37	2135.37
MW-10	3/21/2013	2294.55	NP	159.26	NP	2135.29	2135.29
MW-10	4/15/2013	2294.55	NP	159.43	NP	2135.12	2135.12
MW-10	5/23/2013	2294.55	NP	159.60	NP	2134.95	2134.95
MW-10	6/26/2013	2294.55	NP	159.94	NP	2134.61	2134.61
MW-10	7/8/2013	2294.55	NP	160.03	NP	2134.52	2134.52
MW-10	8/8/2013	2294.55	NP	160.20	NP	2134.35	2134.35
MW-10	9/5/2013	2294.55	NP	160.07	NP	2134.48	2134.48
MW-10	10/3/2013	2294.55	NP	160.21	NP	2134.34	2134.34
MW-10	11/27/2013	2294.55	NP	160.41	NP	2134.14	2134.14
MW-10	12/31/2013	2294.55	NP	160.36	NP	2134.19	2134.19
MW-10	1/10/2014	2294.55	NP	160.60	NP	2133.95	2133.95
MW-10	2/18/2014	2294.55	NP	160.70	NP	2133.85	2133.85
MW-10	3/12/2014	2294.55	NP	160.74	NP	2133.81	2133.81

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-10	4/17/2014	2294.55	NP	160.92	NP	2133.63	2133.63
MW-10	5/22/2014	2294.55	NP	161.21	NP	2133.34	2133.34
MW-10	6/20/2014	2294.55	NP	161.53	NP	2133.02	2133.02
MW-10	7/15/2014	2294.55	NP	161.80	NP	2132.75	2132.75
MW-10	8/14/2014	2294.55	NP	162.13	NP	2132.42	2132.42
MW-10	9/9/2014	2294.55	NP	161.93	NP	2132.62	2132.62
MW-10	10/1/2014	2294.55	NP	161.15	NP	2133.40	2133.40
MW-10	11/18/2014	2294.55	NP	160.93	NP	2133.62	2133.62
MW-10	12/16/2014	2294.55	NP	160.97	NP	2133.58	2133.58
MW-10	1/19/2015	2294.55	NP	160.73	NP	2133.82	2133.82
MW-10	2/19/2015	2294.55	NP	160.53	NP	2134.02	2134.02
MW-10	3/26/2015	2294.55	NP	160.21	NP	2134.34	2134.34
MW-10	4/16/2015	2294.55	NP	160.09	NP	2134.46	2134.46
MW-10	5/19/2015	2294.55	NP	160.40	NP	2134.15	2134.15
MW-10	6/22/2015	2294.55	NP	160.99	NP	2133.56	2133.56
MW-11	11/11/2003	2290.63	NP	142.61	NP	2148.02	2148.02
MW-11	11/12/2003	2290.63	NP	142.58	NP	2148.05	2148.05
MW-11	11/13/2003	2290.63	NP	142.64	NP	2147.99	2147.99
MW-11	11/14/2003	2290.63	NP	142.64	NP	2147.99	2147.99
MW-11	11/17/2003	2290.63	NP	142.65	NP	2147.98	2147.98
MW-11	11/18/2003	2290.63	NP	142.61	NP	2148.02	2148.02
MW-11	11/19/2003	2290.63	NP	142.59	NP	2148.04	2148.04
MW-11	11/20/2003	2290.63	NP	142.68	NP	2147.95	2147.95
MW-11	11/24/2003	2290.63	NP	142.66	NP	2147.97	2147.97
MW-11	11/26/2003	2290.63	NP	142.66	NP	2147.97	2147.97
MW-11	12/1/2003	2290.63	NP	142.69	NP	2147.94	2147.94
MW-11	1/19/2004	2290.63	NP	143.22	NP	2147.41	2147.41
MW-11	1/26/2004	2290.63	NP	143.29	NP	2147.34	2147.34
MW-11	1/29/2004	2290.63	NP	143.37	NP	2147.26	2147.26
MW-11	2/5/2004	2290.63	NP	143.46	NP	2147.17	2147.17
MW-11	2/12/2004	2290.63	NP	143.48	NP	2147.15	2147.15
MW-11	2/23/2004	2290.63	NP	143.51	NP	2147.12	2147.12
MW-11	3/2/2004	2290.63	NP	143.51	NP	2147.12	2147.12
MW-11	3/8/2004	2290.63	NP	143.51	NP	2147.12	2147.12
MW-11	3/15/2004	2290.63	NP	143.66	NP	2146.97	2146.97
MW-11	3/22/2004	2290.63	NP	143.69	NP	2146.94	2146.94
MW-11	3/29/2004	2290.63	NP	143.75	NP	2146.88	2146.88
MW-11	4/5/2004	2290.63	NP	143.80	NP	2146.83	2146.83
MW-11	4/12/2004	2290.63	NP	143.80	NP	2146.83	2146.83
MW-11	4/19/2004	2290.63	NP	143.82	NP	2146.81	2146.81
MW-11	4/26/2004	2290.63	NP	143.84	NP	2146.79	2146.79
MW-11	5/3/2004	2290.63	NP	143.80	NP	2146.83	2146.83
MW-11	5/10/2004	2290.63	NP	143.85	NP	2146.78	2146.78
MW-11	5/17/2004	2290.63	NP	143.90	NP	2146.73	2146.73
MW-11	5/24/2004	2290.63	NP	143.97	NP	2146.66	2146.66
MW-11	5/31/2004	2290.63	NP	143.99	NP	2146.64	2146.64

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-11	6/7/2004	2290.63	NP	144.11	NP	2146.52	2146.52
MW-11	6/14/2004	2290.63	NP	144.16	NP	2146.47	2146.47
MW-11	6/21/2004	2290.63	NP	144.34	NP	2146.29	2146.29
MW-11	6/28/2004	2290.63	NP	144.46	NP	2146.17	2146.17
MW-11	7/6/2004	2290.63	NP	144.59	NP	2146.04	2146.04
MW-11	7/12/2004	2290.63	NP	144.70	NP	2145.93	2145.93
MW-11	7/19/2004	2290.63	NP	144.81	NP	2145.82	2145.82
MW-11	7/26/2004	2290.63	NP	144.91	NP	2145.72	2145.72
MW-11	8/2/2004	2290.63	NP	145.04	NP	2145.59	2145.59
MW-11	8/9/2004	2290.63	NP	145.20	NP	2145.43	2145.43
MW-11	8/16/2004	2290.63	NP	145.32	NP	2145.31	2145.31
MW-11	8/23/2004	2290.63	NP	145.41	NP	2145.22	2145.22
MW-11	8/30/2004	2290.63	NP	145.54	NP	2145.09	2145.09
MW-11	9/8/2004	2290.63	NP	145.60	NP	2145.03	2145.03
MW-11	9/13/2004	2290.63	NP	145.72	NP	2144.91	2144.91
MW-11	9/20/2004	2290.63	NP	145.81	NP	2144.82	2144.82
MW-11	9/27/2004	2290.63	NP	145.89	NP	2144.74	2144.74
MW-11	10/4/2004	2290.63	NP	145.98	NP	2144.65	2144.65
MW-11	10/11/2004	2290.63	NP	146.03	NP	2144.60	2144.60
MW-11	10/18/2004	2290.63	149.61	146.06	-3.55	2144.57	2141.91
MW-11	10/25/2004	2290.63	NP	146.08	NP	2144.55	2144.55
MW-11	11/1/2004	2290.63	NP	146.22	NP	2144.41	2144.41
MW-11	11/8/2004	2290.63	NP	146.32	NP	2144.31	2144.31
MW-11	11/15/2004	2290.63	NP	146.39	NP	2144.24	2144.24
MW-11	11/30/2004	2290.63	NP	146.50	NP	2144.13	2144.13
MW-11	12/6/2004	2290.63	NP	146.68	NP	2143.95	2143.95
MW-11	12/13/2004	2290.63	NP	146.74	NP	2143.89	2143.89
MW-11	12/20/2004	2290.63	NP	146.75	NP	2143.88	2143.88
MW-11	1/4/2005	2290.63	NP	146.88	NP	2143.75	2143.75
MW-11	1/10/2005	2290.63	NP	146.80	NP	2143.83	2143.83
MW-11	1/17/2005	2290.63	NP	146.75	NP	2143.88	2143.88
MW-11	1/24/2005	2290.63	NP	146.81	NP	2143.82	2143.82
MW-11	1/31/2005	2290.63	NP	146.95	NP	2143.68	2143.68
MW-11	2/22/2005	2290.63	NP	146.88	NP	2143.75	2143.75
MW-11	3/2/2005	2290.63	NP	146.97	NP	2143.66	2143.66
MW-11	3/7/2005	2290.63	NP	146.91	NP	2143.72	2143.72
MW-11	3/14/2005	2290.63	NP	146.92	NP	2143.71	2143.71
MW-11	3/21/2005	2290.63	NP	146.73	NP	2143.90	2143.90
MW-11	3/27/2005	2290.63	NP	146.65	NP	2143.98	2143.98
MW-11	4/4/2005	2290.63	NP	146.71	NP	2143.92	2143.92
MW-11	4/11/2005	2290.63	NP	146.70	NP	2143.93	2143.93
MW-11	4/18/2005	2290.63	NP	146.91	NP	2143.72	2143.72
MW-11	4/25/2005	2290.63	NP	146.89	NP	2143.74	2143.74
MW-11	5/2/2005	2290.63	NP	146.91	NP	2143.72	2143.72
MW-11	5/10/2005	2290.63	NP	146.95	NP	2143.68	2143.68
MW-11	5/16/2005	2290.63	NP	146.97	NP	2143.66	2143.66

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-11	5/23/2005	2290.63	NP	147.11	NP	2143.52	2143.52
MW-11	5/30/2005	2290.63	NP	147.16	NP	2143.47	2143.47
MW-11	6/6/2005	2290.63	NP	147.27	NP	2143.36	2143.36
MW-11	6/13/2005	2290.63	NP	147.32	NP	2143.31	2143.31
MW-11	6/20/2005	2290.63	NP	147.37	NP	2143.26	2143.26
MW-11	6/27/2005	2290.63	NP	147.44	NP	2143.19	2143.19
MW-11	7/11/2005	2290.63	NP	147.62	NP	2143.01	2143.01
MW-11	7/18/2005	2290.63	NP	147.73	NP	2142.90	2142.90
MW-11	7/25/2005	2290.63	NP	147.81	NP	2142.82	2142.82
MW-11	8/1/2005	2290.63	NP	147.80	NP	2142.83	2142.83
MW-11	8/8/2005	2290.63	NP	147.95	NP	2142.68	2142.68
MW-11	8/15/2005	2290.63	NP	147.98	NP	2142.65	2142.65
MW-11	8/22/2005	2290.63	NP	147.99	NP	2142.64	2142.64
MW-11	8/29/2005	2290.63	NP	147.64	NP	2142.99	2142.99
MW-11	9/7/2005	2290.63	NP	146.95	NP	2143.68	2143.68
MW-11	9/12/2005	2290.63	NP	146.56	NP	2144.07	2144.07
MW-11	9/19/2005	2290.63	NP	146.29	NP	2144.34	2144.34
MW-11	9/26/2005	2290.63	NP	146.30	NP	2144.33	2144.33
MW-11	10/3/2005	2290.63	NP	146.47	NP	2144.16	2144.16
MW-11	10/10/2005	2290.63	NP	146.70	NP	2143.93	2143.93
MW-11	10/17/2005	2290.63	NP	146.86	NP	2143.77	2143.77
MW-11	10/24/2005	2290.63	NP	146.99	NP	2143.64	2143.64
MW-11	10/31/2005	2290.63	NP	147.23	NP	2143.40	2143.40
MW-11	11/7/2005	2290.63	NP	147.43	NP	2143.20	2143.20
MW-11	11/14/2005	2290.63	NP	147.53	NP	2143.10	2143.10
MW-11	11/21/2005	2290.63	NP	147.72	NP	2142.91	2142.91
MW-11	12/5/2005	2290.63	NP	147.88	NP	2142.75	2142.75
MW-11	12/19/2005	2290.63	NP	147.93	NP	2142.70	2142.70
MW-11	1/9/2006	2290.63	NP	148.08	NP	2142.55	2142.55
MW-11	1/16/2006	2290.63	NP	148.15	NP	2142.48	2142.48
MW-11	1/30/2006	2290.63	NP	148.21	NP	2142.42	2142.42
MW-11	2/13/2006	2290.63	NP	148.28	NP	2142.35	2142.35
MW-11	2/27/2006	2290.63	NP	148.36	NP	2142.27	2142.27
MW-11	3/6/2006	2290.63	NP	148.38	NP	2142.25	2142.25
MW-11	3/13/2006	2290.63	NP	148.41	NP	2142.22	2142.22
MW-11	3/20/2006	2290.63	NP	148.43	NP	2142.20	2142.20
MW-11	3/27/2006	2290.63	NP	148.95	NP	2141.68	2141.68
MW-11	4/3/2006	2290.63	NP	148.97	NP	2141.66	2141.66
MW-11	4/10/2006	2290.63	NP	148.59	NP	2142.04	2142.04
MW-11	4/17/2006	2290.63	NP	148.63	NP	2142.00	2142.00
MW-11	4/24/2006	2290.63	NP	148.65	NP	2141.98	2141.98
MW-11	5/1/2006	2290.63	NP	148.66	NP	2141.97	2141.97
MW-11	5/15/2006	2290.63	NP	148.75	NP	2141.88	2141.88
MW-11	5/22/2006	2290.63	NP	148.79	NP	2141.84	2141.84
MW-11	5/30/2006	2290.63	NP	148.89	NP	2141.74	2141.74
MW-11	6/5/2006	2290.63	NP	149.03	NP	2141.60	2141.60

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-11	6/12/2006	2290.63	NP	149.10	NP	2141.53	2141.53
MW-11	6/26/2006	2290.63	NP	149.29	NP	2141.34	2141.34
MW-11	7/10/2006	2290.63	NP	149.40	NP	2141.23	2141.23
MW-11	8/2/2006	2290.63	NP	149.58	NP	2141.05	2141.05
MW-11	8/14/2006	2290.63	NP	149.64	NP	2140.99	2140.99
MW-11	8/23/2006	2290.63	NP	149.38	NP	2141.25	2141.25
MW-11	9/19/2006	2290.63	NP	147.50	NP	2143.13	2143.13
MW-11	10/20/2006	2290.63	NP	147.01	NP	2143.62	2143.62
MW-11	10/30/2006	2290.63	NP	147.28	NP	2143.35	2143.35
MW-11	11/17/2006	2290.63	NP	147.74	NP	2142.89	2142.89
MW-11	1/29/2007	2290.63	NP	149.02	NP	2141.61	2141.61
MW-11	3/1/2007	2290.63	NP	149.28	NP	2141.35	2141.35
MW-11	3/28/2007	2290.63	NP	149.50	NP	2141.13	2141.13
MW-11	4/24/2007	2290.63	NP	149.69	NP	2140.94	2140.94
MW-11	5/28/2007	2290.63	NP	149.78	NP	2140.85	2140.85
MW-11	6/27/2007	2290.63	NP	150.19	NP	2140.44	2140.44
MW-11	7/23/2007	2290.63	NP	150.39	NP	2140.24	2140.24
MW-11	8/25/2007	2290.63	NP	148.97	NP	2141.66	2141.66
MW-11	9/25/2007	2290.63	NP	148.45	NP	2142.18	2142.18
MW-11	10/22/2007	2290.63	NP	149.11	NP	2141.52	2141.52
MW-11	11/28/2007	2290.63	NP	150.43	NP	2140.20	2140.20
MW-11	12/31/2007	2290.63	NP	150.37	NP	2140.26	2140.26
MW-11	1/26/2008	2290.63	NP	150.13	NP	2140.50	2140.50
MW-11	2/29/2008	2290.63	NP	150.27	NP	2140.36	2140.36
MW-11	3/31/2008	2290.63	NP	149.79	NP	2140.84	2140.84
MW-11	4/21/2008	2290.63	NP	153.16	NP	2137.47	2137.47
MW-11	5/23/2008	2290.63	NP	150.70	NP	2139.93	2139.93
MW-11	6/25/2008	2290.63	NP	150.82	NP	2139.81	2139.81
MW-11	7/28/2008	2290.63	NP	151.17	NP	2139.46	2139.46
MW-11	8/25/2008	2290.63	NP	148.76	NP	2141.87	2141.87
MW-11	9/30/2008	2290.63	NP	147.09	NP	2143.54	2143.54
MW-11	10/13/2008	2290.63	NP	147.33	NP	2143.30	2143.30
MW-11	11/26/2008	2290.63	NP	148.58	NP	2142.05	2142.05
MW-11	12/23/2008	2290.63	NP	149.00	NP	2141.63	2141.63
MW-11	1/26/2009	2290.63	NP	149.18	NP	2141.45	2141.45
MW-11	2/27/2009	2290.63	NP	149.25	NP	2141.38	2141.38
MW-11	3/26/2009	2290.63	NP	149.67	NP	2140.96	2140.96
MW-11	4/27/2009	2290.63	NP	149.74	NP	2140.89	2140.89
MW-11	5/20/2009	2290.63	NP	151.15	NP	2139.48	2139.48
MW-11	6/16/2009	2290.63	NP	150.87	NP	2139.76	2139.76
MW-11	7/20/2009	2290.63	NP	151.26	NP	2139.37	2139.37
MW-11	8/31/2009	2290.63	NP	151.43	NP	2139.20	2139.20
MW-11	9/29/2009	2290.63	NP	151.67	NP	2138.96	2138.96
MW-11	10/22/2009	2290.63	NP	151.73	NP	2138.90	2138.90
MW-11	11/25/2009	2290.63	NP	152.08	NP	2138.55	2138.55
MW-11	12/14/2009	2290.63	NP	152.14	NP	2138.49	2138.49

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-11	1/18/2010	2290.63	NP	152.10	NP	2138.53	2138.53
MW-11	2/26/2010	2290.63	NP	152.00	NP	2138.63	2138.63
MW-11	3/22/2010	2290.63	NP	151.45	NP	2139.18	2139.18
MW-11	4/12/2010	2290.63	NP	151.16	NP	2139.47	2139.47
MW-11	5/27/2010	2290.63	NP	151.81	NP	2138.82	2138.82
MW-11	6/22/2010	2290.63	NP	152.17	NP	2138.46	2138.46
MW-11	7/12/2010	2290.63	NP	152.54	NP	2138.09	2138.09
MW-11	8/26/2010	2290.63	NP	152.62	NP	2138.01	2138.01
MW-11	9/22/2010	2290.63	NP	152.06	NP	2138.57	2138.57
MW-11	10/5/2010	2290.63	NP	151.80	NP	2138.83	2138.83
MW-11	10/18/2010	2290.63	NP	151.80	NP	2138.83	2138.83
MW-11	11/30/2010	2290.63	NP	152.27	NP	2138.36	2138.36
MW-11	12/21/2010	2290.63	NP	152.45	NP	2138.18	2138.18
MW-11	1/10/2011	2290.63	NP	152.41	NP	2138.22	2138.22
MW-11	2/17/2011	2290.63	NP	152.86	NP	2137.77	2137.77
MW-11	3/25/2011	2290.63	NP	152.83	NP	2137.80	2137.80
MW-11	4/11/2011	2290.63	NP	153.10	NP	2137.53	2137.53
MW-11	5/9/2011	2290.63	NP	153.49	NP	2137.14	2137.14
MW-11	6/29/2011	2290.63	NP	154.16	NP	2136.47	2136.47
MW-11	7/11/2011	2290.63	NP	154.26	NP	2136.37	2136.37
MW-11	8/31/2011	2290.63	NP	154.70	NP	2135.93	2135.93
MW-11	9/28/2011	2290.63	NP	154.63	NP	2136.00	2136.00
MW-11	10/10/2011	2290.63	NP	153.55	NP	2137.08	2137.08
MW-11	11/16/2011	2290.63	NP	153.65	NP	2136.98	2136.98
MW-11	12/29/2011	2290.63	NP	153.86	NP	2136.77	2136.77
MW-11	1/16/2012	2290.63	NP	153.75	NP	2136.88	2136.88
MW-11	2/28/2012	2290.63	NP	153.56	NP	2137.07	2137.07
MW-11	3/30/2012	2290.63	NP	153.83	NP	2136.80	2136.80
MW-11	4/2/2012	2290.63	NP	153.92	NP	2136.71	2136.71
MW-11	5/30/2012	2290.63	NP	154.87	NP	2135.76	2135.76
MW-11	6/29/2012	2290.63	NP	155.18	NP	2135.45	2135.45
MW-11	7/9/2012	2290.63	NP	155.17	NP	2135.46	2135.46
MW-11	8/29/2012	2290.63	NP	154.39	NP	2136.24	2136.24
MW-11	9/25/2012	2290.63	NP	153.77	NP	2136.86	2136.86
MW-11	10/22/2012	2290.63	NP	154.11	NP	2136.52	2136.52
MW-11	11/15/2012	2290.63	NP	154.69	NP	2135.94	2135.94
MW-11	12/13/2012	2290.63	NP	155.11	NP	2135.52	2135.52
MW-11	1/21/2013	2290.63	NP	155.27	NP	2135.36	2135.36
MW-11	2/13/2013	2290.63	NP	155.30	NP	2135.33	2135.33
MW-11	3/21/2013	2290.63	NP	155.40	NP	2135.23	2135.23
MW-11	4/15/2013	2290.63	NP	155.48	NP	2135.15	2135.15
MW-11	5/23/2013	2290.63	NP	155.77	NP	2134.86	2134.86
MW-11	6/26/2013	2290.63	NP	156.12	NP	2134.51	2134.51
MW-11	7/8/2013	2290.63	NP	157.95	NP	2132.68	2132.68
MW-11	8/8/2013	2290.63	NP	156.41	NP	2134.22	2134.22
MW-11	9/5/2013	2290.63	NP	156.07	NP	2134.56	2134.56

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-11	10/3/2013	2290.63	NP	156.31	NP	2134.32	2134.32
MW-11	11/27/2013	2290.63	NP	156.55	NP	2134.08	2134.08
MW-11	12/31/2013	2290.63	NP	156.48	NP	2134.15	2134.15
MW-11	1/10/2014	2290.63	NP	156.73	NP	2133.90	2133.90
MW-11	2/18/2014	2290.63	NP	156.78	NP	2133.85	2133.85
MW-11	3/12/2014	2290.63	NP	156.85	NP	2133.78	2133.78
MW-11	4/17/2014	2290.63	NP	157.17	NP	2133.46	2133.46
MW-11	5/22/2014	2290.63	NP	157.49	NP	2133.14	2133.14
MW-11	6/20/2014	2290.63	NP	157.83	NP	2132.80	2132.80
MW-11	7/14/2014	2290.63	NP	158.00	NP	2132.63	2132.63
MW-11	8/14/2014	2290.63	NP	158.38	NP	2132.25	2132.25
MW-11	9/10/2014	2290.63	NP	157.83	NP	2132.80	2132.80
MW-11	10/1/2014	2290.63	NP	156.88	NP	2133.75	2133.75
MW-11	11/18/2014	2290.63	NP	156.78	NP	2133.85	2133.85
MW-11	12/16/2014	2290.63	NP	156.92	NP	2133.71	2133.71
MW-11	1/19/2015	2290.63	NP	156.75	NP	2133.88	2133.88
MW-11	2/19/2015	2290.63	NP	156.57	NP	2134.06	2134.06
MW-11	3/26/2015	2290.63	NP	156.30	NP	2134.33	2134.33
MW-11	4/16/2015	2290.63	NP	156.26	NP	2134.37	2134.37
MW-11	5/19/2015	2290.63	NP	156.63	NP	2134.00	2134.00
MW-11	6/22/2015	2290.63	NP	157.11	NP	2133.52	2133.52
MW-12	11/14/2003	2291.61	NP	144.18	NP	2147.43	2147.43
MW-12	11/17/2003	2291.61	NP	144.25	NP	2147.36	2147.36
MW-12	11/18/2003	2291.61	NP	144.22	NP	2147.39	2147.39
MW-12	11/19/2003	2291.61	NP	144.20	NP	2147.41	2147.41
MW-12	11/20/2003	2291.61	NP	144.28	NP	2147.33	2147.33
MW-12	11/24/2003	2291.61	NP	144.28	NP	2147.33	2147.33
MW-12	11/26/2003	2291.61	NP	144.33	NP	2147.28	2147.28
MW-12	12/1/2003	2291.61	NP	144.31	NP	2147.30	2147.30
MW-12	1/19/2004	2291.61	NP	144.38	NP	2147.23	2147.23
MW-12	1/26/2004	2291.61	NP	144.46	NP	2147.15	2147.15
MW-12	1/29/2004	2291.61	NP	144.55	NP	2147.06	2147.06
MW-12	2/5/2004	2291.61	NP	144.64	NP	2146.97	2146.97
MW-12	2/12/2004	2291.61	NP	144.65	NP	2146.96	2146.96
MW-12	2/23/2004	2291.61	NP	144.67	NP	2146.94	2146.94
MW-12	3/2/2004	2291.61	NP	144.67	NP	2146.94	2146.94
MW-12	3/8/2004	2291.61	NP	144.67	NP	2146.94	2146.94
MW-12	3/15/2004	2291.61	NP	144.81	NP	2146.80	2146.80
MW-12	3/22/2004	2291.61	NP	144.81	NP	2146.80	2146.80
MW-12	3/29/2004	2291.61	NP	144.88	NP	2146.73	2146.73
MW-12	4/5/2004	2291.61	NP	144.92	NP	2146.69	2146.69
MW-12	4/12/2004	2291.61	NP	144.92	NP	2146.69	2146.69
MW-12	4/19/2004	2291.61	NP	144.94	NP	2146.67	2146.67
MW-12	4/26/2004	2291.61	NP	144.95	NP	2146.66	2146.66
MW-12	5/3/2004	2291.61	NP	144.90	NP	2146.71	2146.71
MW-12	5/10/2004	2291.61	NP	144.93	NP	2146.68	2146.68

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-12	5/17/2004	2291.61	NP	144.99	NP	2146.62	2146.62
MW-12	5/24/2004	2291.61	NP	145.05	NP	2146.56	2146.56
MW-12	5/31/2004	2291.61	NP	145.07	NP	2146.54	2146.54
MW-12	6/7/2004	2291.61	NP	145.16	NP	2146.45	2146.45
MW-12	6/14/2004	2291.61	NP	145.28	NP	2146.33	2146.33
MW-12	6/21/2004	2291.61	NP	145.41	NP	2146.20	2146.20
MW-12	6/28/2004	2291.61	NP	145.52	NP	2146.09	2146.09
MW-12	7/6/2004	2291.61	NP	145.69	NP	2145.92	2145.92
MW-12	7/12/2004	2291.61	NP	145.80	NP	2145.81	2145.81
MW-12	7/19/2004	2291.61	NP	145.92	NP	2145.69	2145.69
MW-12	7/26/2004	2291.61	NP	146.02	NP	2145.59	2145.59
MW-12	8/2/2004	2291.61	NP	146.14	NP	2145.47	2145.47
MW-12	8/9/2004	2291.61	NP	146.32	NP	2145.29	2145.29
MW-12	8/16/2004	2291.61	NP	146.45	NP	2145.16	2145.16
MW-12	8/23/2004	2291.61	NP	146.52	NP	2145.09	2145.09
MW-12	8/30/2004	2291.61	NP	146.65	NP	2144.96	2144.96
MW-12	9/8/2004	2291.61	NP	146.70	NP	2144.91	2144.91
MW-12	9/13/2004	2291.61	NP	146.81	NP	2144.80	2144.80
MW-12	9/20/2004	2291.61	NP	146.91	NP	2144.70	2144.70
MW-12	9/27/2004	2291.61	NP	147.00	NP	2144.61	2144.61
MW-12	10/4/2004	2291.61	NP	147.05	NP	2144.56	2144.56
MW-12	10/11/2004	2291.61	NP	147.13	NP	2144.48	2144.48
MW-12	10/18/2004	2291.61	NP	147.15	NP	2144.46	2144.46
MW-12	10/25/2004	2291.61	NP	147.15	NP	2144.46	2144.46
MW-12	11/1/2004	2291.61	NP	147.30	NP	2144.31	2144.31
MW-12	11/8/2004	2291.61	NP	147.42	NP	2144.19	2144.19
MW-12	11/15/2004	2291.61	NP	147.48	NP	2144.13	2144.13
MW-12	11/30/2004	2291.61	NP	147.56	NP	2144.05	2144.05
MW-12	12/6/2004	2291.61	NP	147.78	NP	2143.83	2143.83
MW-12	12/13/2004	2291.61	NP	147.83	NP	2143.78	2143.78
MW-12	12/20/2004	2291.61	NP	147.82	NP	2143.79	2143.79
MW-12	1/4/2005	2291.61	NP	147.96	NP	2143.65	2143.65
MW-12	1/10/2005	2291.61	NP	147.87	NP	2143.74	2143.74
MW-12	1/17/2005	2291.61	NP	147.80	NP	2143.81	2143.81
MW-12	1/24/2005	2291.61	NP	147.96	NP	2143.65	2143.65
MW-12	1/31/2005	2291.61	NP	148.04	NP	2143.57	2143.57
MW-12	2/22/2005	2291.61	NP	147.88	NP	2143.73	2143.73
MW-12	2/22/2005	2291.61	NP	147.88	NP	2143.73	2143.73
MW-12	3/2/2005	2291.61	NP	148.02	NP	2143.59	2143.59
MW-12	3/7/2005	2291.61	NP	147.96	NP	2143.65	2143.65
MW-12	3/14/2005	2291.61	NP	147.96	NP	2143.65	2143.65
MW-12	3/21/2005	2291.61	NP	147.73	NP	2143.88	2143.88
MW-12	3/27/2005	2291.61	NP	147.61	NP	2144.00	2144.00
MW-12	4/4/2005	2291.61	NP	147.69	NP	2143.92	2143.92
MW-12	4/11/2005	2291.61	NP	147.69	NP	2143.92	2143.92
MW-12	4/18/2005	2291.61	NP	147.90	NP	2143.71	2143.71

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-12	4/25/2005	2291.61	NP	147.89	NP	2143.72	2143.72
MW-12	5/2/2005	2291.61	NP	147.95	NP	2143.66	2143.66
MW-12	5/10/2005	2291.61	NP	148.02	NP	2143.59	2143.59
MW-12	5/16/2005	2291.61	NP	148.05	NP	2143.56	2143.56
MW-12	5/23/2005	2291.61	NP	148.16	NP	2143.45	2143.45
MW-12	5/30/2005	2291.61	NP	148.22	NP	2143.39	2143.39
MW-12	6/6/2005	2291.61	NP	148.32	NP	2143.29	2143.29
MW-12	6/13/2005	2291.61	NP	148.35	NP	2143.26	2143.26
MW-12	6/20/2005	2291.61	NP	148.44	NP	2143.17	2143.17
MW-12	6/27/2005	2291.61	NP	148.52	NP	2143.09	2143.09
MW-12	7/11/2005	2291.61	NP	148.71	NP	2142.90	2142.90
MW-12	7/18/2005	2291.61	NP	148.82	NP	2142.79	2142.79
MW-12	7/25/2005	2291.61	NP	149.89	NP	2141.72	2141.72
MW-12	8/1/2005	2291.61	NP	148.97	NP	2142.64	2142.64
MW-12	8/8/2005	2291.61	NP	149.04	NP	2142.57	2142.57
MW-12	8/15/2005	2291.61	NP	149.07	NP	2142.54	2142.54
MW-12	8/22/2005	2291.61	NP	149.08	NP	2142.53	2142.53
MW-12	8/29/2005	2291.61	NP	148.78	NP	2142.83	2142.83
MW-12	9/7/2005	2291.61	NP	148.04	NP	2143.57	2143.57
MW-12	9/12/2005	2291.61	NP	147.56	NP	2144.05	2144.05
MW-12	9/19/2005	2291.61	NP	147.18	NP	2144.43	2144.43
MW-12	9/26/2005	2291.61	NP	147.16	NP	2144.45	2144.45
MW-12	10/3/2005	2291.61	NP	147.31	NP	2144.30	2144.30
MW-12	10/10/2005	2291.61	NP	147.59	NP	2144.02	2144.02
MW-12	10/17/2005	2291.61	NP	147.80	NP	2143.81	2143.81
MW-12	10/24/2005	2291.61	NP	147.94	NP	2143.67	2143.67
MW-12	10/31/2005	2291.61	NP	148.22	NP	2143.39	2143.39
MW-12	11/7/2005	2291.61	NP	148.42	NP	2143.19	2143.19
MW-12	11/14/2005	2291.61	NP	148.53	NP	2143.08	2143.08
MW-12	11/21/2005	2291.61	NP	148.76	NP	2142.85	2142.85
MW-12	12/5/2005	2291.61	NP	148.96	NP	2142.65	2142.65
MW-12	12/19/2005	2291.61	NP	148.99	NP	2142.62	2142.62
MW-12	1/9/2006	2291.61	NP	149.17	NP	2142.44	2142.44
MW-12	1/16/2006	2291.61	NP	149.23	NP	2142.38	2142.38
MW-12	1/30/2006	2291.61	NP	149.30	NP	2142.31	2142.31
MW-12	2/13/2006	2291.61	NP	149.39	NP	2142.22	2142.22
MW-12	2/27/2006	2291.61	NP	149.45	NP	2142.16	2142.16
MW-12	3/6/2006	2291.61	NP	149.46	NP	2142.15	2142.15
MW-12	3/13/2006	2291.61	NP	149.51	NP	2142.10	2142.10
MW-12	3/20/2006	2291.61	NP	149.54	NP	2142.07	2142.07
MW-12	3/27/2006	2291.61	NP	149.53	NP	2142.08	2142.08
MW-12	4/3/2006	2291.61	NP	149.57	NP	2142.04	2142.04
MW-12	4/10/2006	2291.61	NP	149.65	NP	2141.96	2141.96
MW-12	4/17/2006	2291.61	NP	149.67	NP	2141.94	2141.94
MW-12	4/24/2006	2291.61	NP	149.72	NP	2141.89	2141.89
MW-12	5/1/2006	2291.61	NP	149.73	NP	2141.88	2141.88

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-12	5/15/2006	2291.61	NP	149.80	NP	2141.81	2141.81
MW-12	5/22/2006	2291.61	NP	149.85	NP	2141.76	2141.76
MW-12	5/30/2006	2291.61	NP	149.94	NP	2141.67	2141.67
MW-12	6/5/2006	2291.61	NP	150.11	NP	2141.50	2141.50
MW-12	6/10/2006	2291.61	NP	150.18	NP	2141.43	2141.43
MW-12	6/26/2006	2291.61	NP	150.37	NP	2141.24	2141.24
MW-12	7/10/2006	2291.61	NP	150.50	NP	2141.11	2141.11
MW-12	8/2/2006	2291.61	NP	150.70	NP	2140.91	2140.91
MW-12	8/14/2006	2291.61	NP	150.74	NP	2140.87	2140.87
MW-12	8/23/2006	2291.61	NP	150.62	NP	2140.99	2140.99
MW-12	9/19/2006	2291.61	NP	148.46	NP	2143.15	2143.15
MW-12	10/20/2006	2291.61	NP	147.86	NP	2143.75	2143.75
MW-12	10/30/2006	2291.61	NP	148.19	NP	2143.42	2143.42
MW-12	11/17/2006	2291.61	NP	148.61	NP	2143.00	2143.00
MW-12	1/30/2007	2291.61	NP	150.06	NP	2141.55	2141.55
MW-12	3/1/2007	2291.61	NP	150.32	NP	2141.29	2141.29
MW-12	3/28/2007	2291.61	NP	150.57	NP	2141.04	2141.04
MW-12	4/24/2007	2291.61	NP	150.74	NP	2140.87	2140.87
MW-12	5/28/2007	2291.61	NP	150.87	NP	2140.74	2140.74
MW-12	6/27/2007	2291.61	NP	151.28	NP	2140.33	2140.33
MW-12	7/23/2007	2291.61	NP	151.53	NP	2140.08	2140.08
MW-12	8/25/2007	2291.61	NP	150.36	NP	2141.25	2141.25
MW-12	9/25/2007	2291.61	NP	149.36	NP	2142.25	2142.25
MW-12	10/22/2007	2291.61	NP	150.10	NP	2141.51	2141.51
MW-12	11/28/2007	2291.61	NP	151.40	NP	2140.21	2140.21
MW-12	12/31/2007	2291.61	NP	151.45	NP	2140.16	2140.16
MW-12	1/26/2008	2291.61	NP	151.16	NP	2140.45	2140.45
MW-12	2/29/2008	2291.61	NP	151.33	NP	2140.28	2140.28
MW-12	3/31/2008	2291.61	NP	150.84	NP	2140.77	2140.77
MW-12	4/21/2008	2291.61	NP	151.04	NP	2140.57	2140.57
MW-12	5/23/2008	2291.61	NP	151.61	NP	2140.00	2140.00
MW-12	6/25/2008	2291.61	NP	151.87	NP	2139.74	2139.74
MW-12	7/28/2008	2291.61	NP	152.21	NP	2139.40	2139.40
MW-12	8/25/2008	2291.61	NP	149.84	NP	2141.77	2141.77
MW-12	9/30/2008	2291.61	NP	147.87	NP	2143.74	2143.74
MW-12	10/13/2008	2291.61	NP	148.12	NP	2143.49	2143.49
MW-12	11/26/2008	2291.61	NP	149.55	NP	2142.06	2142.06
MW-12	12/23/2008	2291.61	NP	149.99	NP	2141.62	2141.62
MW-12	1/26/2009	2291.61	NP	150.20	NP	2141.41	2141.41
MW-12	2/27/2009	2291.61	NP	150.29	NP	2141.32	2141.32
MW-12	3/26/2009	2291.61	NP	150.84	NP	2140.77	2140.77
MW-12	4/27/2009	2291.61	NP	150.81	NP	2140.80	2140.80
MW-12	5/20/2009	2291.61	NP	151.21	NP	2140.40	2140.40
MW-12	6/16/2009	2291.61	NP	151.82	NP	2139.79	2139.79
MW-12	7/20/2009	2291.61	NP	152.28	NP	2139.33	2139.33
MW-12	8/31/2009	2291.61	NP	152.64	NP	2138.97	2138.97

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-12	9/29/2009	2291.61	NP	152.74	NP	2138.87	2138.87
MW-12	10/22/2009	2291.61	NP	153.83	NP	2137.78	2137.78
MW-12	11/25/2009	2291.61	NP	153.18	NP	2138.43	2138.43
MW-12	12/14/2009	2291.61	NP	153.19	NP	2138.42	2138.42
MW-12	1/18/2010	2291.61	NP	153.18	NP	2138.43	2138.43
MW-12	2/26/2010	2291.61	NP	153.15	NP	2138.46	2138.46
MW-12	3/22/2010	2291.61	NP	152.52	NP	2139.09	2139.09
MW-12	4/12/2010	2291.61	NP	152.25	NP	2139.36	2139.36
MW-12	5/27/2010	2291.61	NP	152.92	NP	2138.69	2138.69
MW-12	6/22/2010	2291.61	NP	153.25	NP	2138.36	2138.36
MW-12	7/12/2010	2291.61	NP	153.64	NP	2137.97	2137.97
MW-12	8/26/2010	2291.61	NP	153.86	NP	2137.75	2137.75
MW-12	9/22/2010	2291.61	NP	153.13	NP	2138.48	2138.48
MW-12	10/5/2010	2291.61	NP	152.87	NP	2138.74	2138.74
MW-12	10/18/2010	2291.61	NP	152.85	NP	2138.76	2138.76
MW-12	11/30/2010	2291.61	NP	153.33	NP	2138.28	2138.28
MW-12	12/21/2010	2291.61	NP	153.49	NP	2138.12	2138.12
MW-12	1/10/2011	2291.61	NP	153.43	NP	2138.18	2138.18
MW-12	2/17/2011	2291.61	NP	153.86	NP	2137.75	2137.75
MW-12	3/25/2011	2291.61	NP	153.89	NP	2137.72	2137.72
MW-12	4/11/2011	2291.61	NP	154.19	NP	2137.42	2137.42
MW-12	5/9/2011	2291.61	NP	154.49	NP	2137.12	2137.12
MW-12	6/29/2011	2291.61	NP	155.29	NP	2136.32	2136.32
MW-12	7/11/2011	2291.61	NP	155.33	NP	2136.28	2136.28
MW-12	8/31/2011	2291.61	NP	155.95	NP	2135.66	2135.66
MW-12	9/28/2011	2291.61	NP	155.81	NP	2135.80	2135.80
MW-12	10/10/2011	2291.61	NP	154.91	NP	2136.70	2136.70
MW-12	11/16/2011	2291.61	NP	154.75	NP	2136.86	2136.86
MW-12	12/29/2011	2291.61	NP	154.99	NP	2136.62	2136.62
MW-12	1/16/2012	2291.61	NP	154.93	NP	2136.68	2136.68
MW-12	2/28/2012	2291.61	NP	154.67	NP	2136.94	2136.94
MW-12	3/30/2012	2291.61	NP	154.94	NP	2136.67	2136.67
MW-12	4/2/2012	2291.61	NP	155.00	NP	2136.61	2136.61
MW-12	5/30/2012	2291.61	NP	155.99	NP	2135.62	2135.62
MW-12	6/29/2012	2291.61	NP	156.29	NP	2135.32	2135.32
MW-12	7/9/2012	2291.61	NP	156.32	NP	2135.29	2135.29
MW-12	8/29/2012	2291.61	NP	155.62	NP	2135.99	2135.99
MW-12	9/25/2012	2291.61	NP	155.03	NP	2136.58	2136.58
MW-12	10/22/2012	2291.61	NP	155.19	NP	2136.42	2136.42
MW-12	11/15/2012	2291.61	NP	155.82	NP	2135.79	2135.79
MW-12	12/13/2012	2291.61	NP	156.28	NP	2135.33	2135.33
MW-12	1/21/2013	2291.61	NP	156.42	NP	2135.19	2135.19
MW-12	2/13/2013	2291.61	NP	156.45	NP	2135.16	2135.16
MW-12	3/21/2013	2291.61	NP	156.50	NP	2135.11	2135.11
MW-12	4/15/2013	2291.61	NP	156.66	NP	2134.95	2134.95
MW-12	5/23/2013	2291.61	NP	156.94	NP	2134.67	2134.67

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-12	6/26/2013	2291.61	NP	157.29	NP	2134.32	2134.32
MW-12	7/8/2013	2291.61	NP	157.41	NP	2134.20	2134.20
MW-12	8/8/2013	2291.61	NP	157.58	NP	2134.03	2134.03
MW-12	9/5/2013	2291.61	NP	157.27	NP	2134.34	2134.34
MW-12	10/3/2013	2291.61	NP	157.51	NP	2134.10	2134.10
MW-12	11/27/2013	2291.61	NP	157.72	NP	2133.89	2133.89
MW-12	12/31/2013	2291.61	NP	157.65	NP	2133.96	2133.96
MW-12	1/10/2014	2291.61	NP	157.88	NP	2133.73	2133.73
MW-12	2/18/2014	2291.61	NP	157.97	NP	2133.64	2133.64
MW-12	3/12/2014	2291.61	NP	158.04	NP	2133.57	2133.57
MW-12	4/17/2014	2291.61	NP	158.29	NP	2133.32	2133.32
MW-12	5/22/2014	2291.61	NP	158.64	NP	2132.97	2132.97
MW-12	6/20/2014	2291.61	NP	158.98	NP	2132.63	2132.63
MW-12	7/14/2014	2291.61	NP	159.15	NP	2132.46	2132.46
MW-12	8/14/2014	2291.61	NP	159.64	NP	2131.97	2131.97
MW-12	9/10/2014	2291.61	NP	159.25	NP	2132.36	2132.36
MW-12	10/1/2014	2291.61	NP	158.32	NP	2133.29	2133.29
MW-12	11/18/2014	2291.61	NP	157.90	NP	2133.71	2133.71
MW-12	12/16/2014	2291.61	NP	158.03	NP	2133.58	2133.58
MW-12	1/19/2015	2291.61	NP	157.91	NP	2133.70	2133.70
MW-12	2/19/2015	2291.61	NP	157.69	NP	2133.92	2133.92
MW-12	3/26/2015	2291.61	NP	157.37	NP	2134.24	2134.24
MW-12	4/16/2015	2291.61	NP	157.33	NP	2134.28	2134.28
MW-12	5/19/2015	2291.61	NP	157.64	NP	2133.97	2133.97
MW-12	6/22/2015	2291.61	NP	158.21	NP	2133.40	2133.40
MW-13	11/18/2003	2289.75	NP	143.35	NP	2146.40	2146.40
MW-13	11/19/2003	2289.75	NP	143.26	NP	2146.49	2146.49
MW-13	11/20/2003	2289.75	NP	143.38	NP	2146.37	2146.37
MW-13	11/24/2003	2289.75	NP	143.38	NP	2146.37	2146.37
MW-13	11/26/2003	2289.75	NP	143.31	NP	2146.44	2146.44
MW-13	12/1/2003	2289.75	NP	143.41	NP	2146.34	2146.34
MW-13	1/19/2004	2289.75	NP	144.00	NP	2145.75	2145.75
MW-13	1/26/2004	2289.75	NP	144.10	NP	2145.65	2145.65
MW-13	1/28/2004	2289.75	NP	144.15	NP	2145.60	2145.60
MW-13	2/5/2004	2289.75	NP	144.24	NP	2145.51	2145.51
MW-13	2/12/2004	2289.75	NP	144.26	NP	2145.49	2145.49
MW-13	2/12/2004	2289.75	NP	144.26	NP	2145.49	2145.49
MW-13	2/23/2004	2289.75	NP	144.29	NP	2145.46	2145.46
MW-13	3/2/2004	2289.75	NP	144.29	NP	2145.46	2145.46
MW-13	3/8/2004	2289.75	NP	144.29	NP	2145.46	2145.46
MW-13	3/15/2004	2289.75	NP	144.42	NP	2145.33	2145.33
MW-13	3/22/2004	2289.75	NP	144.44	NP	2145.31	2145.31
MW-13	3/29/2004	2289.75	NP	144.51	NP	2145.24	2145.24
MW-13	4/5/2004	2289.75	NP	144.55	NP	2145.20	2145.20
MW-13	4/12/2004	2289.75	NP	144.55	NP	2145.20	2145.20
MW-13	4/19/2004	2289.75	NP	144.58	NP	2145.17	2145.17

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-13	4/26/2004	2289.75	NP	144.59	NP	2145.16	2145.16
MW-13	5/3/2004	2289.75	NP	144.57	NP	2145.18	2145.18
MW-13	5/10/2004	2289.75	NP	144.61	NP	2145.14	2145.14
MW-13	5/17/2004	2289.75	NP	144.66	NP	2145.09	2145.09
MW-13	5/24/2004	2289.75	NP	144.73	NP	2145.02	2145.02
MW-13	5/31/2004	2289.75	NP	144.74	NP	2145.01	2145.01
MW-13	6/7/2004	2289.75	NP	144.82	NP	2144.93	2144.93
MW-13	6/14/2004	2289.75	NP	144.95	NP	2144.80	2144.80
MW-13	6/21/2004	2289.75	NP	145.10	NP	2144.65	2144.65
MW-13	6/28/2004	2289.75	NP	145.23	NP	2144.52	2144.52
MW-13	7/6/2004	2289.75	NP	145.36	NP	2144.39	2144.39
MW-13	7/12/2004	2289.75	NP	145.49	NP	2144.26	2144.26
MW-13	7/19/2004	2289.75	NP	145.58	NP	2144.17	2144.17
MW-13	7/26/2004	2289.75	NP	145.70	NP	2144.05	2144.05
MW-13	8/2/2004	2289.75	NP	145.81	NP	2143.94	2143.94
MW-13	8/9/2004	2289.75	NP	145.97	NP	2143.78	2143.78
MW-13	8/16/2004	2289.75	NP	146.10	NP	2143.65	2143.65
MW-13	8/23/2004	2289.75	NP	145.19	NP	2144.56	2144.56
MW-13	8/30/2004	2289.75	NP	146.31	NP	2143.44	2143.44
MW-13	9/8/2004	2289.75	NP	146.42	NP	2143.33	2143.33
MW-13	9/13/2004	2289.75	NP	146.55	NP	2143.20	2143.20
MW-13	9/20/2004	2289.75	NP	146.62	NP	2143.13	2143.13
MW-13	9/27/2004	2289.75	NP	146.71	NP	2143.04	2143.04
MW-13	10/4/2004	2289.75	NP	146.79	NP	2142.96	2142.96
MW-13	10/11/2004	2289.75	NP	146.86	NP	2142.89	2142.89
MW-13	10/18/2004	2289.75	NP	146.91	NP	2142.84	2142.84
MW-13	10/25/2004	2289.75	NP	146.93	NP	2142.82	2142.82
MW-13	11/1/2004	2289.75	NP	147.08	NP	2142.67	2142.67
MW-13	11/8/2004	2289.75	NP	147.19	NP	2142.56	2142.56
MW-13	11/15/2004	2289.75	NP	147.25	NP	2142.50	2142.50
MW-13	11/30/2004	2289.75	NP	147.38	NP	2142.37	2142.37
MW-13	12/6/2004	2289.75	NP	147.55	NP	2142.20	2142.20
MW-13	12/13/2004	2289.75	NP	147.61	NP	2142.14	2142.14
MW-13	12/20/2004	2289.75	NP	147.61	NP	2142.14	2142.14
MW-13	1/4/2005	2289.75	NP	147.74	NP	2142.01	2142.01
MW-13	1/10/2005	2289.75	NP	147.65	NP	2142.10	2142.10
MW-13	1/17/2005	2289.75	NP	147.70	NP	2142.05	2142.05
MW-13	1/24/2005	2289.75	NP	147.82	NP	2141.93	2141.93
MW-13	1/31/2005	2289.75	NP	147.81	NP	2141.94	2141.94
MW-13	2/22/2005	2289.75	NP	147.67	NP	2142.08	2142.08
MW-13	3/2/2005	2289.75	NP	147.84	NP	2141.91	2141.91
MW-13	3/7/2005	2289.75	NP	147.79	NP	2141.96	2141.96
MW-13	3/14/2005	2289.75	NP	147.80	NP	2141.95	2141.95
MW-13	3/21/2005	2289.75	NP	147.83	NP	2141.92	2141.92
MW-13	3/27/2005	2289.75	NP	147.52	NP	2142.23	2142.23
MW-13	4/4/2005	2289.75	NP	147.59	NP	2142.16	2142.16

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-13	4/11/2005	2289.75	NP	147.58	NP	2142.17	2142.17
MW-13	4/18/2005	2289.75	NP	147.74	NP	2142.01	2142.01
MW-13	4/25/2005	2289.75	NP	147.74	NP	2142.01	2142.01
MW-13	5/2/2005	2289.75	NP	147.74	NP	2142.01	2142.01
MW-13	5/10/2005	2289.75	NP	147.79	NP	2141.96	2141.96
MW-13	5/16/2005	2289.75	NP	147.80	NP	2141.95	2141.95
MW-13	5/23/2005	2289.75	NP	147.95	NP	2141.80	2141.80
MW-13	5/30/2005	2289.75	NP	147.99	NP	2141.76	2141.76
MW-13	6/6/2005	2289.75	NP	148.09	NP	2141.66	2141.66
MW-13	6/13/2005	2289.75	NP	148.15	NP	2141.60	2141.60
MW-13	6/20/2005	2289.75	NP	148.18	NP	2141.57	2141.57
MW-13	6/27/2005	2289.75	NP	148.27	NP	2141.48	2141.48
MW-13	7/11/2005	2289.75	NP	148.46	NP	2141.29	2141.29
MW-13	7/18/2005	2289.75	NP	148.56	NP	2141.19	2141.19
MW-13	7/25/2005	2289.75	NP	148.63	NP	2141.12	2141.12
MW-13	8/1/2005	2289.75	NP	148.71	NP	2141.04	2141.04
MW-13	8/8/2005	2289.75	NP	148.79	NP	2140.96	2140.96
MW-13	8/15/2005	2289.75	NP	148.81	NP	2140.94	2140.94
MW-13	8/22/2005	2289.75	NP	148.81	NP	2140.94	2140.94
MW-13	8/29/2005	2289.75	NP	148.58	NP	2141.17	2141.17
MW-13	9/7/2005	2289.75	NP	148.06	NP	2141.69	2141.69
MW-13	9/12/2005	2289.75	NP	147.72	NP	2142.03	2142.03
MW-13	9/19/2005	2289.75	NP	147.42	NP	2142.33	2142.33
MW-13	9/26/2005	2289.75	NP	147.36	NP	2142.39	2142.39
MW-13	10/3/2005	2289.75	NP	147.48	NP	2142.27	2142.27
MW-13	10/10/2005	2289.75	NP	147.66	NP	2142.09	2142.09
MW-13	10/17/2005	2289.75	NP	147.81	NP	2141.94	2141.94
MW-13	10/24/2005	2289.75	NP	147.96	NP	2141.79	2141.79
MW-13	10/31/2005	2289.75	NP	148.16	NP	2141.59	2141.59
MW-13	11/7/2005	2289.75	NP	148.34	NP	2141.41	2141.41
MW-13	11/14/2005	2289.75	NP	148.47	NP	2141.28	2141.28
MW-13	11/21/2005	2289.75	NP	148.62	NP	2141.13	2141.13
MW-13	12/5/2005	2289.75	NP	148.78	NP	2140.97	2140.97
MW-13	12/19/2005	2289.75	NP	148.82	NP	2140.93	2140.93
MW-13	1/9/2006	2289.75	NP	148.99	NP	2140.76	2140.76
MW-13	1/16/2006	2289.75	NP	150.04	NP	2139.71	2139.71
MW-13	1/30/2006	2289.75	NP	148.87	NP	2140.88	2140.88
MW-13	2/13/2006	2289.75	NP	148.96	NP	2140.79	2140.79
MW-13	2/27/2006	2289.75	148.97	150.04	1.07	2139.71	2140.51
MW-13	3/6/2006	2289.75	149.03	150.02	0.99	2139.73	2140.47
MW-13	3/13/2006	2289.75	149.06	150.01	0.95	2139.74	2140.45
MW-13	3/20/2006	2289.75	149.09	150.05	0.96	2139.70	2140.42
MW-13	3/27/2006	2289.75	149.11	150.00	0.89	2139.75	2140.42
MW-13	4/3/2006	2289.75	149.20	149.91	0.71	2139.84	2140.37
MW-13	4/10/2006	2289.75	149.29	149.94	0.65	2139.81	2140.30
MW-13	4/17/2006	2289.75	149.41	149.66	0.25	2140.09	2140.28

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-13	4/24/2006	2289.75	149.46	149.67	0.21	2140.08	2140.24
MW-13	5/15/2006	2289.75	149.50	150.02	0.52	2139.73	2140.12
MW-13	5/22/2006	2289.75	149.67	149.94	0.27	2139.81	2140.01
MW-13	5/30/2006	2289.75	149.75	150.00	0.25	2139.75	2139.94
MW-13	6/5/2006	2289.75	149.86	150.06	0.20	2139.69	2139.84
MW-13	6/12/2006	2289.75	149.96	150.11	0.15	2139.64	2139.75
MW-13	6/26/2006	2289.75	150.11	150.39	0.28	2139.36	2139.57
MW-13	7/10/2006	2289.75	150.28	150.48	0.20	2139.27	2139.42
MW-13	8/4/2006	2289.75	149.70	150.10	0.40	2139.65	2139.95
MW-13	8/14/2006	2289.75	150.42	150.95	0.53	2138.80	2139.20
MW-13	8/23/2006	2289.75	150.25	150.65	0.40	2139.10	2139.40
MW-13	9/19/2006	2289.75	148.68	148.95	0.27	2140.80	2141.00
MW-13	10/20/2006	2289.75	147.99	148.38	0.39	2141.37	2141.66
MW-13	10/30/2006	2289.75	148.20	148.66	0.46	2141.09	2141.44
MW-13	11/17/2006	2289.75	148.61	149.07	0.46	2140.68	2141.03
MW-13	1/29/2007	2289.75	149.83	150.37	0.54	2139.38	2139.79
MW-13	3/1/2007	2289.75	150.07	150.67	0.60	2139.08	2139.53
MW-13	3/28/2007	2289.75	150.29	150.91	0.62	2138.84	2139.31
MW-13	4/24/2007	2289.75	150.48	151.11	0.63	2138.64	2139.11
MW-13	5/28/2007	2289.75	150.55	151.23	0.68	2138.52	2139.03
MW-13	6/27/2007	2289.75	150.95	151.63	0.68	2138.12	2138.63
MW-13	7/23/2007	2289.75	151.22	151.84	0.62	2137.91	2138.38
MW-13	8/25/2007	2289.75	150.34	150.68	0.34	2139.07	2139.33
MW-13	9/25/2007	2289.75	149.62	149.95	0.33	2139.80	2140.05
MW-13	10/22/2007	2289.75	150.12	150.55	0.43	2139.20	2139.52
MW-13	11/28/2007	2289.75	151.32	151.71	0.39	2138.04	2138.33
MW-13	12/31/2007	2289.75	151.34	151.67	0.33	2138.08	2138.33
MW-13	1/26/2008	2289.75	151.12	151.31	0.19	2138.44	2138.58
MW-13	2/29/2008	2289.75	151.12	151.23	0.11	2138.52	2138.60
MW-13	3/31/2008	2289.75	150.78	150.97	0.19	2138.78	2138.92
MW-13	4/21/2008	2289.75	151.06	151.23	0.17	2138.52	2138.65
MW-13	5/23/2008	2289.75	151.54	151.79	0.25	2137.96	2138.15
MW-13	6/25/2008	2289.75	151.69	152.09	0.40	2137.66	2137.96
MW-13	7/28/2008	2289.75	152.08	152.50	0.42	2137.25	2137.57
MW-13	8/25/2008	2289.75	NP	150.27	NP	2139.48	2139.48
MW-13	9/30/2008	2289.75	NP	148.50	NP	2141.25	2141.25
MW-13	11/26/2008	2289.75	NP	149.63	NP	2140.12	2140.12
MW-13	12/23/2008	2289.75	NP	150.06	NP	2139.69	2139.69
MW-13	1/26/2009	2289.75	NP	150.20	NP	2139.55	2139.55
MW-13	2/27/2009	2289.75	NP	150.30	NP	2139.45	2139.45
MW-13	3/26/2009	2289.75	NP	150.65	NP	2139.10	2139.10
MW-13	4/27/2009	2289.75	NP	150.75	NP	2139.00	2139.00
MW-13	5/20/2009	2289.75	NP	151.13	NP	2138.62	2138.62
MW-13	6/16/2009	2289.75	NP	151.83	NP	2137.92	2137.92
MW-13	7/20/2009	2289.75	152.22	152.24	0.02	2137.51	2137.53
MW-13	8/31/2009	2289.75	NP	152.62	NP	2137.13	2137.13

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-13	9/29/2009	2289.75	NP	152.82	NP	2136.93	2136.93
MW-13	10/22/2009	2289.75	NP	152.86	NP	2136.89	2136.89
MW-13	11/25/2009	2289.75	NP	153.20	NP	2136.55	2136.55
MW-13	12/14/2009	2289.75	NP	153.35	NP	2136.40	2136.40
MW-13	1/18/2010	2289.75	NP	153.22	NP	2136.53	2136.53
MW-13	2/26/2010	2289.75	NP	153.26	NP	2136.49	2136.49
MW-13	3/22/2010	2289.75	NP	152.81	NP	2136.94	2136.94
MW-13	4/12/2010	2289.75	NP	152.35	NP	2137.40	2137.40
MW-13	5/27/2010	2289.75	NP	152.90	NP	2136.85	2136.85
MW-13	6/22/2010	2289.75	NP	153.27	NP	2136.48	2136.48
MW-13	7/12/2010	2289.75	153.54	153.55	0.01	2136.20	2136.21
MW-13	8/26/2010	2289.75	NP	153.89	NP	2135.86	2135.86
MW-13	9/22/2010	2289.75	NP	153.29	NP	2136.46	2136.46
MW-13	10/5/2010	2289.75	NP	153.12	NP	2136.63	2136.63
MW-13	10/18/2010	2289.75	NP	152.92	NP	2136.83	2136.83
MW-13	11/30/2010	2289.75	NP	153.44	NP	2136.31	2136.31
MW-13	12/21/2010	2289.75	NP	153.81	NP	2135.94	2135.94
MW-13	1/10/2011	2289.75	NP	153.50	NP	2136.25	2136.25
MW-13	2/17/2011	2289.75	NP	153.99	NP	2135.76	2135.76
MW-13	3/25/2011	2289.75	NP	153.93	NP	2135.82	2135.82
MW-13	4/11/2011	2289.75	NP	154.15	NP	2135.60	2135.60
MW-13	5/9/2011	2289.75	NP	154.35	NP	2135.40	2135.40
MW-13	6/29/2011	2289.75	NP	155.53	NP	2134.22	2134.22
MW-13	7/11/2011	2289.75	NP	155.33	NP	2134.42	2134.42
MW-13	8/31/2011	2289.75	NP	155.91	NP	2133.84	2133.84
MW-13	9/28/2011	2289.75	NP	155.92	NP	2133.83	2133.83
MW-13	10/10/2011	2289.75	NP	155.09	NP	2134.66	2134.66
MW-13	11/16/2011	2289.75	NP	155.06	NP	2134.69	2134.69
MW-13	12/29/2011	2289.75	NP	155.06	NP	2134.69	2134.69
MW-13	1/16/2012	2289.75	NP	155.01	NP	2134.74	2134.74
MW-13	2/28/2012	2289.75	NP	154.82	NP	2134.93	2134.93
MW-13	3/30/2012	2289.75	NP	155.06	NP	2134.69	2134.69
MW-13	4/2/2012	2289.75	NP	155.15	NP	2134.60	2134.60
MW-13	5/30/2012	2289.75	NP	156.04	NP	2133.71	2133.71
MW-13	6/29/2012	2289.75	NP	156.38	NP	2133.37	2133.37
MW-13	7/9/2012	2289.75	NP	156.37	NP	2133.38	2133.38
MW-13	8/29/2012	2289.75	NP	155.87	NP	2133.88	2133.88
MW-13	9/25/2012	2289.75	NP	155.36	NP	2134.39	2134.39
MW-13	10/22/2012	2289.75	NP	155.53	NP	2134.22	2134.22
MW-13	11/15/2012	2289.75	NP	156.04	NP	2133.71	2133.71
MW-13	12/13/2012	2289.75	NP	156.41	NP	2133.34	2133.34
MW-13	1/21/2013	2289.75	NP	156.47	NP	2133.28	2133.28
MW-13	2/13/2013	2289.75	NP	156.77	NP	2132.98	2132.98
MW-13	3/21/2013	2289.75	NP	156.63	NP	2133.12	2133.12
MW-13	4/15/2013	2289.75	NP	156.79	NP	2132.96	2132.96
MW-13	5/23/2013	2289.75	NP	156.99	NP	2132.76	2132.76

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-13	6/26/2013	2289.75	NP	157.34	NP	2132.41	2132.41
MW-13	7/8/2013	2289.75	NP	157.45	NP	2132.30	2132.30
MW-13	8/8/2013	2289.75	NP	157.60	NP	2132.15	2132.15
MW-13	9/5/2013	2289.75	NP	157.43	NP	2132.32	2132.32
MW-13	10/3/2013	2289.75	NP	157.66	NP	2132.09	2132.09
MW-13	11/27/2013	2289.75	NP	157.82	NP	2131.93	2131.93
MW-13	12/31/2013	2289.75	NP	157.76	NP	2131.99	2131.99
MW-13	1/10/2014	2289.75	NP	158.03	NP	2131.72	2131.72
MW-13	2/18/2014	2289.75	NP	158.07	NP	2131.68	2131.68
MW-13	3/12/2014	2289.75	NP	158.14	NP	2131.61	2131.61
MW-13	4/17/2014	2289.75	NP	158.40	NP	2131.35	2131.35
MW-13	5/22/2014	2289.75	NP	158.73	NP	2131.02	2131.02
MW-13	6/20/2014	2289.75	NP	159.05	NP	2130.70	2130.70
MW-13	7/14/2014	2289.75	NP	159.26	NP	2130.49	2130.49
MW-13	8/14/2014	2289.75	NP	159.71	NP	2130.04	2130.04
MW-13	9/10/2014	2289.75	NP	159.41	NP	2130.34	2130.34
MW-13	10/1/2014	2289.75	NP	158.66	NP	2131.09	2131.09
MW-13	11/18/2014	2289.75	NP	158.29	NP	2131.46	2131.46
MW-13	12/16/2014	2289.75	NP	158.34	NP	2131.41	2131.41
MW-13	1/19/2015	2289.75	NP	158.15	NP	2131.60	2131.60
MW-13	2/19/2015	2289.75	NP	157.90	NP	2131.85	2131.85
MW-13	3/26/2015	2289.75	NP	157.60	NP	2132.15	2132.15
MW-13	4/16/2015	2289.75	NP	157.50	NP	2132.25	2132.25
MW-13	5/19/2015	2289.75	NP	157.81	NP	2131.94	2131.94
MW-13	6/22/2015	2289.75	NP	158.33	NP	2131.42	2131.42
MW-14	11/20/2003	2290.49	NP	143.61	NP	2146.88	2146.88
MW-14	11/24/2003	2290.49	NP	143.57	NP	2146.92	2146.92
MW-14	11/26/2003	2290.49	NP	143.62	NP	2146.87	2146.87
MW-14	12/1/2003	2290.49	NP	143.54	NP	2146.95	2146.95
MW-14	1/19/2004	2290.49	NP	144.25	NP	2146.24	2146.24
MW-14	1/26/2004	2290.49	NP	144.32	NP	2146.17	2146.17
MW-14	1/28/2004	2290.49	NP	144.39	NP	2146.10	2146.10
MW-14	2/5/2004	2290.49	NP	144.50	NP	2145.99	2145.99
MW-14	2/12/2004	2290.49	NP	144.51	NP	2145.98	2145.98
MW-14	2/12/2004	2290.49	NP	144.51	NP	2145.98	2145.98
MW-14	2/23/2004	2290.49	NP	144.57	NP	2145.92	2145.92
MW-14	3/2/2004	2290.49	NP	144.57	NP	2145.92	2145.92
MW-14	3/8/2004	2290.49	NP	144.57	NP	2145.92	2145.92
MW-14	3/15/2004	2290.49	NP	144.65	NP	2145.84	2145.84
MW-14	3/22/2004	2290.49	NP	144.67	NP	2145.82	2145.82
MW-14	3/29/2004	2290.49	NP	144.70	NP	2145.79	2145.79
MW-14	4/5/2004	2290.49	NP	144.75	NP	2145.74	2145.74
MW-14	4/12/2004	2290.49	NP	144.76	NP	2145.73	2145.73
MW-14	4/19/2004	2290.49	NP	144.78	NP	2145.71	2145.71
MW-14	4/26/2004	2290.49	NP	144.80	NP	2145.69	2145.69
MW-14	5/3/2004	2290.49	NP	144.89	NP	2145.60	2145.60

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-14	5/10/2004	2290.49	NP	144.90	NP	2145.59	2145.59
MW-14	5/17/2004	2290.49	NP	144.86	NP	2145.63	2145.63
MW-14	5/24/2004	2290.49	NP	144.92	NP	2145.57	2145.57
MW-14	5/31/2004	2290.49	NP	144.93	NP	2145.56	2145.56
MW-14	6/7/2004	2290.49	NP	145.01	NP	2145.48	2145.48
MW-14	6/14/2004	2290.49	NP	145.13	NP	2145.36	2145.36
MW-14	6/21/2004	2290.49	NP	145.22	NP	2145.27	2145.27
MW-14	6/28/2004	2290.49	NP	145.39	NP	2145.10	2145.10
MW-14	7/6/2004	2290.49	NP	145.52	NP	2144.97	2144.97
MW-14	7/12/2004	2290.49	NP	145.63	NP	2144.86	2144.86
MW-14	7/19/2004	2290.49	NP	145.75	NP	2144.74	2144.74
MW-14	7/26/2004	2290.49	NP	145.85	NP	2144.64	2144.64
MW-14	8/9/2004	2290.49	NP	146.16	NP	2144.33	2144.33
MW-14	8/16/2004	2290.49	NP	146.26	NP	2144.23	2144.23
MW-14	8/23/2004	2290.49	NP	146.35	NP	2144.14	2144.14
MW-14	8/30/2004	2290.49	NP	146.50	NP	2143.99	2143.99
MW-14	9/8/2004	2290.49	NP	146.55	NP	2143.94	2143.94
MW-14	9/13/2004	2290.49	NP	146.70	NP	2143.79	2143.79
MW-14	9/20/2004	2290.49	NP	146.79	NP	2143.70	2143.70
MW-14	9/27/2004	2290.49	NP	146.89	NP	2143.60	2143.60
MW-14	10/18/2004	2290.49	NP	147.10	NP	2143.39	2143.39
MW-14	10/25/2004	2290.49	NP	147.12	NP	2143.37	2143.37
MW-14	11/1/2004	2290.49	NP	147.24	NP	2143.25	2143.25
MW-14	11/8/2004	2290.49	NP	147.36	NP	2143.13	2143.13
MW-14	11/15/2004	2290.49	NP	147.41	NP	2143.08	2143.08
MW-14	11/30/2004	2290.49	NP	147.51	NP	2142.98	2142.98
MW-14	12/6/2004	2290.49	NP	147.74	NP	2142.75	2142.75
MW-14	12/13/2004	2290.49	NP	147.75	NP	2142.74	2142.74
MW-14	12/20/2004	2290.49	NP	147.75	NP	2142.74	2142.74
MW-14	1/4/2005	2290.49	NP	147.91	NP	2142.58	2142.58
MW-14	1/10/2005	2290.49	NP	147.86	NP	2142.63	2142.63
MW-14	1/17/2005	2290.49	NP	147.80	NP	2142.69	2142.69
MW-14	1/24/2005	2290.49	NP	147.89	NP	2142.60	2142.60
MW-14	1/31/2005	2290.49	NP	147.90	NP	2142.59	2142.59
MW-14	2/23/2005	2290.49	NP	147.83	NP	2142.66	2142.66
MW-14	3/2/2005	2290.49	NP	147.97	NP	2142.52	2142.52
MW-14	3/9/2005	2290.49	NP	147.92	NP	2142.57	2142.57
MW-14	3/14/2005	2290.49	NP	147.93	NP	2142.56	2142.56
MW-14	3/21/2005	2290.49	NP	147.83	NP	2142.66	2142.66
MW-14	3/27/2005	2290.49	NP	147.60	NP	2142.89	2142.89
MW-14	4/18/2005	2290.49	NP	147.83	NP	2142.66	2142.66
MW-14	4/25/2005	2290.49	NP	147.82	NP	2142.67	2142.67
MW-14	5/2/2005	2290.49	NP	147.81	NP	2142.68	2142.68
MW-14	5/10/2005	2290.49	NP	147.83	NP	2142.66	2142.66
MW-14	5/16/2005	2290.49	NP	147.85	NP	2142.64	2142.64
MW-14	5/23/2005	2290.49	NP	148.05	NP	2142.44	2142.44

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-14	5/30/2005	2290.49	NP	148.10	NP	2142.39	2142.39
MW-14	6/6/2005	2290.49	NP	148.19	NP	2142.30	2142.30
MW-14	6/13/2005	2290.49	NP	148.25	NP	2142.24	2142.24
MW-14	6/20/2005	2290.49	NP	148.24	NP	2142.25	2142.25
MW-14	6/27/2005	2290.49	NP	148.37	NP	2142.12	2142.12
MW-14	7/11/2005	2290.49	NP	148.54	NP	2141.95	2141.95
MW-14	7/18/2005	2290.49	NP	148.64	NP	2141.85	2141.85
MW-14	7/25/2005	2290.49	NP	148.63	NP	2141.86	2141.86
MW-14	8/1/2005	2290.49	NP	148.80	NP	2141.69	2141.69
MW-14	8/8/2005	2290.49	NP	148.87	NP	2141.62	2141.62
MW-14	8/15/2005	2290.49	NP	148.89	NP	2141.60	2141.60
MW-14	8/22/2005	2290.49	NP	148.90	NP	2141.59	2141.59
MW-14	8/29/2005	2290.49	NP	148.73	NP	2141.76	2141.76
MW-14	9/7/2005	2290.49	NP	148.29	NP	2142.20	2142.20
MW-14	9/12/2005	2290.49	NP	147.95	NP	2142.54	2142.54
MW-14	9/19/2005	2290.49	NP	147.60	NP	2142.89	2142.89
MW-14	9/26/2005	2290.49	NP	147.47	NP	2143.02	2143.02
MW-14	10/3/2005	2290.49	NP	147.55	NP	2142.94	2142.94
MW-14	10/10/2005	2290.49	NP	147.74	NP	2142.75	2142.75
MW-14	10/17/2005	2290.49	NP	147.90	NP	2142.59	2142.59
MW-14	10/24/2005	2290.49	NP	148.02	NP	2142.47	2142.47
MW-14	10/31/2005	2290.49	NP	148.27	NP	2142.22	2142.22
MW-14	11/7/2005	2290.49	NP	148.44	NP	2142.05	2142.05
MW-14	11/14/2005	2290.49	NP	148.55	NP	2141.94	2141.94
MW-14	11/21/2005	2290.49	NP	148.75	NP	2141.74	2141.74
MW-14	12/5/2005	2290.49	NP	148.90	NP	2141.59	2141.59
MW-14	12/19/2005	2290.49	NP	148.96	NP	2141.53	2141.53
MW-14	1/9/2006	2290.49	NP	149.11	NP	2141.38	2141.38
MW-14	1/16/2006	2290.49	NP	149.19	NP	2141.30	2141.30
MW-14	1/30/2006	2290.49	NP	149.21	NP	2141.28	2141.28
MW-14	2/13/2006	2290.49	NP	149.29	NP	2141.20	2141.20
MW-14	2/27/2006	2290.49	NP	149.35	NP	2141.14	2141.14
MW-14	3/6/2006	2290.49	NP	149.37	NP	2141.12	2141.12
MW-14	3/13/2006	2290.49	NP	149.39	NP	2141.10	2141.10
MW-14	3/20/2006	2290.49	NP	149.42	NP	2141.07	2141.07
MW-14	3/27/2006	2290.49	NP	149.41	NP	2141.08	2141.08
MW-14	4/3/2006	2290.49	NP	149.45	NP	2141.04	2141.04
MW-14	4/10/2006	2290.49	NP	149.52	NP	2140.97	2140.97
MW-14	4/17/2006	2290.49	NP	149.56	NP	2140.93	2140.93
MW-14	4/24/2006	2290.49	NP	149.59	NP	2140.90	2140.90
MW-14	5/1/2006	2290.49	NP	149.61	NP	2140.88	2140.88
MW-14	5/15/2006	2290.49	NP	149.23	NP	2141.26	2141.26
MW-14	5/22/2006	2290.49	NP	149.69	NP	2140.80	2140.80
MW-14	5/30/2006	2290.49	NP	149.80	NP	2140.69	2140.69
MW-14	6/5/2006	2290.49	NP	149.92	NP	2140.57	2140.57
MW-14	6/12/2006	2290.49	NP	150.00	NP	2140.49	2140.49

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-14	6/26/2006	2290.49	NP	150.17	NP	2140.32	2140.32
MW-14	7/10/2006	2290.49	NP	150.31	NP	2140.18	2140.18
MW-14	8/2/2006	2290.49	NP	150.55	NP	2139.94	2139.94
MW-14	8/14/2006	2290.49	NP	150.57	NP	2139.92	2139.92
MW-14	8/23/2006	2290.49	NP	150.46	NP	2140.03	2140.03
MW-14	9/19/2006	2290.49	NP	148.95	NP	2141.54	2141.54
MW-14	10/20/2006	2290.49	NP	148.11	NP	2142.38	2142.38
MW-14	10/30/2006	2290.49	NP	148.42	NP	2142.07	2142.07
MW-14	11/17/2006	2290.49	NP	148.82	NP	2141.67	2141.67
MW-14	1/31/2007	2290.49	NP	150.09	NP	2140.40	2140.40
MW-14	3/1/2007	2290.49	NP	150.28	NP	2140.21	2140.21
MW-14	3/28/2007	2290.49	NP	150.49	NP	2140.00	2140.00
MW-14	4/24/2007	2290.49	NP	150.68	NP	2139.81	2139.81
MW-14	5/29/2007	2290.49	NP	150.81	NP	2139.68	2139.68
MW-14	6/27/2007	2290.49	NP	151.16	NP	2139.33	2139.33
MW-14	7/23/2007	2290.49	NP	151.45	NP	2139.04	2139.04
MW-14	9/25/2007	2290.49	NP	149.92	NP	2140.57	2140.57
MW-14	10/22/2007	2290.49	NP	150.39	NP	2140.10	2140.10
MW-14	11/28/2007	2290.49	NP	151.44	NP	2139.05	2139.05
MW-14	12/31/2007	2290.49	NP	151.50	NP	2138.99	2138.99
MW-14	1/26/2008	2290.49	NP	151.27	NP	2139.22	2139.22
MW-14	2/29/2008	2290.49	NP	151.35	NP	2139.14	2139.14
MW-14	3/31/2008	2290.49	NP	150.91	NP	2139.58	2139.58
MW-14	4/21/2008	2290.49	NP	151.05	NP	2139.44	2139.44
MW-14	5/23/2008	2290.49	NP	151.53	NP	2138.96	2138.96
MW-14	6/25/2008	2290.49	NP	151.80	NP	2138.69	2138.69
MW-14	7/28/2008	2290.49	NP	152.16	NP	2138.33	2138.33
MW-14	8/25/2008	2290.49	NP	150.63	NP	2139.86	2139.86
MW-14	9/30/2008	2290.49	NP	148.85	NP	2141.64	2141.64
MW-14	10/13/2008	2290.49	NP	148.93	NP	2141.56	2141.56
MW-14	11/26/2008	2290.49	NP	149.78	NP	2140.71	2140.71
MW-14	12/23/2008	2290.49	NP	150.21	NP	2140.28	2140.28
MW-14	1/26/2009	2290.49	NP	150.33	NP	2140.16	2140.16
MW-14	2/27/2009	2290.49	NP	150.39	NP	2140.10	2140.10
MW-14	3/26/2009	2290.49	NP	150.68	NP	2139.81	2139.81
MW-14	4/27/2009	2290.49	NP	150.80	NP	2139.69	2139.69
MW-14	5/20/2009	2290.49	NP	151.16	NP	2139.33	2139.33
MW-14	6/16/2009	2290.49	NP	151.80	NP	2138.69	2138.69
MW-14	7/20/2009	2290.49	NP	152.25	NP	2138.24	2138.24
MW-14	8/31/2009	2290.49	NP	152.67	NP	2137.82	2137.82
MW-14	9/29/2009	2290.49	NP	152.73	NP	2137.76	2137.76
MW-14	10/22/2009	2290.49	NP	152.94	NP	2137.55	2137.55
MW-14	11/25/2009	2290.49	NP	153.23	NP	2137.26	2137.26
MW-14	12/14/2009	2290.49	NP	153.23	NP	2137.26	2137.26
MW-14	1/18/2010	2290.49	NP	153.28	NP	2137.21	2137.21
MW-14	2/26/2010	2290.49	NP	153.09	NP	2137.40	2137.40

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-14	3/22/2010	2290.49	NP	152.61	NP	2137.88	2137.88
MW-14	4/12/2010	2290.49	NP	152.48	NP	2138.01	2138.01
MW-14	5/27/2010	2290.49	NP	152.96	NP	2137.53	2137.53
MW-14	6/22/2010	2290.49	NP	153.27	NP	2137.22	2137.22
MW-14	7/12/2010	2290.49	NP	153.56	NP	2136.93	2136.93
MW-14	8/26/2010	2290.49	NP	153.99	NP	2136.50	2136.50
MW-14	9/22/2010	2290.49	NP	153.51	NP	2136.98	2136.98
MW-14	10/5/2010	2290.49	NP	153.27	NP	2137.22	2137.22
MW-14	10/18/2010	2290.49	NP	153.18	NP	2137.31	2137.31
MW-14	12/21/2010	2290.49	NP	153.63	NP	2136.86	2136.86
MW-14	1/10/2011	2290.49	NP	153.57	NP	2136.92	2136.92
MW-14	3/25/2011	2290.49	NP	153.95	NP	2136.54	2136.54
MW-14	4/11/2011	2290.49	NP	154.17	NP	2136.32	2136.32
MW-14	5/9/2011	2290.49	NP	154.45	NP	2136.04	2136.04
MW-14	7/11/2011	2290.49	NP	155.26	NP	2135.23	2135.23
MW-14	8/31/2011	2290.49	NP	155.91	NP	2134.58	2134.58
MW-14	9/28/2011	2290.49	NP	155.94	NP	2134.55	2134.55
MW-14	10/10/2011	2290.49	NP	155.38	NP	2135.11	2135.11
MW-14	11/16/2011	2290.49	NP	155.06	NP	2135.43	2135.43
MW-14	12/29/2011	2290.49	NP	155.20	NP	2135.29	2135.29
MW-14	1/16/2012	2290.49	NP	155.18	NP	2135.31	2135.31
MW-14	2/28/2012	2290.49	NP	154.88	NP	2135.61	2135.61
MW-14	3/30/2012	2290.49	NP	155.07	NP	2135.42	2135.42
MW-14	4/2/2012	2290.49	NP	155.18	NP	2135.31	2135.31
MW-14	5/30/2012	2290.49	NP	156.01	NP	2134.48	2134.48
MW-14	6/29/2012	2290.49	NP	156.31	NP	2134.18	2134.18
MW-14	7/9/2012	2290.49	NP	156.34	NP	2134.15	2134.15
MW-14	8/29/2012	2290.49	NP	156.02	NP	2134.47	2134.47
MW-14	9/25/2012	2290.49	NP	155.62	NP	2134.87	2134.87
MW-14	10/22/2012	2290.49	NP	155.65	NP	2134.84	2134.84
MW-14	11/15/2012	2290.49	NP	156.11	NP	2134.38	2134.38
MW-14	12/13/2012	2290.49	NP	156.43	NP	2134.06	2134.06
MW-14	1/21/2013	2290.49	NP	156.48	NP	2134.01	2134.01
MW-14	2/13/2013	2290.49	NP	156.56	NP	2133.93	2133.93
MW-14	3/21/2013	2290.49	NP	156.57	NP	2133.92	2133.92
MW-14	4/15/2013	2290.49	NP	156.67	NP	2133.82	2133.82
MW-14	5/23/2013	2290.49	NP	156.89	NP	2133.60	2133.60
MW-14	6/26/2013	2290.49	NP	157.21	NP	2133.28	2133.28
MW-14	7/8/2013	2290.49	NP	157.37	NP	2133.12	2133.12
MW-14	8/8/2013	2290.49	NP	157.52	NP	2132.97	2132.97
MW-14	9/5/2013	2290.49	NP	157.42	NP	2133.07	2133.07
MW-14	10/3/2013	2290.49	NP	157.61	NP	2132.88	2132.88
MW-14	11/27/2013	2290.49	NP	157.80	NP	2132.69	2132.69
MW-14	12/31/2013	2290.49	NP	157.67	NP	2132.82	2132.82
MW-14	1/10/2014	2290.49	NP	157.91	NP	2132.58	2132.58
MW-14	2/18/2014	2290.49	NP	157.97	NP	2132.52	2132.52

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-14	3/12/2014	2290.49	NP	158.02	NP	2132.47	2132.47
MW-14	4/17/2014	2290.49	NP	158.22	NP	2132.27	2132.27
MW-14	5/22/2014	2290.49	NP	158.54	NP	2131.95	2131.95
MW-14	6/20/2014	2290.49	NP	158.84	NP	2131.65	2131.65
MW-14	7/15/2014	2290.49	NP	159.15	NP	2131.34	2131.34
MW-14	8/14/2014	2290.49	NP	159.52	NP	2130.97	2130.97
MW-14	9/10/2014	2290.49	NP	159.43	NP	2131.06	2131.06
MW-14	10/1/2014	2290.49	NP	158.69	NP	2131.80	2131.80
MW-14	11/18/2014	2290.49	NP	158.29	NP	2132.20	2132.20
MW-14	12/16/2014	2290.49	NP	158.25	NP	2132.24	2132.24
MW-14	1/19/2015	2290.49	NP	158.05	NP	2132.44	2132.44
MW-14	2/19/2015	2290.49	NP	157.77	NP	2132.72	2132.72
MW-14	3/26/2015	2290.49	NP	157.45	NP	2133.04	2133.04
MW-14	4/16/2015	2290.49	NP	157.31	NP	2133.18	2133.18
MW-14	5/19/2015	2290.49	NP	157.52	NP	2132.97	2132.97
MW-14	6/22/2015	2290.49	NP	158.07	NP	2132.42	2132.42
MW-15	11/20/2003	2291.28	NP	143.23	NP	2148.05	2148.05
MW-15	11/24/2003	2291.28	NP	143.28	NP	2148.00	2148.00
MW-15	11/26/2003	2291.28	NP	143.30	NP	2147.98	2147.98
MW-15	12/1/2003	2291.28	NP	143.30	NP	2147.98	2147.98
MW-15	1/26/2004	2291.28	NP	143.70	NP	2147.58	2147.58
MW-15	1/28/2004	2291.28	NP	143.70	NP	2147.58	2147.58
MW-15	2/5/2004	2291.28	NP	143.87	NP	2147.41	2147.41
MW-15	2/12/2004	2291.28	NP	143.89	NP	2147.39	2147.39
MW-15	2/23/2004	2291.28	NP	143.93	NP	2147.35	2147.35
MW-15	3/2/2004	2291.28	NP	143.93	NP	2147.35	2147.35
MW-15	3/8/2004	2291.28	NP	143.93	NP	2147.35	2147.35
MW-15	3/15/2004	2291.28	NP	144.11	NP	2147.17	2147.17
MW-15	3/22/2004	2291.28	NP	144.11	NP	2147.17	2147.17
MW-15	3/29/2004	2291.28	NP	144.17	NP	2147.11	2147.11
MW-15	4/5/2004	2291.28	NP	144.22	NP	2147.06	2147.06
MW-15	4/12/2004	2291.28	NP	144.24	NP	2147.04	2147.04
MW-15	4/19/2004	2291.28	NP	144.28	NP	2147.00	2147.00
MW-15	4/26/2004	2291.28	NP	144.29	NP	2146.99	2146.99
MW-15	5/3/2004	2291.28	NP	144.29	NP	2146.99	2146.99
MW-15	5/10/2004	2291.28	NP	144.31	NP	2146.97	2146.97
MW-15	5/17/2004	2291.28	NP	144.38	NP	2146.90	2146.90
MW-15	5/24/2004	2291.28	NP	144.42	NP	2146.86	2146.86
MW-15	5/31/2004	2291.28	NP	144.42	NP	2146.86	2146.86
MW-15	6/7/2004	2291.28	NP	144.50	NP	2146.78	2146.78
MW-15	6/14/2004	2291.28	NP	144.59	NP	2146.69	2146.69
MW-15	6/21/2004	2291.28	NP	144.72	NP	2146.56	2146.56
MW-15	6/28/2004	2291.28	NP	144.85	NP	2146.43	2146.43
MW-15	7/6/2004	2291.28	NP	144.96	NP	2146.32	2146.32
MW-15	7/12/2004	2291.28	NP	145.07	NP	2146.21	2146.21
MW-15	7/19/2004	2291.28	NP	145.19	NP	2146.09	2146.09

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-15	7/26/2004	2291.28	NP	145.27	NP	2146.01	2146.01
MW-15	8/2/2004	2291.28	NP	145.40	NP	2145.88	2145.88
MW-15	8/9/2004	2291.28	NP	145.55	NP	2145.73	2145.73
MW-15	8/16/2004	2291.28	NP	145.68	NP	2145.60	2145.60
MW-15	8/23/2004	2291.28	NP	145.78	NP	2145.50	2145.50
MW-15	8/30/2004	2291.28	NP	145.91	NP	2145.37	2145.37
MW-15	9/8/2004	2291.28	NP	145.96	NP	2145.32	2145.32
MW-15	9/13/2004	2291.28	NP	146.10	NP	2145.18	2145.18
MW-15	9/20/2004	2291.28	NP	146.20	NP	2145.08	2145.08
MW-15	9/27/2004	2291.28	NP	146.29	NP	2144.99	2144.99
MW-15	10/4/2004	2291.28	NP	146.36	NP	2144.92	2144.92
MW-15	10/11/2004	2291.28	NP	146.42	NP	2144.86	2144.86
MW-15	10/18/2004	2291.28	NP	146.49	NP	2144.79	2144.79
MW-15	10/25/2004	2291.28	NP	146.49	NP	2144.79	2144.79
MW-15	11/1/2004	2291.28	NP	146.62	NP	2144.66	2144.66
MW-15	11/8/2004	2291.28	NP	146.73	NP	2144.55	2144.55
MW-15	11/15/2004	2291.28	NP	146.76	NP	2144.52	2144.52
MW-15	11/30/2004	2291.28	NP	146.85	NP	2144.43	2144.43
MW-15	12/6/2004	2291.28	NP	147.07	NP	2144.21	2144.21
MW-15	12/13/2004	2291.28	NP	147.15	NP	2144.13	2144.13
MW-15	12/20/2004	2291.28	NP	147.13	NP	2144.15	2144.15
MW-15	1/4/2005	2291.28	NP	147.30	NP	2143.98	2143.98
MW-15	1/10/2005	2291.28	NP	147.29	NP	2143.99	2143.99
MW-15	1/17/2005	2291.28	NP	147.11	NP	2144.17	2144.17
MW-15	1/24/2005	2291.28	NP	147.21	NP	2144.07	2144.07
MW-15	1/31/2005	2291.28	NP	147.69	NP	2143.59	2143.59
MW-15	2/22/2005	2291.28	NP	147.32	NP	2143.96	2143.96
MW-15	3/2/2005	2291.28	NP	147.45	NP	2143.83	2143.83
MW-15	3/7/2005	2291.28	NP	147.43	NP	2143.85	2143.85
MW-15	3/14/2005	2291.28	NP	147.42	NP	2143.86	2143.86
MW-15	3/21/2005	2291.28	NP	147.26	NP	2144.02	2144.02
MW-15	3/27/2005	2291.28	NP	147.16	NP	2144.12	2144.12
MW-15	4/4/2005	2291.28	NP	147.22	NP	2144.06	2144.06
MW-15	4/11/2005	2291.28	NP	147.24	NP	2144.04	2144.04
MW-15	4/18/2005	2291.28	NP	147.39	NP	2143.89	2143.89
MW-15	4/25/2005	2291.28	NP	147.40	NP	2143.88	2143.88
MW-15	5/2/2005	2291.28	NP	147.39	NP	2143.89	2143.89
MW-15	5/10/2005	2291.28	NP	147.41	NP	2143.87	2143.87
MW-15	5/16/2005	2291.28	NP	147.43	NP	2143.85	2143.85
MW-15	5/23/2005	2291.28	NP	147.54	NP	2143.74	2143.74
MW-15	5/30/2005	2291.28	NP	147.60	NP	2143.68	2143.68
MW-15	6/6/2005	2291.28	NP	147.68	NP	2143.60	2143.60
MW-15	6/13/2005	2291.28	NP	147.74	NP	2143.54	2143.54
MW-15	6/20/2005	2291.28	NP	147.78	NP	2143.50	2143.50
MW-15	6/27/2005	2291.28	NP	147.88	NP	2143.40	2143.40
MW-15	7/11/2005	2291.28	NP	148.05	NP	2143.23	2143.23

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-15	7/18/2005	2291.28	NP	148.14	NP	2143.14	2143.14
MW-15	7/25/2005	2291.28	NP	148.22	NP	2143.06	2143.06
MW-15	8/1/2005	2291.28	NP	148.29	NP	2142.99	2142.99
MW-15	8/8/2005	2291.28	NP	148.39	NP	2142.89	2142.89
MW-15	8/15/2005	2291.28	NP	148.42	NP	2142.86	2142.86
MW-15	8/22/2005	2291.28	NP	148.42	NP	2142.86	2142.86
MW-15	8/29/2005	2291.28	NP	148.09	NP	2143.19	2143.19
MW-15	9/7/2005	2291.28	NP	147.54	NP	2143.74	2143.74
MW-15	9/12/2005	2291.28	NP	147.23	NP	2144.05	2144.05
MW-15	9/19/2005	2291.28	NP	147.03	NP	2144.25	2144.25
MW-15	9/26/2005	2291.28	NP	147.02	NP	2144.26	2144.26
MW-15	10/3/2005	2291.28	NP	147.13	NP	2144.15	2144.15
MW-15	10/10/2005	2291.28	NP	147.33	NP	2143.95	2143.95
MW-15	10/17/2005	2291.28	NP	147.45	NP	2143.83	2143.83
MW-15	10/24/2005	2291.28	NP	147.60	NP	2143.68	2143.68
MW-15	10/31/2005	2291.28	NP	147.79	NP	2143.49	2143.49
MW-15	11/7/2005	2291.28	NP	147.93	NP	2143.35	2143.35
MW-15	11/14/2005	2291.28	NP	148.06	NP	2143.22	2143.22
MW-15	11/21/2005	2291.28	NP	148.21	NP	2143.07	2143.07
MW-15	12/5/2005	2291.28	NP	148.35	NP	2142.93	2142.93
MW-15	12/19/2005	2291.28	NP	148.40	NP	2142.88	2142.88
MW-15	1/9/2006	2291.28	NP	148.55	NP	2142.73	2142.73
MW-15	1/16/2006	2291.28	NP	148.61	NP	2142.67	2142.67
MW-15	1/30/2006	2291.28	NP	148.68	NP	2142.60	2142.60
MW-15	2/13/2006	2291.28	NP	148.75	NP	2142.53	2142.53
MW-15	2/27/2006	2291.28	NP	148.85	NP	2142.43	2142.43
MW-15	3/6/2006	2291.28	NP	148.86	NP	2142.42	2142.42
MW-15	3/13/2006	2291.28	NP	148.91	NP	2142.37	2142.37
MW-15	3/20/2006	2291.28	NP	148.93	NP	2142.35	2142.35
MW-15	3/27/2006	2291.28	NP	148.95	NP	2142.33	2142.33
MW-15	4/3/2006	2291.28	NP	148.97	NP	2142.31	2142.31
MW-15	4/10/2006	2291.28	NP	149.07	NP	2142.21	2142.21
MW-15	4/17/2006	2291.28	NP	149.11	NP	2142.17	2142.17
MW-15	4/24/2006	2291.28	NP	149.15	NP	2142.13	2142.13
MW-15	5/1/2006	2291.28	NP	149.17	NP	2142.11	2142.11
MW-15	5/15/2006	2291.28	NP	149.23	NP	2142.05	2142.05
MW-15	5/22/2006	2291.28	NP	149.30	NP	2141.98	2141.98
MW-15	5/30/2006	2291.28	NP	149.42	NP	2141.86	2141.86
MW-15	6/5/2006	2291.28	NP	149.50	NP	2141.78	2141.78
MW-15	6/12/2006	2291.28	NP	149.57	NP	2141.71	2141.71
MW-15	6/26/2006	2291.28	NP	149.74	NP	2141.54	2141.54
MW-15	7/10/2006	2291.28	NP	149.89	NP	2141.39	2141.39
MW-15	8/1/2006	2291.28	NP	150.13	NP	2141.15	2141.15
MW-15	8/14/2006	2291.28	NP	150.11	NP	2141.17	2141.17
MW-15	8/23/2006	2291.28	NP	149.77	NP	2141.51	2141.51
MW-15	9/19/2006	2291.28	NP	148.17	NP	2143.11	2143.11

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-15	10/20/2006	2291.28	NP	147.73	NP	2143.55	2143.55
MW-15	10/30/2006	2291.28	NP	147.95	NP	2143.33	2143.33
MW-15	11/17/2006	2291.28	NP	148.34	NP	2142.94	2142.94
MW-15	1/29/2007	2291.28	NP	149.52	NP	2141.76	2141.76
MW-15	3/1/2007	2291.28	NP	149.81	NP	2141.47	2141.47
MW-15	3/28/2007	2291.28	NP	150.03	NP	2141.25	2141.25
MW-15	4/24/2007	2291.28	NP	150.12	NP	2141.16	2141.16
MW-15	5/28/2007	2291.28	NP	150.28	NP	2141.00	2141.00
MW-15	6/27/2007	2291.28	NP	150.66	NP	2140.62	2140.62
MW-15	7/23/2007	2291.28	NP	150.91	NP	2140.37	2140.37
MW-15	8/25/2007	2291.28	NP	149.43	NP	2141.85	2141.85
MW-15	9/25/2007	2291.28	NP	149.13	NP	2142.15	2142.15
MW-15	10/22/2007	2291.28	NP	149.72	NP	2141.56	2141.56
MW-15	11/28/2007	2291.28	NP	150.86	NP	2140.42	2140.42
MW-15	12/31/2007	2291.28	NP	150.87	NP	2140.41	2140.41
MW-15	1/26/2008	2291.28	NP	150.67	NP	2140.61	2140.61
MW-15	2/29/2008	2291.28	NP	150.80	NP	2140.48	2140.48
MW-15	3/31/2008	2291.28	NP	150.36	NP	2140.92	2140.92
MW-15	4/21/2008	2291.28	NP	150.65	NP	2140.63	2140.63
MW-15	5/23/2008	2291.28	NP	151.12	NP	2140.16	2140.16
MW-15	6/25/2008	2291.28	NP	151.30	NP	2139.98	2139.98
MW-15	7/28/2008	2291.28	NP	151.56	NP	2139.72	2139.72
MW-15	8/25/2008	2291.28	NP	149.49	NP	2141.79	2141.79
MW-15	9/30/2008	2291.28	NP	147.96	NP	2143.32	2143.32
MW-15	10/13/2008	2291.28	NP	148.16	NP	2143.12	2143.12
MW-15	11/26/2008	2291.28	NP	149.22	NP	2142.06	2142.06
MW-15	12/23/2008	2291.28	NP	149.62	NP	2141.66	2141.66
MW-15	1/26/2009	2291.28	NP	149.82	NP	2141.46	2141.46
MW-15	2/27/2009	2291.28	NP	149.86	NP	2141.42	2141.42
MW-15	3/26/2009	2291.28	NP	150.15	NP	2141.13	2141.13
MW-15	4/27/2009	2291.28	NP	150.29	NP	2140.99	2140.99
MW-15	5/20/2009	2291.28	NP	150.68	NP	2140.60	2140.60
MW-15	6/16/2009	2291.28	NP	151.31	NP	2139.97	2139.97
MW-15	7/20/2009	2291.28	NP	151.77	NP	2139.51	2139.51
MW-15	8/31/2009	2291.28	NP	151.93	NP	2139.35	2139.35
MW-15	9/29/2009	2291.28	NP	152.11	NP	2139.17	2139.17
MW-15	10/22/2009	2291.28	NP	152.25	NP	2139.03	2139.03
MW-15	11/25/2009	2291.28	NP	152.61	NP	2138.67	2138.67
MW-15	12/14/2009	2291.28	NP	152.70	NP	2138.58	2138.58
MW-15	1/18/2010	2291.28	NP	152.64	NP	2138.64	2138.64
MW-15	2/26/2010	2291.28	NP	152.51	NP	2138.77	2138.77
MW-15	3/22/2010	2291.28	NP	152.03	NP	2139.25	2139.25
MW-15	4/12/2010	2291.28	NP	151.75	NP	2139.53	2139.53
MW-15	5/27/2010	2291.28	NP	152.36	NP	2138.92	2138.92
MW-15	6/22/2010	2291.28	NP	152.71	NP	2138.57	2138.57
MW-15	7/12/2010	2291.28	NP	153.09	NP	2138.19	2138.19

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-15	8/26/2010	2291.28	NP	153.11	NP	2138.17	2138.17
MW-15	9/22/2010	2291.28	NP	152.57	NP	2138.71	2138.71
MW-15	10/5/2010	2291.28	NP	152.43	NP	2138.85	2138.85
MW-15	10/18/2010	2291.28	NP	152.50	NP	2138.78	2138.78
MW-15	11/30/2010	2291.28	NP	152.88	NP	2138.40	2138.40
MW-15	12/21/2010	2291.28	NP	153.05	NP	2138.23	2138.23
MW-15	1/10/2011	2291.28	NP	153.11	NP	2138.17	2138.17
MW-15	2/17/2011	2291.28	NP	153.41	NP	2137.87	2137.87
MW-15	3/25/2011	2291.28	NP	153.41	NP	2137.87	2137.87
MW-15	4/11/2011	2291.28	NP	153.64	NP	2137.64	2137.64
MW-15	5/9/2011	2291.28	NP	153.94	NP	2137.34	2137.34
MW-15	6/29/2011	2291.28	NP	154.63	NP	2136.65	2136.65
MW-15	7/11/2011	2291.28	NP	154.70	NP	2136.58	2136.58
MW-15	8/31/2011	2291.28	NP	155.13	NP	2136.15	2136.15
MW-15	9/28/2011	2291.28	NP	154.98	NP	2136.30	2136.30
MW-15	10/10/2011	2291.28	NP	154.07	NP	2137.21	2137.21
MW-15	11/16/2011	2291.28	NP	154.23	NP	2137.05	2137.05
MW-15	12/29/2011	2291.28	NP	154.44	NP	2136.84	2136.84
MW-15	1/16/2012	2291.28	NP	154.31	NP	2136.97	2136.97
MW-15	2/28/2012	2291.28	NP	154.17	NP	2137.11	2137.11
MW-15	3/30/2012	2291.28	NP	154.38	NP	2136.90	2136.90
MW-15	4/2/2012	2291.28	NP	154.49	NP	2136.79	2136.79
MW-15	5/30/2012	2291.28	NP	155.31	NP	2135.97	2135.97
MW-15	6/29/2012	2291.28	NP	155.62	NP	2135.66	2135.66
MW-15	7/9/2012	2291.28	NP	155.65	NP	2135.63	2135.63
MW-15	8/29/2012	2291.28	NP	154.90	NP	2136.38	2136.38
MW-15	9/25/2012	2291.28	NP	154.29	NP	2136.99	2136.99
MW-15	10/22/2012	2291.28	NP	153.87	NP	2137.41	2137.41
MW-15	11/15/2012	2291.28	NP	155.20	NP	2136.08	2136.08
MW-15	12/13/2012	2291.28	NP	155.61	NP	2135.67	2135.67
MW-15	1/21/2013	2291.28	NP	155.84	NP	2135.44	2135.44
MW-15	2/13/2013	2291.28	NP	155.83	NP	2135.45	2135.45
MW-15	3/21/2013	2291.28	NP	155.92	NP	2135.36	2135.36
MW-15	4/15/2013	2291.28	NP	156.02	NP	2135.26	2135.26
MW-15	5/23/2013	2291.28	NP	156.27	NP	2135.01	2135.01
MW-15	6/26/2013	2291.28	NP	156.61	NP	2134.67	2134.67
MW-15	7/8/2013	2291.28	NP	158.44	NP	2132.84	2132.84
MW-15	8/8/2013	2291.28	NP	156.90	NP	2134.38	2134.38
MW-15	9/5/2013	2291.28	NP	156.55	NP	2134.73	2134.73
MW-15	10/3/2013	2291.28	NP	156.83	NP	2134.45	2134.45
MW-15	11/27/2013	2291.28	NP	157.06	NP	2134.22	2134.22
MW-15	12/31/2013	2291.28	NP	157.04	NP	2134.24	2134.24
MW-15	1/10/2014	2291.28	NP	157.24	NP	2134.04	2134.04
MW-15	2/18/2014	2291.28	NP	157.30	NP	2133.98	2133.98
MW-15	3/12/2014	2291.28	NP	157.39	NP	2133.89	2133.89
MW-15	4/17/2014	2291.28	NP	157.67	NP	2133.61	2133.61

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-15	5/22/2014	2291.28	NP	158.00	NP	2133.28	2133.28
MW-15	6/20/2014	2291.28	NP	158.30	NP	2132.98	2132.98
MW-15	7/14/2014	2291.28	NP	158.55	NP	2132.73	2132.73
MW-15	8/14/2014	2291.28	NP	158.87	NP	2132.41	2132.41
MW-15	9/10/2014	2291.28	NP	158.31	NP	2132.97	2132.97
MW-15	10/1/2014	2291.28	NP	157.38	NP	2133.90	2133.90
MW-15	11/18/2014	2291.28	NP	157.40	NP	2133.88	2133.88
MW-15	12/16/2014	2291.28	NP	157.57	NP	2133.71	2133.71
MW-15	1/19/2015	2291.28	NP	157.40	NP	2133.88	2133.88
MW-15	2/19/2015	2291.28	NP	157.20	NP	2134.08	2134.08
MW-15	3/26/2015	2291.28	NP	156.92	NP	2134.36	2134.36
MW-15	4/16/2015	2291.28	NP	156.90	NP	2134.38	2134.38
MW-15	5/19/2015	2291.28	NP	157.20	NP	2134.08	2134.08
MW-15	6/22/2015	2291.28	NP	157.71	NP	2133.57	2133.57
MW-16	11/20/2003	2292.34	NP	145.80	NP	2146.54	2146.54
MW-16	11/24/2003	2292.34	NP	145.91	NP	2146.43	2146.43
MW-16	11/26/2003	2292.34	NP	145.97	NP	2146.37	2146.37
MW-16	12/1/2003	2292.34	NP	145.90	NP	2146.44	2146.44
MW-16	1/26/2004	2292.34	NP	146.35	NP	2145.99	2145.99
MW-16	1/29/2004	2292.34	NP	146.40	NP	2145.94	2145.94
MW-16	2/5/2004	2292.34	NP	146.51	NP	2145.83	2145.83
MW-16	2/12/2004	2292.34	NP	146.53	NP	2145.81	2145.81
MW-16	2/23/2004	2292.34	NP	146.54	NP	2145.80	2145.80
MW-16	3/2/2004	2292.34	NP	146.54	NP	2145.80	2145.80
MW-16	3/8/2004	2292.34	NP	146.54	NP	2145.80	2145.80
MW-16	3/15/2004	2292.34	NP	146.65	NP	2145.69	2145.69
MW-16	3/22/2004	2292.34	NP	146.65	NP	2145.69	2145.69
MW-16	3/29/2004	2292.34	NP	146.69	NP	2145.65	2145.65
MW-16	4/5/2004	2292.34	NP	146.75	NP	2145.59	2145.59
MW-16	4/12/2004	2292.34	NP	146.75	NP	2145.59	2145.59
MW-16	4/19/2004	2292.34	NP	146.78	NP	2145.56	2145.56
MW-16	4/26/2004	2292.34	NP	146.81	NP	2145.53	2145.53
MW-16	5/3/2004	2292.34	NP	146.80	NP	2145.54	2145.54
MW-16	5/10/2004	2292.34	NP	146.80	NP	2145.54	2145.54
MW-16	5/17/2004	2292.34	NP	146.86	NP	2145.48	2145.48
MW-16	5/24/2004	2292.34	NP	146.94	NP	2145.40	2145.40
MW-16	5/31/2004	2292.34	NP	146.93	NP	2145.41	2145.41
MW-16	6/7/2004	2292.34	NP	147.02	NP	2145.32	2145.32
MW-16	6/14/2004	2292.34	NP	147.12	NP	2145.22	2145.22
MW-16	6/21/2004	2292.34	NP	147.27	NP	2145.07	2145.07
MW-16	6/28/2004	2292.34	NP	147.40	NP	2144.94	2144.94
MW-16	7/6/2004	2292.34	NP	147.50	NP	2144.84	2144.84
MW-16	7/12/2004	2292.34	NP	147.62	NP	2144.72	2144.72
MW-16	7/19/2004	2292.34	NP	147.73	NP	2144.61	2144.61
MW-16	7/26/2004	2292.34	NP	147.83	NP	2144.51	2144.51
MW-16	8/2/2004	2292.34	NP	147.97	NP	2144.37	2144.37

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-16	8/9/2004	2292.34	NP	148.11	NP	2144.23	2144.23
MW-16	8/16/2004	2292.34	NP	148.24	NP	2144.10	2144.10
MW-16	8/23/2004	2292.34	NP	148.33	NP	2144.01	2144.01
MW-16	8/30/2004	2292.34	NP	148.48	NP	2143.86	2143.86
MW-16	9/8/2004	2292.34	NP	148.56	NP	2143.78	2143.78
MW-16	9/13/2004	2292.34	NP	148.69	NP	2143.65	2143.65
MW-16	9/20/2004	2292.34	NP	148.79	NP	2143.55	2143.55
MW-16	9/27/2004	2292.34	NP	148.89	NP	2143.45	2143.45
MW-16	10/4/2004	2292.34	NP	148.94	NP	2143.40	2143.40
MW-16	10/11/2004	2292.34	NP	149.04	NP	2143.30	2143.30
MW-16	10/18/2004	2292.34	NP	149.14	NP	2143.20	2143.20
MW-16	10/25/2004	2292.34	NP	149.14	NP	2143.20	2143.20
MW-16	11/1/2004	2292.34	NP	149.27	NP	2143.07	2143.07
MW-16	11/8/2004	2292.34	NP	149.38	NP	2142.96	2142.96
MW-16	11/15/2004	2292.34	NP	149.43	NP	2142.91	2142.91
MW-16	11/30/2004	2292.34	NP	149.48	NP	2142.86	2142.86
MW-16	12/6/2004	2292.34	NP	149.74	NP	2142.60	2142.60
MW-16	12/13/2004	2292.34	NP	149.78	NP	2142.56	2142.56
MW-16	12/20/2004	2292.34	NP	149.75	NP	2142.59	2142.59
MW-16	1/4/2005	2292.34	NP	149.90	NP	2142.44	2142.44
MW-16	1/10/2005	2292.34	NP	149.81	NP	2142.53	2142.53
MW-16	1/17/2005	2292.34	NP	149.69	NP	2142.65	2142.65
MW-16	1/24/2005	2292.34	NP	149.75	NP	2142.59	2142.59
MW-16	1/31/2005	2292.34	NP	149.96	NP	2142.38	2142.38
MW-16	2/23/2005	2292.34	NP	149.77	NP	2142.57	2142.57
MW-16	3/2/2005	2292.34	NP	149.99	NP	2142.35	2142.35
MW-16	3/7/2005	2292.34	NP	149.95	NP	2142.39	2142.39
MW-16	3/14/2005	2292.34	NP	149.94	NP	2142.40	2142.40
MW-16	3/21/2005	2292.34	NP	149.80	NP	2142.54	2142.54
MW-16	3/27/2005	2292.34	NP	149.68	NP	2142.66	2142.66
MW-16	4/4/2005	2292.34	NP	149.71	NP	2142.63	2142.63
MW-16	4/11/2005	2292.34	NP	149.70	NP	2142.64	2142.64
MW-16	4/18/2005	2292.34	NP	149.84	NP	2142.50	2142.50
MW-16	4/25/2005	2292.34	NP	149.82	NP	2142.52	2142.52
MW-16	5/2/2005	2292.34	NP	149.81	NP	2142.53	2142.53
MW-16	5/10/2005	2292.34	NP	149.84	NP	2142.50	2142.50
MW-16	5/16/2005	2292.34	NP	149.85	NP	2142.49	2142.49
MW-16	5/23/2005	2292.34	NP	150.01	NP	2142.33	2142.33
MW-16	5/30/2005	2292.34	NP	150.05	NP	2142.29	2142.29
MW-16	6/6/2005	2292.34	NP	150.13	NP	2142.21	2142.21
MW-16	6/13/2005	2292.34	NP	150.15	NP	2142.19	2142.19
MW-16	6/20/2005	2292.34	NP	150.20	NP	2142.14	2142.14
MW-16	6/27/2005	2292.34	NP	150.30	NP	2142.04	2142.04
MW-16	7/11/2005	2292.34	NP	150.47	NP	2141.87	2141.87
MW-16	7/18/2005	2292.34	NP	150.55	NP	2141.79	2141.79
MW-16	7/25/2005	2292.34	NP	150.63	NP	2141.71	2141.71

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-16	8/1/2005	2292.34	NP	150.71	NP	2141.63	2141.63
MW-16	8/8/2005	2292.34	NP	150.78	NP	2141.56	2141.56
MW-16	8/15/2005	2292.34	NP	150.82	NP	2141.52	2141.52
MW-16	8/22/2005	2292.34	NP	150.82	NP	2141.52	2141.52
MW-16	8/29/2005	2292.34	NP	150.65	NP	2141.69	2141.69
MW-16	9/7/2005	2292.34	NP	150.38	NP	2141.96	2141.96
MW-16	9/12/2005	2292.34	NP	150.11	NP	2142.23	2142.23
MW-16	9/19/2005	2292.34	NP	149.83	NP	2142.51	2142.51
MW-16	9/26/2005	2292.34	NP	149.71	NP	2142.63	2142.63
MW-16	10/3/2005	2292.34	NP	149.77	NP	2142.57	2142.57
MW-16	10/10/2005	2292.34	NP	149.90	NP	2142.44	2142.44
MW-16	10/17/2005	2292.34	NP	150.02	NP	2142.32	2142.32
MW-16	10/24/2005	2292.34	NP	150.19	NP	2142.15	2142.15
MW-16	10/31/2005	2292.34	NP	150.34	NP	2142.00	2142.00
MW-16	11/7/2005	2292.34	NP	150.50	NP	2141.84	2141.84
MW-16	11/14/2005	2292.34	NP	150.62	NP	2141.72	2141.72
MW-16	11/21/2005	2292.34	NP	150.75	NP	2141.59	2141.59
MW-16	12/5/2005	2292.34	NP	150.88	NP	2141.46	2141.46
MW-16	12/19/2005	2292.34	NP	150.94	NP	2141.40	2141.40
MW-16	1/9/2006	2292.34	NP	151.10	NP	2141.24	2141.24
MW-16	1/16/2006	2292.34	NP	151.18	NP	2141.16	2141.16
MW-16	1/30/2006	2292.34	NP	151.18	NP	2141.16	2141.16
MW-16	2/13/2006	2292.34	NP	151.26	NP	2141.08	2141.08
MW-16	2/27/2006	2292.34	NP	151.32	NP	2141.02	2141.02
MW-16	3/6/2006	2292.34	NP	151.33	NP	2141.01	2141.01
MW-16	3/13/2006	2292.34	NP	151.36	NP	2140.98	2140.98
MW-16	3/20/2006	2292.34	NP	151.38	NP	2140.96	2140.96
MW-16	3/27/2006	2292.34	NP	151.37	NP	2140.97	2140.97
MW-16	4/3/2006	2292.34	NP	151.41	NP	2140.93	2140.93
MW-16	4/10/2006	2292.34	NP	151.47	NP	2140.87	2140.87
MW-16	4/17/2006	2292.34	NP	151.50	NP	2140.84	2140.84
MW-16	4/24/2006	2292.34	NP	151.54	NP	2140.80	2140.80
MW-16	5/1/2006	2292.34	NP	151.56	NP	2140.78	2140.78
MW-16	5/15/2006	2292.34	NP	151.59	NP	2140.75	2140.75
MW-16	5/22/2006	2292.34	NP	151.62	NP	2140.72	2140.72
MW-16	5/30/2006	2292.34	NP	151.75	NP	2140.59	2140.59
MW-16	6/5/2006	2292.34	NP	151.85	NP	2140.49	2140.49
MW-16	6/12/2006	2292.34	NP	151.91	NP	2140.43	2140.43
MW-16	6/26/2006	2292.34	NP	152.09	NP	2140.25	2140.25
MW-16	7/10/2006	2292.34	NP	152.22	NP	2140.12	2140.12
MW-16	8/3/2006	2292.34	NP	152.43	NP	2139.91	2139.91
MW-16	8/14/2006	2292.34	NP	152.45	NP	2139.89	2139.89
MW-16	8/23/2006	2292.34	NP	152.42	NP	2139.92	2139.92
MW-16	9/19/2006	2292.34	NP	151.20	NP	2141.14	2141.14
MW-16	10/20/2006	2292.34	NP	150.42	NP	2141.92	2141.92
MW-16	10/30/2006	2292.34	NP	150.59	NP	2141.75	2141.75

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-16	11/17/2006	2292.34	NP	150.88	NP	2141.46	2141.46
MW-16	1/31/2007	2292.34	NP	151.97	NP	2140.37	2140.37
MW-16	3/1/2007	2292.34	NP	152.21	NP	2140.13	2140.13
MW-16	3/28/2007	2292.34	NP	152.39	NP	2139.95	2139.95
MW-16	4/24/2007	2292.34	NP	152.57	NP	2139.77	2139.77
MW-16	5/28/2007	2292.34	NP	153.03	NP	2139.31	2139.31
MW-16	6/27/2007	2292.34	NP	153.03	NP	2139.31	2139.31
MW-16	7/23/2007	2292.34	NP	153.35	NP	2138.99	2138.99
MW-16	8/25/2007	2292.34	NP	152.95	NP	2139.39	2139.39
MW-16	9/25/2007	2292.34	NP	152.17	NP	2140.17	2140.17
MW-16	10/22/2007	2292.34	NP	152.55	NP	2139.79	2139.79
MW-16	11/28/2007	2292.34	NP	153.42	NP	2138.92	2138.92
MW-16	12/31/2007	2292.34	NP	153.48	NP	2138.86	2138.86
MW-16	1/26/2008	2292.34	NP	153.27	NP	2139.07	2139.07
MW-16	2/29/2008	2292.34	NP	153.32	NP	2139.02	2139.02
MW-16	3/31/2008	2292.34	NP	152.90	NP	2139.44	2139.44
MW-16	4/21/2008	2292.34	NP	153.16	NP	2139.18	2139.18
MW-16	5/23/2008	2292.34	NP	153.48	NP	2138.86	2138.86
MW-16	6/25/2008	2292.34	NP	153.71	NP	2138.63	2138.63
MW-16	7/28/2008	2292.34	NP	154.10	NP	2138.24	2138.24
MW-16	8/25/2008	2292.34	NP	152.91	NP	2139.43	2139.43
MW-16	9/30/2008	2292.34	NP	151.25	NP	2141.09	2141.09
MW-16	10/13/2008	2292.34	NP	151.24	NP	2141.10	2141.10
MW-16	11/26/2008	2292.34	NP	151.82	NP	2140.52	2140.52
MW-16	12/23/2008	2292.34	NP	152.28	NP	2140.06	2140.06
MW-16	1/26/2009	2292.34	NP	152.38	NP	2139.96	2139.96
MW-16	2/27/2009	2292.34	NP	152.41	NP	2139.93	2139.93
MW-16	3/26/2009	2292.34	NP	152.66	NP	2139.68	2139.68
MW-16	4/27/2009	2292.34	NP	152.77	NP	2139.57	2139.57
MW-16	5/20/2009	2292.34	NP	153.14	NP	2139.20	2139.20
MW-16	6/16/2009	2292.34	NP	153.75	NP	2138.59	2138.59
MW-16	7/20/2009	2292.34	NP	154.21	NP	2138.13	2138.13
MW-16	8/31/2009	2292.34	NP	154.55	NP	2137.79	2137.79
MW-16	9/29/2009	2292.34	NP	154.75	NP	2137.59	2137.59
MW-16	10/22/2009	2292.34	NP	154.93	NP	2137.41	2137.41
MW-16	11/25/2009	2292.34	NP	155.28	NP	2137.06	2137.06
MW-16	12/14/2009	2292.34	NP	155.27	NP	2137.07	2137.07
MW-16	1/18/2010	2292.34	NP	155.32	NP	2137.02	2137.02
MW-16	2/26/2010	2292.34	NP	155.36	NP	2136.98	2136.98
MW-16	3/22/2010	2292.34	NP	154.75	NP	2137.59	2137.59
MW-16	4/12/2010	2292.34	NP	154.64	NP	2137.70	2137.70
MW-16	5/27/2010	2292.34	NP	154.97	NP	2137.37	2137.37
MW-16	6/22/2010	2292.34	NP	155.31	NP	2137.03	2137.03
MW-16	7/12/2010	2292.34	NP	155.65	NP	2136.69	2136.69
MW-16	8/26/2010	2292.34	NP	156.03	NP	2136.31	2136.31
MW-16	9/22/2010	2292.34	NP	155.70	NP	2136.64	2136.64

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-16	10/5/2010	2292.34	NP	155.43	NP	2136.91	2136.91
MW-16	10/18/2010	2292.34	NP	155.39	NP	2136.95	2136.95
MW-16	11/30/2010	2292.34	NP	155.65	NP	2136.69	2136.69
MW-16	12/21/2010	2292.34	NP	155.69	NP	2136.65	2136.65
MW-16	1/10/2011	2292.34	NP	155.70	NP	2136.64	2136.64
MW-16	2/17/2011	2292.34	NP	155.95	NP	2136.39	2136.39
MW-16	3/25/2011	2292.34	NP	155.99	NP	2136.35	2136.35
MW-16	4/11/2011	2292.34	NP	156.22	NP	2136.12	2136.12
MW-16	5/9/2011	2292.34	NP	156.45	NP	2135.89	2135.89
MW-16	6/29/2011	2292.34	NP	157.21	NP	2135.13	2135.13
MW-16	7/11/2011	2292.34	NP	157.32	NP	2135.02	2135.02
MW-16	8/31/2011	2292.34	NP	157.96	NP	2134.38	2134.38
MW-16	9/28/2011	2292.34	NP	158.03	NP	2134.31	2134.31
MW-16	10/10/2011	2292.34	NP	157.60	NP	2134.74	2134.74
MW-16	11/16/2011	2292.34	NP	157.55	NP	2134.79	2134.79
MW-16	12/29/2011	2292.34	NP	157.43	NP	2134.91	2134.91
MW-16	1/16/2012	2292.34	NP	157.35	NP	2134.99	2134.99
MW-16	2/28/2012	2292.34	NP	157.06	NP	2135.28	2135.28
MW-16	3/30/2012	2292.34	NP	157.22	NP	2135.12	2135.12
MW-16	4/2/2012	2292.34	NP	157.31	NP	2135.03	2135.03
MW-16	5/30/2012	2292.34	NP	158.12	NP	2134.22	2134.22
MW-16	6/29/2012	2292.34	NP	158.39	NP	2133.95	2133.95
MW-16	7/9/2012	2292.34	NP	158.42	NP	2133.92	2133.92
MW-16	8/29/2012	2292.34	NP	158.25	NP	2134.09	2134.09
MW-16	9/25/2012	2292.34	NP	157.92	NP	2134.42	2134.42
MW-16	10/22/2012	2292.34	NP	157.97	NP	2134.37	2134.37
MW-16	11/15/2012	2292.34	NP	158.33	NP	2134.01	2134.01
MW-16	12/13/2012	2292.34	NP	158.61	NP	2133.73	2133.73
MW-16	1/21/2013	2292.34	NP	158.64	NP	2133.70	2133.70
MW-16	2/13/2013	2292.34	NP	158.68	NP	2133.66	2133.66
MW-16	3/21/2013	2292.34	NP	158.68	NP	2133.66	2133.66
MW-16	4/15/2013	2292.34	NP	158.80	NP	2133.54	2133.54
MW-16	5/23/2013	2292.34	NP	158.98	NP	2133.36	2133.36
MW-16	6/26/2013	2292.34	NP	159.30	NP	2133.04	2133.04
MW-16	7/8/2013	2292.34	NP	159.44	NP	2132.90	2132.90
MW-16	8/8/2013	2292.34	NP	159.66	NP	2132.68	2132.68
MW-16	9/5/2013	2292.34	NP	159.63	NP	2132.71	2132.71
MW-16	10/3/2013	2292.34	NP	159.73	NP	2132.61	2132.61
MW-16	11/27/2013	2292.34	NP	159.96	NP	2132.38	2132.38
MW-16	12/31/2013	2292.34	NP	159.84	NP	2132.50	2132.50
MW-16	1/10/2014	2292.34	NP	160.05	NP	2132.29	2132.29
MW-16	2/18/2014	2292.34	NP	160.14	NP	2132.20	2132.20
MW-16	4/17/2014	2292.34	NP	160.27	NP	2132.07	2132.07
MW-16	5/22/2014	2292.34	NP	160.58	NP	2131.76	2131.76
MW-16	6/20/2014	2292.34	NP	160.90	NP	2131.44	2131.44
MW-16	7/15/2014	2292.34	NP	161.25	NP	2131.09	2131.09

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-16	8/14/2014	2292.34	NP	161.56	NP	2130.78	2130.78
MW-16	9/9/2014	2292.34	NP	161.65	NP	2130.69	2130.69
MW-16	10/1/2014	2292.34	NP	160.99	NP	2131.35	2131.35
MW-16	11/18/2014	2292.34	NP	160.61	NP	2131.73	2131.73
MW-16	12/16/2014	2292.34	NP	160.52	NP	2131.82	2131.82
MW-16	1/19/2015	2292.34	NP	160.30	NP	2132.04	2132.04
MW-16	2/19/2015	2292.34	NP	159.97	NP	2132.37	2132.37
MW-16	3/26/2015	2292.34	NP	159.64	NP	2132.70	2132.70
MW-16	4/16/2015	2292.34	NP	159.45	NP	2132.89	2132.89
MW-16	5/19/2015	2292.34	NP	159.77	NP	2132.57	2132.57
MW-16	6/22/2015	2292.34	NP	160.18	NP	2132.16	2132.16
MW-17	2/5/2004	2289.88	141.18	144.36	3.18	2145.52	2147.91
MW-17	2/19/2004	2289.88	141.91	142.28	0.37	2147.60	2147.88
MW-17	3/8/2004	2289.88	142.08	144.28	2.20	2145.60	2147.25
MW-17	3/15/2004	2289.88	142.16	144.24	2.08	2145.64	2147.20
MW-17	3/22/2004	2289.88	142.19	144.16	1.97	2145.72	2147.20
MW-17	3/29/2004	2289.88	142.27	144.19	1.92	2145.69	2147.13
MW-17	4/5/2004	2289.88	142.32	144.11	1.79	2145.77	2147.11
MW-17	4/12/2004	2289.88	142.39	144.09	1.70	2145.79	2147.07
MW-17	4/19/2004	2289.88	142.41	144.08	1.67	2145.80	2147.05
MW-17	4/26/2004	2289.88	142.46	144.06	1.60	2145.82	2147.02
MW-17	5/3/2004	2289.88	142.45	144.03	1.58	2145.85	2147.04
MW-17	5/10/2004	2289.88	142.51	144.05	1.54	2145.83	2146.99
MW-17	5/17/2004	2289.88	142.57	144.09	1.52	2145.79	2146.93
MW-17	5/24/2004	2289.88	142.61	144.16	1.55	2145.72	2146.88
MW-17	5/31/2004	2289.88	142.61	144.17	1.56	2145.71	2146.88
MW-17	6/7/2004	2289.88	142.69	144.25	1.56	2145.63	2146.80
MW-17	6/14/2004	2289.88	143.34	144.89	1.55	2144.99	2146.15
MW-17	6/21/2004	2289.88	142.91	144.48	1.57	2145.40	2146.58
MW-17	6/28/2004	2289.88	143.02	144.64	1.62	2145.24	2146.46
MW-17	7/6/2004	2289.88	143.05	144.99	1.94	2144.89	2146.35
MW-17	7/12/2004	2289.88	143.21	144.97	1.76	2144.91	2146.23
MW-17	7/19/2004	2289.88	143.32	145.02	1.70	2144.86	2146.14
MW-17	7/26/2004	2289.88	143.95	145.65	1.70	2144.23	2145.51
MW-17	8/2/2004	2289.88	143.55	145.24	1.69	2144.64	2145.91
MW-17	8/9/2004	2289.88	143.68	146.35	2.67	2143.53	2145.53
MW-17	8/16/2004	2289.88	143.80	145.48	1.68	2144.40	2145.66
MW-17	8/23/2004	2289.88	143.90	145.59	1.69	2144.29	2145.56
MW-17	8/30/2004	2289.88	142.35	144.03	1.68	2145.85	2147.11
MW-17	9/8/2004	2289.88	144.69	146.45	1.76	2143.43	2144.75
MW-17	9/13/2004	2289.88	144.78	146.46	1.68	2143.42	2144.68
MW-17	9/20/2004	2289.88	144.35	145.98	1.63	2143.90	2145.12
MW-17	9/27/2004	2289.88	144.45	146.07	1.62	2143.81	2145.03
MW-17	10/4/2004	2289.88	144.54	146.10	1.56	2143.78	2144.95
MW-17	10/11/2004	2289.88	145.18	146.75	1.57	2143.13	2144.31
MW-17	10/18/2004	2289.88	145.26	146.79	1.53	2143.09	2144.24

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-17	10/25/2004	2289.88	145.30	146.84	1.54	2143.04	2144.20
MW-17	11/1/2004	2289.88	145.45	147.01	1.56	2142.87	2144.04
MW-17	11/8/2004	2289.88	145.49	147.06	1.57	2142.82	2144.00
MW-17	11/15/2004	2289.88	145.56	147.15	1.59	2142.73	2143.92
MW-17	11/30/2004	2289.88	145.73	147.35	1.62	2142.53	2143.75
MW-17	12/6/2004	2289.88	145.78	147.48	1.70	2142.40	2143.68
MW-17	12/13/2004	2289.88	145.31	146.96	1.65	2142.92	2144.16
MW-17	12/20/2004	2289.88	146.21	146.60	0.39	2143.28	2143.57
MW-17	1/4/2005	2289.88	146.36	146.60	0.24	2143.28	2143.46
MW-17	1/10/2005	2289.88	146.45	146.54	0.09	2143.34	2143.41
MW-17	1/17/2005	2289.88	146.46	146.58	0.12	2143.30	2143.39
MW-17	1/24/2005	2289.88	146.53	146.69	0.16	2143.19	2143.31
MW-17	1/31/2005	2289.88	146.47	146.62	0.15	2143.26	2143.37
MW-17	2/7/2005	2289.88	146.54	146.79	0.25	2143.09	2143.28
MW-17	2/14/2005	2289.88	146.25	147.59	1.34	2142.29	2143.30
MW-17	2/21/2005	2289.88	146.25	147.61	1.36	2142.27	2143.29
MW-17	2/28/2005	2289.88	146.23	147.53	1.30	2142.35	2143.33
MW-17	3/7/2005	2289.88	146.19	147.50	1.31	2142.38	2143.36
MW-17	3/14/2005	2289.88	146.10	147.41	1.31	2142.47	2143.45
MW-17	3/21/2005	2289.88	146.05	147.32	1.27	2142.56	2143.51
MW-17	3/27/2005	2289.88	145.95	147.35	1.40	2142.53	2143.58
MW-17	4/4/2005	2289.88	145.94	147.44	1.50	2142.44	2143.57
MW-17	4/11/2005	2289.88	145.98	147.55	1.57	2142.33	2143.51
MW-17	4/18/2005	2289.88	146.04	147.54	1.50	2142.34	2143.47
MW-17	4/25/2005	2289.88	145.97	147.49	1.52	2142.39	2143.53
MW-17	5/2/2005	2289.88	145.99	147.52	1.53	2142.36	2143.51
MW-17	5/10/2005	2289.88	146.03	147.59	1.56	2142.29	2143.46
MW-17	5/16/2005	2289.88	146.08	147.61	1.53	2142.27	2143.42
MW-17	5/23/2005	2289.88	146.19	147.68	1.49	2142.20	2143.32
MW-17	5/30/2005	2289.88	146.25	147.74	1.49	2142.14	2143.26
MW-17	6/6/2005	2289.88	146.32	147.46	1.14	2142.42	2143.28
MW-17	6/13/2005	2289.88	146.39	147.82	1.43	2142.06	2143.13
MW-17	6/20/2005	2289.88	146.57	147.53	0.96	2142.35	2143.07
MW-17	6/27/2005	2289.88	146.74	147.26	0.52	2142.62	2143.01
MW-17	7/5/2005	2289.88	146.87	147.20	0.33	2142.68	2142.93
MW-17	7/11/2005	2289.88	146.95	147.26	0.31	2142.62	2142.85
MW-17	7/18/2005	2289.88	146.99	147.46	0.47	2142.42	2142.77
MW-17	7/25/2005	2289.88	147.01	147.71	0.70	2142.17	2142.70
MW-17	8/1/2005	2289.88	147.02	147.97	0.95	2141.91	2142.62
MW-17	8/8/2005	2289.88	147.03	148.15	1.12	2141.73	2142.57
MW-17	8/15/2005	2289.88	147.07	148.21	1.14	2141.67	2142.53
MW-17	8/22/2005	2289.88	147.07	148.31	1.24	2141.57	2142.50
MW-17	8/29/2005	2289.88	146.95	148.15	1.20	2141.73	2142.63
MW-17	9/7/2005	2289.88	146.65	147.78	1.13	2142.10	2142.95
MW-17	9/12/2005	2289.88	146.47	147.43	0.96	2142.45	2143.17
MW-17	9/19/2005	2289.88	146.38	146.80	0.42	2143.08	2143.40

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-17	9/26/2005	2289.88	146.23	146.83	0.60	2143.05	2143.50
MW-17	10/3/2005	2289.88	146.14	147.21	1.07	2142.67	2143.47
MW-17	10/10/2005	2289.88	146.25	147.38	1.13	2142.50	2143.35
MW-17	10/17/2005	2289.88	146.47	147.14	0.67	2142.74	2143.24
MW-17	10/24/2005	2289.88	146.71	147.19	0.48	2142.69	2143.05
MW-17	10/31/2005	2289.88	146.81	147.24	0.43	2142.64	2142.96
MW-17	11/7/2005	2289.88	146.90	147.56	0.66	2142.32	2142.82
MW-17	11/14/2005	2289.88	146.94	147.85	0.91	2142.03	2142.71
MW-17	11/21/2005	2289.88	146.99	148.16	1.17	2141.72	2142.60
MW-17	12/5/2005	2289.88	147.05	148.39	1.34	2141.49	2142.50
MW-17	12/12/2005	2289.88	147.10	148.96	1.86	2140.92	2142.32
MW-17	12/19/2005	2289.88	147.17	148.50	1.33	2141.38	2142.38
MW-17	12/28/2005	2289.88	147.18	148.59	1.41	2141.29	2142.35
MW-17	1/9/2006	2289.88	147.20	148.65	1.45	2141.23	2142.32
MW-17	1/16/2006	2289.88	147.34	148.70	1.36	2141.18	2142.20
MW-17	1/30/2006	2289.88	147.36	148.73	1.37	2141.15	2142.18
MW-17	2/13/2006	2289.88	147.41	148.81	1.40	2141.07	2142.12
MW-17	2/27/2006	2289.88	147.50	148.88	1.38	2141.00	2142.04
MW-17	3/6/2006	2289.88	147.53	148.82	1.29	2141.06	2142.03
MW-17	3/13/2006	2289.88	147.56	148.88	1.32	2141.00	2141.99
MW-17	3/20/2006	2289.88	147.56	148.90	1.34	2140.98	2141.99
MW-17	3/27/2006	2289.88	147.62	148.84	1.22	2141.04	2141.96
MW-17	4/3/2006	2289.88	147.69	148.80	1.11	2141.08	2141.91
MW-17	4/10/2006	2289.88	147.69	149.00	1.31	2140.88	2141.86
MW-17	4/17/2006	2289.88	147.72	149.08	1.36	2140.80	2141.82
MW-17	4/24/2006	2289.88	147.79	149.04	1.25	2140.84	2141.78
MW-17	5/1/2006	2289.88	147.82	149.05	1.23	2140.83	2141.75
MW-17	5/15/2006	2289.88	147.84	149.04	1.20	2140.84	2141.74
MW-17	5/22/2006	2289.88	147.95	148.99	1.04	2140.89	2141.67
MW-17	5/30/2006	2289.88	148.05	149.18	1.13	2140.70	2141.55
MW-17	6/5/2006	2289.88	148.21	149.00	0.79	2140.88	2141.47
MW-17	6/12/2006	2289.88	148.32	149.06	0.74	2140.82	2141.38
MW-17	6/26/2006	2289.88	148.41	149.38	0.97	2140.50	2141.23
MW-17	7/10/2006	2289.88	148.54	149.52	0.98	2140.36	2141.10
MW-17	8/4/2006	2289.88	148.27	149.21	0.94	2140.67	2141.38
MW-17	8/14/2006	2289.88	148.68	149.93	1.25	2139.95	2140.89
MW-17	8/23/2006	2289.88	148.59	149.71	1.12	2140.17	2141.01
MW-17	9/19/2006	2289.88	147.71	147.87	0.16	2142.01	2142.13
MW-17	10/20/2006	2289.88	147.04	147.16	0.12	2142.72	2142.81
MW-17	10/30/2006	2289.88	147.12	147.54	0.42	2142.34	2142.66
MW-17	11/17/2006	2289.88	147.32	148.02	0.70	2141.86	2142.39
MW-17	1/29/2007	2289.88	148.20	149.60	1.40	2140.28	2141.33
MW-17	3/1/2007	2289.88	148.40	149.81	1.41	2140.07	2141.13
MW-17	3/28/2007	2289.88	148.60	150.00	1.40	2139.88	2140.93
MW-17	4/24/2007	2289.88	NP	148.79	NP	2141.09	2141.09
MW-17	5/28/2007	2289.88	148.97	149.99	1.02	2139.89	2140.66

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-17	6/27/2007	2289.88	149.25	150.37	1.12	2139.51	2140.35
MW-17	7/23/2007	2289.88	149.56	150.68	1.12	2139.20	2140.04
MW-17	8/25/2007	2289.88	149.07	149.93	0.86	2139.95	2140.60
MW-17	9/25/2007	2289.88	148.47	149.35	0.88	2140.53	2141.19
MW-17	10/22/2007	2289.88	148.77	149.83	1.06	2140.05	2140.85
MW-17	11/28/2007	2289.88	149.62	150.78	1.16	2139.10	2139.97
MW-17	12/31/2007	2289.88	149.67	150.91	1.24	2138.97	2139.90
MW-17	1/26/2008	2289.88	149.49	150.61	1.12	2139.27	2140.11
MW-17	2/29/2008	2289.88	149.52	150.84	1.32	2139.04	2140.03
MW-17	3/31/2008	2289.88	149.18	150.26	1.08	2139.62	2140.43
MW-17	4/21/2008	2289.88	149.30	150.50	1.20	2139.38	2140.28
MW-17	5/23/2008	2289.88	149.93	151.19	1.26	2138.69	2139.64
MW-17	6/25/2008	2289.88	149.93	151.14	1.21	2138.74	2139.65
MW-17	7/28/2008	2289.88	150.30	151.40	1.10	2138.48	2139.31
MW-17	8/25/2008	2289.88	149.19	149.92	0.73	2139.96	2140.51
MW-17	9/30/2008	2289.88	NP	147.85	NP	2142.03	2142.03
MW-17	10/13/2008	2289.88	147.82	147.83	0.01	2142.05	2142.06
MW-17	11/26/2008	2289.88	148.36	148.70	0.34	2141.18	2141.44
MW-17	12/23/2008	2289.88	148.70	149.26	0.56	2140.62	2141.04
MW-17	1/26/2009	2289.88	148.80	149.47	0.67	2140.41	2140.91
MW-17	2/27/2009	2289.88	148.82	149.53	0.71	2140.35	2140.88
MW-17	3/26/2009	2289.88	149.06	149.76	0.70	2140.12	2140.65
MW-17	4/27/2009	2289.88	149.15	149.82	0.67	2140.06	2140.56
MW-17	5/20/2009	2289.88	149.50	150.18	0.68	2139.70	2140.21
MW-17	6/16/2009	2289.88	150.04	150.93	0.89	2138.95	2139.62
MW-17	7/20/2009	2289.88	150.42	151.47	1.05	2138.41	2139.20
MW-17	8/31/2009	2289.88	150.80	151.65	0.85	2138.23	2138.87
MW-17	9/29/2009	2289.88	151.01	151.94	0.93	2137.94	2138.64
MW-17	10/22/2009	2289.88	151.14	152.08	0.94	2137.80	2138.51
MW-17	11/25/2009	2289.88	151.51	152.34	0.83	2137.54	2138.16
MW-17	12/14/2009	2289.88	NP	152.41	NP	2137.47	2137.47
MW-17	1/18/2010	2289.88	151.54	152.42	0.88	2137.46	2138.12
MW-17	2/26/2010	2289.88	151.62	152.46	0.84	2137.42	2138.05
MW-17	3/22/2010	2289.88	151.05	151.60	0.55	2138.28	2138.69
MW-17	4/12/2010	2289.88	150.98	151.44	0.46	2138.44	2138.79
MW-17	5/27/2010	2289.88	NP	151.25	NP	2138.63	2138.63
MW-17	6/22/2010	2289.88	151.56	152.40	0.84	2137.48	2138.11
MW-17	7/12/2010	2289.88	151.83	152.73	0.90	2137.15	2137.83
MW-17	8/26/2010	2289.88	152.21	153.04	0.83	2136.84	2137.46
MW-17	9/22/2010	2289.88	NP	151.88	NP	2138.00	2138.00
MW-17	10/5/2010	2289.88	151.70	152.36	0.66	2137.52	2138.02
MW-17	10/18/2010	2289.88	151.61	152.20	0.59	2137.68	2138.12
MW-17	11/30/2010	2289.88	151.90	152.64	0.74	2137.24	2137.80
MW-17	12/21/2010	2289.88	152.04	152.82	0.78	2137.06	2137.65
MW-17	1/10/2011	2289.88	151.91	152.67	0.76	2137.21	2137.78
MW-17	2/17/2011	2289.88	152.31	152.97	0.66	2136.91	2137.41

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-17	3/25/2011	2289.88	152.40	152.98	0.58	2136.90	2137.34
MW-17	4/11/2011	2289.88	152.46	153.05	0.59	2136.83	2137.27
MW-17	5/9/2011	2289.88	152.68	153.28	0.60	2136.60	2137.05
MW-17	7/11/2011	2289.88	153.57	154.15	0.58	2135.73	2136.17
MW-17	8/31/2011	2289.88	154.16	154.69	0.53	2135.19	2135.59
MW-17	9/28/2011	2289.88	154.21	154.77	0.56	2135.11	2135.53
MW-17	10/10/2011	2289.88	153.78	154.20	0.42	2135.68	2136.00
MW-17	11/16/2011	2289.88	153.76	154.24	0.48	2135.64	2136.00
MW-17	12/29/2011	2289.88	153.68	154.03	0.35	2135.85	2136.11
MW-17	1/16/2012	2289.88	153.61	153.62	0.01	2136.26	2136.27
MW-17	2/28/2012	2289.88	NP	153.36	NP	2136.52	2136.52
MW-17	3/30/2012	2289.88	153.55	153.85	0.3	2136.03	2136.26
MW-17	4/2/2012	2289.88	153.66	153.67	0.01	2136.21	2136.22
MW-17	5/30/2012	2289.88	154.36	154.77	0.41	2135.11	2135.42
MW-17	6/29/2012	2289.88	154.64	155.07	0.43	2134.81	2135.13
MW-17	7/9/2012	2289.88	154.66	155.07	0.41	2134.81	2135.12
MW-17	8/29/2012	2289.88	154.50	154.72	0.22	2135.16	2135.33
MW-17	9/25/2012	2289.88	154.15	154.31	0.16	2135.57	2135.69
MW-17	10/22/2012	2289.88	154.23	154.52	0.29	2135.36	2135.58
MW-17	11/15/2012	2289.88	154.59	154.91	0.32	2134.97	2135.21
MW-17	12/13/2012	2289.88	154.85	155.18	0.33	2134.70	2134.95
MW-17	1/21/2013	2289.88	154.92	155.26	0.34	2134.62	2134.88
MW-17	2/13/2013	2289.88	154.95	155.27	0.32	2134.61	2134.85
MW-17	3/21/2013	2289.88	154.99	155.33	0.34	2134.55	2134.81
MW-17	4/15/2013	2289.88	155.10	155.45	0.35	2134.43	2134.69
MW-17	5/23/2013	2289.88	155.29	155.83	0.54	2134.05	2134.46
MW-17	6/26/2013	2289.88	155.55	155.91	0.36	2133.97	2134.24
MW-17	7/8/2013	2289.88	155.66	156.05	0.39	2133.83	2134.12
MW-17	8/8/2013	2289.88	155.88	156.21	0.33	2133.67	2133.92
MW-17	9/5/2013	2289.88	155.84	156.14	0.30	2133.74	2133.97
MW-17	10/3/2013	2289.88	156.00	156.29	0.29	2133.59	2133.81
MW-17	11/27/2013	2286.73	153.04	153.23	0.19	2133.50	2133.64
MW-17	12/31/2013	2286.73	NP	153.00	NP	2133.73	2133.73
MW-17	1/10/2014	2286.73	153.21	153.23	0.02	2133.50	2133.52
MW-17	2/18/2014	2286.73	153.31	153.32	0.01	2133.41	2133.42
MW-17	3/12/2014	2286.73	NP	153.35	NP	2133.38	2133.38
MW-17	4/17/2014	2286.73	NP	153.46	NP	2133.27	2133.27
MW-17	5/22/2014	2286.73	NP	153.80	NP	2132.93	2132.93
MW-17	6/20/2014	2286.73	NP	154.05	NP	2132.68	2132.68
MW-17	7/15/2014	2286.73	NP	154.37	NP	2132.36	2132.36
MW-17	8/14/2014	2286.73	NP	154.71	NP	2132.02	2132.02
MW-17	9/9/2014	2286.73	NP	154.70	NP	2132.03	2132.03
MW-17	10/1/2014	2286.73	154.05	154.05	0.00	2132.68	2132.68
MW-17	11/18/2014	2286.73	NP	153.76	NP	2132.97	2132.97
MW-17	12/16/2014	2286.73	NP	153.72	NP	2133.01	2133.01
MW-17	1/19/2015	2286.73	NP	153.46	NP	2133.27	2133.27

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-17	2/19/2015	2286.73	NP	153.17	NP	2133.56	2133.56
MW-17	3/26/2015	2286.73	NP	152.89	NP	2133.84	2133.84
MW-17	4/16/2015	2286.73	NP	152.72	NP	2134.01	2134.01
MW-17	5/19/2015	2286.73	NP	152.93	NP	2133.80	2133.80
MW-17	6/22/2015	2286.73	NP	153.45	NP	2133.28	2133.28
MW-18	2/5/2004	2286.11	NP	140.27	NP	2145.84	2145.84
MW-18	2/12/2004	2286.11	NP	140.30	NP	2145.81	2145.81
MW-18	2/23/2004	2286.11	NP	140.34	NP	2145.77	2145.77
MW-18	3/2/2004	2286.11	NP	140.34	NP	2145.77	2145.77
MW-18	3/8/2004	2286.11	NP	140.34	NP	2145.77	2145.77
MW-18	3/15/2004	2286.11	NP	140.43	NP	2145.68	2145.68
MW-18	3/22/2004	2286.11	NP	140.45	NP	2145.66	2145.66
MW-18	3/29/2004	2286.11	NP	140.49	NP	2145.62	2145.62
MW-18	4/5/2004	2286.11	NP	140.52	NP	2145.59	2145.59
MW-18	4/12/2004	2286.11	NP	140.54	NP	2145.57	2145.57
MW-18	4/19/2004	2286.11	NP	140.58	NP	2145.53	2145.53
MW-18	4/26/2004	2286.11	NP	140.79	NP	2145.32	2145.32
MW-18	5/3/2004	2286.11	NP	140.59	NP	2145.52	2145.52
MW-18	5/10/2004	2286.11	NP	140.80	NP	2145.31	2145.31
MW-18	5/17/2004	2286.11	NP	140.67	NP	2145.44	2145.44
MW-18	5/24/2004	2286.11	NP	140.71	NP	2145.40	2145.40
MW-18	5/31/2004	2286.11	NP	140.79	NP	2145.32	2145.32
MW-18	6/7/2004	2286.11	NP	140.79	NP	2145.32	2145.32
MW-18	6/14/2004	2286.11	NP	140.91	NP	2145.20	2145.20
MW-18	6/21/2004	2286.11	NP	141.03	NP	2145.08	2145.08
MW-18	6/28/2004	2286.11	NP	141.17	NP	2144.94	2144.94
MW-18	7/6/2004	2286.11	NP	141.28	NP	2144.83	2144.83
MW-18	7/12/2004	2286.11	NP	141.38	NP	2144.73	2144.73
MW-18	7/19/2004	2286.11	NP	141.50	NP	2144.61	2144.61
MW-18	7/26/2004	2286.11	NP	141.59	NP	2144.52	2144.52
MW-18	8/2/2004	2286.11	NP	141.73	NP	2144.38	2144.38
MW-18	8/9/2004	2286.11	NP	141.89	NP	2144.22	2144.22
MW-18	8/16/2004	2286.11	NP	142.01	NP	2144.10	2144.10
MW-18	8/23/2004	2286.11	NP	142.01	NP	2144.10	2144.10
MW-18	8/30/2004	2286.11	NP	142.23	NP	2143.88	2143.88
MW-18	9/8/2004	2286.11	NP	142.31	NP	2143.80	2143.80
MW-18	9/13/2004	2286.11	NP	142.31	NP	2143.80	2143.80
MW-18	9/20/2004	2286.11	NP	142.56	NP	2143.55	2143.55
MW-18	9/27/2004	2286.11	NP	142.67	NP	2143.44	2143.44
MW-18	10/4/2004	2286.11	NP	142.74	NP	2143.37	2143.37
MW-18	10/11/2004	2286.11	NP	142.84	NP	2143.27	2143.27
MW-18	10/18/2004	2286.11	NP	142.91	NP	2143.20	2143.20
MW-18	10/25/2004	2286.11	NP	142.95	NP	2143.16	2143.16
MW-18	11/1/2004	2286.11	NP	143.08	NP	2143.03	2143.03
MW-18	11/8/2004	2286.11	NP	143.19	NP	2142.92	2142.92
MW-18	11/15/2004	2286.11	NP	143.21	NP	2142.90	2142.90

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-18	11/30/2004	2286.11	NP	143.36	NP	2142.75	2142.75
MW-18	12/6/2004	2286.11	NP	143.55	NP	2142.56	2142.56
MW-18	12/13/2004	2286.11	NP	143.57	NP	2142.54	2142.54
MW-18	12/20/2004	2286.11	NP	143.56	NP	2142.55	2142.55
MW-18	1/4/2005	2286.11	NP	143.72	NP	2142.39	2142.39
MW-18	1/10/2005	2286.11	NP	143.38	NP	2142.73	2142.73
MW-18	1/17/2005	2286.11	NP	143.71	NP	2142.40	2142.40
MW-18	1/24/2005	2286.11	NP	143.84	NP	2142.27	2142.27
MW-18	1/31/2005	2286.11	NP	143.79	NP	2142.32	2142.32
MW-18	2/24/2005	2286.11	NP	143.71	NP	2142.40	2142.40
MW-18	3/2/2005	2286.11	143.79	143.84	0.05	2142.27	2142.31
MW-18	3/7/2005	2286.11	143.97	144.13	0.16	2141.98	2142.10
MW-18	3/14/2005	2286.11	143.60	143.85	0.25	2142.26	2142.45
MW-18	3/21/2005	2286.11	143.55	143.79	0.24	2142.32	2142.50
MW-18	3/27/2005	2286.11	143.42	143.74	0.32	2142.37	2142.61
MW-18	4/4/2005	2286.11	143.49	143.74	0.25	2142.37	2142.56
MW-18	4/11/2005	2286.11	143.50	143.93	0.43	2142.18	2142.50
MW-18	4/18/2005	2286.11	143.54	144.02	0.48	2142.09	2142.45
MW-18	4/25/2005	2286.11	143.47	143.89	0.42	2142.22	2142.54
MW-18	5/2/2005	2286.11	143.45	144.03	0.58	2142.08	2142.52
MW-18	5/10/2005	2286.11	143.48	144.10	0.62	2142.01	2142.48
MW-18	5/16/2005	2286.11	143.62	143.95	0.33	2142.16	2142.41
MW-18	5/23/2005	2286.11	143.71	144.03	0.32	2142.08	2142.32
MW-18	5/30/2005	2286.11	143.82	144.00	0.18	2142.11	2142.25
MW-18	6/6/2005	2286.11	143.89	144.03	0.14	2142.08	2142.19
MW-18	6/13/2005	2286.11	143.95	144.05	0.10	2142.06	2142.14
MW-18	6/20/2005	2286.11	144.02	144.12	0.10	2141.99	2142.07
MW-18	6/27/2005	2286.11	144.00	144.28	0.28	2141.83	2142.04
MW-18	7/5/2005	2286.11	144.05	144.50	0.45	2141.61	2141.95
MW-18	7/11/2005	2286.11	144.07	144.75	0.68	2141.36	2141.87
MW-18	7/18/2005	2286.11	144.10	145.04	0.94	2141.07	2141.78
MW-18	7/25/2005	2286.11	144.11	145.28	1.17	2140.83	2141.71
MW-18	8/1/2005	2286.11	144.25	145.35	1.10	2140.76	2141.59
MW-18	8/8/2005	2286.11	144.26	145.50	1.24	2140.61	2141.54
MW-18	8/15/2005	2286.11	144.31	145.58	1.27	2140.53	2141.48
MW-18	8/22/2005	2286.11	144.31	145.62	1.31	2140.49	2141.47
MW-18	8/29/2005	2286.11	144.25	145.46	1.21	2140.65	2141.56
MW-18	9/7/2005	2286.11	143.99	145.10	1.11	2141.01	2141.84
MW-18	9/19/2005	2286.11	143.77	143.92	0.15	2142.19	2142.30
MW-18	9/26/2005	2286.11	143.67	143.70	0.03	2142.41	2142.43
MW-18	10/3/2005	2286.11	143.66	143.77	0.11	2142.34	2142.42
MW-18	10/10/2005	2286.11	143.75	144.00	0.25	2142.11	2142.30
MW-18	10/17/2005	2286.11	143.84	144.05	0.21	2142.06	2142.22
MW-18	10/24/2005	2286.11	144.04	144.18	0.14	2141.93	2142.04
MW-18	10/31/2005	2286.11	144.14	144.38	0.24	2141.73	2141.91
MW-18	11/7/2005	2286.11	144.24	144.59	0.35	2141.52	2141.78

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-18	11/14/2005	2286.11	144.21	145.15	0.94	2140.96	2141.67
MW-18	11/21/2005	2286.11	144.25	145.50	1.25	2140.61	2141.55
MW-18	12/5/2005	2286.11	144.35	145.72	1.37	2140.39	2141.42
MW-18	12/12/2005	2286.11	144.38	145.80	1.42	2140.31	2141.38
MW-18	12/19/2005	2286.11	144.45	145.86	1.41	2140.25	2141.31
MW-18	12/28/2005	2286.11	144.49	145.89	1.40	2140.22	2141.27
MW-18	1/9/2006	2286.11	144.61	145.87	1.26	2140.24	2141.19
MW-18	1/16/2006	2286.11	144.69	145.92	1.23	2140.19	2141.11
MW-18	1/30/2006	2286.11	144.73	145.93	1.20	2140.18	2141.08
MW-18	2/13/2006	2286.11	144.76	146.05	1.29	2140.06	2141.03
MW-18	2/27/2006	2286.11	144.79	146.14	1.35	2139.97	2140.98
MW-18	3/6/2006	2286.11	144.82	146.09	1.27	2140.02	2140.97
MW-18	3/13/2006	2286.11	144.86	146.11	1.25	2140.00	2140.94
MW-18	3/20/2006	2286.11	144.89	146.13	1.24	2139.98	2140.91
MW-18	3/27/2006	2286.11	144.89	146.15	1.26	2139.96	2140.91
MW-18	4/3/2006	2286.11	144.95	146.14	1.19	2139.97	2140.86
MW-18	4/10/2006	2286.11	145.00	146.18	1.18	2139.93	2140.82
MW-18	4/17/2006	2286.11	145.09	146.19	1.10	2139.92	2140.75
MW-18	4/24/2006	2286.11	145.14	146.11	0.97	2140.00	2140.73
MW-18	5/1/2006	2286.11	145.15	146.19	1.04	2139.92	2140.70
MW-18	5/15/2006	2286.11	145.11	146.32	1.21	2139.79	2140.70
MW-18	5/22/2006	2286.11	145.28	146.35	1.07	2139.76	2140.56
MW-18	5/30/2006	2286.11	145.27	146.53	1.26	2139.58	2140.53
MW-18	6/5/2006	2286.11	145.36	146.59	1.23	2139.52	2140.44
MW-18	6/12/2006	2286.11	145.68	146.03	0.35	2140.08	2140.34
MW-18	6/26/2006	2286.11	145.73	146.50	0.77	2139.61	2140.19
MW-18	7/10/2006	2286.11	145.85	146.75	0.90	2139.36	2140.04
MW-18	8/4/2006	2286.11	NP	146.90	NP	2139.21	2139.21
MW-18	8/14/2006	2286.11	146.00	147.13	1.13	2138.98	2139.83
MW-18	8/23/2006	2286.11	145.98	147.05	1.07	2139.06	2139.86
MW-18	9/19/2006	2286.11	144.95	145.81	0.86	2140.30	2140.95
MW-18	10/20/2006	2286.11	144.38	144.56	0.18	2141.55	2141.69
MW-18	10/30/2006	2286.11	144.46	144.83	0.37	2141.28	2141.56
MW-18	11/17/2006	2286.11	144.70	145.21	0.51	2140.90	2141.28
MW-18	1/29/2007	2286.11	145.60	146.79	1.19	2139.32	2140.21
MW-18	3/1/2007	2286.11	145.78	146.92	1.14	2139.19	2140.05
MW-18	3/28/2007	2286.11	145.99	147.17	1.18	2138.94	2139.83
MW-18	4/26/2007	2286.11	146.09	147.30	1.21	2138.81	2139.72
MW-18	5/28/2007	2286.11	146.26	147.42	1.16	2138.69	2139.56
MW-18	6/27/2007	2286.11	146.60	147.74	1.14	2138.37	2139.23
MW-18	7/23/2007	2286.11	146.93	148.00	1.07	2138.11	2138.91
MW-18	8/25/2007	2286.11	146.21	147.28	1.07	2138.83	2139.63
MW-18	9/25/2007	2286.11	146.10	146.33	0.23	2139.78	2139.95
MW-18	10/22/2007	2286.11	146.35	146.89	0.54	2139.22	2139.63
MW-18	11/28/2007	2286.11	147.13	147.71	0.58	2138.40	2138.84
MW-18	12/31/2007	2286.11	147.20	147.80	0.60	2138.31	2138.76

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-18	1/26/2008	2286.11	147.07	147.54	0.47	2138.57	2138.92
MW-18	2/29/2008	2286.11	147.09	147.52	0.43	2138.59	2138.91
MW-18	3/31/2008	2286.11	146.71	147.05	0.34	2139.06	2139.32
MW-18	4/21/2008	2286.11	146.83	147.19	0.36	2138.92	2139.19
MW-18	5/23/2008	2286.11	147.22	147.58	0.36	2138.53	2138.80
MW-18	6/25/2008	2286.11	147.43	148.04	0.61	2138.07	2138.53
MW-18	7/28/2008	2286.11	147.80	148.48	0.68	2137.63	2138.14
MW-18	8/25/2008	2286.11	146.88	147.11	0.23	2139.00	2139.17
MW-18	9/30/2008	2286.11	NP	145.35	NP	2140.76	2140.76
MW-18	10/13/2008	2286.11	NP	145.32	NP	2140.79	2140.79
MW-18	11/26/2008	2286.11	145.82	145.83	0.01	2140.28	2140.29
MW-18	12/23/2008	2286.11	NP	146.24	NP	2139.87	2139.87
MW-18	1/26/2009	2286.11	NP	146.31	NP	2139.80	2139.80
MW-18	2/27/2009	2286.11	NP	146.36	NP	2139.75	2139.75
MW-18	3/26/2009	2286.11	NP	146.56	NP	2139.55	2139.55
MW-18	4/27/2009	2286.11	NP	146.65	NP	2139.46	2139.46
MW-18	5/20/2009	2286.11	NP	147.01	NP	2139.10	2139.10
MW-18	6/16/2009	2286.11	NP	147.60	NP	2138.51	2138.51
MW-18	7/20/2009	2286.11	NP	148.06	NP	2138.05	2138.05
MW-18	8/31/2009	2286.11	148.42	148.54	0.12	2137.57	2137.66
MW-18	9/29/2009	2286.11	148.62	148.73	0.11	2137.38	2137.46
MW-18	10/22/2009	2286.11	148.81	148.92	0.11	2137.19	2137.27
MW-18	11/25/2009	2286.11	149.07	149.23	0.16	2136.88	2137.00
MW-18	12/14/2009	2286.11	NP	149.28	NP	2136.83	2136.83
MW-18	1/18/2010	2286.11	149.19	149.24	0.05	2136.87	2136.91
MW-18	2/26/2010	2286.11	149.30	149.34	0.04	2136.77	2136.80
MW-18	3/22/2010	2286.11	NP	148.67	NP	2137.44	2137.44
MW-18	4/12/2010	2286.11	NP	148.56	NP	2137.55	2137.55
MW-18	5/27/2010	2286.11	NP	148.83	NP	2137.28	2137.28
MW-18	6/22/2010	2286.11	NP	149.19	NP	2136.92	2136.92
MW-18	7/12/2010	2286.11	149.55	149.56	0.01	2136.55	2136.56
MW-18	8/26/2010	2286.11	NP	149.95	NP	2136.16	2136.16
MW-18	9/22/2010	2286.11	NP	149.61	NP	2136.50	2136.50
MW-18	10/5/2010	2286.11	NP	149.39	NP	2136.72	2136.72
MW-18	10/18/2010	2286.11	NP	149.35	NP	2136.76	2136.76
MW-18	11/30/2010	2286.11	NP	149.56	NP	2136.55	2136.55
MW-18	12/21/2010	2286.11	NP	149.62	NP	2136.49	2136.49
MW-18	1/10/2011	2286.11	NP	149.60	NP	2136.51	2136.51
MW-18	2/17/2011	2286.11	NP	149.87	NP	2136.24	2136.24
MW-18	3/25/2011	2286.11	NP	149.87	NP	2136.24	2136.24
MW-18	4/11/2011	2286.11	NP	150.05	NP	2136.06	2136.06
MW-18	5/9/2011	2286.11	NP	150.32	NP	2135.79	2135.79
MW-18	6/29/2011	2286.11	151.12	151.15	0.03	2134.96	2134.98
MW-18	8/31/2011	2286.11	151.80	151.83	0.03	2134.28	2134.30
MW-18	9/28/2011	2286.11	151.71	152.45	0.74	2133.66	2134.22
MW-18	10/10/2011	2286.11	151.46	151.76	0.30	2134.35	2134.58

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-18	11/16/2011	2286.11	151.24	151.35	0.11	2134.76	2134.84
MW-18	12/29/2011	2286.11	NP	151.36	NP	2134.75	2134.75
MW-18	1/16/2012	2286.11	NP	151.31	NP	2134.80	2134.80
MW-18	2/28/2012	2286.11	NP	150.08	NP	2136.03	2136.03
MW-18	3/30/2012	2286.11	NP	151.13	NP	2134.98	2134.98
MW-18	4/2/2012	2286.11	NP	151.23	NP	2134.88	2134.88
MW-18	5/30/2012	2286.11	151.92	152.16	0.24	2133.95	2134.13
MW-18	6/29/2012	2286.11	152.08	152.84	0.76	2133.27	2133.84
MW-18	7/9/2012	2286.11	152.11	152.86	0.75	2133.25	2133.81
MW-18	8/29/2012	2286.11	152.08	152.51	0.43	2133.60	2133.92
MW-18	9/25/2012	2286.11	151.88	151.89	0.01	2134.22	2134.23
MW-18	10/22/2012	2286.11	151.88	152.00	0.12	2134.11	2134.20
MW-18	11/15/2012	2286.11	152.19	152.59	0.40	2133.52	2133.82
MW-18	12/13/2012	2286.11	152.35	153.14	0.79	2132.97	2133.56
MW-18	1/21/2013	2286.11	152.38	153.15	0.77	2132.96	2133.54
MW-18	2/13/2013	2286.11	152.42	153.20	0.78	2132.91	2133.50
MW-18	3/21/2013	2286.11	152.42	153.18	0.76	2132.93	2133.50
MW-18	4/15/2013	2286.11	152.50	153.37	0.87	2132.74	2133.39
MW-18	5/23/2013	2286.11	152.72	153.44	0.72	2132.67	2133.21
MW-18	6/26/2013	2286.11	153.00	153.70	0.70	2132.41	2132.94
MW-18	7/8/2013	2286.11	153.12	153.76	0.64	2132.35	2132.83
MW-18	8/8/2013	2286.11	153.34	154.08	0.74	2132.03	2132.59
MW-18	9/5/2013	2286.11	153.39	153.91	0.52	2132.20	2132.59
MW-18	10/3/2013	2286.11	153.52	154.14	0.62	2131.97	2132.44
MW-18	11/27/2013	2286.08	153.72	154.25	0.53	2131.83	2132.23
MW-18	12/31/2013	2286.08	153.61	154.03	0.42	2132.05	2132.37
MW-18	1/10/2014	2286.08	153.75	154.34	0.59	2131.74	2132.18
MW-18	2/18/2014	2286.08	153.91	154.42	0.51	2131.66	2132.04
MW-18	3/12/2014	2286.08	153.99	154.00	0.01	2132.08	2132.09
MW-18	4/17/2014	2286.08	157.11	157.18	0.07	2128.90	2128.95
MW-18	5/22/2014	2286.08	NP	154.45	NP	2131.63	2131.63
MW-18	6/20/2014	2286.08	NP	154.72	NP	2131.36	2131.36
MW-18	7/15/2014	2286.08	NP	155.07	NP	2131.01	2131.01
MW-18	8/14/2014	2286.08	NP	155.40	NP	2130.68	2130.68
MW-18	9/9/2014	2286.08	NP	155.50	NP	2130.58	2130.58
MW-18	10/1/2014	2286.08	NP	154.91	NP	2131.17	2131.17
MW-18	11/18/2014	2286.08	NP	154.55	NP	2131.53	2131.53
MW-18	12/16/2014	2286.08	NP	154.44	NP	2131.64	2131.64
MW-18	1/19/2015	2286.08	NP	154.17	NP	2131.91	2131.91
MW-18	2/19/2015	2286.08	NP	153.86	NP	2132.22	2132.22
MW-18	3/26/2015	2286.08	NP	153.51	NP	2132.57	2132.57
MW-18	4/16/2015	2286.08	NP	153.32	NP	2132.76	2132.76
MW-18	5/19/2015	2286.08	NP	153.50	NP	2132.58	2132.58
MW-18	6/22/2015	2286.08	NP	154.03	NP	2132.05	2132.05
MW-19	2/5/2004	2289.32	141.95	142.05	0.10	2147.27	2147.35
MW-19	3/8/2004	2289.32	141.00	143.20	2.20	2146.12	2147.77

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-19	3/15/2004	2289.32	141.63	143.75	2.12	2145.57	2147.16
MW-19	3/22/2004	2289.32	141.11	143.15	2.04	2146.17	2147.70
MW-19	3/29/2004	2289.32	141.19	143.18	1.99	2146.14	2147.63
MW-19	4/5/2004	2289.32	141.21	143.14	1.93	2146.18	2147.63
MW-19	4/12/2004	2289.32	141.28	143.14	1.86	2146.18	2147.58
MW-19	4/19/2004	2289.32	141.29	143.11	1.82	2146.21	2147.58
MW-19	4/26/2004	2289.32	141.34	143.11	1.77	2146.21	2147.54
MW-19	5/3/2004	2289.32	141.34	143.06	1.72	2146.26	2147.55
MW-19	5/10/2004	2289.32	141.39	143.08	1.69	2146.24	2147.51
MW-19	5/17/2004	2289.32	141.45	143.13	1.68	2146.19	2147.45
MW-19	5/24/2004	2289.32	141.51	143.17	1.66	2146.15	2147.40
MW-19	5/31/2004	2289.32	141.51	143.18	1.67	2146.14	2147.39
MW-19	6/7/2004	2289.32	141.51	143.18	1.67	2146.14	2147.39
MW-19	6/14/2004	2289.32	141.66	143.35	1.69	2145.97	2147.24
MW-19	6/21/2004	2289.32	141.80	143.41	1.61	2145.91	2147.12
MW-19	6/28/2004	2289.32	142.00	143.28	1.28	2146.04	2147.00
MW-19	7/6/2004	2289.32	142.09	143.53	1.44	2145.79	2146.87
MW-19	7/12/2004	2289.32	142.39	143.05	0.66	2146.27	2146.77
MW-19	7/19/2004	2289.32	142.56	142.97	0.41	2146.35	2146.66
MW-19	7/26/2004	2289.32	142.47	143.56	1.09	2145.76	2146.58
MW-19	8/2/2004	2289.32	142.73	143.30	0.57	2146.02	2146.45
MW-19	8/9/2004	2289.32	142.89	143.38	0.49	2145.94	2146.31
MW-19	8/16/2004	2289.32	142.67	144.56	1.89	2144.76	2146.18
MW-19	8/23/2004	2289.32	143.03	143.83	0.80	2145.49	2146.09
MW-19	8/30/2004	2289.32	143.32	143.50	0.18	2145.82	2145.96
MW-19	9/8/2004	2289.32	143.48	143.53	0.05	2145.79	2145.83
MW-19	9/13/2004	2289.32	NP	144.10	NP	2145.22	2145.22
MW-19	9/20/2004	2289.32	143.66	143.71	0.05	2145.61	2145.65
MW-19	9/27/2004	2289.32	NP	143.77	NP	2145.55	2145.55
MW-19	10/4/2004	2289.32	143.82	143.89	0.07	2145.43	2145.48
MW-19	10/11/2004	2289.32	143.85	144.14	0.29	2145.18	2145.40
MW-19	10/18/2004	2289.32	143.85	144.40	0.55	2144.92	2145.33
MW-19	10/25/2004	2289.32	143.83	144.63	0.80	2144.69	2145.29
MW-19	11/1/2004	2289.32	144.08	144.49	0.41	2144.83	2145.14
MW-19	11/8/2004	2289.32	144.72	145.03	0.31	2144.29	2144.52
MW-19	11/15/2004	2289.32	144.80	145.04	0.24	2144.28	2144.46
MW-19	11/30/2004	2289.32	144.21	145.19	0.98	2144.13	2144.87
MW-19	12/6/2004	2289.32	144.29	145.29	1.00	2144.03	2144.78
MW-19	12/13/2004	2289.32	144.39	145.31	0.92	2144.01	2144.70
MW-19	12/20/2004	2289.32	144.97	145.89	0.92	2143.43	2144.12
MW-19	1/4/2005	2289.32	145.07	146.04	0.97	2143.28	2144.01
MW-19	1/10/2005	2289.32	145.20	145.87	0.67	2143.45	2143.95
MW-19	1/17/2005	2289.32	145.27	145.75	0.48	2143.57	2143.93
MW-19	1/24/2005	2289.32	144.86	145.07	0.21	2144.25	2144.41
MW-19	1/31/2005	2289.32	144.79	145.06	0.27	2144.26	2144.46
MW-19	2/7/2005	2289.32	144.89	145.09	0.20	2144.23	2144.38

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-19	2/14/2005	2289.32	144.89	145.10	0.21	2144.22	2144.38
MW-19	2/21/2005	2289.32	144.90	145.17	0.27	2144.15	2144.35
MW-19	2/28/2005	2289.32	144.92	144.96	0.04	2144.36	2144.39
MW-19	3/7/2005	2289.32	144.84	145.03	0.19	2144.29	2144.43
MW-19	3/14/2005	2289.32	144.74	144.98	0.24	2144.34	2144.52
MW-19	3/21/2005	2289.32	144.69	144.87	0.18	2144.45	2144.59
MW-19	3/27/2005	2289.32	145.15	145.26	0.11	2144.06	2144.14
MW-19	4/4/2005	2289.32	145.18	145.42	0.24	2143.90	2144.08
MW-19	4/11/2005	2289.32	145.25	145.44	0.19	2143.88	2144.02
MW-19	4/18/2005	2289.32	145.30	145.48	0.18	2143.84	2143.98
MW-19	4/25/2005	2289.32	144.70	144.82	0.12	2144.50	2144.59
MW-19	5/2/2005	2289.32	144.72	144.85	0.13	2144.47	2144.57
MW-19	5/10/2005	2289.32	145.33	145.45	0.12	2143.87	2143.96
MW-19	5/16/2005	2289.32	145.38	145.49	0.11	2143.83	2143.91
MW-19	5/23/2005	2289.32	145.45	145.65	0.20	2143.67	2143.82
MW-19	5/30/2005	2289.32	145.45	145.86	0.41	2143.46	2143.77
MW-19	6/6/2005	2289.32	145.50	145.94	0.44	2143.38	2143.71
MW-19	6/13/2005	2289.32	145.61	145.92	0.31	2143.40	2143.63
MW-19	6/20/2005	2289.32	145.69	145.88	0.19	2143.44	2143.58
MW-19	6/27/2005	2289.32	145.76	145.92	0.16	2143.40	2143.52
MW-19	7/5/2005	2289.32	145.79	146.11	0.32	2143.21	2143.45
MW-19	7/11/2005	2289.32	145.85	146.22	0.37	2143.10	2143.38
MW-19	7/18/2005	2289.32	146.02	146.06	0.04	2143.26	2143.29
MW-19	7/25/2005	2289.32	146.06	146.26	0.20	2143.06	2143.21
MW-19	8/1/2005	2289.32	146.13	146.33	0.20	2142.99	2143.14
MW-19	8/8/2005	2289.32	146.26	146.34	0.08	2142.98	2143.04
MW-19	8/15/2005	2289.32	146.29	146.30	0.01	2143.02	2143.03
MW-19	8/22/2005	2289.32	NP	146.31	NP	2143.01	2143.01
MW-19	8/29/2005	2289.32	146.19	146.20	0.01	2143.12	2143.13
MW-19	9/7/2005	2289.32	NP	145.86	NP	2143.46	2143.46
MW-19	9/12/2005	2289.32	NP	145.63	NP	2143.69	2143.69
MW-19	9/19/2005	2289.32	NP	145.40	NP	2143.92	2143.92
MW-19	9/26/2005	2289.32	NP	145.30	NP	2144.02	2144.02
MW-19	10/3/2005	2289.32	NP	145.33	NP	2143.99	2143.99
MW-19	10/10/2005	2289.32	NP	145.47	NP	2143.85	2143.85
MW-19	10/17/2005	2289.32	NP	145.57	NP	2143.75	2143.75
MW-19	10/24/2005	2289.32	NP	145.71	NP	2143.61	2143.61
MW-19	10/31/2005	2289.32	NP	145.86	NP	2143.46	2143.46
MW-19	11/7/2005	2289.32	NP	145.98	NP	2143.34	2143.34
MW-19	11/14/2005	2289.32	NP	146.16	NP	2143.16	2143.16
MW-19	11/21/2005	2289.32	146.20	146.26	0.06	2143.06	2143.11
MW-19	12/5/2005	2289.32	146.30	146.52	0.22	2142.80	2142.97
MW-19	12/12/2005	2289.32	NP	146.37	NP	2142.95	2142.95
MW-19	12/19/2005	2289.32	146.43	146.44	0.01	2142.88	2142.89
MW-19	12/28/2005	2289.32	146.45	146.47	0.02	2142.85	2142.87
MW-19	1/9/2006	2289.32	NP	146.55	NP	2142.77	2142.77

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-19	1/16/2006	2289.32	NP	146.61	NP	2142.71	2142.71
MW-19	1/30/2006	2289.32	146.61	146.66	0.05	2142.66	2142.70
MW-19	2/13/2006	2289.32	146.65	146.87	0.22	2142.45	2142.62
MW-19	2/27/2006	2289.32	146.74	146.86	0.12	2142.46	2142.55
MW-19	3/6/2006	2289.32	146.76	146.87	0.11	2142.45	2142.53
MW-19	3/13/2006	2289.32	146.81	146.91	0.10	2142.41	2142.49
MW-19	3/20/2006	2289.32	146.85	146.92	0.07	2142.40	2142.45
MW-19	3/27/2006	2289.32	146.86	146.94	0.08	2142.38	2142.44
MW-19	4/3/2006	2289.32	146.90	146.97	0.07	2142.35	2142.40
MW-19	4/10/2006	2289.32	146.96	147.02	0.06	2142.30	2142.35
MW-19	4/17/2006	2289.32	147.00	147.14	0.14	2142.18	2142.29
MW-19	4/24/2006	2289.32	146.94	147.37	0.43	2141.95	2142.27
MW-19	5/1/2006	2289.32	146.98	147.37	0.39	2141.95	2142.24
MW-19	5/15/2006	2289.32	147.09	147.17	0.08	2142.15	2142.21
MW-19	5/22/2006	2289.32	147.09	147.17	0.08	2142.15	2142.21
MW-19	5/30/2006	2289.32	147.24	147.34	0.10	2141.98	2142.06
MW-19	6/5/2006	2289.32	147.32	147.42	0.10	2141.90	2141.98
MW-19	6/12/2006	2289.32	147.41	147.48	0.07	2141.84	2141.89
MW-19	6/26/2006	2289.32	147.56	147.59	0.03	2141.73	2141.75
MW-19	7/10/2006	2289.32	147.70	147.74	0.04	2141.58	2141.61
MW-19	8/4/2006	2289.32	NP	147.40	NP	2141.92	2141.92
MW-19	8/14/2006	2289.32	147.91	147.95	0.04	2141.37	2141.40
MW-19	8/23/2006	2289.32	147.75	147.77	0.02	2141.55	2141.57
MW-19	9/19/2006	2289.32	NP	146.71	NP	2142.61	2142.61
MW-19	10/20/2006	2289.32	NP	146.00	NP	2143.32	2143.32
MW-19	10/30/2006	2289.32	NP	146.15	NP	2143.17	2143.17
MW-19	11/17/2006	2289.32	NP	146.42	NP	2142.90	2142.90
MW-19	1/29/2007	2289.32	NP	147.49	NP	2141.83	2141.83
MW-19	3/1/2007	2289.32	NP	147.69	NP	2141.63	2141.63
MW-19	3/28/2007	2289.32	147.88	147.90	0.02	2141.42	2141.44
MW-19	4/24/2007	2289.32	148.02	148.04	0.02	2141.28	2141.30
MW-19	5/28/2007	2289.32	148.15	148.16	0.01	2141.16	2141.17
MW-19	6/27/2007	2289.32	148.46	148.47	0.01	2140.85	2140.86
MW-19	7/23/2007	2289.32	148.55	149.38	0.83	2139.94	2140.56
MW-19	8/25/2007	2289.32	148.00	148.64	0.64	2140.68	2141.16
MW-19	9/25/2007	2289.32	NP	147.54	NP	2141.78	2141.78
MW-19	10/22/2007	2289.32	147.87	148.18	0.31	2141.14	2141.37
MW-19	11/28/2007	2289.32	148.67	149.15	0.48	2140.17	2140.53
MW-19	12/31/2007	2289.32	148.77	149.24	0.47	2140.08	2140.43
MW-19	1/26/2008	2289.32	148.56	149.11	0.55	2140.21	2140.62
MW-19	2/29/2008	2289.32	148.61	148.63	0.02	2140.69	2140.71
MW-19	3/31/2008	2289.32	148.24	148.76	0.52	2140.56	2140.95
MW-19	4/21/2008	2289.32	148.39	148.96	0.57	2140.36	2140.79
MW-19	5/23/2008	2289.32	148.76	149.43	0.67	2139.89	2140.39
MW-19	6/25/2008	2289.32	149.00	149.64	0.64	2139.68	2140.16
MW-19	7/28/2008	2289.32	149.29	150.05	0.76	2139.27	2139.84

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-19	8/25/2008	2289.32	NP	148.22	NP	2141.10	2141.10
MW-19	9/30/2008	2289.32	NP	146.78	NP	2142.54	2142.54
MW-19	10/13/2008	2289.32	NP	146.74	NP	2142.58	2142.58
MW-19	11/26/2008	2289.32	NP	147.37	NP	2141.95	2141.95
MW-19	12/23/2008	2289.32	147.65	147.75	0.10	2141.57	2141.65
MW-19	1/26/2009	2289.32	147.89	147.90	0.01	2141.42	2141.43
MW-19	2/27/2009	2289.32	147.94	147.95	0.01	2141.37	2141.38
MW-19	3/26/2009	2289.32	148.15	148.16	0.01	2141.16	2141.17
MW-19	4/27/2009	2289.32	148.24	148.25	0.01	2141.07	2141.08
MW-19	5/20/2009	2289.32	149.58	149.62	0.04	2139.70	2139.73
MW-19	6/16/2009	2289.32	149.17	149.23	0.06	2140.09	2140.14
MW-19	7/20/2009	2289.32	149.43	150.04	0.61	2139.28	2139.74
MW-19	8/31/2009	2289.32	149.80	150.35	0.55	2138.97	2139.38
MW-19	9/29/2009	2289.32	149.98	150.69	0.71	2138.63	2139.16
MW-19	10/22/2009	2289.32	150.09	150.11	0.02	2139.21	2139.23
MW-19	11/25/2009	2289.32	150.44	151.15	0.71	2138.17	2138.70
MW-19	12/14/2009	2289.32	NP	151.27	NP	2138.05	2138.05
MW-19	1/18/2010	2289.32	150.50	151.17	0.67	2138.15	2138.65
MW-19	2/26/2010	2289.32	150.58	151.21	0.63	2138.11	2138.58
MW-19	3/22/2010	2289.32	150.04	150.30	0.26	2139.02	2139.22
MW-19	4/12/2010	2289.32	149.98	150.13	0.15	2139.19	2139.30
MW-19	5/27/2010	2289.32	150.28	150.58	0.30	2138.74	2138.97
MW-19	6/22/2010	2289.32	150.62	150.63	0.01	2138.69	2138.70
MW-19	7/12/2010	2289.32	150.86	151.25	0.39	2138.07	2138.36
MW-19	8/26/2010	2289.32	151.05	151.34	0.29	2137.98	2138.20
MW-19	9/22/2010	2289.32	NP	150.87	NP	2138.45	2138.45
MW-19	10/5/2010	2289.32	150.71	150.96	0.25	2138.36	2138.55
MW-19	10/18/2010	2289.32	150.61	150.81	0.20	2138.51	2138.66
MW-19	11/30/2010	2289.32	150.96	151.17	0.21	2138.15	2138.31
MW-19	12/21/2010	2289.32	151.06	151.33	0.27	2137.99	2138.19
MW-19	1/10/2011	2289.32	151.01	151.23	0.22	2138.09	2138.26
MW-19	2/17/2011	2289.32	151.33	151.52	0.19	2137.80	2137.94
MW-19	3/25/2011	2289.32	151.41	151.56	0.15	2137.76	2137.87
MW-19	4/11/2011	2289.32	151.51	151.52	0.01	2137.80	2137.81
MW-19	5/9/2011	2289.32	152.68	153.28	0.60	2136.04	2136.49
MW-19	7/11/2011	2289.32	152.58	152.66	0.08	2136.66	2136.72
MW-19	8/31/2011	2289.32	153.11	153.22	0.11	2136.10	2136.18
MW-19	9/28/2011	2289.32	NP	153.17	NP	2136.15	2136.15
MW-19	10/10/2011	2289.32	NP	152.70	NP	2136.62	2136.62
MW-19	11/16/2011	2289.32	NP	153.58	NP	2135.74	2135.74
MW-19	12/29/2011	2289.32	NP	152.60	NP	2136.72	2136.72
MW-19	1/16/2012	2289.32	NP	152.55	NP	2136.77	2136.77
MW-19	2/28/2012	2289.32	NP	152.30	NP	2137.02	2137.02
MW-19	3/30/2012	2289.32	NP	152.53	NP	2136.79	2136.79
MW-19	4/2/2012	2289.32	NP	153.57	NP	2135.75	2135.75
MW-19	5/30/2012	2289.32	NP	153.32	NP	2136.00	2136.00

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-19	6/29/2012	2289.32	NP	153.58	NP	2135.74	2135.74
MW-19	7/9/2012	2289.32	NP	153.62	NP	2135.70	2135.70
MW-19	8/29/2012	2289.32	NP	153.40	NP	2135.92	2135.92
MW-19	9/25/2012	2289.32	NP	153.02	NP	2136.30	2136.30
MW-19	10/22/2012	2289.32	NP	153.10	NP	2136.22	2136.22
MW-19	11/15/2012	2289.32	NP	153.50	NP	2135.82	2135.82
MW-19	12/13/2012	2289.32	NP	153.79	NP	2135.53	2135.53
MW-19	1/21/2013	2289.32	NP	153.86	NP	2135.46	2135.46
MW-19	2/13/2013	2289.32	NP	153.89	NP	2135.43	2135.43
MW-19	3/21/2013	2289.32	NP	153.93	NP	2135.39	2135.39
MW-19	4/15/2013	2289.32	NP	154.05	NP	2135.27	2135.27
MW-19	5/23/2013	2289.32	NP	154.23	NP	2135.09	2135.09
MW-19	6/26/2013	2289.32	NP	154.51	NP	2134.81	2134.81
MW-19	7/8/2013	2289.32	NP	154.62	NP	2134.70	2134.70
MW-19	8/8/2013	2289.32	NP	154.82	NP	2134.50	2134.50
MW-19	9/5/2013	2289.32	NP	154.77	NP	2134.55	2134.55
MW-19	10/3/2013	2289.32	NP	154.92	NP	2134.40	2134.40
MW-19	11/27/2013	2286.34	NP	152.88	NP	2133.46	2133.46
MW-19	12/31/2013	2286.34	NP	152.11	NP	2134.23	2134.23
MW-19	1/10/2014	2286.34	NP	152.26	NP	2134.08	2134.08
MW-19	2/18/2014	2286.34	NP	152.38	NP	2133.96	2133.96
MW-19	3/12/2014	2286.34	NP	152.43	NP	2133.91	2133.91
MW-19	4/17/2014	2286.34	NP	152.58	NP	2133.76	2133.76
MW-19	5/22/2014	2286.34	NP	152.78	NP	2133.56	2133.56
MW-19	6/20/2014	2286.34	NP	153.17	NP	2133.17	2133.17
MW-19	7/15/2014	2286.34	NP	153.47	NP	2132.87	2132.87
MW-19	8/14/2014	2286.34	NP	153.82	NP	2132.52	2132.52
MW-19	9/9/2014	2286.34	NP	153.76	NP	2132.58	2132.58
MW-19	10/1/2014	2286.34	NP	153.11	NP	2133.23	2133.23
MW-19	11/18/2014	2286.34	NP	152.83	NP	2133.51	2133.51
MW-19	12/16/2014	2286.34	NP	152.80	NP	2133.54	2133.54
MW-19	1/19/2015	2286.34	NP	152.57	NP	2133.77	2133.77
MW-19	2/19/2015	2286.34	NP	152.35	NP	2133.99	2133.99
MW-19	3/26/2015	2286.34	NP	152.01	NP	2134.33	2134.33
MW-19	4/16/2015	2286.34	NP	151.83	NP	2134.51	2134.51
MW-19	5/19/2015	2286.34	NP	152.07	NP	2134.27	2134.27
MW-19	6/22/2015	2286.34	NP	152.57	NP	2133.77	2133.77
MW-20	3/8/2004	2290.38	142.46	144.16	1.70	2146.22	2147.50
MW-20	3/15/2004	2290.38	142.54	144.17	1.63	2146.21	2147.43
MW-20	3/22/2004	2290.38	142.55	144.14	1.59	2146.24	2147.43
MW-20	3/29/2004	2290.38	142.08	143.59	1.51	2146.79	2147.92
MW-20	4/5/2004	2290.38	142.11	143.57	1.46	2146.81	2147.91
MW-20	4/12/2004	2290.38	142.18	143.56	1.38	2146.82	2147.86
MW-20	4/19/2004	2290.38	142.18	143.54	1.36	2146.84	2147.86
MW-20	4/26/2004	2290.38	142.22	143.54	1.32	2146.84	2147.83
MW-20	5/3/2004	2290.38	142.21	143.49	1.28	2146.89	2147.85

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-20	5/10/2004	2290.38	142.27	143.52	1.25	2146.86	2147.80
MW-20	5/17/2004	2290.38	142.32	143.55	1.23	2146.83	2147.75
MW-20	5/24/2004	2290.38	142.39	143.57	1.18	2146.81	2147.70
MW-20	5/31/2004	2290.38	142.40	143.51	1.11	2146.87	2147.70
MW-20	6/7/2004	2290.38	142.40	143.52	1.12	2146.86	2147.70
MW-20	6/14/2004	2290.38	142.58	143.63	1.05	2146.75	2147.54
MW-20	6/21/2004	2290.38	142.68	143.79	1.11	2146.59	2147.42
MW-20	6/28/2004	2290.38	142.80	143.86	1.06	2146.52	2147.32
MW-20	7/6/2004	2290.38	142.95	143.96	1.01	2146.42	2147.18
MW-20	7/12/2004	2290.38	143.09	143.90	0.81	2146.48	2147.09
MW-20	7/19/2004	2290.38	143.26	143.84	0.58	2146.54	2146.98
MW-20	7/26/2004	2290.38	143.39	143.88	0.49	2146.50	2146.87
MW-20	8/2/2004	2290.38	143.51	144.00	0.49	2146.38	2146.75
MW-20	8/9/2004	2290.38	143.63	144.14	0.51	2146.24	2146.62
MW-20	8/16/2004	2290.38	143.75	144.28	0.53	2146.10	2146.50
MW-20	8/23/2004	2290.38	143.86	144.32	0.46	2146.06	2146.41
MW-20	8/30/2004	2290.38	144.04	144.27	0.23	2146.11	2146.28
MW-20	9/8/2004	2290.38	144.21	144.27	0.06	2146.11	2146.16
MW-20	9/13/2004	2290.38	NP	144.29	NP	2146.09	2146.09
MW-20	9/20/2004	2290.38	NP	144.40	NP	2145.98	2145.98
MW-20	9/27/2004	2290.38	NP	144.49	NP	2145.89	2145.89
MW-20	10/4/2004	2290.38	NP	144.57	NP	2145.81	2145.81
MW-20	10/11/2004	2290.38	NP	144.66	NP	2145.72	2145.72
MW-20	10/18/2004	2290.38	NP	144.71	NP	2145.67	2145.67
MW-20	10/25/2004	2290.38	NP	144.78	NP	2145.60	2145.60
MW-20	11/1/2004	2290.38	NP	144.89	NP	2145.49	2145.49
MW-20	11/8/2004	2290.38	NP	144.95	NP	2145.43	2145.43
MW-20	11/15/2004	2290.38	NP	145.02	NP	2145.36	2145.36
MW-20	11/30/2004	2290.38	NP	145.19	NP	2145.19	2145.19
MW-20	12/6/2004	2290.38	145.77	146.06	0.29	2144.32	2144.54
MW-20	12/13/2004	2290.38	145.73	146.46	0.73	2143.92	2144.47
MW-20	12/20/2004	2290.38	145.77	146.48	0.71	2143.90	2144.43
MW-20	1/4/2005	2290.38	145.87	146.59	0.72	2143.79	2144.33
MW-20	1/10/2005	2290.38	145.92	146.64	0.72	2143.74	2144.28
MW-20	1/17/2005	2290.38	145.96	146.65	0.69	2143.73	2144.25
MW-20	1/24/2005	2290.38	146.03	146.72	0.69	2143.66	2144.18
MW-20	1/31/2005	2290.38	145.96	146.66	0.70	2143.72	2144.25
MW-20	2/7/2005	2290.38	146.09	146.67	0.58	2143.71	2144.15
MW-20	2/14/2005	2290.38	146.09	146.66	0.57	2143.72	2144.15
MW-20	2/21/2005	2290.38	146.12	146.65	0.53	2143.73	2144.13
MW-20	2/28/2005	2290.38	146.12	146.57	0.45	2143.81	2144.15
MW-20	3/7/2005	2290.38	146.11	146.48	0.37	2143.90	2144.18
MW-20	3/14/2005	2290.38	146.02	146.36	0.34	2144.02	2144.28
MW-20	3/21/2005	2290.38	146.00	146.24	0.24	2144.14	2144.32
MW-20	3/27/2005	2290.38	145.96	146.08	0.12	2144.30	2144.39
MW-20	4/4/2005	2290.38	145.95	146.08	0.13	2144.30	2144.40

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-20	4/11/2005	2290.38	146.01	146.15	0.14	2144.23	2144.34
MW-20	4/18/2005	2290.38	146.00	146.41	0.41	2143.97	2144.28
MW-20	4/25/2005	2290.38	145.96	146.31	0.35	2144.07	2144.33
MW-20	5/2/2005	2290.38	146.00	146.30	0.30	2144.08	2144.31
MW-20	5/10/2005	2290.38	146.03	146.31	0.28	2144.07	2144.28
MW-20	5/16/2005	2290.38	146.05	146.36	0.31	2144.02	2144.25
MW-20	5/23/2005	2290.38	146.13	146.62	0.49	2143.76	2144.13
MW-20	5/30/2005	2290.38	146.23	146.56	0.33	2143.82	2144.07
MW-20	6/6/2005	2290.38	146.25	146.70	0.45	2143.68	2144.02
MW-20	6/13/2005	2290.38	146.26	146.73	0.47	2143.65	2144.00
MW-20	6/20/2005	2290.38	146.37	146.80	0.43	2143.58	2143.90
MW-20	6/27/2005	2290.38	146.43	146.80	0.37	2143.58	2143.86
MW-20	7/5/2005	2290.38	146.54	146.82	0.28	2143.56	2143.77
MW-20	7/11/2005	2290.38	146.61	146.86	0.25	2143.52	2143.71
MW-20	7/18/2005	2290.38	146.74	146.88	0.14	2143.50	2143.61
MW-20	7/25/2005	2290.38	146.82	146.92	0.10	2143.46	2143.54
MW-20	8/1/2005	2290.38	146.90	147.00	0.10	2143.38	2143.46
MW-20	8/8/2005	2290.38	146.94	147.07	0.13	2143.31	2143.41
MW-20	8/15/2005	2290.38	147.00	147.12	0.12	2143.26	2143.35
MW-20	8/22/2005	2290.38	147.03	147.16	0.13	2143.22	2143.32
MW-20	8/29/2005	2290.38	146.91	146.96	0.05	2143.42	2143.46
MW-20	9/7/2005	2290.38	146.59	146.61	0.02	2143.77	2143.79
MW-20	9/12/2005	2290.38	NP	146.63	NP	2143.75	2143.75
MW-20	9/19/2005	2290.38	NP	146.13	NP	2144.25	2144.25
MW-20	9/26/2005	2290.38	NP	146.05	NP	2144.33	2144.33
MW-20	10/3/2005	2290.38	NP	146.10	NP	2144.28	2144.28
MW-20	10/10/2005	2290.38	NP	146.22	NP	2144.16	2144.16
MW-20	10/17/2005	2290.38	NP	146.31	NP	2144.07	2144.07
MW-20	10/24/2005	2290.38	NP	146.46	NP	2143.92	2143.92
MW-20	10/31/2005	2290.38	NP	146.59	NP	2143.79	2143.79
MW-20	11/7/2005	2290.38	NP	146.72	NP	2143.66	2143.66
MW-20	11/14/2005	2290.38	NP	146.84	NP	2143.54	2143.54
MW-20	11/21/2005	2290.38	146.95	146.96	0.01	2143.42	2143.43
MW-20	12/5/2005	2290.38	147.05	147.07	0.02	2143.31	2143.33
MW-20	12/12/2005	2290.38	147.10	147.13	0.03	2143.25	2143.27
MW-20	12/19/2005	2290.38	147.16	147.19	0.03	2143.19	2143.21
MW-20	12/28/2005	2290.38	147.19	147.25	0.06	2143.13	2143.18
MW-20	1/9/2006	2290.38	147.28	147.31	0.03	2143.07	2143.09
MW-20	1/16/2006	2290.38	147.31	147.34	0.03	2143.04	2143.06
MW-20	1/30/2006	2290.38	147.36	147.40	0.04	2142.98	2143.01
MW-20	2/13/2006	2290.38	147.44	147.48	0.04	2142.90	2142.93
MW-20	2/27/2006	2290.38	147.50	147.54	0.04	2142.84	2142.87
MW-20	3/6/2006	2290.38	147.52	147.57	0.05	2142.81	2142.85
MW-20	3/13/2006	2290.38	147.56	147.60	0.04	2142.78	2142.81
MW-20	3/20/2006	2290.38	147.58	147.62	0.04	2142.76	2142.79
MW-20	3/27/2006	2290.38	147.61	147.62	0.01	2142.76	2142.77

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-20	4/3/2006	2290.38	147.65	147.66	0.01	2142.72	2142.73
MW-20	4/10/2006	2290.38	147.71	147.73	0.02	2142.65	2142.67
MW-20	4/17/2006	2290.38	147.75	147.77	0.02	2142.61	2142.63
MW-20	4/24/2006	2290.38	147.76	147.78	0.02	2142.60	2142.62
MW-20	5/1/2006	2290.38	147.80	147.83	0.03	2142.55	2142.57
MW-20	5/15/2006	2290.38	147.84	147.85	0.01	2142.53	2142.54
MW-20	5/22/2006	2290.38	147.89	147.90	0.01	2142.48	2142.49
MW-20	5/30/2006	2290.38	148.00	148.02	0.02	2142.36	2142.38
MW-20	6/5/2006	2290.38	148.07	148.08	0.01	2142.30	2142.31
MW-20	6/12/2006	2290.38	148.15	148.17	0.02	2142.21	2142.23
MW-20	6/26/2006	2290.38	148.31	148.32	0.01	2142.06	2142.07
MW-20	7/10/2006	2290.38	148.44	148.45	0.01	2141.93	2141.94
MW-20	8/4/2006	2290.38	NP	148.15	NP	2142.23	2142.23
MW-20	8/14/2006	2290.38	148.70	148.71	0.01	2141.67	2141.68
MW-20	8/23/2006	2290.38	NP	148.57	NP	2141.81	2141.81
MW-20	9/19/2006	2290.38	NP	147.45	NP	2142.93	2142.93
MW-20	10/20/2006	2290.38	NP	146.80	NP	2143.58	2143.58
MW-20	10/30/2006	2290.38	146.44	146.93	0.49	2143.45	2143.82
MW-20	11/17/2006	2290.38	147.19	147.21	0.02	2143.17	2143.19
MW-20	1/29/2007	2290.38	148.26	148.28	0.02	2142.10	2142.12
MW-20	3/1/2007	2290.38	148.46	148.47	0.01	2141.91	2141.92
MW-20	3/28/2007	2290.38	148.65	148.67	0.02	2141.71	2141.73
MW-20	4/24/2007	2290.38	148.80	148.81	0.01	2141.57	2141.58
MW-20	5/28/2007	2290.38	148.92	148.94	0.02	2141.44	2141.46
MW-20	6/27/2007	2290.38	149.25	149.26	0.01	2141.12	2141.13
MW-20	7/23/2007	2290.38	149.54	149.55	0.01	2140.83	2140.84
MW-20	8/25/2007	2290.38	NP	148.93	NP	2141.45	2141.45
MW-20	9/25/2007	2290.38	NP	148.36	NP	2142.02	2142.02
MW-20	10/22/2007	2290.38	NP	148.72	NP	2141.66	2141.66
MW-20	11/28/2007	2290.38	NP	149.57	NP	2140.81	2140.81
MW-20	12/31/2007	2290.38	NP	149.68	NP	2140.70	2140.70
MW-20	1/26/2008	2290.38	NP	149.49	NP	2140.89	2140.89
MW-20	2/29/2008	2290.38	NP	149.60	NP	2140.78	2140.78
MW-20	3/31/2008	2290.38	NP	149.18	NP	2141.20	2141.20
MW-20	4/21/2008	2290.38	NP	149.31	NP	2141.07	2141.07
MW-20	5/23/2008	2290.38	NP	149.72	NP	2140.66	2140.66
MW-20	6/25/2008	2290.38	NP	149.96	NP	2140.42	2140.42
MW-20	7/28/2008	2290.38	NP	150.27	NP	2140.11	2140.11
MW-20	8/25/2008	2290.38	NP	149.06	NP	2141.32	2141.32
MW-20	9/30/2008	2290.38	NP	147.56	NP	2142.82	2142.82
MW-20	10/13/2008	2290.38	NP	147.56	NP	2142.82	2142.82
MW-20	11/26/2008	2290.38	NP	148.17	NP	2142.21	2142.21
MW-20	12/23/2008	2290.38	NP	148.56	NP	2141.82	2141.82
MW-20	1/26/2009	2290.38	NP	148.68	NP	2141.70	2141.70
MW-20	2/27/2009	2290.38	NP	148.77	NP	2141.61	2141.61
MW-20	3/26/2009	2290.38	NP	148.95	NP	2141.43	2141.43

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-20	4/27/2009	2290.38	NP	149.06	NP	2141.32	2141.32
MW-20	5/20/2009	2290.38	NP	149.41	NP	2140.97	2140.97
MW-20	6/16/2009	2290.38	NP	149.95	NP	2140.43	2140.43
MW-20	7/20/2009	2290.38	NP	150.40	NP	2139.98	2139.98
MW-20	8/31/2009	2290.38	NP	150.71	NP	2139.67	2139.67
MW-20	9/29/2009	2290.38	NP	150.93	NP	2139.45	2139.45
MW-20	10/22/2009	2290.38	NP	151.05	NP	2139.33	2139.33
MW-20	11/25/2009	2290.38	NP	151.39	NP	2138.99	2138.99
MW-20	12/14/2009	2290.38	NP	151.49	NP	2138.89	2138.89
MW-20	1/18/2010	2290.38	NP	151.41	NP	2138.97	2138.97
MW-20	2/26/2010	2290.38	NP	151.51	NP	2138.87	2138.87
MW-20	3/22/2010	2290.38	NP	150.89	NP	2139.49	2139.49
MW-20	4/12/2010	2290.38	NP	150.80	NP	2139.58	2139.58
MW-20	5/27/2010	2290.38	NP	151.14	NP	2139.24	2139.24
MW-20	6/22/2010	2290.38	NP	151.48	NP	2138.90	2138.90
MW-20	7/12/2010	2290.38	151.73	151.74	0.01	2138.64	2138.65
MW-20	8/26/2010	2290.38	NP	151.88	NP	2138.50	2138.50
MW-20	9/22/2010	2290.38	NP	151.70	NP	2138.68	2138.68
MW-20	10/5/2010	2290.38	NP	151.54	NP	2138.84	2138.84
MW-20	10/18/2010	2290.38	NP	151.44	NP	2138.94	2138.94
MW-20	11/30/2010	2290.38	NP	151.80	NP	2138.58	2138.58
MW-20	12/21/2010	2290.38	NP	151.90	NP	2138.48	2138.48
MW-20	1/10/2011	2290.38	NP	151.86	NP	2138.52	2138.52
MW-20	2/17/2011	2290.38	NP	152.13	NP	2138.25	2138.25
MW-20	3/25/2011	2290.38	NP	152.21	NP	2138.17	2138.17
MW-20	4/11/2011	2290.38	NP	152.32	NP	2138.06	2138.06
MW-20	5/9/2011	2290.38	NP	152.52	NP	2137.86	2137.86
MW-20	7/11/2011	2290.38	NP	153.35	NP	2137.03	2137.03
MW-20	8/31/2011	2290.38	NP	153.93	NP	2136.45	2136.45
MW-20	9/28/2011	2290.38	NP	153.94	NP	2136.44	2136.44
MW-20	10/10/2011	2290.38	NP	153.48	NP	2136.90	2136.90
MW-20	11/16/2011	2290.38	NP	153.36	NP	2137.02	2137.02
MW-20	12/29/2011	2290.38	NP	153.42	NP	2136.96	2136.96
MW-20	1/16/2012	2290.38	NP	153.36	NP	2137.02	2137.02
MW-20	2/28/2012	2290.38	NP	153.12	NP	2137.26	2137.26
MW-20	3/30/2012	2290.38	NP	153.32	NP	2137.06	2137.06
MW-20	4/2/2012	2290.38	NP	154.40	NP	2135.98	2135.98
MW-20	5/30/2012	2290.38	NP	154.11	NP	2136.27	2136.27
MW-20	6/29/2012	2290.38	NP	154.39	NP	2135.99	2135.99
MW-20	7/9/2012	2290.38	NP	154.41	NP	2135.97	2135.97
MW-20	8/29/2012	2290.38	NP	154.18	NP	2136.20	2136.20
MW-20	9/25/2012	2290.38	NP	153.80	NP	2136.58	2136.58
MW-20	10/22/2012	2290.38	NP	153.91	NP	2136.47	2136.47
MW-20	11/15/2012	2290.38	NP	154.30	NP	2136.08	2136.08
MW-20	12/13/2012	2290.38	NP	154.58	NP	2135.80	2135.80
MW-20	1/21/2013	2290.38	NP	154.67	NP	2135.71	2135.71

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-20	2/13/2013	2290.38	NP	154.69	NP	2135.69	2135.69
MW-20	3/21/2013	2290.38	NP	154.74	NP	2135.64	2135.64
MW-20	4/15/2013	2290.38	NP	154.85	NP	2135.53	2135.53
MW-20	5/23/2013	2290.38	NP	155.02	NP	2135.36	2135.36
MW-20	6/26/2013	2290.38	NP	155.32	NP	2135.06	2135.06
MW-20	7/8/2013	2290.38	NP	155.45	NP	2134.93	2134.93
MW-20	8/8/2013	2290.38	NP	155.61	NP	2134.77	2134.77
MW-20	9/5/2013	2290.38	NP	154.57	NP	2135.81	2135.81
MW-20	10/3/2013	2290.38	NP	155.71	NP	2134.67	2134.67
MW-20	11/27/2013	2290.38	NP	155.93	NP	2134.45	2134.45
MW-20	12/31/2013	2290.38	NP	155.91	NP	2134.47	2134.47
MW-20	1/10/2014	2290.38	NP	156.07	NP	2134.31	2134.31
MW-20	2/18/2014	2290.38	NP	156.17	NP	2134.21	2134.21
MW-20	3/12/2014	2290.38	NP	156.20	NP	2134.18	2134.18
MW-20	4/17/2014	2290.38	NP	156.36	NP	2134.02	2134.02
MW-20	5/22/2014	2290.38	NP	156.68	NP	2133.70	2133.70
MW-20	6/20/2014	2290.38	NP	156.94	NP	2133.44	2133.44
MW-20	7/15/2014	2290.38	NP	157.22	NP	2133.16	2133.16
MW-20	8/14/2014	2290.38	NP	157.59	NP	2132.79	2132.79
MW-20	9/9/2014	2290.38	NP	157.50	NP	2132.88	2132.88
MW-20	10/1/2014	2290.38	NP	156.89	NP	2133.49	2133.49
MW-20	11/18/2014	2290.38	NP	156.60	NP	2133.78	2133.78
MW-20	12/16/2014	2290.38	NP	156.59	NP	2133.79	2133.79
MW-20	1/19/2015	2290.38	NP	156.31	NP	2134.07	2134.07
MW-20	2/19/2015	2290.38	NP	156.14	NP	2134.24	2134.24
MW-20	3/26/2015	2290.38	NP	155.80	NP	2134.58	2134.58
MW-20	4/16/2015	2290.38	NP	155.65	NP	2134.73	2134.73
MW-20	5/19/2015	2290.38	NP	155.85	NP	2134.53	2134.53
MW-20	6/22/2015	2290.38	NP	156.35	NP	2134.03	2134.03
MW-21	2/23/2004	2286.12	NP	140.50	NP	2145.62	2145.62
MW-21	3/2/2004	2286.12	NP	140.50	NP	2145.62	2145.62
MW-21	3/8/2004	2286.12	NP	140.50	NP	2145.62	2145.62
MW-21	3/15/2004	2286.12	NP	140.62	NP	2145.50	2145.50
MW-21	3/22/2004	2286.12	NP	140.63	NP	2145.49	2145.49
MW-21	3/29/2004	2286.12	NP	140.67	NP	2145.45	2145.45
MW-21	4/5/2004	2286.12	NP	140.71	NP	2145.41	2145.41
MW-21	4/12/2004	2286.12	140.61	141.02	0.41	2145.10	2145.41
MW-21	4/19/2004	2286.12	140.36	141.82	1.46	2144.30	2145.40
MW-21	4/26/2004	2286.12	140.35	141.89	1.54	2144.23	2145.39
MW-21	5/3/2004	2286.12	140.34	141.92	1.58	2144.20	2145.39
MW-21	5/10/2004	2286.12	140.41	142.00	1.59	2144.12	2145.31
MW-21	5/17/2004	2286.12	140.46	142.05	1.59	2144.07	2145.26
MW-21	5/24/2004	2286.12	140.51	142.11	1.60	2144.01	2145.21
MW-21	5/31/2004	2286.12	140.52	142.09	1.57	2144.03	2145.21
MW-21	6/7/2004	2286.12	140.52	142.20	1.68	2143.92	2145.18
MW-21	6/14/2004	2286.12	140.69	142.28	1.59	2143.84	2145.03

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-21	6/21/2004	2286.12	140.80	142.40	1.60	2143.72	2144.92
MW-21	6/28/2004	2286.12	140.95	142.51	1.56	2143.61	2144.78
MW-21	7/6/2004	2286.12	141.06	142.64	1.58	2143.48	2144.67
MW-21	7/12/2004	2286.12	141.17	142.71	1.54	2143.41	2144.57
MW-21	7/19/2004	2286.12	141.29	142.80	1.51	2143.32	2144.45
MW-21	7/26/2004	2286.12	141.41	142.91	1.50	2143.21	2144.34
MW-21	8/2/2004	2286.12	141.57	142.99	1.42	2143.13	2144.20
MW-21	8/9/2004	2286.12	141.68	143.07	1.39	2143.05	2144.09
MW-21	8/16/2004	2286.12	141.81	143.16	1.35	2142.96	2143.97
MW-21	8/30/2004	2286.12	142.15	143.35	1.20	2142.77	2143.67
MW-21	9/8/2004	2286.12	142.31	143.48	1.17	2142.64	2143.52
MW-21	9/13/2004	2286.12	142.38	143.47	1.09	2142.65	2143.47
MW-21	9/20/2004	2286.12	142.52	143.55	1.03	2142.57	2143.34
MW-21	9/27/2004	2286.12	142.64	143.64	1.00	2142.48	2143.23
MW-21	10/11/2004	2286.12	142.81	143.86	1.05	2142.26	2143.05
MW-21	10/18/2004	2286.12	142.92	143.99	1.07	2142.13	2142.93
MW-21	10/25/2004	2286.12	142.94	144.06	1.12	2142.06	2142.90
MW-21	11/1/2004	2286.12	143.08	144.26	1.18	2141.86	2142.75
MW-21	11/8/2004	2286.12	143.15	144.31	1.16	2141.81	2142.68
MW-21	11/15/2004	2286.12	143.23	144.45	1.22	2141.67	2142.59
MW-21	11/30/2004	2286.12	143.38	144.55	1.17	2141.57	2142.45
MW-21	12/6/2004	2286.12	143.64	144.22	0.58	2141.90	2142.34
MW-21	12/20/2004	2286.12	143.46	144.46	1.00	2141.66	2142.41
MW-21	1/4/2005	2286.12	143.52	144.71	1.19	2141.41	2142.30
MW-21	1/10/2005	2286.12	143.81	144.24	0.43	2141.88	2142.20
MW-21	1/17/2005	2286.12	143.79	144.14	0.35	2141.98	2142.24
MW-21	1/24/2005	2286.12	143.86	144.21	0.35	2141.91	2142.17
MW-21	1/31/2005	2286.12	143.95	144.36	0.41	2141.76	2142.07
MW-21	2/14/2005	2286.12	143.98	144.15	0.17	2141.97	2142.10
MW-21	2/21/2005	2286.12	144.05	144.22	0.17	2141.90	2142.03
MW-21	3/2/2005	2286.12	143.98	144.10	0.12	2142.02	2142.11
MW-21	3/7/2005	2286.12	143.75	143.90	0.15	2142.22	2142.33
MW-21	3/14/2005	2286.12	143.81	144.22	0.41	2141.90	2142.21
MW-21	3/21/2005	2286.12	143.69	144.42	0.73	2141.70	2142.25
MW-21	3/27/2005	2286.12	143.49	144.40	0.91	2141.72	2142.40
MW-21	4/4/2005	2286.12	143.49	144.47	0.98	2141.65	2142.39
MW-21	4/11/2005	2286.12	143.57	144.55	0.98	2141.57	2142.31
MW-21	4/18/2005	2286.12	143.60	144.59	0.99	2141.53	2142.27
MW-21	4/25/2005	2286.12	143.58	144.44	0.86	2141.68	2142.33
MW-21	5/2/2005	2286.12	143.58	144.47	0.89	2141.65	2142.32
MW-21	5/10/2005	2286.12	143.60	144.55	0.95	2141.57	2142.28
MW-21	5/16/2005	2286.12	143.70	144.45	0.75	2141.67	2142.23
MW-21	5/23/2005	2286.12	143.88	144.29	0.41	2141.83	2142.14
MW-21	5/30/2005	2286.12	144.03	144.16	0.13	2141.96	2142.06
MW-21	6/6/2005	2286.12	144.06	144.20	0.14	2141.92	2142.03
MW-21	6/13/2005	2286.12	144.11	144.29	0.18	2141.83	2141.97

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-21	6/20/2005	2286.12	144.15	144.37	0.22	2141.75	2141.92
MW-21	6/27/2005	2286.12	144.19	144.39	0.20	2141.73	2141.88
MW-21	7/5/2005	2286.12	144.30	144.45	0.15	2141.67	2141.78
MW-21	7/11/2005	2286.12	144.41	144.49	0.08	2141.63	2141.69
MW-21	7/18/2005	2286.12	NP	144.50	NP	2141.62	2141.62
MW-21	7/25/2005	2286.12	144.57	144.60	0.03	2141.52	2141.54
MW-21	8/1/2005	2286.12	144.64	144.68	0.04	2141.44	2141.47
MW-21	8/8/2005	2286.12	144.74	144.77	0.03	2141.35	2141.37
MW-21	8/15/2005	2286.12	144.80	144.84	0.04	2141.28	2141.31
MW-21	8/22/2005	2286.12	144.81	144.85	0.04	2141.27	2141.30
MW-21	8/29/2005	2286.12	144.74	144.75	0.01	2141.37	2141.38
MW-21	9/7/2005	2286.12	NP	144.56	NP	2141.56	2141.56
MW-21	9/12/2005	2286.12	NP	144.32	NP	2141.80	2141.80
MW-21	9/19/2005	2286.12	NP	144.11	NP	2142.01	2142.01
MW-21	9/26/2005	2286.12	NP	143.99	NP	2142.13	2142.13
MW-21	10/3/2005	2286.12	143.94	144.14	0.20	2141.98	2142.13
MW-21	10/10/2005	2286.12	143.99	144.46	0.47	2141.66	2142.01
MW-21	10/17/2005	2286.12	144.00	144.65	0.65	2141.47	2141.96
MW-21	10/24/2005	2286.12	144.21	144.62	0.41	2141.50	2141.81
MW-21	10/31/2005	2286.12	143.37	143.64	0.27	2142.48	2142.68
MW-21	11/7/2005	2286.12	144.52	144.71	0.19	2141.41	2141.55
MW-21	11/14/2005	2286.12	144.63	144.80	0.17	2141.32	2141.45
MW-21	11/21/2005	2286.12	144.72	144.96	0.24	2141.16	2141.34
MW-21	12/5/2005	2286.12	144.85	145.00	0.15	2141.12	2141.23
MW-21	12/12/2005	2286.12	144.91	145.02	0.11	2141.10	2141.18
MW-21	12/19/2005	2286.12	144.98	145.09	0.11	2141.03	2141.11
MW-21	12/28/2005	2286.12	144.99	145.09	0.10	2141.03	2141.11
MW-21	1/9/2006	2286.12	145.11	145.20	0.09	2140.92	2140.99
MW-21	1/16/2006	2286.12	145.15	145.24	0.09	2140.88	2140.95
MW-21	1/30/2006	2286.12	145.18	145.26	0.08	2140.86	2140.92
MW-21	2/13/2006	2286.12	145.25	145.32	0.07	2140.80	2140.85
MW-21	2/27/2006	2286.12	145.29	145.35	0.06	2140.77	2140.82
MW-21	3/6/2006	2286.12	145.31	145.36	0.05	2140.76	2140.80
MW-21	3/13/2006	2286.12	145.35	145.42	0.07	2140.70	2140.75
MW-21	3/20/2006	2286.12	145.40	145.45	0.05	2140.67	2140.71
MW-21	3/27/2006	2286.12	145.40	145.45	0.05	2140.67	2140.71
MW-21	4/3/2006	2286.12	145.41	145.47	0.06	2140.65	2140.70
MW-21	4/10/2006	2286.12	145.47	145.52	0.05	2140.60	2140.64
MW-21	4/17/2006	2286.12	145.51	145.57	0.06	2140.55	2140.60
MW-21	4/24/2006	2286.12	145.54	145.59	0.05	2140.53	2140.57
MW-21	5/1/2006	2286.12	145.60	145.64	0.04	2140.48	2140.51
MW-21	5/15/2006	2286.12	145.60	145.64	0.04	2140.48	2140.51
MW-21	5/22/2006	2286.12	145.65	145.69	0.04	2140.43	2140.46
MW-21	5/30/2006	2286.12	145.74	145.79	0.05	2140.33	2140.37
MW-21	6/5/2006	2286.12	145.83	145.88	0.05	2140.24	2140.28
MW-21	6/12/2006	2286.12	145.91	145.96	0.05	2140.16	2140.20

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-21	6/26/2006	2286.12	146.05	146.09	0.04	2140.03	2140.06
MW-21	7/10/2006	2286.12	146.20	146.23	0.03	2139.89	2139.91
MW-21	8/4/2006	2286.12	146.15	146.17	0.02	2139.95	2139.97
MW-21	8/14/2006	2286.12	146.43	146.46	0.03	2139.66	2139.68
MW-21	8/23/2006	2286.12	146.40	146.44	0.04	2139.68	2139.71
MW-21	9/19/2006	2286.12	NP	145.48	NP	2140.64	2140.64
MW-21	10/20/2006	2286.12	NP	144.75	NP	2141.37	2141.37
MW-21	10/30/2006	2286.12	NP	144.84	NP	2141.28	2141.28
MW-21	11/17/2006	2286.12	NP	145.06	NP	2141.06	2141.06
MW-21	1/29/2007	2286.12	NP	146.07	NP	2140.05	2140.05
MW-21	3/1/2007	2286.12	NP	146.23	NP	2139.89	2139.89
MW-21	3/28/2007	2286.12	NP	146.44	NP	2139.68	2139.68
MW-21	4/24/2007	2286.12	NP	146.54	NP	2139.58	2139.58
MW-21	5/28/2007	2286.12	NP	146.68	NP	2139.44	2139.44
MW-21	6/27/2007	2286.12	NP	146.99	NP	2139.13	2139.13
MW-21	7/23/2007	2286.12	NP	147.31	NP	2138.81	2138.81
MW-21	8/25/2007	2286.12	NP	147.05	NP	2139.07	2139.07
MW-21	9/25/2007	2286.12	NP	146.45	NP	2139.67	2139.67
MW-21	10/22/2007	2286.12	NP	146.75	NP	2139.37	2139.37
MW-21	11/28/2007	2286.12	NP	147.45	NP	2138.67	2138.67
MW-21	12/31/2007	2286.12	NP	147.50	NP	2138.62	2138.62
MW-21	1/26/2008	2286.12	NP	147.35	NP	2138.77	2138.77
MW-21	2/29/2008	2286.12	NP	147.35	NP	2138.77	2138.77
MW-21	3/31/2008	2286.12	NP	146.97	NP	2139.15	2139.15
MW-21	4/21/2008	2286.12	NP	147.05	NP	2139.07	2139.07
MW-21	5/23/2008	2286.12	NP	147.45	NP	2138.67	2138.67
MW-21	6/25/2008	2286.12	NP	147.71	NP	2138.41	2138.41
MW-21	7/28/2008	2286.12	NP	148.10	NP	2138.02	2138.02
MW-21	8/25/2008	2286.12	NP	147.22	NP	2138.90	2138.90
MW-21	9/30/2008	2286.12	NP	145.77	NP	2140.35	2140.35
MW-21	10/13/2008	2286.12	NP	145.68	NP	2140.44	2140.44
MW-21	11/26/2008	2286.12	NP	146.11	NP	2140.01	2140.01
MW-21	12/23/2008	2286.12	NP	146.51	NP	2139.61	2139.61
MW-21	1/26/2009	2286.12	NP	146.60	NP	2139.52	2139.52
MW-21	2/27/2009	2286.12	NP	146.61	NP	2139.51	2139.51
MW-21	3/26/2009	2286.12	NP	146.77	NP	2139.35	2139.35
MW-21	4/27/2009	2286.12	NP	146.87	NP	2139.25	2139.25
MW-21	5/20/2009	2286.12	NP	147.23	NP	2138.89	2138.89
MW-21	6/16/2009	2286.12	NP	147.76	NP	2138.36	2138.36
MW-21	7/20/2009	2286.12	NP	148.25	NP	2137.87	2137.87
MW-21	8/31/2009	2286.12	NP	148.63	NP	2137.49	2137.49
MW-21	9/29/2009	2286.12	NP	148.83	NP	2137.29	2137.29
MW-21	10/22/2009	2286.12	NP	149.05	NP	2137.07	2137.07
MW-21	11/25/2009	2286.12	NP	149.39	NP	2136.73	2136.73
MW-21	12/14/2009	2286.12	NP	149.43	NP	2136.69	2136.69
MW-21	1/18/2010	2286.12	NP	149.43	NP	2136.69	2136.69

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-21	2/26/2010	2286.12	NP	149.45	NP	2136.67	2136.67
MW-21	3/22/2010	2286.12	NP	149.12	NP	2137.00	2137.00
MW-21	4/12/2010	2286.12	NP	148.80	NP	2137.32	2137.32
MW-21	5/27/2010	2286.12	NP	149.07	NP	2137.05	2137.05
MW-21	6/22/2010	2286.12	NP	149.40	NP	2136.72	2136.72
MW-21	7/12/2010	2286.12	149.78	149.79	0.01	2136.33	2136.34
MW-21	8/26/2010	2286.12	NP	150.05	NP	2136.07	2136.07
MW-21	9/22/2010	2286.12	NP	149.88	NP	2136.24	2136.24
MW-21	10/5/2010	2286.12	NP	149.69	NP	2136.43	2136.43
MW-21	10/18/2010	2286.12	NP	149.66	NP	2136.46	2136.46
MW-21	11/30/2010	2286.12	NP	149.82	NP	2136.30	2136.30
MW-21	12/21/2010	2286.12	NP	149.92	NP	2136.20	2136.20
MW-21	1/10/2011	2286.12	NP	149.86	NP	2136.26	2136.26
MW-21	2/17/2011	2286.12	NP	150.07	NP	2136.05	2136.05
MW-21	3/25/2011	2286.12	NP	150.09	NP	2136.03	2136.03
MW-21	4/11/2011	2286.12	NP	150.26	NP	2135.86	2135.86
MW-21	5/9/2011	2286.12	NP	150.51	NP	2135.61	2135.61
MW-21	6/29/2011	2286.12	NP	151.25	NP	2134.87	2134.87
MW-21	7/11/2011	2286.12	NP	151.31	NP	2134.81	2134.81
MW-21	8/31/2011	2286.12	NP	152.00	NP	2134.12	2134.12
MW-21	9/28/2011	2286.12	NP	152.08	NP	2134.04	2134.04
MW-21	10/10/2011	2286.12	NP	151.75	NP	2134.37	2134.37
MW-21	11/16/2011	2286.12	NP	151.64	NP	2134.48	2134.48
MW-21	12/29/2011	2286.12	NP	151.62	NP	2134.50	2134.50
MW-21	1/16/2012	2286.12	NP	151.60	NP	2134.52	2134.52
MW-21	2/28/2012	2286.12	NP	151.29	NP	2134.83	2134.83
MW-21	3/30/2012	2286.12	NP	151.38	NP	2134.74	2134.74
MW-21	4/2/2012	2286.12	NP	151.49	NP	2134.63	2134.63
MW-21	5/30/2012	2286.12	NP	152.19	NP	2133.93	2133.93
MW-21	6/29/2012	2286.12	NP	152.47	NP	2133.65	2133.65
MW-21	7/9/2012	2286.12	NP	152.55	NP	2133.57	2133.57
MW-21	8/29/2012	2286.12	NP	152.45	NP	2133.67	2133.67
MW-21	9/25/2012	2286.12	NP	152.20	NP	2133.92	2133.92
MW-21	10/22/2012	2286.12	NP	152.22	NP	2133.90	2133.90
MW-21	11/15/2012	2286.12	NP	152.58	NP	2133.54	2133.54
MW-21	12/13/2012	2286.12	NP	152.78	NP	2133.34	2133.34
MW-21	1/21/2013	2286.12	NP	152.85	NP	2133.27	2133.27
MW-21	2/13/2013	2286.12	NP	152.87	NP	2133.25	2133.25
MW-21	3/21/2013	2286.12	NP	152.82	NP	2133.30	2133.30
MW-21	4/15/2013	2286.12	NP	152.88	NP	2133.24	2133.24
MW-21	5/23/2013	2286.12	NP	153.07	NP	2133.05	2133.05
MW-21	6/26/2013	2286.12	NP	153.36	NP	2132.76	2132.76
MW-21	7/8/2013	2286.12	153.50	153.51	0.01	2132.61	2132.62
MW-21	8/8/2013	2286.12	NP	153.71	NP	2132.41	2132.41
MW-21	9/5/2013	2286.12	NP	153.75	NP	2132.37	2132.37
MW-21	10/3/2013	2286.12	NP	153.91	NP	2132.21	2132.21

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-21	12/31/2013	2286.12	NP	154.00	NP	2132.12	2132.12
MW-21	1/10/2014	2286.12	NP	154.21	NP	2131.91	2131.91
MW-21	2/18/2014	2286.12	NP	154.24	NP	2131.88	2131.88
MW-21	3/12/2014	2286.12	NP	154.28	NP	2131.84	2131.84
MW-21	4/17/2014	2286.12	NP	154.44	NP	2131.68	2131.68
MW-21	5/22/2014	2286.12	NP	154.76	NP	2131.36	2131.36
MW-21	6/20/2014	2286.12	NP	155.04	NP	2131.08	2131.08
MW-21	7/15/2014	2286.12	NP	155.36	NP	2130.76	2130.76
MW-21	8/14/2014	2286.12	NP	155.73	NP	2130.39	2130.39
MW-21	9/10/2014	2286.12	NP	155.81	NP	2130.31	2130.31
MW-21	10/1/2014	2286.12	NP	155.34	NP	2130.78	2130.78
MW-21	11/18/2014	2286.12	NP	154.93	NP	2131.19	2131.19
MW-21	12/16/2014	2286.12	NP	154.75	NP	2131.37	2131.37
MW-21	1/19/2015	2286.12	NP	154.47	NP	2131.65	2131.65
MW-21	2/19/2015	2286.12	NP	154.20	NP	2131.92	2131.92
MW-21	3/26/2015	2286.12	NP	153.86	NP	2132.26	2132.26
MW-21	4/16/2015	2286.12	NP	153.67	NP	2132.45	2132.45
MW-21	5/19/2015	2286.12	NP	153.84	NP	2132.28	2132.28
MW-21	6/22/2015	2286.12	NP	154.27	NP	2131.85	2131.85
MW-22	3/2/2004	2286.83	NP	139.96	NP	2146.87	2146.87
MW-22	3/8/2004	2286.83	NP	139.96	NP	2146.87	2146.87
MW-22	3/15/2004	2286.83	NP	140.08	NP	2146.75	2146.75
MW-22	3/22/2004	2286.83	NP	140.10	NP	2146.73	2146.73
MW-22	3/29/2004	2286.83	NP	140.13	NP	2146.70	2146.70
MW-22	4/5/2004	2286.83	NP	140.18	NP	2146.65	2146.65
MW-22	4/12/2004	2286.83	NP	140.19	NP	2146.64	2146.64
MW-22	4/19/2004	2286.83	NP	140.22	NP	2146.61	2146.61
MW-22	4/26/2004	2286.83	NP	140.24	NP	2146.59	2146.59
MW-22	5/3/2004	2286.83	NP	140.26	NP	2146.57	2146.57
MW-22	5/10/2004	2286.83	NP	140.26	NP	2146.57	2146.57
MW-22	5/17/2004	2286.83	NP	140.33	NP	2146.50	2146.50
MW-22	5/24/2004	2286.83	NP	140.33	NP	2146.50	2146.50
MW-22	5/31/2004	2286.83	NP	140.38	NP	2146.45	2146.45
MW-22	6/7/2004	2286.83	NP	140.46	NP	2146.37	2146.37
MW-22	6/14/2004	2286.83	NP	140.54	NP	2146.29	2146.29
MW-22	6/21/2004	2286.83	NP	140.63	NP	2146.20	2146.20
MW-22	6/28/2004	2286.83	NP	140.79	NP	2146.04	2146.04
MW-22	7/6/2004	2286.83	NP	140.90	NP	2145.93	2145.93
MW-22	7/12/2004	2286.83	NP	140.99	NP	2145.84	2145.84
MW-22	7/19/2004	2286.83	NP	141.11	NP	2145.72	2145.72
MW-22	7/26/2004	2286.83	NP	141.21	NP	2145.62	2145.62
MW-22	8/2/2004	2286.83	NP	141.33	NP	2145.50	2145.50
MW-22	8/9/2004	2286.83	NP	141.48	NP	2145.35	2145.35
MW-22	8/16/2004	2286.83	NP	141.59	NP	2145.24	2145.24
MW-22	8/23/2004	2286.83	NP	141.69	NP	2145.14	2145.14
MW-22	8/30/2004	2286.83	NP	141.83	NP	2145.00	2145.00

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-22	9/8/2004	2286.83	NP	141.87	NP	2144.96	2144.96
MW-22	9/13/2004	2286.83	NP	142.05	NP	2144.78	2144.78
MW-22	9/20/2004	2286.83	NP	142.15	NP	2144.68	2144.68
MW-22	9/27/2004	2286.83	NP	142.24	NP	2144.59	2144.59
MW-22	10/4/2004	2286.83	NP	142.31	NP	2144.52	2144.52
MW-22	10/11/2004	2286.83	NP	142.41	NP	2144.42	2144.42
MW-22	10/18/2004	2286.83	NP	142.48	NP	2144.35	2144.35
MW-22	10/25/2004	2286.83	NP	142.51	NP	2144.32	2144.32
MW-22	11/1/2004	2286.83	NP	142.64	NP	2144.19	2144.19
MW-22	11/8/2004	2286.83	NP	142.75	NP	2144.08	2144.08
MW-22	11/15/2004	2286.83	NP	142.78	NP	2144.05	2144.05
MW-22	11/30/2004	2286.83	NP	142.87	NP	2143.96	2143.96
MW-22	12/6/2004	2286.83	NP	143.08	NP	2143.75	2143.75
MW-22	12/13/2004	2286.83	NP	143.14	NP	2143.69	2143.69
MW-22	12/20/2004	2286.83	NP	143.10	NP	2143.73	2143.73
MW-22	1/4/2005	2286.83	NP	143.27	NP	2143.56	2143.56
MW-22	1/10/2005	2286.83	NP	143.15	NP	2143.68	2143.68
MW-22	1/17/2005	2286.83	NP	143.26	NP	2143.57	2143.57
MW-22	1/24/2005	2286.83	NP	143.47	NP	2143.36	2143.36
MW-22	1/31/2005	2286.83	NP	143.35	NP	2143.48	2143.48
MW-22	2/24/2005	2286.83	NP	143.33	NP	2143.50	2143.50
MW-22	3/2/2005	2286.83	NP	143.41	NP	2143.42	2143.42
MW-22	3/7/2005	2286.83	NP	143.39	NP	2143.44	2143.44
MW-22	3/14/2005	2286.83	NP	143.38	NP	2143.45	2143.45
MW-22	3/21/2005	2286.83	NP	143.26	NP	2143.57	2143.57
MW-22	3/27/2005	2286.83	NP	143.14	NP	2143.69	2143.69
MW-22	4/4/2005	2286.83	NP	143.18	NP	2143.65	2143.65
MW-22	4/11/2005	2286.83	NP	143.18	NP	2143.65	2143.65
MW-22	4/18/2005	2286.83	NP	143.28	NP	2143.55	2143.55
MW-22	4/25/2005	2286.83	NP	143.27	NP	2143.56	2143.56
MW-22	5/2/2005	2286.83	NP	143.25	NP	2143.58	2143.58
MW-22	5/10/2005	2286.83	NP	143.29	NP	2143.54	2143.54
MW-22	5/16/2005	2286.83	NP	143.30	NP	2143.53	2143.53
MW-22	5/23/2005	2286.83	NP	143.42	NP	2143.41	2143.41
MW-22	5/30/2005	2286.83	NP	143.49	NP	2143.34	2143.34
MW-22	6/6/2005	2286.83	NP	143.52	NP	2143.31	2143.31
MW-22	6/13/2005	2286.83	NP	143.59	NP	2143.24	2143.24
MW-22	6/20/2005	2286.83	NP	143.57	NP	2143.26	2143.26
MW-22	6/27/2005	2286.83	NP	143.69	NP	2143.14	2143.14
MW-22	7/11/2005	2286.83	NP	143.85	NP	2142.98	2142.98
MW-22	7/18/2005	2286.83	NP	143.95	NP	2142.88	2142.88
MW-22	7/25/2005	2286.83	NP	143.99	NP	2142.84	2142.84
MW-22	8/1/2005	2286.83	NP	144.07	NP	2142.76	2142.76
MW-22	8/8/2005	2286.83	NP	144.15	NP	2142.68	2142.68
MW-22	8/15/2005	2286.83	NP	144.20	NP	2142.63	2142.63
MW-22	8/22/2005	2286.83	NP	144.21	NP	2142.62	2142.62

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-22	8/29/2005	2286.83	NP	144.11	NP	2142.72	2142.72
MW-22	9/7/2005	2286.83	NP	143.84	NP	2142.99	2142.99
MW-22	9/12/2005	2286.83	NP	143.66	NP	2143.17	2143.17
MW-22	9/19/2005	2286.83	NP	144.11	NP	2142.72	2142.72
MW-22	9/26/2005	2286.83	NP	143.35	NP	2143.48	2143.48
MW-22	10/3/2005	2286.83	NP	143.36	NP	2143.47	2143.47
MW-22	10/10/2005	2286.83	NP	143.48	NP	2143.35	2143.35
MW-22	10/17/2005	2286.83	NP	143.56	NP	2143.27	2143.27
MW-22	10/24/2005	2286.83	NP	143.68	NP	2143.15	2143.15
MW-22	10/31/2005	2286.83	NP	143.83	NP	2143.00	2143.00
MW-22	11/7/2005	2286.83	NP	143.95	NP	2142.88	2142.88
MW-22	11/14/2005	2286.83	NP	144.09	NP	2142.74	2142.74
MW-22	11/21/2005	2286.83	NP	144.18	NP	2142.65	2142.65
MW-22	12/5/2005	2286.83	NP	144.28	NP	2142.55	2142.55
MW-22	12/19/2005	2286.83	NP	144.33	NP	2142.50	2142.50
MW-22	1/9/2006	2286.83	NP	144.50	NP	2142.33	2142.33
MW-22	1/16/2006	2286.83	NP	144.56	NP	2142.27	2142.27
MW-22	1/30/2006	2286.83	NP	144.59	NP	2142.24	2142.24
MW-22	2/13/2006	2286.83	NP	144.68	NP	2142.15	2142.15
MW-22	2/27/2006	2286.83	NP	144.72	NP	2142.11	2142.11
MW-22	3/6/2006	2286.83	NP	144.74	NP	2142.09	2142.09
MW-22	3/13/2006	2286.83	NP	144.77	NP	2142.06	2142.06
MW-22	3/20/2006	2286.83	NP	144.79	NP	2142.04	2142.04
MW-22	3/27/2006	2286.83	NP	144.81	NP	2142.02	2142.02
MW-22	4/3/2006	2286.83	NP	144.83	NP	2142.00	2142.00
MW-22	4/10/2006	2286.83	NP	144.90	NP	2141.93	2141.93
MW-22	4/17/2006	2286.83	NP	144.94	NP	2141.89	2141.89
MW-22	4/24/2006	2286.83	NP	144.96	NP	2141.87	2141.87
MW-22	5/1/2006	2286.83	NP	144.98	NP	2141.85	2141.85
MW-22	5/15/2006	2286.83	NP	145.03	NP	2141.80	2141.80
MW-22	5/22/2006	2286.83	NP	145.08	NP	2141.75	2141.75
MW-22	5/30/2006	2286.83	NP	145.19	NP	2141.64	2141.64
MW-22	6/5/2006	2286.83	NP	145.27	NP	2141.56	2141.56
MW-22	6/12/2006	2286.83	NP	145.35	NP	2141.48	2141.48
MW-22	6/26/2006	2286.83	NP	145.47	NP	2141.36	2141.36
MW-22	7/10/2006	2286.83	NP	145.61	NP	2141.22	2141.22
MW-22	8/2/2006	2286.83	NP	145.82	NP	2141.01	2141.01
MW-22	8/14/2006	2286.83	NP	145.87	NP	2140.96	2140.96
MW-22	8/23/2006	2286.83	NP	145.79	NP	2141.04	2141.04
MW-22	9/19/2006	2286.83	NP	145.78	NP	2141.05	2141.05
MW-22	10/20/2006	2286.83	NP	144.11	NP	2142.72	2142.72
MW-22	10/30/2006	2286.83	NP	144.22	NP	2142.61	2142.61
MW-22	10/30/2006	2286.83	NP	144.22	NP	2142.61	2142.61
MW-22	11/17/2006	2286.83	NP	144.46	NP	2142.37	2142.37
MW-22	1/30/2007	2286.83	NP	145.51	NP	2141.32	2141.32
MW-22	3/1/2007	2286.83	NP	145.68	NP	2141.15	2141.15

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-22	3/28/2007	2286.83	NP	145.87	NP	2140.96	2140.96
MW-22	4/24/2007	2286.83	NP	145.99	NP	2140.84	2140.84
MW-22	5/28/2007	2286.83	NP	146.11	NP	2140.72	2140.72
MW-22	6/27/2007	2286.83	NP	146.41	NP	2140.42	2140.42
MW-22	7/23/2007	2286.83	NP	146.70	NP	2140.13	2140.13
MW-22	8/25/2007	2286.83	NP	146.23	NP	2140.60	2140.60
MW-22	9/25/2007	2286.83	NP	145.71	NP	2141.12	2141.12
MW-22	10/22/2007	2286.83	NP	146.05	NP	2140.78	2140.78
MW-22	11/28/2007	2286.83	NP	146.83	NP	2140.00	2140.00
MW-22	12/31/2007	2286.83	NP	148.88	NP	2137.95	2137.95
MW-22	1/26/2008	2286.83	NP	146.72	NP	2140.11	2140.11
MW-22	2/29/2008	2286.83	NP	146.76	NP	2140.07	2140.07
MW-22	3/31/2008	2286.83	NP	146.38	NP	2140.45	2140.45
MW-22	4/21/2008	2286.83	NP	146.51	NP	2140.32	2140.32
MW-22	5/23/2008	2286.83	NP	146.91	NP	2139.92	2139.92
MW-22	6/25/2008	2286.83	NP	147.11	NP	2139.72	2139.72
MW-22	7/28/2008	2286.83	NP	147.47	NP	2139.36	2139.36
MW-22	8/25/2008	2286.83	NP	146.41	NP	2140.42	2140.42
MW-22	9/30/2008	2286.83	NP	144.99	NP	2141.84	2141.84
MW-22	10/13/2008	2286.83	NP	144.97	NP	2141.86	2141.86
MW-22	11/26/2008	2286.83	NP	145.43	NP	2141.40	2141.40
MW-22	12/23/2008	2286.83	NP	145.84	NP	2140.99	2140.99
MW-22	1/26/2009	2286.83	NP	145.94	NP	2140.89	2140.89
MW-22	2/27/2009	2286.83	NP	145.99	NP	2140.84	2140.84
MW-22	3/26/2009	2286.83	NP	146.17	NP	2140.66	2140.66
MW-22	4/27/2009	2286.83	NP	146.22	NP	2140.61	2140.61
MW-22	5/20/2009	2286.83	NP	146.60	NP	2140.23	2140.23
MW-22	6/16/2009	2286.83	NP	147.16	NP	2139.67	2139.67
MW-22	7/20/2009	2286.83	NP	147.60	NP	2139.23	2139.23
MW-22	8/31/2009	2286.83	NP	147.93	NP	2138.90	2138.90
MW-22	9/29/2009	2286.83	NP	148.13	NP	2138.70	2138.70
MW-22	10/22/2009	2286.83	NP	148.33	NP	2138.50	2138.50
MW-22	11/25/2009	2286.83	NP	148.65	NP	2138.18	2138.18
MW-22	12/14/2009	2286.83	NP	148.73	NP	2138.10	2138.10
MW-22	1/18/2010	2286.83	NP	148.71	NP	2138.12	2138.12
MW-22	2/26/2010	2286.83	NP	148.73	NP	2138.10	2138.10
MW-22	3/22/2010	2286.83	NP	148.39	NP	2138.44	2138.44
MW-22	4/12/2010	2286.83	NP	148.07	NP	2138.76	2138.76
MW-22	5/27/2010	2286.83	NP	148.38	NP	2138.45	2138.45
MW-22	6/22/2010	2286.83	NP	148.70	NP	2138.13	2138.13
MW-22	7/12/2010	2286.83	NP	149.04	NP	2137.79	2137.79
MW-22	8/26/2010	2286.83	NP	149.22	NP	2137.61	2137.61
MW-22	9/22/2010	2286.83	NP	149.06	NP	2137.77	2137.77
MW-22	10/5/2010	2286.83	NP	148.89	NP	2137.94	2137.94
MW-22	10/18/2010	2286.83	NP	148.85	NP	2137.98	2137.98
MW-22	11/30/2010	2286.83	NP	149.08	NP	2137.75	2137.75

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-22	12/21/2010	2286.83	NP	149.23	NP	2137.60	2137.60
MW-22	1/10/2011	2286.83	NP	149.14	NP	2137.69	2137.69
MW-22	2/17/2011	2286.83	NP	149.37	NP	2137.46	2137.46
MW-22	3/25/2011	2286.83	NP	149.42	NP	2137.41	2137.41
MW-22	4/11/2011	2286.83	NP	149.56	NP	2137.27	2137.27
MW-22	5/9/2011	2286.83	NP	149.81	NP	2137.02	2137.02
MW-22	6/29/2011	2286.83	NP	150.54	NP	2136.29	2136.29
MW-22	7/11/2011	2286.83	NP	150.58	NP	2136.25	2136.25
MW-22	8/31/2011	2286.83	NP	151.17	NP	2135.66	2135.66
MW-22	9/28/2011	2286.83	NP	151.24	NP	2135.59	2135.59
MW-22	10/10/2011	2286.83	NP	150.80	NP	2136.03	2136.03
MW-22	11/16/2011	2286.83	NP	150.68	NP	2136.15	2136.15
MW-22	12/29/2011	2286.83	NP	150.75	NP	2136.08	2136.08
MW-22	1/16/2012	2286.83	NP	150.71	NP	2136.12	2136.12
MW-22	2/28/2012	2286.83	NP	150.47	NP	2136.36	2136.36
MW-22	3/30/2012	2286.83	NP	150.56	NP	2136.27	2136.27
MW-22	4/2/2012	2286.83	NP	150.69	NP	2136.14	2136.14
MW-22	5/30/2012	2286.83	NP	151.38	NP	2135.45	2135.45
MW-22	6/29/2012	2286.83	NP	151.65	NP	2135.18	2135.18
MW-22	7/9/2012	2286.83	NP	151.70	NP	2135.13	2135.13
MW-22	8/29/2012	2286.83	NP	151.49	NP	2135.34	2135.34
MW-22	9/25/2012	2286.83	NP	151.20	NP	2135.63	2135.63
MW-22	10/22/2012	2286.83	NP	151.26	NP	2135.57	2135.57
MW-22	11/15/2012	2286.83	NP	151.65	NP	2135.18	2135.18
MW-22	12/13/2012	2286.83	NP	151.88	NP	2134.95	2134.95
MW-22	1/21/2013	2286.83	NP	151.97	NP	2134.86	2134.86
MW-22	2/13/2013	2286.83	NP	152.02	NP	2134.81	2134.81
MW-22	3/21/2013	2286.83	NP	152.01	NP	2134.82	2134.82
MW-22	4/15/2013	2286.83	NP	152.07	NP	2134.76	2134.76
MW-22	5/23/2013	2286.83	NP	152.26	NP	2134.57	2134.57
MW-22	6/26/2013	2286.83	NP	152.53	NP	2134.30	2134.30
MW-22	7/8/2013	2286.83	NP	152.65	NP	2134.18	2134.18
MW-22	8/8/2013	2286.83	NP	152.85	NP	2133.98	2133.98
MW-22	9/5/2013	2286.83	NP	152.86	NP	2133.97	2133.97
MW-22	10/3/2013	2286.83	NP	153.02	NP	2133.81	2133.81
MW-22	11/27/2013	2286.83	NP	153.22	NP	2133.61	2133.61
MW-22	12/31/2013	2286.83	NP	153.13	NP	2133.70	2133.70
MW-22	1/10/2014	2286.83	NP	153.33	NP	2133.50	2133.50
MW-22	2/18/2014	2286.83	NP	153.36	NP	2133.47	2133.47
MW-22	3/12/2014	2286.83	NP	153.42	NP	2133.41	2133.41
MW-22	4/17/2014	2286.83	NP	153.62	NP	2133.21	2133.21
MW-22	5/22/2014	2286.83	NP	153.92	NP	2132.91	2132.91
MW-22	6/20/2014	2286.83	NP	154.20	NP	2132.63	2132.63
MW-22	7/15/2014	2286.83	NP	154.45	NP	2132.38	2132.38
MW-22	8/14/2014	2286.83	NP	154.83	NP	2132.00	2132.00
MW-22	9/10/2014	2286.83	NP	154.77	NP	2132.06	2132.06

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-22	10/1/2014	2286.83	NP	154.27	NP	2132.56	2132.56
MW-22	11/18/2014	2286.83	NP	153.93	NP	2132.90	2132.90
MW-22	12/16/2014	2286.83	NP	153.83	NP	2133.00	2133.00
MW-22	1/19/2015	2286.83	NP	153.68	NP	2133.15	2133.15
MW-22	2/19/2015	2286.83	NP	153.37	NP	2133.46	2133.46
MW-22	3/26/2015	2286.83	NP	153.04	NP	2133.79	2133.79
MW-22	4/16/2015	2286.83	NP	152.90	NP	2133.93	2133.93
MW-22	5/19/2015	2286.83	NP	153.09	NP	2133.74	2133.74
MW-22	6/22/2015	2286.83	NP	153.51	NP	2133.32	2133.32
MW-23	3/2/2004	2287.43	NP	139.38	NP	2148.05	2148.05
MW-23	3/8/2004	2287.43	NP	139.38	NP	2148.05	2148.05
MW-23	3/15/2004	2287.43	NP	139.53	NP	2147.90	2147.90
MW-23	3/22/2004	2287.43	NP	139.54	NP	2147.89	2147.89
MW-23	3/29/2004	2287.43	NP	139.58	NP	2147.85	2147.85
MW-23	4/5/2004	2287.43	NP	139.64	NP	2147.79	2147.79
MW-23	4/12/2004	2287.43	NP	139.65	NP	2147.78	2147.78
MW-23	4/19/2004	2287.43	NP	139.68	NP	2147.75	2147.75
MW-23	4/26/2004	2287.43	NP	139.70	NP	2147.73	2147.73
MW-23	5/3/2004	2287.43	NP	139.71	NP	2147.72	2147.72
MW-23	5/10/2004	2287.43	NP	139.73	NP	2147.70	2147.70
MW-23	5/17/2004	2287.43	NP	139.78	NP	2147.65	2147.65
MW-23	5/24/2004	2287.43	NP	139.78	NP	2147.65	2147.65
MW-23	5/31/2004	2287.43	NP	139.83	NP	2147.60	2147.60
MW-23	6/7/2004	2287.43	NP	139.89	NP	2147.54	2147.54
MW-23	6/14/2004	2287.43	NP	139.95	NP	2147.48	2147.48
MW-23	6/21/2004	2287.43	NP	140.09	NP	2147.34	2147.34
MW-23	6/28/2004	2287.43	NP	140.21	NP	2147.22	2147.22
MW-23	7/6/2004	2287.43	NP	140.32	NP	2147.11	2147.11
MW-23	7/12/2004	2287.43	NP	140.41	NP	2147.02	2147.02
MW-23	7/19/2004	2287.43	NP	140.53	NP	2146.90	2146.90
MW-23	7/26/2004	2287.43	NP	140.61	NP	2146.82	2146.82
MW-23	8/2/2004	2287.43	NP	140.72	NP	2146.71	2146.71
MW-23	8/9/2004	2287.43	NP	140.90	NP	2146.53	2146.53
MW-23	8/16/2004	2287.43	NP	141.01	NP	2146.42	2146.42
MW-23	8/23/2004	2287.43	NP	141.10	NP	2146.33	2146.33
MW-23	8/30/2004	2287.43	NP	141.22	NP	2146.21	2146.21
MW-23	9/8/2004	2287.43	NP	141.26	NP	2146.17	2146.17
MW-23	9/13/2004	2287.43	NP	141.40	NP	2146.03	2146.03
MW-23	9/20/2004	2287.43	NP	141.52	NP	2145.91	2145.91
MW-23	9/27/2004	2287.43	NP	141.63	NP	2145.80	2145.80
MW-23	10/4/2004	2287.43	NP	141.70	NP	2145.73	2145.73
MW-23	10/11/2004	2287.43	NP	141.79	NP	2145.64	2145.64
MW-23	10/18/2004	2287.43	NP	141.84	NP	2145.59	2145.59
MW-23	10/25/2004	2287.43	NP	141.80	NP	2145.63	2145.63
MW-23	11/1/2004	2287.43	NP	142.02	NP	2145.41	2145.41
MW-23	11/8/2004	2287.43	NP	142.11	NP	2145.32	2145.32

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-23	11/15/2004	2287.43	NP	142.15	NP	2145.28	2145.28
MW-23	11/30/2004	2287.43	NP	142.34	NP	2145.09	2145.09
MW-23	12/6/2004	2287.43	NP	142.41	NP	2145.02	2145.02
MW-23	12/13/2004	2287.43	NP	142.50	NP	2144.93	2144.93
MW-23	12/20/2004	2287.43	NP	142.48	NP	2144.95	2144.95
MW-23	1/4/2005	2287.43	NP	142.65	NP	2144.78	2144.78
MW-23	1/10/2005	2287.43	NP	143.22	NP	2144.21	2144.21
MW-23	1/17/2005	2287.43	NP	143.18	NP	2144.25	2144.25
MW-23	1/24/2005	2287.43	NP	143.31	NP	2144.12	2144.12
MW-23	1/31/2005	2287.43	NP	142.74	NP	2144.69	2144.69
MW-23	2/23/2005	2287.43	NP	142.67	NP	2144.76	2144.76
MW-23	3/2/2005	2287.43	NP	142.82	NP	2144.61	2144.61
MW-23	3/7/2005	2287.43	NP	142.80	NP	2144.63	2144.63
MW-23	3/14/2005	2287.43	NP	142.81	NP	2144.62	2144.62
MW-23	3/21/2005	2287.43	NP	142.66	NP	2144.77	2144.77
MW-23	3/27/2005	2287.43	NP	142.57	NP	2144.86	2144.86
MW-23	4/4/2005	2287.43	NP	142.59	NP	2144.84	2144.84
MW-23	4/11/2005	2287.43	NP	142.60	NP	2144.83	2144.83
MW-23	4/18/2005	2287.43	NP	142.71	NP	2144.72	2144.72
MW-23	4/25/2005	2287.43	NP	142.72	NP	2144.71	2144.71
MW-23	5/2/2005	2287.43	NP	142.71	NP	2144.72	2144.72
MW-23	5/10/2005	2287.43	NP	142.73	NP	2144.70	2144.70
MW-23	5/16/2005	2287.43	NP	142.76	NP	2144.67	2144.67
MW-23	5/23/2005	2287.43	NP	142.84	NP	2144.59	2144.59
MW-23	5/30/2005	2287.43	NP	142.91	NP	2144.52	2144.52
MW-23	6/6/2005	2287.43	NP	143.01	NP	2144.42	2144.42
MW-23	6/13/2005	2287.43	NP	143.03	NP	2144.40	2144.40
MW-23	6/20/2005	2287.43	NP	143.09	NP	2144.34	2144.34
MW-23	6/27/2005	2287.43	NP	143.13	NP	2144.30	2144.30
MW-23	7/11/2005	2287.43	NP	143.29	NP	2144.14	2144.14
MW-23	7/18/2005	2287.43	NP	143.37	NP	2144.06	2144.06
MW-23	7/25/2005	2287.43	NP	143.42	NP	2144.01	2144.01
MW-23	8/1/2005	2287.43	NP	143.50	NP	2143.93	2143.93
MW-23	8/8/2005	2287.43	NP	143.59	NP	2143.84	2143.84
MW-23	8/15/2005	2287.43	NP	143.65	NP	2143.78	2143.78
MW-23	8/22/2005	2287.43	NP	143.67	NP	2143.76	2143.76
MW-23	8/29/2005	2287.43	NP	143.50	NP	2143.93	2143.93
MW-23	9/7/2005	2287.43	NP	143.20	NP	2144.23	2144.23
MW-23	9/12/2005	2287.43	NP	142.99	NP	2144.44	2144.44
MW-23	9/19/2005	2287.43	NP	142.80	NP	2144.63	2144.63
MW-23	9/26/2005	2287.43	NP	142.72	NP	2144.71	2144.71
MW-23	10/3/2005	2287.43	NP	142.73	NP	2144.70	2144.70
MW-23	10/10/2005	2287.43	NP	142.86	NP	2144.57	2144.57
MW-23	10/17/2005	2287.43	NP	142.95	NP	2144.48	2144.48
MW-23	10/24/2005	2287.43	NP	143.07	NP	2144.36	2144.36
MW-23	10/31/2005	2287.43	NP	143.21	NP	2144.22	2144.22

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-23	11/7/2005	2287.43	NP	143.34	NP	2144.09	2144.09
MW-23	11/14/2005	2287.43	NP	143.47	NP	2143.96	2143.96
MW-23	11/21/2005	2287.43	NP	143.56	NP	2143.87	2143.87
MW-23	12/5/2005	2287.43	NP	143.69	NP	2143.74	2143.74
MW-23	12/19/2005	2287.43	NP	143.74	NP	2143.69	2143.69
MW-23	1/9/2006	2287.43	NP	143.91	NP	2143.52	2143.52
MW-23	1/16/2006	2287.43	NP	143.98	NP	2143.45	2143.45
MW-23	1/30/2006	2287.43	NP	143.99	NP	2143.44	2143.44
MW-23	2/13/2006	2287.43	NP	144.08	NP	2143.35	2143.35
MW-23	2/27/2006	2287.43	NP	144.14	NP	2143.29	2143.29
MW-23	3/6/2006	2287.43	NP	144.16	NP	2143.27	2143.27
MW-23	3/13/2006	2287.43	NP	144.19	NP	2143.24	2143.24
MW-23	3/20/2006	2287.43	NP	144.20	NP	2143.23	2143.23
MW-23	3/27/2006	2287.43	NP	144.23	NP	2143.20	2143.20
MW-23	4/3/2006	2287.43	NP	144.26	NP	2143.17	2143.17
MW-23	4/10/2006	2287.43	NP	144.32	NP	2143.11	2143.11
MW-23	4/17/2006	2287.43	NP	144.35	NP	2143.08	2143.08
MW-23	4/24/2006	2287.43	NP	144.39	NP	2143.04	2143.04
MW-23	5/1/2006	2287.43	NP	144.41	NP	2143.02	2143.02
MW-23	5/15/2006	2287.43	NP	144.45	NP	2142.98	2142.98
MW-23	5/22/2006	2287.43	NP	144.50	NP	2142.93	2142.93
MW-23	5/30/2006	2287.43	NP	144.62	NP	2142.81	2142.81
MW-23	6/5/2006	2287.43	NP	144.68	NP	2142.75	2142.75
MW-23	6/12/2006	2287.43	NP	144.74	NP	2142.69	2142.69
MW-23	6/26/2006	2287.43	NP	144.90	NP	2142.53	2142.53
MW-23	7/10/2006	2287.43	NP	145.04	NP	2142.39	2142.39
MW-23	8/2/2006	2287.43	NP	145.23	NP	2142.20	2142.20
MW-23	8/14/2006	2287.43	NP	145.27	NP	2142.16	2142.16
MW-23	8/23/2006	2287.43	NP	145.13	NP	2142.30	2142.30
MW-23	9/19/2006	2287.43	NP	144.08	NP	2143.35	2143.35
MW-23	10/20/2006	2287.43	NP	143.45	NP	2143.98	2143.98
MW-23	10/30/2006	2287.43	NP	143.58	NP	2143.85	2143.85
MW-23	11/17/2006	2287.43	NP	143.84	NP	2143.59	2143.59
MW-23	1/30/2007	2287.43	NP	144.95	NP	2142.48	2142.48
MW-23	3/1/2007	2287.43	NP	145.08	NP	2142.35	2142.35
MW-23	3/28/2007	2287.43	NP	145.28	NP	2142.15	2142.15
MW-23	4/24/2007	2287.43	NP	145.38	NP	2142.05	2142.05
MW-23	5/28/2007	2287.43	NP	145.52	NP	2141.91	2141.91
MW-23	6/27/2007	2287.43	NP	145.83	NP	2141.60	2141.60
MW-23	7/23/2007	2287.43	NP	146.12	NP	2141.31	2141.31
MW-23	8/25/2007	2287.43	NP	145.42	NP	2142.01	2142.01
MW-23	9/25/2007	2287.43	NP	144.96	NP	2142.47	2142.47
MW-23	10/22/2007	2287.43	NP	145.34	NP	2142.09	2142.09
MW-23	11/28/2007	2287.43	NP	146.14	NP	2141.29	2141.29
MW-23	12/31/2007	2287.43	NP	146.27	NP	2141.16	2141.16
MW-23	1/26/2008	2287.43	NP	146.09	NP	2141.34	2141.34

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-23	2/29/2008	2287.43	NP	146.17	NP	2141.26	2141.26
MW-23	3/31/2008	2287.43	NP	145.78	NP	2141.65	2141.65
MW-23	4/21/2008	2287.43	NP	145.89	NP	2141.54	2141.54
MW-23	5/23/2008	2287.43	NP	146.32	NP	2141.11	2141.11
MW-23	6/25/2008	2287.43	NP	146.52	NP	2140.91	2140.91
MW-23	7/28/2008	2287.43	NP	146.82	NP	2140.61	2140.61
MW-23	8/25/2008	2287.43	NP	145.63	NP	2141.80	2141.80
MW-23	9/30/2008	2287.43	NP	144.17	NP	2143.26	2143.26
MW-23	10/13/2008	2287.43	NP	144.21	NP	2143.22	2143.22
MW-23	11/26/2008	2287.43	NP	144.77	NP	2142.66	2142.66
MW-23	12/23/2008	2287.43	NP	145.16	NP	2142.27	2142.27
MW-23	1/26/2009	2287.43	NP	145.29	NP	2142.14	2142.14
MW-23	2/27/2009	2287.43	NP	145.35	NP	2142.08	2142.08
MW-23	3/26/2009	2287.43	NP	145.54	NP	2141.89	2141.89
MW-23	4/27/2009	2287.43	NP	145.63	NP	2141.80	2141.80
MW-23	5/20/2009	2287.43	NP	145.98	NP	2141.45	2141.45
MW-23	6/16/2009	2287.43	NP	146.51	NP	2140.92	2140.92
MW-23	7/20/2009	2287.43	NP	146.95	NP	2140.48	2140.48
MW-23	8/31/2009	2287.43	NP	147.27	NP	2140.16	2140.16
MW-23	9/29/2009	2287.43	NP	147.46	NP	2139.97	2139.97
MW-23	10/22/2009	2287.43	NP	147.60	NP	2139.83	2139.83
MW-23	11/25/2009	2287.43	NP	147.95	NP	2139.48	2139.48
MW-23	12/14/2009	2287.43	NP	148.03	NP	2139.40	2139.40
MW-23	1/18/2010	2287.43	NP	148.01	NP	2139.42	2139.42
MW-23	2/26/2010	2287.43	NP	148.07	NP	2139.36	2139.36
MW-23	3/22/2010	2287.43	NP	147.47	NP	2139.96	2139.96
MW-23	4/12/2010	2287.43	NP	147.35	NP	2140.08	2140.08
MW-23	5/27/2010	2287.43	NP	147.69	NP	2139.74	2139.74
MW-23	6/22/2010	2287.43	NP	148.03	NP	2139.40	2139.40
MW-23	7/12/2010	2287.43	NP	148.30	NP	2139.13	2139.13
MW-23	8/26/2010	2287.43	NP	148.45	NP	2138.98	2138.98
MW-23	9/22/2010	2287.43	NP	148.24	NP	2139.19	2139.19
MW-23	10/5/2010	2287.43	NP	148.09	NP	2139.34	2139.34
MW-23	10/18/2010	2287.43	NP	148.10	NP	2139.33	2139.33
MW-23	11/30/2010	2287.43	NP	148.36	NP	2139.07	2139.07
MW-23	12/21/2010	2287.43	NP	148.45	NP	2138.98	2138.98
MW-23	1/10/2011	2287.43	NP	148.43	NP	2139.00	2139.00
MW-23	2/17/2011	2287.43	NP	148.69	NP	2138.74	2138.74
MW-23	3/25/2011	2287.43	NP	148.75	NP	2138.68	2138.68
MW-23	4/11/2011	2287.43	NP	148.90	NP	2138.53	2138.53
MW-23	5/9/2011	2287.43	NP	149.09	NP	2138.34	2138.34
MW-23	6/29/2011	2287.43	NP	149.88	NP	2137.55	2137.55
MW-23	7/11/2011	2287.43	NP	149.87	NP	2137.56	2137.56
MW-23	8/31/2011	2287.43	NP	150.42	NP	2137.01	2137.01
MW-23	9/28/2011	2287.43	NP	150.43	NP	2137.00	2137.00
MW-23	10/10/2011	2287.43	NP	149.96	NP	2137.47	2137.47

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-23	11/16/2011	2287.43	NP	149.90	NP	2137.53	2137.53
MW-23	12/29/2011	2287.43	NP	149.98	NP	2137.45	2137.45
MW-23	1/16/2012	2287.43	NP	149.90	NP	2137.53	2137.53
MW-23	2/28/2012	2287.43	NP	149.68	NP	2137.75	2137.75
MW-23	3/30/2012	2287.43	NP	149.83	NP	2137.60	2137.60
MW-23	4/2/2012	2287.43	NP	149.91	NP	2137.52	2137.52
MW-23	5/30/2012	2287.43	NP	150.63	NP	2136.80	2136.80
MW-23	6/29/2012	2287.43	NP	150.88	NP	2136.55	2136.55
MW-23	7/9/2012	2287.43	NP	150.92	NP	2136.51	2136.51
MW-23	8/29/2012	2287.43	NP	150.67	NP	2136.76	2136.76
MW-23	9/25/2012	2287.43	NP	150.30	NP	2137.13	2137.13
MW-23	10/22/2012	2287.43	NP	150.39	NP	2137.04	2137.04
MW-23	11/15/2012	2287.43	NP	150.80	NP	2136.63	2136.63
MW-23	12/13/2012	2287.43	NP	151.08	NP	2136.35	2136.35
MW-23	1/21/2013	2287.43	NP	151.19	NP	2136.24	2136.24
MW-23	2/13/2013	2287.43	NP	151.23	NP	2136.20	2136.20
MW-23	3/21/2013	2287.43	NP	151.22	NP	2136.21	2136.21
MW-23	4/15/2013	2287.43	NP	151.37	NP	2136.06	2136.06
MW-23	5/23/2013	2287.43	NP	151.54	NP	2135.89	2135.89
MW-23	6/26/2013	2287.43	NP	151.82	NP	2135.61	2135.61
MW-23	7/8/2013	2287.43	NP	151.92	NP	2135.51	2135.51
MW-23	8/8/2013	2287.43	NP	152.13	NP	2135.30	2135.30
MW-23	9/5/2013	2287.43	NP	152.06	NP	2135.37	2135.37
MW-23	10/3/2013	2287.43	NP	152.22	NP	2135.21	2135.21
MW-23	11/27/2013	2287.43	NP	152.42	NP	2135.01	2135.01
MW-23	12/31/2013	2287.43	NP	152.43	NP	2135.00	2135.00
MW-23	1/10/2014	2287.43	NP	152.57	NP	2134.86	2134.86
MW-23	2/18/2014	2287.43	NP	152.68	NP	2134.75	2134.75
MW-23	3/12/2014	2287.43	NP	152.72	NP	2134.71	2134.71
MW-23	4/17/2014	2287.43	NP	152.88	NP	2134.55	2134.55
MW-23	5/22/2014	2287.43	NP	153.19	NP	2134.24	2134.24
MW-23	6/20/2014	2287.43	NP	153.45	NP	2133.98	2133.98
MW-23	7/15/2014	2287.43	NP	153.95	NP	2133.48	2133.48
MW-23	8/14/2014	2287.43	NP	154.10	NP	2133.33	2133.33
MW-23	9/9/2014	2287.43	NP	153.97	NP	2133.46	2133.46
MW-23	10/1/2014	2287.43	NP	153.37	NP	2134.06	2134.06
MW-23	11/18/2014	2287.43	NP	153.10	NP	2134.33	2134.33
MW-23	12/16/2014	2287.43	NP	153.10	NP	2134.33	2134.33
MW-23	1/19/2015	2287.43	NP	152.88	NP	2134.55	2134.55
MW-23	2/19/2015	2287.43	NP	152.68	NP	2134.75	2134.75
MW-23	3/26/2015	2287.43	NP	152.34	NP	2135.09	2135.09
MW-23	4/16/2015	2287.43	NP	152.22	NP	2135.21	2135.21
MW-23	5/19/2015	2287.43	NP	152.41	NP	2135.02	2135.02
MW-23	6/22/2015	2287.43	NP	152.88	NP	2134.55	2134.55
MW-24	3/2/2004	2283.85	NP	139.08	NP	2144.77	2144.77
MW-24	3/8/2004	2283.85	NP	139.08	NP	2144.77	2144.77

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-24	3/15/2004	2283.85	NP	139.19	NP	2144.66	2144.66
MW-24	3/22/2004	2283.85	NP	139.19	NP	2144.66	2144.66
MW-24	3/29/2004	2283.85	NP	139.23	NP	2144.62	2144.62
MW-24	4/5/2004	2283.85	NP	139.27	NP	2144.58	2144.58
MW-24	4/12/2004	2283.85	NP	139.29	NP	2144.56	2144.56
MW-24	4/19/2004	2283.85	NP	139.31	NP	2144.54	2144.54
MW-24	4/26/2004	2283.85	NP	139.33	NP	2144.52	2144.52
MW-24	5/3/2004	2283.85	NP	139.33	NP	2144.52	2144.52
MW-24	5/10/2004	2283.85	NP	139.34	NP	2144.51	2144.51
MW-24	5/17/2004	2283.85	NP	139.40	NP	2144.45	2144.45
MW-24	5/24/2004	2283.85	NP	139.40	NP	2144.45	2144.45
MW-24	5/31/2004	2283.85	NP	139.47	NP	2144.38	2144.38
MW-24	6/7/2004	2283.85	NP	139.55	NP	2144.30	2144.30
MW-24	6/14/2004	2283.85	NP	139.66	NP	2144.19	2144.19
MW-24	6/21/2004	2283.85	NP	139.80	NP	2144.05	2144.05
MW-24	6/28/2004	2283.85	NP	139.93	NP	2143.92	2143.92
MW-24	7/6/2004	2283.85	NP	140.06	NP	2143.79	2143.79
MW-24	7/12/2004	2283.85	NP	140.16	NP	2143.69	2143.69
MW-24	7/19/2004	2283.85	NP	140.29	NP	2143.56	2143.56
MW-24	7/26/2004	2283.85	NP	140.40	NP	2143.45	2143.45
MW-24	8/2/2004	2283.85	NP	140.55	NP	2143.30	2143.30
MW-24	8/9/2004	2283.85	NP	140.69	NP	2143.16	2143.16
MW-24	8/16/2004	2283.85	NP	140.81	NP	2143.04	2143.04
MW-24	8/23/2004	2283.85	NP	140.91	NP	2142.94	2142.94
MW-24	8/30/2004	2283.85	NP	141.05	NP	2142.80	2142.80
MW-24	9/8/2004	2283.85	NP	141.15	NP	2142.70	2142.70
MW-24	9/13/2004	2283.85	NP	141.31	NP	2142.54	2142.54
MW-24	9/20/2004	2283.85	NP	141.38	NP	2142.47	2142.47
MW-24	9/27/2004	2283.85	NP	141.50	NP	2142.35	2142.35
MW-24	10/4/2004	2283.85	NP	141.58	NP	2142.27	2142.27
MW-24	10/11/2004	2283.85	NP	141.68	NP	2142.17	2142.17
MW-24	10/18/2004	2283.85	NP	142.76	NP	2141.09	2141.09
MW-24	10/25/2004	2283.85	NP	141.76	NP	2142.09	2142.09
MW-24	11/1/2004	2283.85	NP	141.90	NP	2141.95	2141.95
MW-24	11/8/2004	2283.85	NP	142.02	NP	2141.83	2141.83
MW-24	11/15/2004	2283.85	NP	142.06	NP	2141.79	2141.79
MW-24	11/30/2004	2283.85	NP	142.07	NP	2141.78	2141.78
MW-24	12/6/2004	2283.85	NP	142.40	NP	2141.45	2141.45
MW-24	12/13/2004	2283.85	NP	142.42	NP	2141.43	2141.43
MW-24	12/20/2004	2283.85	NP	142.40	NP	2141.45	2141.45
MW-24	1/4/2005	2283.85	NP	142.56	NP	2141.29	2141.29
MW-24	1/10/2005	2283.85	NP	142.59	NP	2141.26	2141.26
MW-24	1/17/2005	2283.85	NP	142.70	NP	2141.15	2141.15
MW-24	1/24/2005	2283.85	NP	142.81	NP	2141.04	2141.04
MW-24	1/31/2005	2283.85	NP	142.60	NP	2141.25	2141.25
MW-24	2/24/2005	2283.85	NP	142.50	NP	2141.35	2141.35

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-24	3/2/2005	2283.85	NP	142.60	NP	2141.25	2141.25
MW-24	3/7/2005	2283.85	NP	142.56	NP	2141.29	2141.29
MW-24	3/14/2005	2283.85	NP	142.54	NP	2141.31	2141.31
MW-24	3/21/2005	2283.85	NP	142.41	NP	2141.44	2141.44
MW-24	3/27/2005	2283.85	NP	142.27	NP	2141.58	2141.58
MW-24	4/4/2005	2283.85	NP	142.32	NP	2141.53	2141.53
MW-24	4/11/2005	2283.85	NP	142.33	NP	2141.52	2141.52
MW-24	4/18/2005	2283.85	NP	142.42	NP	2141.43	2141.43
MW-24	4/25/2005	2283.85	NP	142.40	NP	2141.45	2141.45
MW-24	5/2/2005	2283.85	NP	142.83	NP	2141.02	2141.02
MW-24	5/10/2005	2283.85	NP	142.42	NP	2141.43	2141.43
MW-24	5/16/2005	2283.85	NP	142.42	NP	2141.43	2141.43
MW-24	5/23/2005	2283.85	NP	142.60	NP	2141.25	2141.25
MW-24	5/30/2005	2283.85	NP	142.64	NP	2141.21	2141.21
MW-24	6/6/2005	2283.85	NP	142.72	NP	2141.13	2141.13
MW-24	6/13/2005	2283.85	NP	142.76	NP	2141.09	2141.09
MW-24	6/20/2005	2283.85	NP	142.77	NP	2141.08	2141.08
MW-24	6/27/2005	2283.85	NP	142.90	NP	2140.95	2140.95
MW-24	7/11/2005	2283.85	NP	143.07	NP	2140.78	2140.78
MW-24	7/18/2005	2283.85	NP	143.16	NP	2140.69	2140.69
MW-24	7/25/2005	2283.85	NP	143.22	NP	2140.63	2140.63
MW-24	8/1/2005	2283.85	NP	143.33	NP	2140.52	2140.52
MW-24	8/8/2005	2283.85	NP	143.39	NP	2140.46	2140.46
MW-24	8/15/2005	2283.85	NP	143.43	NP	2140.42	2140.42
MW-24	8/22/2005	2283.85	NP	143.43	NP	2140.42	2140.42
MW-24	8/29/2005	2283.85	NP	143.33	NP	2140.52	2140.52
MW-24	9/7/2005	2283.85	NP	143.06	NP	2140.79	2140.79
MW-24	9/12/2005	2283.85	NP	142.83	NP	2141.02	2141.02
MW-24	9/19/2005	2283.85	NP	142.57	NP	2141.28	2141.28
MW-24	9/26/2005	2283.85	NP	142.44	NP	2141.41	2141.41
MW-24	10/3/2005	2283.85	NP	142.45	NP	2141.40	2141.40
MW-24	10/10/2005	2283.85	NP	142.58	NP	2141.27	2141.27
MW-24	10/17/2005	2283.85	NP	142.64	NP	2141.21	2141.21
MW-24	10/24/2005	2283.85	NP	142.77	NP	2141.08	2141.08
MW-24	10/31/2005	2283.85	NP	142.99	NP	2140.86	2140.86
MW-24	11/7/2005	2283.85	NP	143.14	NP	2140.71	2140.71
MW-24	11/14/2005	2283.85	NP	143.26	NP	2140.59	2140.59
MW-24	11/21/2005	2283.85	NP	143.39	NP	2140.46	2140.46
MW-24	12/5/2005	2283.85	NP	143.50	NP	2140.35	2140.35
MW-24	12/19/2005	2283.85	NP	143.56	NP	2140.29	2140.29
MW-24	1/9/2006	2283.85	NP	143.72	NP	2140.13	2140.13
MW-24	1/16/2006	2283.85	NP	143.80	NP	2140.05	2140.05
MW-24	1/30/2006	2283.85	NP	143.82	NP	2140.03	2140.03
MW-24	2/13/2006	2283.85	NP	143.91	NP	2139.94	2139.94
MW-24	2/27/2006	2283.85	NP	143.93	NP	2139.92	2139.92
MW-24	3/6/2006	2283.85	NP	143.96	NP	2139.89	2139.89

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-24	3/13/2006	2283.85	NP	143.98	NP	2139.87	2139.87
MW-24	3/20/2006	2283.85	NP	143.99	NP	2139.86	2139.86
MW-24	3/27/2006	2283.85	NP	144.00	NP	2139.85	2139.85
MW-24	4/3/2006	2283.85	NP	144.03	NP	2139.82	2139.82
MW-24	4/10/2006	2283.85	NP	144.08	NP	2139.77	2139.77
MW-24	4/17/2006	2283.85	NP	144.11	NP	2139.74	2139.74
MW-24	4/24/2006	2283.85	NP	144.16	NP	2139.69	2139.69
MW-24	5/1/2006	2283.85	NP	144.17	NP	2139.68	2139.68
MW-24	5/15/2006	2283.85	NP	144.21	NP	2139.64	2139.64
MW-24	5/22/2006	2283.85	NP	144.26	NP	2139.59	2139.59
MW-24	5/30/2006	2283.85	NP	144.36	NP	2139.49	2139.49
MW-24	6/5/2006	2283.85	NP	144.46	NP	2139.39	2139.39
MW-24	6/12/2006	2283.85	NP	144.55	NP	2139.30	2139.30
MW-24	6/26/2006	2283.85	NP	144.70	NP	2139.15	2139.15
MW-24	7/10/2006	2283.85	NP	144.85	NP	2139.00	2139.00
MW-24	8/3/2006	2283.85	NP	145.06	NP	2138.79	2138.79
MW-24	8/14/2006	2283.85	NP	145.11	NP	2138.74	2138.74
MW-24	8/23/2006	2283.85	NP	145.10	NP	2138.75	2138.75
MW-24	9/19/2006	2283.85	NP	144.01	NP	2139.84	2139.84
MW-24	10/20/2006	2283.85	NP	143.19	NP	2140.66	2140.66
MW-24	10/30/2006	2283.85	NP	143.33	NP	2140.52	2140.52
MW-24	11/17/2006	2283.85	NP	143.61	NP	2140.24	2140.24
MW-24	1/31/2007	2283.85	NP	144.70	NP	2139.15	2139.15
MW-24	3/1/2007	2283.85	NP	144.88	NP	2138.97	2138.97
MW-24	3/28/2007	2283.85	NP	145.11	NP	2138.74	2138.74
MW-24	4/26/2007	2283.85	NP	145.21	NP	2138.64	2138.64
MW-24	5/28/2007	2283.85	NP	145.68	NP	2138.17	2138.17
MW-24	6/27/2007	2283.85	NP	145.42	NP	2138.43	2138.43
MW-24	7/23/2007	2283.85	NP	146.05	NP	2137.80	2137.80
MW-24	8/25/2007	2283.85	NP	145.86	NP	2137.99	2137.99
MW-24	9/25/2007	2283.85	NP	145.09	NP	2138.76	2138.76
MW-24	10/22/2007	2283.85	NP	145.39	NP	2138.46	2138.46
MW-24	11/28/2007	2283.85	NP	146.15	NP	2137.70	2137.70
MW-24	12/31/2007	2283.85	NP	146.19	NP	2137.66	2137.66
MW-24	1/26/2008	2283.85	NP	146.03	NP	2137.82	2137.82
MW-24	2/29/2008	2283.85	NP	146.00	NP	2137.85	2137.85
MW-24	3/31/2008	2283.85	NP	145.60	NP	2138.25	2138.25
MW-24	4/21/2008	2283.85	NP	145.70	NP	2138.15	2138.15
MW-24	5/23/2008	2283.85	NP	146.10	NP	2137.75	2137.75
MW-24	6/25/2008	2283.85	NP	146.42	NP	2137.43	2137.43
MW-24	7/28/2008	2283.85	NP	146.81	NP	2137.04	2137.04
MW-24	8/25/2008	2283.85	NP	145.83	NP	2138.02	2138.02
MW-24	9/30/2008	2283.85	NP	144.23	NP	2139.62	2139.62
MW-24	10/13/2008	2283.85	NP	144.71	NP	2139.14	2139.14
MW-24	11/26/2008	2283.85	NP	144.71	NP	2139.14	2139.14
MW-24	12/23/2008	2283.85	NP	145.13	NP	2138.72	2138.72

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-24	1/26/2009	2283.85	NP	145.21	NP	2138.64	2138.64
MW-24	2/27/2009	2283.85	NP	145.21	NP	2138.64	2138.64
MW-24	3/26/2009	2283.85	NP	145.40	NP	2138.45	2138.45
MW-24	4/27/2009	2283.85	NP	145.52	NP	2138.33	2138.33
MW-24	5/20/2009	2283.85	NP	145.87	NP	2137.98	2137.98
MW-24	6/16/2009	2283.85	NP	146.44	NP	2137.41	2137.41
MW-24	7/20/2009	2283.85	NP	146.96	NP	2136.89	2136.89
MW-24	8/31/2009	2283.85	NP	147.35	NP	2136.50	2136.50
MW-24	9/29/2009	2283.85	NP	148.53	NP	2135.32	2135.32
MW-24	10/22/2009	2283.85	NP	147.76	NP	2136.09	2136.09
MW-24	11/25/2009	2283.85	NP	148.10	NP	2135.75	2135.75
MW-24	12/14/2009	2283.85	NP	148.12	NP	2135.73	2135.73
MW-24	1/18/2010	2283.85	NP	148.18	NP	2135.67	2135.67
MW-24	2/26/2010	2283.85	NP	148.24	NP	2135.61	2135.61
MW-24	3/22/2010	2283.85	NP	147.60	NP	2136.25	2136.25
MW-24	4/12/2010	2283.85	NP	147.47	NP	2136.38	2136.38
MW-24	5/27/2010	2283.85	NP	147.74	NP	2136.11	2136.11
MW-24	6/22/2010	2283.85	NP	148.11	NP	2135.74	2135.74
MW-24	7/12/2010	2283.85	NP	148.51	NP	2135.34	2135.34
MW-24	8/26/2010	2283.85	NP	148.92	NP	2134.93	2134.93
MW-24	9/22/2010	2283.85	NP	148.61	NP	2135.24	2135.24
MW-24	10/5/2010	2283.85	NP	148.35	NP	2135.50	2135.50
MW-24	10/18/2010	2283.85	NP	148.31	NP	2135.54	2135.54
MW-24	11/30/2010	2283.85	NP	148.50	NP	2135.35	2135.35
MW-24	12/21/2010	2283.85	NP	148.54	NP	2135.31	2135.31
MW-24	1/10/2011	2283.85	NP	148.53	NP	2135.32	2135.32
MW-24	2/17/2011	2283.85	NP	148.78	NP	2135.07	2135.07
MW-24	3/25/2011	2283.85	NP	148.79	NP	2135.06	2135.06
MW-24	4/11/2011	2283.85	NP	149.01	NP	2134.84	2134.84
MW-24	5/9/2011	2283.85	NP	149.26	NP	2134.59	2134.59
MW-24	6/29/2011	2283.85	NP	150.05	NP	2133.80	2133.80
MW-24	7/11/2011	2283.85	NP	150.11	NP	2133.74	2133.74
MW-24	8/31/2011	2283.85	NP	150.85	NP	2133.00	2133.00
MW-24	9/28/2011	2283.85	NP	150.93	NP	2132.92	2132.92
MW-24	10/10/2011	2283.85	NP	150.63	NP	2133.22	2133.22
MW-24	11/16/2011	2283.85	NP	150.61	NP	2133.24	2133.24
MW-24	12/29/2011	2283.85	NP	150.41	NP	2133.44	2133.44
MW-24	1/16/2012	2283.85	NP	150.36	NP	2133.49	2133.49
MW-24	2/28/2012	2283.85	NP	150.04	NP	2133.81	2133.81
MW-24	3/30/2012	2283.85	NP	150.15	NP	2133.70	2133.70
MW-24	4/2/2012	2283.85	NP	150.25	NP	2133.60	2133.60
MW-24	5/30/2012	2283.85	NP	151.05	NP	2132.80	2132.80
MW-24	6/29/2012	2283.85	NP	151.34	NP	2132.51	2132.51
MW-24	7/9/2012	2283.85	NP	151.38	NP	2132.47	2132.47
MW-24	8/29/2012	2283.85	NP	151.35	NP	2132.50	2132.50
MW-24	9/25/2012	2283.85	NP	151.08	NP	2132.77	2132.77

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-24	10/22/2012	2283.85	NP	151.05	NP	2132.80	2132.80
MW-24	11/15/2012	2283.85	NP	151.41	NP	2132.44	2132.44
MW-24	12/13/2012	2283.85	NP	151.65	NP	2132.20	2132.20
MW-24	1/21/2013	2283.85	NP	151.65	NP	2132.20	2132.20
MW-24	2/13/2013	2283.85	NP	151.68	NP	2132.17	2132.17
MW-24	3/21/2013	2283.85	NP	151.61	NP	2132.24	2132.24
MW-24	4/15/2013	2283.85	NP	151.71	NP	2132.14	2132.14
MW-24	5/23/2013	2283.85	NP	151.89	NP	2131.96	2131.96
MW-24	6/26/2013	2283.85	NP	152.20	NP	2131.65	2131.65
MW-24	7/8/2013	2283.85	NP	152.37	NP	2131.48	2131.48
MW-24	8/8/2013	2283.85	NP	152.60	NP	2131.25	2131.25
MW-24	9/5/2013	2283.85	NP	152.63	NP	2131.22	2131.22
MW-24	10/3/2013	2283.85	NP	152.75	NP	2131.10	2131.10
MW-24	11/27/2013	2283.85	NP	153.00	NP	2130.85	2130.85
MW-24	12/31/2013	2283.85	NP	152.91	NP	2130.94	2130.94
MW-24	1/10/2014	2283.85	NP	153.05	NP	2130.80	2130.80
MW-24	2/18/2014	2283.85	NP	153.16	NP	2130.69	2130.69
MW-24	3/12/2014	2283.85	NP	153.16	NP	2130.69	2130.69
MW-24	4/17/2014	2283.85	NP	153.34	NP	2130.51	2130.51
MW-24	5/22/2014	2283.85	NP	153.66	NP	2130.19	2130.19
MW-24	6/20/2014	2283.85	NP	154.00	NP	2129.85	2129.85
MW-24	7/15/2014	2283.85	NP	154.27	NP	2129.58	2129.58
MW-24	8/14/2014	2283.85	NP	154.71	NP	2129.14	2129.14
MW-24	9/9/2014	2283.85	NP	154.77	NP	2129.08	2129.08
MW-24	10/1/2014	2283.85	NP	154.33	NP	2129.52	2129.52
MW-24	11/18/2014	2283.85	NP	153.79	NP	2130.06	2130.06
MW-24	12/16/2014	2283.85	NP	153.61	NP	2130.24	2130.24
MW-24	1/19/2015	2283.85	NP	153.31	NP	2130.54	2130.54
MW-24	2/19/2015	2283.85	NP	153.02	NP	2130.83	2130.83
MW-24	3/26/2015	2283.85	NP	152.63	NP	2131.22	2131.22
MW-24	4/16/2015	2283.85	NP	152.45	NP	2131.40	2131.40
MW-24	5/19/2015	2283.85	NP	152.61	NP	2131.24	2131.24
MW-24	6/22/2015	2283.85	NP	153.09	NP	2130.76	2130.76
MW-25	3/8/2004	2285.05	NP	140.89	NP	2144.16	2144.16
MW-25	3/15/2004	2285.05	NP	140.74	NP	2144.31	2144.31
MW-25	3/22/2004	2285.05	NP	140.73	NP	2144.32	2144.32
MW-25	3/29/2004	2285.05	NP	140.76	NP	2144.29	2144.29
MW-25	4/5/2004	2285.05	NP	140.78	NP	2144.27	2144.27
MW-25	4/12/2004	2285.05	NP	140.81	NP	2144.24	2144.24
MW-25	4/19/2004	2285.05	NP	140.84	NP	2144.21	2144.21
MW-25	4/26/2004	2285.05	NP	140.87	NP	2144.18	2144.18
MW-25	5/3/2004	2285.05	NP	140.88	NP	2144.17	2144.17
MW-25	5/10/2004	2285.05	NP	140.89	NP	2144.16	2144.16
MW-25	5/17/2004	2285.05	NP	140.96	NP	2144.09	2144.09
MW-25	5/24/2004	2285.05	NP	140.96	NP	2144.09	2144.09
MW-25	5/31/2004	2285.05	NP	141.03	NP	2144.02	2144.02

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-25	6/7/2004	2285.05	NP	141.08	NP	2143.97	2143.97
MW-25	6/14/2004	2285.05	NP	141.21	NP	2143.84	2143.84
MW-25	6/21/2004	2285.05	NP	141.34	NP	2143.71	2143.71
MW-25	6/28/2004	2285.05	NP	141.47	NP	2143.58	2143.58
MW-25	7/6/2004	2285.05	NP	141.59	NP	2143.46	2143.46
MW-25	7/12/2004	2285.05	NP	141.70	NP	2143.35	2143.35
MW-25	7/19/2004	2285.05	NP	141.82	NP	2143.23	2143.23
MW-25	7/26/2004	2285.05	NP	141.92	NP	2143.13	2143.13
MW-25	8/2/2004	2285.05	NP	142.07	NP	2142.98	2142.98
MW-25	8/9/2004	2285.05	NP	142.21	NP	2142.84	2142.84
MW-25	8/16/2004	2285.05	NP	142.34	NP	2142.71	2142.71
MW-25	8/23/2004	2285.05	NP	142.43	NP	2142.62	2142.62
MW-25	8/30/2004	2285.05	NP	142.58	NP	2142.47	2142.47
MW-25	9/8/2004	2285.05	NP	142.68	NP	2142.37	2142.37
MW-25	9/13/2004	2285.05	NP	142.03	NP	2143.02	2143.02
MW-25	9/20/2004	2285.05	NP	142.93	NP	2142.12	2142.12
MW-25	9/27/2004	2285.05	NP	143.06	NP	2141.99	2141.99
MW-25	10/4/2004	2285.05	NP	143.14	NP	2141.91	2141.91
MW-25	10/11/2004	2285.05	NP	143.23	NP	2141.82	2141.82
MW-25	10/18/2004	2285.05	NP	143.34	NP	2141.71	2141.71
MW-25	10/25/2004	2285.05	NP	143.34	NP	2141.71	2141.71
MW-25	11/1/2004	2285.05	NP	143.49	NP	2141.56	2141.56
MW-25	11/8/2004	2285.05	NP	143.62	NP	2141.43	2141.43
MW-25	11/15/2004	2285.05	NP	143.64	NP	2141.41	2141.41
MW-25	11/30/2004	2285.05	NP	143.71	NP	2141.34	2141.34
MW-25	12/6/2004	2285.05	NP	143.95	NP	2141.10	2141.10
MW-25	12/13/2004	2285.05	NP	143.99	NP	2141.06	2141.06
MW-25	12/20/2004	2285.05	NP	143.96	NP	2141.09	2141.09
MW-25	1/4/2005	2285.05	NP	144.11	NP	2140.94	2140.94
MW-25	1/10/2005	2285.05	NP	144.20	NP	2140.85	2140.85
MW-25	1/17/2005	2285.05	NP	144.16	NP	2140.89	2140.89
MW-25	1/24/2005	2285.05	NP	144.34	NP	2140.71	2140.71
MW-25	1/31/2005	2285.05	NP	144.15	NP	2140.90	2140.90
MW-25	2/23/2005	2285.05	NP	144.00	NP	2141.05	2141.05
MW-25	3/2/2005	2285.05	NP	144.15	NP	2140.90	2140.90
MW-25	3/7/2005	2285.05	NP	144.14	NP	2140.91	2140.91
MW-25	3/14/2005	2285.05	NP	144.13	NP	2140.92	2140.92
MW-25	3/21/2005	2285.05	NP	144.00	NP	2141.05	2141.05
MW-25	3/27/2005	2285.05	NP	143.89	NP	2141.16	2141.16
MW-25	4/4/2005	2285.05	NP	143.91	NP	2141.14	2141.14
MW-25	4/11/2005	2285.05	NP	143.89	NP	2141.16	2141.16
MW-25	4/18/2005	2285.05	NP	143.95	NP	2141.10	2141.10
MW-25	4/25/2005	2285.05	NP	143.93	NP	2141.12	2141.12
MW-25	5/2/2005	2285.05	NP	143.89	NP	2141.16	2141.16
MW-25	5/10/2005	2285.05	NP	143.92	NP	2141.13	2141.13
MW-25	5/16/2005	2285.05	NP	143.95	NP	2141.10	2141.10

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-25	5/23/2005	2285.05	NP	144.07	NP	2140.98	2140.98
MW-25	5/30/2005	2285.05	NP	144.13	NP	2140.92	2140.92
MW-25	6/6/2005	2285.05	NP	144.18	NP	2140.87	2140.87
MW-25	6/13/2005	2285.05	NP	144.22	NP	2140.83	2140.83
MW-25	6/20/2005	2285.05	NP	144.24	NP	2140.81	2140.81
MW-25	6/27/2005	2285.05	NP	144.35	NP	2140.70	2140.70
MW-25	7/11/2005	2285.05	NP	144.52	NP	2140.53	2140.53
MW-25	7/18/2005	2285.05	NP	144.60	NP	2140.45	2140.45
MW-25	7/25/2005	2285.05	NP	144.66	NP	2140.39	2140.39
MW-25	8/1/2005	2285.05	NP	144.76	NP	2140.29	2140.29
MW-25	8/8/2005	2285.05	NP	144.83	NP	2140.22	2140.22
MW-25	8/15/2005	2285.05	NP	144.88	NP	2140.17	2140.17
MW-25	8/22/2005	2285.05	NP	144.89	NP	2140.16	2140.16
MW-25	8/29/2005	2285.05	NP	144.83	NP	2140.22	2140.22
MW-25	9/7/2005	2285.05	NP	144.71	NP	2140.34	2140.34
MW-25	9/12/2005	2285.05	NP	144.55	NP	2140.50	2140.50
MW-25	9/19/2005	2285.05	NP	144.38	NP	2140.67	2140.67
MW-25	9/26/2005	2285.05	NP	144.25	NP	2140.80	2140.80
MW-25	10/3/2005	2285.05	NP	144.22	NP	2140.83	2140.83
MW-25	10/10/2005	2285.05	NP	144.31	NP	2140.74	2140.74
MW-25	10/17/2005	2285.05	NP	144.39	NP	2140.66	2140.66
MW-25	10/24/2005	2285.05	NP	144.54	NP	2140.51	2140.51
MW-25	10/31/2005	2285.05	NP	144.63	NP	2140.42	2140.42
MW-25	11/7/2005	2285.05	NP	144.73	NP	2140.32	2140.32
MW-25	11/14/2005	2285.05	NP	144.84	NP	2140.21	2140.21
MW-25	11/21/2005	2285.05	NP	144.93	NP	2140.12	2140.12
MW-25	12/5/2005	2285.05	NP	145.03	NP	2140.02	2140.02
MW-25	12/19/2005	2285.05	NP	145.08	NP	2139.97	2139.97
MW-25	1/9/2006	2285.05	NP	145.25	NP	2139.80	2139.80
MW-25	1/16/2006	2285.05	NP	145.32	NP	2139.73	2139.73
MW-25	1/30/2006	2285.05	NP	145.33	NP	2139.72	2139.72
MW-25	2/13/2006	2285.05	NP	145.39	NP	2139.66	2139.66
MW-25	2/27/2006	2285.05	NP	145.44	NP	2139.61	2139.61
MW-25	3/6/2006	2285.05	NP	145.46	NP	2139.59	2139.59
MW-25	3/13/2006	2285.05	NP	145.49	NP	2139.56	2139.56
MW-25	3/20/2006	2285.05	NP	145.51	NP	2139.54	2139.54
MW-25	3/27/2006	2285.05	NP	145.51	NP	2139.54	2139.54
MW-25	4/3/2006	2285.05	NP	145.54	NP	2139.51	2139.51
MW-25	4/10/2006	2285.05	NP	145.58	NP	2139.47	2139.47
MW-25	4/17/2006	2285.05	NP	145.62	NP	2139.43	2139.43
MW-25	4/24/2006	2285.05	NP	145.65	NP	2139.40	2139.40
MW-25	5/1/2006	2285.05	NP	145.67	NP	2139.38	2139.38
MW-25	5/15/2006	2285.05	NP	145.70	NP	2139.35	2139.35
MW-25	5/22/2006	2285.05	NP	145.74	NP	2139.31	2139.31
MW-25	5/30/2006	2285.05	NP	145.85	NP	2139.20	2139.20
MW-25	6/5/2006	2285.05	NP	145.94	NP	2139.11	2139.11

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-25	6/12/2006	2285.05	NP	146.01	NP	2139.04	2139.04
MW-25	6/26/2006	2285.05	NP	146.14	NP	2138.91	2138.91
MW-25	7/10/2006	2285.05	NP	146.29	NP	2138.76	2138.76
MW-25	8/1/2006	2285.05	NP	146.41	NP	2138.64	2138.64
MW-25	8/14/2006	2285.05	NP	146.54	NP	2138.51	2138.51
MW-25	8/23/2006	2285.05	NP	146.59	NP	2138.46	2138.46
MW-25	9/19/2006	2285.05	NP	146.78	NP	2138.27	2138.27
MW-25	10/20/2006	2285.05	NP	145.06	NP	2139.99	2139.99
MW-25	10/30/2006	2285.05	NP	145.12	NP	2139.93	2139.93
MW-25	11/17/2006	2285.05	NP	145.30	NP	2139.75	2139.75
MW-25	1/30/2007	2285.05	NP	146.30	NP	2138.75	2138.75
MW-25	3/1/2007	2285.05	NP	146.39	NP	2138.66	2138.66
MW-25	3/28/2007	2285.05	NP	146.59	NP	2138.46	2138.46
MW-25	4/24/2007	2285.05	NP	146.69	NP	2138.36	2138.36
MW-25	5/28/2007	2285.05	NP	146.84	NP	2138.21	2138.21
MW-25	6/27/2007	2285.05	NP	147.16	NP	2137.89	2137.89
MW-25	7/23/2007	2285.05	NP	147.50	NP	2137.55	2137.55
MW-25	8/25/2007	2285.05	NP	147.40	NP	2137.65	2137.65
MW-25	9/25/2007	2285.05	NP	146.90	NP	2138.15	2138.15
MW-25	10/22/2007	2285.05	NP	147.10	NP	2137.95	2137.95
MW-25	11/28/2007	2285.05	NP	147.68	NP	2137.37	2137.37
MW-25	12/31/2007	2285.05	NP	147.73	NP	2137.32	2137.32
MW-25	1/26/2008	2285.05	NP	147.59	NP	2137.46	2137.46
MW-25	2/29/2008	2285.05	NP	147.51	NP	2137.54	2137.54
MW-25	3/31/2008	2285.05	NP	147.18	NP	2137.87	2137.87
MW-25	4/21/2008	2285.05	NP	147.19	NP	2137.86	2137.86
MW-25	5/23/2008	2285.05	NP	147.57	NP	2137.48	2137.48
MW-25	6/25/2008	2285.05	NP	147.89	NP	2137.16	2137.16
MW-25	7/28/2008	2285.05	NP	148.28	NP	2136.77	2136.77
MW-25	8/25/2008	2285.05	NP	147.67	NP	2137.38	2137.38
MW-25	9/30/2008	2285.05	NP	146.31	NP	2138.74	2138.74
MW-25	10/13/2008	2285.05	NP	146.18	NP	2138.87	2138.87
MW-25	11/26/2008	2285.05	NP	146.46	NP	2138.59	2138.59
MW-25	12/23/2008	2285.05	NP	146.88	NP	2138.17	2138.17
MW-25	1/26/2009	2285.05	NP	146.89	NP	2138.16	2138.16
MW-25	2/27/2009	2285.05	NP	146.89	NP	2138.16	2138.16
MW-25	3/26/2009	2285.05	NP	147.00	NP	2138.05	2138.05
MW-25	4/27/2009	2285.05	NP	147.10	NP	2137.95	2137.95
MW-25	5/20/2009	2285.05	NP	147.43	NP	2137.62	2137.62
MW-25	6/16/2009	2285.05	NP	147.98	NP	2137.07	2137.07
MW-25	7/20/2009	2285.05	NP	148.48	NP	2136.57	2136.57
MW-25	8/31/2009	2285.05	NP	148.91	NP	2136.14	2136.14
MW-25	9/29/2009	2285.05	NP	149.12	NP	2135.93	2135.93
MW-25	10/22/2009	2285.05	NP	149.38	NP	2135.67	2135.67
MW-25	11/25/2009	2285.05	NP	149.73	NP	2135.32	2135.32
MW-25	12/14/2009	2285.05	NP	149.76	NP	2135.29	2135.29

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-25	1/18/2010	2285.05	NP	149.79	NP	2135.26	2135.26
MW-25	2/26/2010	2285.05	NP	149.81	NP	2135.24	2135.24
MW-25	3/22/2010	2285.05	NP	149.50	NP	2135.55	2135.55
MW-25	4/12/2010	2285.05	NP	149.18	NP	2135.87	2135.87
MW-25	5/27/2010	2285.05	NP	149.37	NP	2135.68	2135.68
MW-25	6/22/2010	2285.05	NP	149.71	NP	2135.34	2135.34
MW-25	7/12/2010	2285.05	NP	150.10	NP	2134.95	2134.95
MW-25	8/26/2010	2285.05	NP	150.44	NP	2134.61	2134.61
MW-25	9/22/2010	2285.05	NP	150.34	NP	2134.71	2134.71
MW-25	10/5/2010	2285.05	NP	150.15	NP	2134.90	2134.90
MW-25	10/18/2010	2285.05	NP	150.11	NP	2134.94	2134.94
MW-25	11/30/2010	2285.05	NP	150.23	NP	2134.82	2134.82
MW-25	12/21/2010	2285.05	NP	150.28	NP	2134.77	2134.77
MW-25	1/10/2011	2285.05	NP	150.29	NP	2134.76	2134.76
MW-25	2/17/2011	2285.05	NP	150.40	NP	2134.65	2134.65
MW-25	3/25/2011	2285.05	NP	150.41	NP	2134.64	2134.64
MW-25	4/11/2011	2285.05	NP	150.58	NP	2134.47	2134.47
MW-25	5/9/2011	2285.05	NP	150.82	NP	2134.23	2134.23
MW-25	6/29/2011	2285.05	NP	151.60	NP	2133.45	2133.45
MW-25	7/11/2011	2285.05	NP	151.68	NP	2133.37	2133.37
MW-25	8/31/2011	2285.05	NP	152.39	NP	2132.66	2132.66
MW-25	9/28/2011	2285.05	NP	152.50	NP	2132.55	2132.55
MW-25	10/10/2011	2285.05	NP	152.30	NP	2132.75	2132.75
MW-25	11/16/2011	2285.05	NP	152.19	NP	2132.86	2132.86
MW-25	12/29/2011	2285.05	NP	152.14	NP	2132.91	2132.91
MW-25	1/16/2012	2285.05	NP	152.15	NP	2132.90	2132.90
MW-25	2/28/2012	2285.05	NP	151.79	NP	2133.26	2133.26
MW-25	3/30/2012	2285.05	NP	151.84	NP	2133.21	2133.21
MW-25	4/2/2012	2285.05	NP	151.96	NP	2133.09	2133.09
MW-25	5/30/2012	2285.05	NP	152.61	NP	2132.44	2132.44
MW-25	6/29/2012	2285.05	NP	152.93	NP	2132.12	2132.12
MW-25	7/9/2012	2285.05	NP	153.02	NP	2132.03	2132.03
MW-25	8/29/2012	2285.05	NP	153.05	NP	2132.00	2132.00
MW-25	9/25/2012	2285.05	NP	152.91	NP	2132.14	2132.14
MW-25	10/22/2012	2285.05	NP	152.88	NP	2132.17	2132.17
MW-25	11/15/2012	2285.05	NP	153.18	NP	2131.87	2131.87
MW-25	12/13/2012	2285.05	NP	153.31	NP	2131.74	2131.74
MW-25	1/21/2013	2285.05	NP	153.36	NP	2131.69	2131.69
MW-25	2/13/2013	2285.05	NP	153.35	NP	2131.70	2131.70
MW-25	3/21/2013	2285.05	NP	153.23	NP	2131.82	2131.82
MW-25	4/15/2013	2285.05	NP	153.27	NP	2131.78	2131.78
MW-25	5/23/2013	2285.05	NP	153.47	NP	2131.58	2131.58
MW-25	6/26/2013	2285.05	NP	153.78	NP	2131.27	2131.27
MW-25	7/8/2013	2285.05	NP	153.90	NP	2131.15	2131.15
MW-25	8/8/2013	2285.05	NP	154.14	NP	2130.91	2130.91
MW-25	9/5/2013	2285.05	NP	154.24	NP	2130.81	2130.81

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-25	10/3/2013	2285.05	NP	154.41	NP	2130.64	2130.64
MW-25	11/27/2013	2285.05	NP	154.61	NP	2130.44	2130.44
MW-25	12/31/2013	2285.05	NP	154.53	NP	2130.52	2130.52
MW-25	1/10/2014	2285.05	NP	154.41	NP	2130.64	2130.64
MW-25	2/18/2014	2285.05	NP	154.73	NP	2130.32	2130.32
MW-25	3/12/2014	2285.05	NP	154.78	NP	2130.27	2130.27
MW-25	4/17/2014	2285.05	NP	154.96	NP	2130.09	2130.09
MW-25	5/22/2014	2285.05	NP	155.27	NP	2129.78	2129.78
MW-25	6/20/2014	2285.05	NP	155.57	NP	2129.48	2129.48
MW-25	7/15/2014	2285.05	NP	155.90	NP	2129.15	2129.15
MW-25	8/14/2014	2285.05	NP	156.33	NP	2128.72	2128.72
MW-25	9/10/2014	2285.05	NP	156.42	NP	2128.63	2128.63
MW-25	10/1/2014	2285.05	NP	156.10	NP	2128.95	2128.95
MW-25	11/18/2014	2285.05	NP	155.60	NP	2129.45	2129.45
MW-25	12/16/2014	2285.05	NP	155.35	NP	2129.70	2129.70
MW-25	1/19/2015	2285.05	NP	154.99	NP	2130.06	2130.06
MW-25	2/19/2015	2285.05	NP	154.72	NP	2130.33	2130.33
MW-25	3/26/2015	2285.05	NP	154.32	NP	2130.73	2130.73
MW-25	4/16/2015	2285.05	NP	154.16	NP	2130.89	2130.89
MW-25	5/19/2015	2285.05	NP	154.23	NP	2130.82	2130.82
MW-25	6/22/2015	2285.05	NP	154.63	NP	2130.42	2130.42
MW-26	3/29/2004	2286.29	NP	142.71	NP	2143.58	2143.58
MW-26	4/5/2004	2286.29	NP	142.74	NP	2143.55	2143.55
MW-26	4/12/2004	2286.29	NP	142.75	NP	2143.54	2143.54
MW-26	4/19/2004	2286.29	NP	142.79	NP	2143.50	2143.50
MW-26	4/26/2004	2286.29	NP	142.80	NP	2143.49	2143.49
MW-26	5/3/2004	2286.29	NP	142.81	NP	2143.48	2143.48
MW-26	5/10/2004	2286.29	NP	142.83	NP	2143.46	2143.46
MW-26	5/17/2004	2286.29	NP	142.90	NP	2143.39	2143.39
MW-26	5/24/2004	2286.29	NP	142.90	NP	2143.39	2143.39
MW-26	5/31/2004	2286.29	NP	142.98	NP	2143.31	2143.31
MW-26	6/7/2004	2286.29	NP	143.05	NP	2143.24	2143.24
MW-26	6/14/2004	2286.29	NP	143.15	NP	2143.14	2143.14
MW-26	6/21/2004	2286.29	NP	143.30	NP	2142.99	2142.99
MW-26	6/28/2004	2286.29	NP	143.45	NP	2142.84	2142.84
MW-26	7/6/2004	2286.29	NP	143.58	NP	2142.71	2142.71
MW-26	7/12/2004	2286.29	NP	143.68	NP	2142.61	2142.61
MW-26	7/19/2004	2286.29	NP	143.80	NP	2142.49	2142.49
MW-26	7/26/2004	2286.29	NP	143.90	NP	2142.39	2142.39
MW-26	8/2/2004	2286.29	NP	144.05	NP	2142.24	2142.24
MW-26	8/9/2004	2286.29	NP	144.21	NP	2142.08	2142.08
MW-26	8/16/2004	2286.29	NP	144.34	NP	2141.95	2141.95
MW-26	8/23/2004	2286.29	NP	144.43	NP	2141.86	2141.86
MW-26	8/30/2004	2286.29	NP	144.60	NP	2141.69	2141.69
MW-26	9/8/2004	2286.29	NP	144.68	NP	2141.61	2141.61
MW-26	9/13/2004	2286.29	NP	144.83	NP	2141.46	2141.46

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-26	9/20/2004	2286.29	NP	144.95	NP	2141.34	2141.34
MW-26	9/27/2004	2286.29	NP	145.07	NP	2141.22	2141.22
MW-26	10/4/2004	2286.29	NP	145.15	NP	2141.14	2141.14
MW-26	10/11/2004	2286.29	NP	145.27	NP	2141.02	2141.02
MW-26	10/18/2004	2286.29	NP	145.33	NP	2140.96	2140.96
MW-26	10/25/2004	2286.29	NP	145.40	NP	2140.89	2140.89
MW-26	11/1/2004	2286.29	NP	145.51	NP	2140.78	2140.78
MW-26	11/8/2004	2286.29	NP	145.64	NP	2140.65	2140.65
MW-26	11/15/2004	2286.29	NP	145.66	NP	2140.63	2140.63
MW-26	11/30/2004	2286.29	NP	145.75	NP	2140.54	2140.54
MW-26	12/6/2004	2286.29	NP	146.00	NP	2140.29	2140.29
MW-26	12/13/2004	2286.29	NP	146.01	NP	2140.28	2140.28
MW-26	12/20/2004	2286.29	NP	145.99	NP	2140.30	2140.30
MW-26	1/4/2005	2286.29	NP	146.12	NP	2140.17	2140.17
MW-26	1/10/2005	2286.29	NP	146.17	NP	2140.12	2140.12
MW-26	1/17/2005	2286.29	NP	146.12	NP	2140.17	2140.17
MW-26	1/24/2005	2286.29	NP	146.27	NP	2140.02	2140.02
MW-26	1/31/2005	2286.29	NP	146.16	NP	2140.13	2140.13
MW-26	2/24/2005	2286.29	NP	146.10	NP	2140.19	2140.19
MW-26	3/2/2005	2286.29	NP	146.14	NP	2140.15	2140.15
MW-26	3/7/2005	2286.29	NP	146.12	NP	2140.17	2140.17
MW-26	3/14/2005	2286.29	NP	146.12	NP	2140.17	2140.17
MW-26	3/21/2005	2286.29	NP	146.00	NP	2140.29	2140.29
MW-26	3/27/2005	2286.29	NP	145.86	NP	2140.43	2140.43
MW-26	4/4/2005	2286.29	NP	145.89	NP	2140.40	2140.40
MW-26	4/11/2005	2286.29	NP	145.87	NP	2140.42	2140.42
MW-26	4/18/2005	2286.29	NP	145.93	NP	2140.36	2140.36
MW-26	4/25/2005	2286.29	NP	145.90	NP	2140.39	2140.39
MW-26	5/2/2005	2286.29	NP	145.85	NP	2140.44	2140.44
MW-26	5/10/2005	2286.29	NP	145.89	NP	2140.40	2140.40
MW-26	5/16/2005	2286.29	NP	145.90	NP	2140.39	2140.39
MW-26	5/23/2005	2286.29	NP	146.06	NP	2140.23	2140.23
MW-26	5/30/2005	2286.29	NP	146.10	NP	2140.19	2140.19
MW-26	6/6/2005	2286.29	NP	146.20	NP	2140.09	2140.09
MW-26	6/13/2005	2286.29	NP	146.24	NP	2140.05	2140.05
MW-26	6/20/2005	2286.29	NP	146.22	NP	2140.07	2140.07
MW-26	6/27/2005	2286.29	NP	146.34	NP	2139.95	2139.95
MW-26	7/11/2005	2286.29	NP	146.51	NP	2139.78	2139.78
MW-26	7/18/2005	2286.29	NP	146.61	NP	2139.68	2139.68
MW-26	7/25/2005	2286.29	NP	146.67	NP	2139.62	2139.62
MW-26	8/1/2005	2286.29	NP	146.77	NP	2139.52	2139.52
MW-26	8/8/2005	2286.29	NP	146.85	NP	2139.44	2139.44
MW-26	8/15/2005	2286.29	NP	146.84	NP	2139.45	2139.45
MW-26	8/22/2005	2286.29	NP	146.86	NP	2139.43	2139.43
MW-26	8/29/2005	2286.29	NP	146.86	NP	2139.43	2139.43
MW-26	9/7/2005	2286.29	NP	146.71	NP	2139.58	2139.58

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-26	9/12/2005	2286.29	NP	146.58	NP	2139.71	2139.71
MW-26	9/19/2005	2286.29	NP	146.37	NP	2139.92	2139.92
MW-26	9/26/2005	2286.29	NP	146.25	NP	2140.04	2140.04
MW-26	10/3/2005	2286.29	NP	146.21	NP	2140.08	2140.08
MW-26	10/10/2005	2286.29	NP	146.29	NP	2140.00	2140.00
MW-26	10/17/2005	2286.29	NP	146.38	NP	2139.91	2139.91
MW-26	10/24/2005	2286.29	NP	146.49	NP	2139.80	2139.80
MW-26	10/31/2005	2286.29	NP	146.62	NP	2139.67	2139.67
MW-26	11/7/2005	2286.29	NP	146.72	NP	2139.57	2139.57
MW-26	11/14/2005	2286.29	NP	146.85	NP	2139.44	2139.44
MW-26	11/21/2005	2286.29	NP	146.93	NP	2139.36	2139.36
MW-26	12/5/2005	2286.29	NP	147.03	NP	2139.26	2139.26
MW-26	12/19/2005	2286.29	NP	147.09	NP	2139.20	2139.20
MW-26	1/9/2006	2286.29	NP	147.26	NP	2139.03	2139.03
MW-26	1/16/2006	2286.29	NP	147.31	NP	2138.98	2138.98
MW-26	1/30/2006	2286.29	NP	147.34	NP	2138.95	2138.95
MW-26	2/13/2006	2286.29	NP	147.72	NP	2138.57	2138.57
MW-26	2/27/2006	2286.29	NP	147.45	NP	2138.84	2138.84
MW-26	3/6/2006	2286.29	NP	147.46	NP	2138.83	2138.83
MW-26	3/13/2006	2286.29	NP	147.50	NP	2138.79	2138.79
MW-26	3/20/2006	2286.29	NP	147.53	NP	2138.76	2138.76
MW-26	3/27/2006	2286.29	NP	147.51	NP	2138.78	2138.78
MW-26	4/3/2006	2286.29	NP	147.53	NP	2138.76	2138.76
MW-26	4/10/2006	2286.29	NP	147.57	NP	2138.72	2138.72
MW-26	4/17/2006	2286.29	NP	147.60	NP	2138.69	2138.69
MW-26	4/24/2006	2286.29	NP	147.65	NP	2138.64	2138.64
MW-26	5/1/2006	2286.29	NP	147.66	NP	2138.63	2138.63
MW-26	5/15/2006	2286.29	NP	147.70	NP	2138.59	2138.59
MW-26	5/22/2006	2286.29	NP	147.75	NP	2138.54	2138.54
MW-26	5/30/2006	2286.29	NP	147.84	NP	2138.45	2138.45
MW-26	6/5/2006	2286.29	NP	147.91	NP	2138.38	2138.38
MW-26	6/12/2006	2286.29	NP	148.00	NP	2138.29	2138.29
MW-26	6/26/2006	2286.29	NP	148.13	NP	2138.16	2138.16
MW-26	7/10/2006	2286.29	NP	148.29	NP	2138.00	2138.00
MW-26	8/3/2006	2286.29	NP	148.50	NP	2137.79	2137.79
MW-26	8/14/2006	2286.29	NP	148.55	NP	2137.74	2137.74
MW-26	8/23/2006	2286.29	NP	148.55	NP	2137.74	2137.74
MW-26	9/19/2006	2286.29	NP	147.76	NP	2138.53	2138.53
MW-26	10/20/2006	2286.29	NP	147.00	NP	2139.29	2139.29
MW-26	10/30/2006	2286.29	NP	147.12	NP	2139.17	2139.17
MW-26	11/17/2006	2286.29	NP	147.27	NP	2139.02	2139.02
MW-26	1/31/2007	2286.29	NP	148.19	NP	2138.10	2138.10
MW-26	3/1/2007	2286.29	NP	148.37	NP	2137.92	2137.92
MW-26	3/28/2007	2286.29	NP	148.57	NP	2137.72	2137.72
MW-26	4/26/2007	2286.29	NP	148.62	NP	2137.67	2137.67
MW-26	5/28/2007	2286.29	NP	148.85	NP	2137.44	2137.44

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-26	6/27/2007	2286.29	NP	149.18	NP	2137.11	2137.11
MW-26	7/23/2007	2286.29	NP	149.53	NP	2136.76	2136.76
MW-26	8/25/2007	2286.29	NP	149.51	NP	2136.78	2136.78
MW-26	9/25/2007	2286.29	NP	148.96	NP	2137.33	2137.33
MW-26	10/22/2007	2286.29	NP	149.14	NP	2137.15	2137.15
MW-26	11/28/2007	2286.29	NP	149.69	NP	2136.60	2136.60
MW-26	12/31/2007	2286.29	NP	149.77	NP	2136.52	2136.52
MW-26	1/26/2008	2286.29	NP	149.61	NP	2136.68	2136.68
MW-26	2/29/2008	2286.29	NP	149.51	NP	2136.78	2136.78
MW-26	3/31/2008	2286.29	NP	149.14	NP	2137.15	2137.15
MW-26	4/21/2008	2286.29	NP	149.17	NP	2137.12	2137.12
MW-26	5/23/2008	2286.29	NP	149.55	NP	2136.74	2136.74
MW-26	6/25/2008	2286.29	NP	149.92	NP	2136.37	2136.37
MW-26	7/28/2008	2286.29	NP	150.33	NP	2135.96	2135.96
MW-26	8/25/2008	2286.29	NP	149.71	NP	2136.58	2136.58
MW-26	9/30/2008	2286.29	NP	148.30	NP	2137.99	2137.99
MW-26	10/13/2008	2286.29	NP	148.18	NP	2138.11	2138.11
MW-26	11/26/2008	2286.29	NP	148.46	NP	2137.83	2137.83
MW-26	12/23/2008	2286.29	NP	148.88	NP	2137.41	2137.41
MW-26	1/26/2009	2286.29	NP	148.91	NP	2137.38	2137.38
MW-26	2/27/2009	2286.29	NP	148.89	NP	2137.40	2137.40
MW-26	3/26/2009	2286.29	NP	148.99	NP	2137.30	2137.30
MW-26	4/27/2009	2286.29	NP	149.08	NP	2137.21	2137.21
MW-26	5/20/2009	2286.29	NP	149.44	NP	2136.85	2136.85
MW-26	6/16/2009	2286.29	NP	149.99	NP	2136.30	2136.30
MW-26	7/20/2009	2286.29	NP	150.53	NP	2135.76	2135.76
MW-26	8/31/2009	2286.29	NP	150.97	NP	2135.32	2135.32
MW-26	9/29/2009	2286.29	NP	151.18	NP	2135.11	2135.11
MW-26	10/22/2009	2286.29	NP	151.45	NP	2134.84	2134.84
MW-26	11/25/2009	2286.29	NP	151.81	NP	2134.48	2134.48
MW-26	12/14/2009	2286.29	NP	151.82	NP	2134.47	2134.47
MW-26	1/18/2010	2286.29	NP	151.86	NP	2134.43	2134.43
MW-26	2/26/2010	2286.29	NP	151.97	NP	2134.32	2134.32
MW-26	3/22/2010	2286.29	NP	151.36	NP	2134.93	2134.93
MW-26	4/12/2010	2286.29	NP	151.21	NP	2135.08	2135.08
MW-26	5/27/2010	2286.29	NP	151.40	NP	2134.89	2134.89
MW-26	6/22/2010	2286.29	NP	151.75	NP	2134.54	2134.54
MW-26	7/12/2010	2286.29	NP	152.17	NP	2134.12	2134.12
MW-26	8/26/2010	2286.29	NP	152.63	NP	2133.66	2133.66
MW-26	9/22/2010	2286.29	NP	152.42	NP	2133.87	2133.87
MW-26	10/5/2010	2286.29	NP	152.21	NP	2134.08	2134.08
MW-26	10/18/2010	2286.29	NP	152.17	NP	2134.12	2134.12
MW-26	11/30/2010	2286.29	NP	152.27	NP	2134.02	2134.02
MW-26	12/21/2010	2286.29	NP	152.30	NP	2133.99	2133.99
MW-26	1/10/2011	2286.29	NP	152.31	NP	2133.98	2133.98
MW-26	2/17/2011	2286.29	NP	152.47	NP	2133.82	2133.82

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-26	3/25/2011	2286.29	NP	152.46	NP	2133.83	2133.83
MW-26	4/11/2011	2286.29	NP	152.65	NP	2133.64	2133.64
MW-26	5/9/2011	2286.29	NP	152.89	NP	2133.40	2133.40
MW-26	6/29/2011	2286.29	NP	153.73	NP	2132.56	2132.56
MW-26	7/11/2011	2286.29	NP	153.78	NP	2132.51	2132.51
MW-26	8/31/2011	2286.29	NP	154.51	NP	2131.78	2131.78
MW-26	9/28/2011	2286.29	NP	154.63	NP	2131.66	2131.66
MW-26	10/10/2011	2286.29	NP	154.45	NP	2131.84	2131.84
MW-26	11/16/2011	2286.29	NP	154.32	NP	2131.97	2131.97
MW-26	12/29/2011	2286.29	NP	154.26	NP	2132.03	2132.03
MW-26	1/16/2012	2286.29	NP	154.24	NP	2132.05	2132.05
MW-26	2/28/2012	2286.29	NP	153.87	NP	2132.42	2132.42
MW-26	3/30/2012	2286.29	NP	153.94	NP	2132.35	2132.35
MW-26	4/2/2012	2286.29	NP	154.06	NP	2132.23	2132.23
MW-26	5/30/2012	2286.29	NP	154.78	NP	2131.51	2131.51
MW-26	6/29/2012	2286.29	NP	155.07	NP	2131.22	2131.22
MW-26	7/9/2012	2286.29	NP	155.04	NP	2131.25	2131.25
MW-26	8/29/2012	2286.29	NP	155.27	NP	2131.02	2131.02
MW-26	9/25/2012	2286.29	NP	155.10	NP	2131.19	2131.19
MW-26	10/22/2012	2286.29	NP	155.03	NP	2131.26	2131.26
MW-26	11/15/2012	2286.29	NP	155.33	NP	2130.96	2130.96
MW-26	12/13/2012	2286.29	NP	155.46	NP	2130.83	2130.83
MW-26	1/21/2013	2286.29	NP	155.45	NP	2130.84	2130.84
MW-26	2/13/2013	2286.29	NP	155.47	NP	2130.82	2130.82
MW-26	3/21/2013	2286.29	NP	155.33	NP	2130.96	2130.96
MW-26	4/15/2013	2286.29	NP	155.41	NP	2130.88	2130.88
MW-26	5/23/2013	2286.29	NP	155.58	NP	2130.71	2130.71
MW-26	6/26/2013	2286.29	NP	155.91	NP	2130.38	2130.38
MW-26	7/8/2013	2286.29	NP	156.05	NP	2130.24	2130.24
MW-26	8/8/2013	2286.29	NP	156.31	NP	2129.98	2129.98
MW-26	9/5/2013	2286.29	NP	156.42	NP	2129.87	2129.87
MW-26	10/3/2013	2286.29	NP	156.55	NP	2129.74	2129.74
MW-26	11/27/2013	2286.29	NP	156.80	NP	2129.49	2129.49
MW-26	12/31/2013	2286.29	NP	156.73	NP	2129.56	2129.56
MW-26	1/10/2014	2286.29	NP	156.75	NP	2129.54	2129.54
MW-26	2/18/2014	2286.29	NP	156.95	NP	2129.34	2129.34
MW-26	3/12/2014	2286.29	NP	156.92	NP	2129.37	2129.37
MW-26	4/17/2014	2286.29	NP	157.08	NP	2129.21	2129.21
MW-26	5/22/2014	2286.29	NP	157.43	NP	2128.86	2128.86
MW-26	6/20/2014	2286.29	NP	157.76	NP	2128.53	2128.53
MW-26	7/15/2014	2286.29	NP	158.07	NP	2128.22	2128.22
MW-26	8/14/2014	2286.29	NP	158.55	NP	2127.74	2127.74
MW-26	9/9/2014	2286.29	NP	158.65	NP	2127.64	2127.64
MW-26	10/1/2014	2286.29	NP	158.33	NP	2127.96	2127.96
MW-26	11/18/2014	2286.29	NP	157.78	NP	2128.51	2128.51
MW-26	12/16/2014	2286.29	NP	157.54	NP	2128.75	2128.75

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-26	1/19/2015	2286.29	NP	157.13	NP	2129.16	2129.16
MW-26	2/19/2015	2286.29	NP	156.83	NP	2129.46	2129.46
MW-26	3/26/2015	2286.29	NP	156.41	NP	2129.88	2129.88
MW-26	4/16/2015	2286.29	NP	156.20	NP	2130.09	2130.09
MW-26	5/19/2015	2286.29	NP	156.29	NP	2130.00	2130.00
MW-26	6/22/2015	2286.29	NP	156.72	NP	2129.57	2129.57
MW-27	12/31/2013	2291.12	NP	169.18	NP	2121.94	2121.94
MW-27	1/10/2014	2291.12	NP	169.22	NP	2121.90	2121.90
MW-27	2/18/2014	2291.12	NP	169.33	NP	2121.79	2121.79
MW-27	3/12/2014	2291.12	NP	169.25	NP	2121.87	2121.87
MW-27	4/17/2014	2291.12	NP	170.48	NP	2120.64	2120.64
MW-27	5/22/2014	2291.12	NP	169.93	NP	2121.19	2121.19
MW-27	6/20/2014	2291.12	NP	170.29	NP	2120.83	2120.83
MW-27	7/15/2014	2291.12	NP	170.74	NP	2120.38	2120.38
MW-27	8/14/2014	2291.12	NP	171.37	NP	2119.75	2119.75
MW-27	9/10/2014	2291.12	NP	171.67	NP	2119.45	2119.45
MW-27	10/1/2014	2291.12	NP	171.63	NP	2119.49	2119.49
MW-27	11/18/2014	2291.12	NP	170.93	NP	2120.19	2120.19
MW-27	12/16/2014	2291.12	NP	170.35	NP	2120.77	2120.77
MW-27	1/19/2015	2291.12	NP	170.55	NP	2120.57	2120.57
MW-27	2/19/2015	2291.12	NP	169.13	NP	2121.99	2121.99
MW-27	3/26/2015	2291.12	NP	168.53	NP	2122.59	2122.59
MW-27	4/16/2015	2291.12	NP	168.26	NP	2122.86	2122.86
MW-27	5/19/2015	2291.12	NP	168.12	NP	2123.00	2123.00
MW-27	6/22/2015	2291.12	NP	168.45	NP	2122.67	2122.67
MW-28	12/31/2013	2284.40	NP	164.30	NP	2120.10	2120.10
MW-28	1/10/2014	2284.40	NP	164.32	NP	2120.08	2120.08
MW-28	2/18/2014	2284.40	NP	164.44	NP	2119.96	2119.96
MW-28	3/12/2014	2284.40	NP	164.33	NP	2120.07	2120.07
MW-28	4/17/2014	2284.40	NP	164.62	NP	2119.78	2119.78
MW-28	5/22/2014	2284.40	NP	165.15	NP	2119.25	2119.25
MW-28	6/20/2014	2284.40	NP	165.59	NP	2118.81	2118.81
MW-28	7/15/2014	2284.40	NP	166.10	NP	2118.30	2118.30
MW-28	8/14/2014	2284.40	NP	166.75	NP	2117.65	2117.65
MW-28	9/10/2014	2284.40	NP	167.01	NP	2117.39	2117.39
MW-28	10/1/2014	2284.40	NP	167.00	NP	2117.40	2117.40
MW-28	11/18/2014	2284.40	NP	166.15	NP	2118.25	2118.25
MW-28	12/16/2014	2284.40	NP	165.46	NP	2118.94	2118.94
MW-28	1/19/2015	2284.40	NP	165.70	NP	2118.70	2118.70
MW-28	2/19/2015	2284.40	NP	164.10	NP	2120.30	2120.30
MW-28	3/26/2015	2284.40	NP	163.49	NP	2120.91	2120.91
MW-28	4/16/2015	2284.40	NP	163.20	NP	2121.20	2121.20
MW-28	5/19/2015	2284.40	NP	163.06	NP	2121.34	2121.34
MW-28	6/22/2015	2284.40	NP	163.46	NP	2120.94	2120.94
MW-29D	12/31/2013	2288.60	NP	166.89	NP	2121.71	2121.71
MW-29D	1/10/2014	2288.60	NP	166.93	NP	2121.67	2121.67

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-29D	2/18/2014	2288.60	NP	167.05	NP	2121.55	2121.55
MW-29D	3/12/2014	2288.60	NP	166.97	NP	2121.63	2121.63
MW-29D	4/17/2014	2288.60	NP	167.25	NP	2121.35	2121.35
MW-29D	5/22/2014	2288.60	NP	167.78	NP	2120.82	2120.82
MW-29D	6/20/2014	2288.60	NP	168.15	NP	2120.45	2120.45
MW-29D	7/15/2014	2288.60	NP	168.61	NP	2119.99	2119.99
MW-29D	8/14/2014	2288.60	NP	169.21	NP	2119.39	2119.39
MW-29D	9/10/2014	2288.60	NP	169.44	NP	2119.16	2119.16
MW-29D	10/1/2014	2288.60	NP	169.41	NP	2119.19	2119.19
MW-29D	11/18/2014	2288.60	NP	168.61	NP	2119.99	2119.99
MW-29D	12/16/2014	2288.60	NP	167.95	NP	2120.65	2120.65
MW-29D	1/19/2015	2288.60	NP	168.33	NP	2120.27	2120.27
MW-29D	2/19/2015	2288.60	NP	166.72	NP	2121.88	2121.88
MW-29D	3/26/2015	2288.60	NP	166.14	NP	2122.46	2122.46
MW-29D	4/16/2015	2288.60	NP	165.89	NP	2122.71	2122.71
MW-29D	5/19/2015	2289.85	NP	165.84	NP	2124.01	2124.01
MW-29D	6/22/2015	2289.85	NP	166.23	NP	2123.62	2123.62
MW-29M	12/31/2013	2288.33	NP	166.78	NP	2121.55	2121.55
MW-29M	1/10/2014	2288.33	NP	166.81	NP	2121.52	2121.52
MW-29M	2/18/2014	2288.33	NP	166.95	NP	2121.38	2121.38
MW-29M	3/12/2014	2288.33	NP	166.86	NP	2121.47	2121.47
MW-29M	4/17/2014	2288.33	NP	167.12	NP	2121.21	2121.21
MW-29M	5/22/2014	2288.33	NP	167.64	NP	2120.69	2120.69
MW-29M	6/20/2014	2288.33	NP	168.00	NP	2120.33	2120.33
MW-29M	7/15/2014	2288.33	NP	168.47	NP	2119.86	2119.86
MW-29M	8/14/2014	2288.33	NP	169.08	NP	2119.25	2119.25
MW-29M	9/10/2014	2288.33	NP	169.31	NP	2119.02	2119.02
MW-29M	10/1/2014	2288.33	NP	169.31	NP	2119.02	2119.02
MW-29M	11/18/2014	2288.33	NP	168.50	NP	2119.83	2119.83
MW-29M	12/16/2014	2288.33	NP	167.83	NP	2120.50	2120.50
MW-29M	1/19/2015	2288.33	NP	168.15	NP	2120.18	2120.18
MW-29M	2/19/2015	2288.33	NP	166.61	NP	2121.72	2121.72
MW-29M	3/26/2015	2288.33	NP	166.04	NP	2122.29	2122.29
MW-29M	4/16/2015	2288.33	NP	165.77	NP	2122.56	2122.56
MW-29M	5/19/2015	2288.33	NP	165.71	NP	2122.62	2122.62
MW-29M	6/22/2015	2288.33	NP	166.11	NP	2122.22	2122.22
MW-29S	12/31/2013	2289.85	NP	169.18	NP	2120.67	2120.67
MW-29S	1/10/2014	2289.85	NP	168.22	NP	2121.63	2121.63
MW-29S	2/18/2014	2289.85	NP	168.38	NP	2121.47	2121.47
MW-29S	3/12/2014	2289.85	NP	168.28	NP	2121.57	2121.57
MW-29S	4/17/2014	2289.85	NP	168.53	NP	2121.32	2121.32
MW-29S	5/22/2014	2289.85	NP	168.99	NP	2120.86	2120.86
MW-29S	6/20/2014	2289.85	NP	169.38	NP	2120.47	2120.47
MW-29S	7/15/2014	2289.85	NP	169.85	NP	2120.00	2120.00
MW-29S	8/14/2014	2289.85	NP	170.44	NP	2119.41	2119.41
MW-29S	9/10/2014	2289.85	NP	170.70	NP	2119.15	2119.15

Appendix G
Historical Groundwater Elevation and Apparent LNAPL Thickness Data
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona

Well ID	Measurement date	Measuring point elevation	Depth to LNAPL	Depth to water	Apparent LNAPL thickness	Uncorrected groundwater elevation	Potentiometric surface elevation
MW-29S	10/1/2014	2289.85	NP	170.69	NP	2119.16	2119.16
MW-29S	11/18/2014	2289.85	NP	169.90	NP	2119.95	2119.95
MW-29S	12/16/2014	2289.85	NP	169.25	NP	2120.60	2120.60
MW-29S	1/19/2015	2289.85	NP	169.51	NP	2120.34	2120.34
MW-29S	2/19/2015	2289.85	NP	168.05	NP	2121.80	2121.80
MW-29S	3/26/2015	2289.85	NP	167.45	NP	2122.40	2122.40
MW-29S	4/16/2015	2289.85	NP	167.17	NP	2122.68	2122.68
MW-29S	5/19/2015	2288.60	NP	167.11	NP	2121.49	2121.49
MW-29S	6/22/2015	2288.60	NP	167.48	NP	2121.12	2121.12
MW-30	12/31/2013	2283.36	NP	153.31	NP	2130.05	2130.05
MW-30	1/10/2014	2283.36	NP	153.42	NP	2129.94	2129.94
MW-30	2/18/2014	2283.36	NP	153.56	NP	2129.80	2129.80
MW-30	3/12/2014	2283.36	NP	153.54	NP	2129.82	2129.82
MW-30	4/17/2014	2283.36	NP	153.73	NP	2129.63	2129.63
MW-30	5/22/2014	2283.36	NP	154.08	NP	2129.28	2129.28
MW-30	6/20/2014	2283.36	NP	154.40	NP	2128.96	2128.96
MW-30	7/15/2014	2283.36	NP	154.69	NP	2128.67	2128.67
MW-30	8/14/2014	2283.36	NP	155.15	NP	2128.21	2128.21
MW-30	9/9/2014	2283.36	NP	155.22	NP	2128.14	2128.14
MW-30	10/1/2014	2283.36	NP	154.85	NP	2128.51	2128.51
MW-30	11/18/2014	2283.36	NP	154.32	NP	2129.04	2129.04
MW-30	12/16/2014	2283.36	NP	154.10	NP	2129.26	2129.26
MW-30	1/19/2015	2283.36	NP	153.72	NP	2129.64	2129.64
MW-30	2/19/2015	2283.36	NP	153.41	NP	2129.95	2129.95
MW-30	3/26/2015	2283.36	NP	153.02	NP	2130.34	2130.34
MW-30	4/16/2015	2283.36	NP	152.82	NP	2130.54	2130.54
MW-30	5/19/2015	2283.36	NP	152.95	NP	2130.41	2130.41
MW-30	6/22/2015	2283.36	NP	153.40	NP	2129.96	2129.96

NOTES
· Depths and thicknesses are expressed in feet (ft).
· Elevations are expressed in feet above mean sea level (ft amsl).
· For potentiometric surface calculations, specific gravity = 0.75.
· LNAPL = light non-aqueous phase liquid.
· NP = no LNAPL detected.

Analytical Results for Shallow-Soil Vapor Sampling and Results of a Human Health Risk Screening Evaluation
SFPP L.P. – Silvercroft Wash Release Site
Tucson, Arizona

May 7, 2004
LFR 014-10022-06-003

Prepared for
SFPP, L.P.
1100 Town & Country Road
Orange, California 92868

Prepared by
LFR Levine · Fricke
13880 North Northsight, Suite 115
Scottsdale, Arizona 85260

May 7, 2004 014-10022-06-003

Mr. Thomas J. Di Domizio, Project Manager
Remedial Projects Unit
Arizona Department of Environmental Quality
Mailcode: 4415B-1
1110 West Washington Street
Phoenix, Arizona 85007

Subject: Analytical Results for Shallow-Soil Vapor Sampling and Results of a Human Health Risk Screening Evaluation, Silvercroft Wash Release Site, Tucson, Arizona

Dear Mr. Di Domizio:

On behalf of SFPP, L.P. (SFPP), a subsidiary of Kinder Morgan Energy Partners (KMEP), LFR Levine·Fricke (LFR) conducted a shallow-soil vapor sampling survey of the Silvercroft Wash Release Site vicinity. The shallow soil-vapor sampling survey was performed in response to the Arizona Department of Environmental Quality's (ADEQ) letter dated February 24, 2004, which presented ADEQ's review of the *Request for No Further Action Determination for Soil from the Surface to Groundwater for the NFA Area* (LFR, January 19, 2004)(hereafter referred to as the "Soil NFA Report").

The Soil NFA Report requested that ADEQ grant NFA status to soil from the surface to groundwater for BTEX, MTBE, and TPH (C_{10}-C_{32}) for Lots 321, 328, 354, 355, and 356, Silver Island Way, and Silverbell Tree Drive. The request for NFA status excluded the soil beneath the utility easement, lots 352 and 353, the storm drain channel, and Silvercroft Wash. The Soil NFA did not include groundwater impacts, as such impacts will be the subject of a separate NFA request following completion of the subsurface soil and groundwater remediation efforts.

Based on their review of the Soil NFA Report, ADEQ granted NFA status to lots 321 and 328 because, "…1) the results of soil sampling activities which did not detect any of the referenced contaminants on the referenced lot portions; and 2) PSH contamination is not present in the groundwater beneath these lots." ADEQ's position on the remainder of the requested NFA area was that, "…ADEQ cannot grant a NFA determination at this time for soils beneath Lots 352 through 356, Silver Island Way, Silverbell Tree Drive, the Common Area easement, and the drainage swale between Lots 352 and 353 due to the presence of phase-separated hydrocarbons (PSH) on the groundwater table beneath the referenced properties. Before an NFA determination can be considered by ADEQ, the presence of petroleum hydrocarbon soil gas contamination in the soil beneath the referenced properties must be assessed and if present it must be demonstrated that the concentrations are below site-specific risk-based levels that are protective for the proposed uses of these properties."(ADEQ, February 24, 2004).

Consistent with ADEQ's February 24, 2004 letter, the objective of this soil vapor sampling investigation is to characterize, "the presence of petroleum hydrocarbon soil gas contamination in the

soil beneath the referenced properties." In addition, LFR conducted shallow-soil vapor sampling on the west side of Silvercroft wash to characterize the presence of petroleum hydrocarbons in soil gas directly above the known phase-separated hydrocarbon plume.

Analytical results from the soil vapor survey were used to assess the potential health risk to a hypothetical residential population associated with residual concentrations of petroleum hydrocarbons beneath the site and associated with the release. Potential human health risk was characterized for the area above the immediate vicinity of the release point, (hereafter referred to as the "source area", Figure 1), and for the areas outside of the source area (hereafter referred to as the "non-source area"). The source area includes the area within an approximately 50-foot radius of the release point, which includes the western portions of lots 352, 353, and the storm drain channel; the easement within approximately 50 feet of the release point; and a small portion of Silvercroft Wash. Note that the source area was excluded from the request for an NFA, as soil in the source area at depths greater than the depth of the release point excavation (approximately 10 feet bgs) was known to have concentrations above RSRLs and GPLs, and as such was to be subjected to further remediation. The non-source area sample locations and results are representative of the remaining areas for which NFA status had been requested, and that ADEQ had responded, "Before an NFA determination can be considered by ADEQ, the presence of petroleum hydrocarbon soil gas contamination in the soil beneath the referenced properties must be assessed and if present it must be demonstrated that the concentrations are below site-specific risk-based levels that are protective for the proposed uses of these properties."

Based on the results of the soil vapor survey and the human health screening evaluation presented in this report, residual soil gas for the non-source area is not anticipated to result in adverse health effects. Results of the health risk assessment indicated that potential human health risks associated with residual soil gas in the non-source areas were well below target risk levels set forth by the USEPA. Based on these findings for the non-source area, it appears that ADEQ's conditions set forth in the letter dated February 24, 2004 for granting NFA status to the remaining areas under consideration have been fulfilled.

For the source area, the potential human health risk for the residential use scenario slightly exceeded the USEPA target risk level for a hypothetical residential population. This result was anticipated as indicated by the exclusion of this area from the soil NFA request, and is why remediation of soil in this location is underway.

If you have any questions or require additional information, please contact Mark Sandon, Director of the Environmental Health & Safety Group for SFPP, at 714-560-4867, or Hayden Truscott, SFPP Environmental Project Manager, at 303-914-7805.

Sincerely,

Eric Rogoff, R.G., C.E.G.
Senior Associate Hydrogeologist

cc: Eric Massey, Gregory Workman, and Michael Traubert, ADEQ

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CERTIFICATION

All hydrogeologic and geologic information, conclusions, and recommendations in this document have been prepared under the supervision of and reviewed by an LFR Levine·Fricke Arizona Registered Geologist.

Eric Rogoff, R.G., C.E.G. Date
Senior Associate Hydrogeologist
Arizona Registered Geologist No. 32828

1.0 INTRODUCTION

On behalf of SFPP, L.P. (SFPP), a subsidiary of Kinder Morgan Energy Partners (KMEP), LFR Levine·Fricke (LFR) conducted a shallow-soil vapor sampling survey of the Silvercroft Wash Release Site vicinity. The shallow soil-vapor sampling survey was performed in response to the Arizona Department of Environmental Quality's (ADEQ) letter dated February 24, 2004, which presented ADEQ's review of the *Request for No Further Action Determination for Soil from the Surface to Groundwater for the NFA Area* (LFR, January 19, 2004)(hereafter referred to as the "Soil NFA Report").

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Consistent with ADEQ's February 24, 2004 letter, the objective of this soil vapor sampling investigation is to characterize, "the presence of petroleum hydrocarbon soil gas contamination in the soil beneath the referenced properties." In addition, LFR conducted shallow-soil vapor sampling on the west side of Silvercroft wash to characterize the presence of petroleum hydrocarbons in soil gas directly above the known phase-separated hydrocarbon plume.

Analytical results from the soil vapor survey were used to assess the potential health risk to a hypothetical residential population associated with residual concentrations of petroleum hydrocarbons beneath the site and associated with the release. Potential human health risk was characterized for the area above the immediate vicinity of the release point, (hereafter referred to as the "source area", Figure 1), and for the areas outside of the source area (hereafter referred to as the "non-source area"). The source

area includes the area within an approximately 50-foot radius of the release point, which includes the western portions of lots 352, 353, and the storm drain channel; the easement within approximately 50 feet of the release point; and a small portion of Silvercroft Wash. Note that the source area was excluded from the Soil NFA Report, as soil in the source area at depths greater than the base of the release point excavation (approximately 10 feet bgs) was known to have concentrations above RSRLs and GPLs, and as such was to be subjected to further remediation. The non-source area sample locations and results are representative of the remaining areas for which NFA status had been requested, and that ADEQ had responded, "Before an NFA determination can be considered by ADEQ, the presence of petroleum hydrocarbon soil gas contamination in the soil beneath the referenced properties must be assessed and if present it must be demonstrated that the concentrations are below site-specific risk-based levels that are protective for the proposed uses of these properties."

Based on the results of the soil vapor survey and the human health screening evaluation presented in this report, residual soil gas for the non-source area is not anticipated to result in adverse health effects. Results of the health risk assessment indicated that potential human health risks associated with residual soil gas in the non-source areas were well below target risk levels set forth by the USEPA. Based on these findings for the non-source area, it appears that ADEQ's conditions set forth in the letter dated February 24, 2004 for granting NFA status to the remaining areas under consideration , have been fulfilled.

For the source area, the potential human health risk for a residential scenario directly above the source area targeted for remediation slightly exceeded the USEPA target risk level for a hypothetical residential population. This result was anticipated as indicated by the exclusion of this area from the request for NFA, and is why remediation of soil in this location is underway.

Subcontractors to LFR included Transwest Geochem, Inc. (TGI), who performed the soil vapor sampling, and Air Toxics LTD, who performed the laboratory analysis of the soil vapor samples. Analysis of three soil samples for physical properties was performed by ATL, Inc.

Based on the soil vapor sampling results and as described more fully herein, residual soil gas outside the source area at the subject site is not anticipated to result in adverse health effects.

The contaminants of concern at the Silvercroft Wash Release Site are:

- benzene (B)
- toluene (T)
- ethyl benzene (E)
- xylenes (X)
- methyl tertiary butyl ether (MTBE)

- total petroleum hydrocarbons (TPH)

Chlorinated solvents, specifically tetrachloroethylene (PCE) and trichloroethylene (TCE), have been detected in soil vapor samples previously collected in the vicinity of the Silvercroft Wash Release Site from groundwater monitoring wells with screen intervals above the groundwater table (i.e., wells are screened from 130 to 170 feet below ground surface [ft bgs], with unsaturated screened intervals from 130 to approximately 140 feet bgs). PCE and TCE have also been detected in many groundwater samples collected beneath the site. The source of the PCE and TCE detected in soil vapor and groundwater samples is not the pipeline release. Because of these findings of PCE and TCE in soil vapor and groundwater samples from wells, SFPP nevertheless analyzed the shallow soil vapor samples collected during this investigation for PCE and TCE in order to characterize their presence in the shallow soil. Therefore, PCE and TCE, as well as all other volatile organic compounds (VOCs) detected in shallow soil vapor at the site, are included in the screening level human health risk evaluation.

2.0 SITE BACKGROUND

Characterization and remediation of shallow soil (ground surface to than approximately 10 feet below the ground surface [bgs]) at the site has been completed. For details, please see the following LFR documents submitted on behalf of SFPP to ADEQ by Monterey Homes under the Voluntary Remediation Program (VRP) process:

- Request for No Further Action Determination for Soil from the Surface to Groundwater for the NFA Area, SFPP, L.P. – Silvercroft Wash Release Site, Tucson, Arizona, January 19, 2004.

- Proposed Remediation Work Plan, SFPP, L.P. – Silvercroft Wash Release Site, Tucson, Arizona, January 23, 2004.

LFR developed a site conceptual model (SCM) based on the results of previous investigations. Discussions and illustrations of the SCM are provided in LFR's *Site Characterization Report* (April 13, 2004).

This soil vapor investigation was conducted to confirm the conceptual model and to quantitatively assess whether the concentrations of BTEX, MTBE, petroleum hydrocarbons, and other VOCs (including PCE and TCE) detected in shallow soil vapor at the site may represent a significant potential risk to human health, either individually or collectively.

While not part of this sampling effort, it is important to note that SFPP plans to implement a soil vapor extraction (SVE) remedy that, at a minimum, is designed to collect petroleum-impacted soil vapor associated with the column of soil near the release point. The SVE remedy includes extraction of soil vapor from the following wells located on the east side of Silvercroft wash:

- SVE-1 (screened from 60 to 100 ft bgs)
- SVE-2 (multiple screen intervals: from 12 to 40, 45 to 75, and 90 to 120 ft bgs)

Vadose-zone vapor monitoring during the operation of the aforementioned SVE remedy will, at a minimum, be conducted at the following well:

- SVM-1 (multiple screen intervals: from 12 to 40, 45 to 75, and 90 to 120 ft bgs)

SFPP began implementing SVE on April 13, 2004 using SVE-1 within the requirements of the General Permit issued by the Pima County Department of Environmental Quality (PCDEQ). SFPP is currently in the process of seeking the regulatory approvals and permissions necessary to implement the full SVE remedy.

3.0 SHALLOW SOIL-VAPOR INVESTIGATION

3.1 Methods and Procedures

3.1.1 Sample Collection

The ADEQ Superfund Programs Section Standard Operating Procedure No. 5 "Soil Vapor Sampling for Soil Vapor Surveys" was adhered to, and constitutes the sampling procedure used during this shallow-soil vapor sampling event. Vapor sampling probes were advanced at each of the sample locations via a "Bobcat"-mounted, direct-push hydraulic hammer rig provided by TGI. A vacuum was applied to the sampling system to purge the sampling equipment and remove "stagnant air" from the temporary "well" prior to the collection of each sample. Sample collection locations are shown on Figure 1.

To ensure that there were no leaks in the sampling equipment train, the following procedure was implemented each day prior to sampling: 1) the entire train was assembled above ground with the sample port sealed; 2) a vacuum was applied to the train; 3) the vacuum pressure was monitored for significant pressure drop for a minimum of 1 minute; 4) if the vacuum pressure dropped significantly over the 1 minute period, the leak was sealed and the vacuum test redone until successful.

All samples were collected in SUMMA™ canisters provided by the laboratory. One soil vapor sample was collected at a depth of 5 ft bgs at each of the 41 shallow-soil vapor sample locations depicted on Figure 1. (Note: Two sample locations depicted on Figure 1 have the same identification [SSG-38], and the two sample identifications [SSG-38] that correspond to these locations are distinguishable only by the sample dates, with the location on the east of Silvercroft wash being sampled later [3/24/04] than the location on the west of the wash [3/22/04]). Additionally, as described below, 8 duplicate samples and 2 equipment blanks were collected for quality assurance/quality control (QA/QC) purposes, for a total of 51 samples.

In addition, three soil samples were collected: SS-32-5 and SS-37-5, which correspond to locations SSG-32 and SSG-37 on Figure 1; and SS-7-5, which corresponds to location SSG-7 on Figure 1. These soil samples were analyzed for the following soil characteristics:

- dry bulk density
- total porosity
- in-situ water content
- percent water saturation
-

Laboratory analysis results for these samples were used to develop site-specific input to the vapor transport model used to calculate potential exposure point concentrations as part of the risk assessment.

3.1.2 Chemical Analysis

Each vapor sample was analyzed via EPA Method TO-15 for BTEX, MTBE, hydrocarbons in the range of C_1-C_{10}, and VOCs, including PCE and TCE.

3.2 Analytical Results

The laboratory reports for these soil vapor and soil results are provided in Appendix A. A summary of the soil vapor results is provided in Tables 1, 2, and 3. Soil physical parameter results are presented in Table 4. Benzene and PCE results are plotted on Figures 1 and 2, respectively.

BTEX concentrations ranged from less than 0.86 parts per billion by volume (ppbv) in sample SSG-20A to 47,000 ppbv benzene, 79,000 ppbv toluene, 3,700 ppbv ethyl benzene, 11,000 ppbv xylene (m,p), and 5,400 ppbv xylene (o) in sample SSG-19. Concentrations of TCE ranged from 0.80 ppbv in sample SSG-24 to 2.9 ppbv in sample SSG-38 (lab ID No. 0403418R1-08A). Concentrations of PCE ranged from 0.82 ppbv in sample SSG-9 to 70 ppbv in sample SSG-3B.

The highest concentrations of BTEX, MTBE, and TPH were detected in samples located in the immediate vicinity of the pipeline release point (samples SSG-18 and SSG-19). This was anticipated, since the column of soil surrounding the release point from 10 to 120 ft bgs has yet to be remediated, and was specifically excluded from the January 2004 no further action request for this reason.

Conversely, low and somewhat uniform concentrations of BTEX, MTBE, and TPH were detected in samples collected from all other sample locations away from the release point,

with the exception of sample SSG-36, for which only trace amounts of toluene, xylene (m,p), and TPH were detected.

3.3 QA/QC

For QA/QC, LFR collected field blank, field duplicate, and leak test samples during this investigation. As described below, results of the QA/QC sampling and analysis indicate that the samples collected are valid representations of soil vapor at 5 ft bgs at each respective sample location.

Two equipment blank samples were collected, one on March 24 (EB-3-24-04) and the other on March 25, 2004 (EB-3-25-04). The collected samples were analyzed using the same methods as the primary samples. Duplicate samples were collected for each of the two equipment blanks. VOCs were not detected in equipment blank sample EB-3-24-04 with the exception of toluene (1.6 ppbv) in the duplicate of sample EB-3-24-04. However, VOCs including toluene, ethyl benzene, xylenes, TPH, 1,2,4-trimethylbenzene, cyclohexane, and acetone were detected in equipment blank sample EB-3-25-04 and its duplicate sample. These results are presented in Table 1. While the detection of these VOCs may indicate equipment carry over from previous sample locations on that day, the concentrations measured are near the detection limits for all detected analytes. The fact that these same analytes were detected at nearly all sampling locations at or above these concentrations suggests that, if VOCs were carried over from other locations via contaminated equipment, this potential cross contamination is not significant and does not compromise the results of the sampling effort.

3.3.1 Results of Field Replicate Sampling

Eight field replicate samples (SSG-3B, SSG-12 Duplicate, SSG-20B, SSG-36B, SSG-36B Duplicate, SSG-37B, EB-3-24-04 Duplicate, and EB-3-25-04 Duplicate) were collected. Results of the duplicate sampling indicate very good agreement between the primary and duplicate sampling pairs, as shown in Tables 1, 2, and 3.

3.3.2 Leak Testing

To ensure that there were no leaks in the sampling equipment train, the following procedure was implemented each day prior to sampling: 1) the entire train was assembled above ground with the sample port sealed; 2) a vacuum was applied to the train; 3) the vacuum pressure was monitored for significant pressure drop for a minimum of 1 minute; 4) if the vacuum pressure dropped significantly over the 1 minute period, the leak was sealed and the vacuum test redone until successful.

In addition, a ring of shaving cream was placed around the drive rod at the borehole annulus to assess for potential compromise of the sample train via “short-circuiting” of the borehole seal to the atmosphere. Finally, a sample of the headspace from the shaving cream was collected by filling a plastic baggie with shaving cream, puncturing the baggie

in two locations, and drawing a vacuum across the shaving cream via a SUMMA™ canister and Teflon ™ tubing. This sample was then analyzed using the same methods as the primary samples. The intent was to compare the unique distribution of VOCs from the results of this profile sample to all of the soil vapor sample results to check for potential "short-circuiting" of the borehole seal to the atmosphere.

Results for the constituents in shaving cream selected as tracers in this shaving cream vapor sample ("Profile-1") were not significantly different from the soil vapor sample results. As a result, the tracer sample results can not be used to evaluate whether short-circuiting was an issue. Despite the lack of a "tracer" to check for "short-circuiting," LFR is confident that the sampling probe was properly advanced and sealed at 5 ft bgs. Since a flow regulator was placed in-line from the sample probe to each SUMMA™ canister to limit the vapor flow rate, "short-circuiting" of the borehole seal to the atmosphere is not likely to have occurred. Also, the significant force generated by the Bobcat to pound the sampler to the 5-foot depth, and the subsequent requirement for the Bobcat to use a hydraulic jack to withdraw the sample rod, strongly suggest that the sampling rod was suitably sealed against the formation. Additionally, the results of the soil vapor sampling demonstrate consistency and repeatability that fit well with the site conceptual model, and do not suggest that "short-circuiting" is an issue at any of the sample locations.

4.0 HUMAN HEALTH RISK SCREENING EVALUATION

LFR prepared a human health risk screen (HHRS) for the site. The approach and methods used to perform this HHRS were derived from guidelines and parameters developed by the U.S. Environmental Protection Agency (U.S. EPA) in "Risk Assessment Guidance for Superfund, Human Health Evaluation Manual, Part A, Interim Final," dated December 29, 1989 (U.S. EPA 1989b). Potential human health risk was characterized for a hypothetical residential population in two areas: the area above the immediate vicinity of the release point ("source area"); and the areas surrounding the release point ("non source area").

4.1 Methods

This HHRS follows U.S. EPA guidelines, which emphasize health protection by incorporating conservative assumptions when estimating potential health risks associated with chemicals of potential concern (COPCs) at a site (U.S. EPA 1989b). In general, the toxicity, exposure, and transport assumptions are conservative to provide a health-protective approach. The following assumptions were used, and will generally result in an overestimation of actual health risks posed by the presence of COPCs at a site:

- Soil gas identified at the site may migrate up through soil and into dwellings. Each COPC detected at or more than 5 percent frequency was selected for quantitative human health risk evaluation. For the "non-source" area, the 95 percent upper confidence levels (95% UCL) of the mean soil gas concentrations were used to

represent the concentration of the COPCs available to migrate into the indoor air. For the source area, the highest concentration detected from SSG-18 and -19 was used to represent the concentration of the COPCs available to migrate into the indoor air. One-half of the detection limits were used as proxy concentrations for COPCs with concentrations below reporting limits[1].

- The reasonable maximum exposure (RME) scenario parameters (e.g., 30-year total exposure duration for the resident) were selected to evaluate potential exposure for the non-source area and the source area. In general, the identified receptor population is likely to receive much less exposure.

- Chemical concentrations are assumed to remain constant throughout the exposure duration (up to 30 years). Environmental processes such as biodegradation and adsorption by soil, which reduce concentrations over time, were not considered.

- Default parameters (e.g., foundation crack width) that were assumed in the transport modeling of COPCs are based on values that are likely to overestimate the exposure point concentration (EPC).

- Toxicity criteria used to estimate potential human health risks are often derived from animal studies, which are usually very conservative to account for the uncertainties of inter- and intra-species differences and the extrapolation of exposure dose and duration from animals to humans.

4.2 Exposure Assessment

The objectives of the exposure assessment are to:

- identify and estimate potential exposure pathways to individuals who may come in contact with COPCs originating at the Site
- characterize potentially exposed populations
- estimate the extent of exposure

4.2.1 Identification of Relevant Exposure Pathways

U.S. EPA guidance documents were used to identify relevant exposure pathways. The U.S. EPA describes exposure pathways consisting of four necessary elements (U.S. EPA 1989b):

1. a source and mechanism of chemical release

[1] For the source area, one-half the detection limits for location SSG-18 were used as proxy concentrations for non-detect results due to matrix interference and elevated detection limits for SSG-19.

2. a retention or transport medium (or media in cases involving media transfer)
3. a point of potential human contact with the contaminated medium (referred to as an exposure point)
4. an exposure route (for example, ingestion) at the exposure point

A pathway is considered "complete" only if all four conditions occur.

The inhalation of volatile emissions pathway is considered complete and is evaluated qualitatively and quantitatively for the potentially exposed population. The affected media is soil gas. Inhalation of the soil gas is the only identified exposure route. The exposure route is defined as the physical way in which chemicals may enter the human body (e.g., inhalation). The exposure points are the locations where potentially exposed populations may come in contact with the COPCs. This evaluation follows U.S. EPA guidance by identifying exposure points and potential exposure routes for a hypothetical residential receptor.

4.2.2 Calculation of Exposure Point Concentrations

Exposure point concentrations (EPCs) in ambient air were estimated using a transport model and data collected from the soil gas investigations at the site. The US EPA version of the Johnson and Ettinger vapor transport model (Johnson & Ettinger 1991) was the selected model for this HHRS. Input parameters for this model are presented on Table 5. EPA default inputs were used for crack length, building area, building exchange rate, and soil physical parameters for a sandy soil. Site specific data were used for total and air-filled soil porosity. A discussion of the Johnson & Ettinger model is presented in Appendix B. Estimated indoor air concentrations for a hypothetical residence directly above the source area and the non source areas based on the model are presented in Tables 6a and 6b, respectively.

For this HHRS, RMEs, defined as "the highest exposure that is reasonably expected to occur at the site", were considered as a representative upper-bound estimate of potential exposures. The RME case uses U.S. EPA and Department of Toxic Substances Control (DTSC) default exposure parameters (U.S. EPA 1989, 1997). The RME approach of assessing exposure relies upon "conservative" or "reasonable worst case" assumptions for some or all of the exposure parameters. RMEs are estimated for the inhalation pathway. As a result of compounding high-end estimates for individual variables, this technique can also result in estimates that are significantly higher than would be expected for any of the potentially exposed populations.

4.2.3 Estimated Chemical Intake

The dose of a COPC is quantified by estimating a chronic daily intake (CDI), which is defined as the mass of substance taken into the body per unit of body weight per unit of time. CDIs are calculated using exposure parameters that represent the duration of

exposure, frequency of exposure, and other factors that affect overall chemical dose. For any route of exposure, the calculated CDI is the product of the concentration (C) in media (e.g., groundwater), the intake rate (IR), the exposure duration (ED), and the absorption efficiency (AE; fraction absorbed into the blood and tissue), divided by body weight (BW) and averaged exposure time (AT). This is expressed as follows:

$$CDI = \frac{(C) \times (IR) \times (ED) \times (AE)}{BW \times AT}$$

C refers to the EPC. IR refers to the inhalation rate (20 cubic meters of air per day), and exposure duration (the length of time the contact lasts; 30 years for residential scenario).

The AE is the fraction of a COPC at an outer boundary of the human body that is likely to be absorbed into blood and tissue once contact occurs. To be conservative, absorption was assumed to be 100 percent.

4.2.4 Consideration of Carcinogenic Endpoints

The hypothetical estimated cancer health risks were calculated using standard exposure assumptions and EPA-approved toxicity factors.

The following equation was used to calculate the potential lifetime excess incremental cancer risk:

$$\text{Lifetime Excess Cancer Risk} = (\text{CDI}) \times (\text{CSF})$$

CSFs, which are a measure of the potential for a chemical to produce a carcinogenic effect, were obtained from the EPA.

Quantification of potential carcinogenic risk is expressed in terms of probability or the likelihood of an incremental cancer risk. For example, a potential incremental cancer risk of 1×10^{-6} represents a one-in-one-million probability of developing cancer.

4.2.5 Consideration of Noncarcinogenic Endpoints

The hypothetical estimated noncancer health risks were calculated using standard exposure assumptions and U.S. EPA-approved toxicity factors.

The following equation was used to calculate noncancer adverse health effects (referred to as the hazard quotient):

$$\text{Hazard Quotient} = \text{CDI}/(\text{RfD})$$

RfDs, which are a measure of the potential for a chemical to produce a carcinogenic effect, were obtained from the following hierarchy of toxicity information sources for the calculation of the potential noncarcinogenic risk:

- IRIS database (U.S. EPA 2003)
- NCEA (as cited in U.S. EPA 2002)

4.3 Results and Conclusions

Potential risks to hypothetical residents were conservatively estimated using data collected during the soil gas survey, and the models described above. This assessment was performed to provide information for the risk management decision process only, and does not represent actual exposure conditions, as actual exposure conditions are expected to be significantly lower than projected by this assessment. Potential human health risk was characterized for a hypothetical residential population in two areas: the area above the immediate vicinity of the release point ("source area"); and the areas surrounding the release point ("non source area"). The source concentrations, detection frequency of COPCs, estimated indoor air concentration, estimated cancer risk, and estimated hazard for the source area and non source area are summarized in Tables 6 and 7, respectively.

Non-Source Area

The risk assessment addresses risk from both individual compounds and cumulative exposures from all compounds. The total estimated cumulative cancer risk, including BTEX, MTBE, petroleum hydrocarbons, PCE, TCE, and other detected VOCs for the non source area is 4×10^{-7}, and the total estimated noncancer hazard is 2×10^{-2}, which are both below the US EPA target risk and hazard of 1×10^{-6} and 1 respectively. Of this total risk, the incremental potential health risk associated with BTEX, MTBE and petroleum hydrocarbons alone is 7×10^{-8}. Based on these data, residual soil gas located at approximately 5 ft bgs in the non source area is not anticipated to result in adverse health effects to the residential population. The HHRS relied on conservative assumptions, and therefore actual risks may be even lower than as set forth above.

Based on the above HHRS findings for the non-source area, it appears that ADEQ's conditions for granting NFA status to the remaining areas under consideration, set forth in the letter dated February 24, 2004, have been fulfilled.

Source Area

As expected, the estimated cumulative cancer risk and non-cancer hazard potential for a residential scenario directly above the source area (2×10^{-5} and 4, respectively) slightly exceeded the USEPA target risk level for a hypothetical residential population. Soil gas in the source area will be addressed through implementation of a remediation system prior to development of the source area for residential use. As such, no adverse health effects are anticipated for the source area.

5.0 REFERENCES

DTSC. 1992, updated 1996. Supplemental Guidance for Human Health Multimedia Risk Assessment for Hazardous Waste Sites and Permitted Facilities. California EPA Department of Toxic Substances Control, Sacramento, California.

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U.S. EPA. 1989. Risk Assessment Guidance for Superfund, Human Health Evaluation Manual, Part A. Interim Final. December 29.

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TABLE 1
Shallow Soil Gas Analysis Results
BTEX, MTBE, TPHg
Silvercroft Wash Release Site

Analyte	Units	SSG-1	SSG-2	SSG-3A	SSG-3B	SSG-4	SSG-5	SSG-6	SSG-7	SSG-8	SSG-9	SSG-10X	SSG-11	SSG-12
Benzene	ppbv	6.7	12	5	3	3.2	3.7	2.4	5.6	11	1	6.9	7.4	8.7
	ug/m3	22	38	16	9.9	10	12	7.7	18	34	3.3	22	24	28
Toluene	ppbv	91	150	130	94	92	68	66	92	110	6.3	110	120	130
	ug/m3	350	570	510	360	350	260	250	350	420	24	420	470	510
Ethyl Benzene	ppbv	11	14	14	13	8	6.7	7.2	10	11	ND<0.82	13	13	16
	ug/m3	48	64	64	57	35	30	32	46	49	ND<3.6	57	56	69
Xylene (m,p)	ppbv	51	63	64	60	36	28	31	45	47	1.3	58	56	74
	ug/m3	220	280	280	260	160	120	140	200	210	5.7	260	250	330
Xylene (o)	ppbv	17	21	21	20	12	9.3	11	16	17	ND<0.82	20	19	26
	ug/m3	76	92	93	90	52	41	48	73	74	ND<3.6	89	83	110
MTBE	ppbv	ND<3.5	ND<3.4	ND<3.4	ND<3.4	ND<3.4	ND<3.6	ND<3.7	ND<3.8	ND<3.7	ND<3.3	ND<3.7	ND<4.0	ND<3.7
	ug/m3	ND<13	ND<12	ND<12	ND<12	ND<12	ND<13	ND<13	ND<14	ND<14	ND<12	ND<15	ND<15	ND<13
TPHg	ppbv	780	800	580	430	410	340	470	860	830	51	890	1000	1700
	ug/m3	3200	3300	2400	1800	1700	1400	2000	3600	3400	210	3700	4200	7100

ppbv = parts per billion volume
ug/m^3 = micro grams per cubic meter
All samples analyzed by Air Toxics LTD.
ft bgs = feet below ground surface
TCE = Trichloroethylene
PCE = Tetrachloroethylene
TPHg = Total Petroleum Hydrocarbons (gas)
ND = Not Detected
J - Estimated Value
E - Exceeds instrument calibration range

TABLE 1
Shallow Soil Gas Analysis Results
BTEX, MTBE, TPHg
Silvercroft Wash Release Site

Analyte	Units	SSG-12 Dup	SSG-13	SSG-14	SSG-15	SSG-16	SSG-17	SSG-18	SSG-19	SSG-20A	SSG-20B	SSG-21	SSG-22	SSG-23	SSG-24
Benzene	ppbv	9.1	6.2	6.9	5.6	6.8	8.3	56	47000	ND<0.86	ND<11	6.1	3	3.8	3.2
	ug/m3	30	20	22	18	22	27	180	150000	ND<2.8	ND<36	20	9.6	12	10
Toluene	ppbv	130	140	220	49	50	57	280	79000	ND<0.86	12	83	62	40	46
	ug/m3	490	530	850	190	190	220	1100	300000	ND<3.3	47	320	240	150	180
Ethyl Benzene	ppbv	16	16	19	6.2	5.8	7.2	22	3700	ND<0.86	ND<11	10	9.3	4.7	5.7
	ug/m3	69	71	82	27	25	32	97	16000	ND<3.8	ND<49	45	41	21	25
Xylene (m,p)	ppbv	70	71	77	27	22	29	72	11000	ND<0.86	ND<11	44	40	19	24
	ug/m3	310	310	340	120	100	130	320	50000	ND<3.8	ND<49	200	180	85	110
Xylene (o)	ppbv	24	26	26	12	8.7	11	36	5400	ND<0.86	ND<11	16	16	7	9.5
	ug/m3	100	110	120	51	100	50	160	24000	ND<3.8	ND<49	71	71	31	42
MTBE	ppbv	ND<15	ND<3.8	18	ND<3.7	6.5	30	2300	1200000	ND<0.86	2700	ND<3.7	ND<3.7	ND<3.5	4.2
	ug/m3	ND<54	ND<14	66	ND<13	24	110	8600	4400000	ND<6.0	10000	ND<14	ND<13	ND<13	15
TPHg	ppbv	1500	1500	1600	580	870	1400	7500	720000	20	3300	1000	560	560	840
	ug/m3	6200	6200	6700	2400	3600	5800	31000	3000000	83	14000	4200	2300	2300	3500

ppbv = parts per billion volume
ug/m^3 = micro grams per cubic meter
All samples analyzed by Air Toxics LTD.
ft bgs = feet below ground surface
TCE = Trichloroethylene
PCE = Tetrachloroethylene
TPHg = Total Petroleum Hydrocarbons (gas)
ND = Not Detected
J - Estimated Value
E - Exceeds instrument calibration range

TABLE 1
Shallow Soil Gas Analysis Results
BTEX, MTBE, TPHg
Silvercroft Wash Release Site

Analyte	Units	SSG-25	SSG-26	SSG-27	SSG-28	SSG-29	SSG-30	SSG-31	SSG-32	SSG-33	SSG-34	SSG-35	SSG-36A	SSG-36B
Benzene	ppbv	1.9	7	ND<12	5.5	32	4.9	5.8	12	3.5	9.4	ND<18	ND<1.1	ND<0.86
	ug/m3	6.2	23	ND<40	18	100	16	19	37	11	30	ND<57	ND<3.4	ND<2.8
Toluene	ppbv	4.7	70	43	63	640	220	130	2900	81	240	6000	1.6	1
	ug/m3	18	270	160	240	2400	830	490	11000	310	930	23000	6.2	4
Ethyl Benzene	ppbv	ND<0.90	8.9	ND<12	6	38	16	14	100	10	17	160	ND<1.1	ND<0.86
	ug/m3	ND<3.9	39	ND<54	26	160	69	63	470	46	76	700	ND<4.7	ND<3.8
Xylene (m,p)	ppbv	2.2	38	24	24	140	60	59	330	45	62	480	1.7	ND<0.86
	ug/m3	9.6	170	110	110	630	260	260	1500	200	270	2100	7.7	ND<3.8
Xylene (o)	ppbv	ND<0.90	15	ND<12	8.9	46	20	21	65	17	22	85	ND<1.1	ND<0.86
	ug/m3	ND<4.0	65	ND<54	39	200	89	94	290	76	98	380	ND<4.7	ND<3.8
MTBE	ppbv	ND<3.6	10	3900	ND<3.6	ND<7.6	ND<3.8	ND<3.8	ND<35	ND<3.7	ND<3.5	ND<70	ND<4.2	ND<3.4
	ug/m3	ND<13	38	14000	ND<13	ND<28	ND<14	ND<14	ND<130	ND<14	ND<13	ND<260	ND<16	ND<12
TPHg	ppbv	56	1600	4700	6200	2700	2200	880	3600	860	8300	6100	35	ND<17
	ug/m3	230	6600	20000	26000	11000	9200	3600	15000	3600	34000	25000	140	ND<71

ppbv = parts per billion volume
ug/m^3 = micro grams per cubic meter
All samples analyzed by Air Toxics LTD.
ft bgs = feet below ground surface
TCE = Trichloroethylene
PCE = Tetrachloroethylene
TPHg = Total Petroleum Hydrocarbons (gas)
ND = Not Detected
J - Estimated Value
E - Exceeds instrument calibration range

TABLE 1
Shallow Soil Gas Analysis Results
BTEX, MTBE, TPHg
Silvercroft Wash Release Site

Analyte	Units	SSG-36B Dup	SSG-37	SSG-37B	SSG-38	SSG-38 (08A)	SSG-39	SSG-40	Profile-1	EB-3-24-04	EB-3-24-04 DUPLICATE	EB-3-25-04	EB-3-25-04 DUPLICATE
Benzene	ppbv	ND<0.86	5.8	3.9	3.3	4.9	9.4	3.2	1.9	ND<1.0	ND<1.0	ND<0.88	ND<0.88
	ug/m3	ND<2.8	19	13	11	16	31	10	6.1	ND<3.3	ND<3.3	ND<2.8	ND<2.8
Toluene	ppbv	1.8	180	140	76	130	75	70	4	ND<1.0	1.6	9.2	9.6
	ug/m3	6.9	710	520	290	510	280	270	15	ND<3.9	6.1	35	37
Ethyl Benzene	ppbv	ND<0.86	11	10	10	14	9.7	8.7	ND<0.88	ND<1.0	ND<1.0	1.1	1.2
	ug/m3	ND<3.8	50	47	45	63	43	38	ND<3.9	ND<4.5	ND<4.5	4.9	5.2
Xylene (m,p)	ppbv	ND<0.86	46	47	45	62	43	36	1.7	ND<1.0	ND<1.0	5.6	5.8
	ug/m3	ND<3.8	200	210	200	280	190	160	7.4	ND<4.5	ND<4.5	25	26
Xylene (o)	ppbv	ND<0.86	17	17	18	21	16	13	ND<0.88	ND<1.0	ND<1.0	2.1	2.2
	ug/m3	ND<3.8	74	76	77	93	73	59	ND<3.9	ND<4.5	ND<4.5	9.3	9.8
MTBE	ppbv	ND<3.4	ND<3.5	ND<3.4	ND<3.5	ND<3.7	ND<3.5	120	ND<3.5	ND<4.1	ND<4.1	ND<3.5	ND<3.5
	ug/m3	ND<12	ND<13	ND<12	ND<13	ND<14	ND<13	430	ND<13	ND<15	ND<15	ND<13	ND<13
TPHg	ppbv	ND<17	1000	790	940	1000	850	850	23000	ND<21	ND<21	18	18
	ug/m3	ND<71	4100	3300	3900	4200	3500	3500	96000	ND<86	ND<86	73	73

ppbv = parts per billion volume
ug/m^3 = micro grams per cubic meter
All samples analyzed by Air Toxics LTD.
ft bgs = feet below ground surface
TCE = Trichloroethylene
PCE = Tetrachloroethylene
TPHg = Total Petroleum Hydrocarbons (gas)
ND = Not Detected
J - Estimated Value
E - Exceeds instrument calibration range

TABLE 2
Shallow Soil Gas Analytical Results
TCE and PCE
Silvercroft Release Site

Analyte	Units	SSG-1	SSG-2	SSG-3A	SSG-3B	SSG-4	SSG-5	SSG-6	SSG-7	SSG-8	SSG-9	SSG-10X	SSG-11	SSG-12
TCE	ppbv	ND<0.88	ND<0.86	ND<0.84	ND<0.84	ND<0.84	ND<0.90	ND<0.92	ND<0.96	ND<0.94	ND<0.82	ND<0.94	ND<1.0	ND<0.92
	ug/m3	ND<4.8	ND<4.7	ND<4.6	ND<4.6	ND<4.6	ND<4.9	ND<5.0	ND<5.2	ND<5.1	ND<4.5	ND<5.1	ND<5.5	ND<5.0
PCE	ppbv	1.7	10	44	70	51	21	1.9	ND<0.96	6.1	ND<0.82	7.2	9.5	6.6
	ug/m3	12	72	300	480	350	150	13	ND<6.6	42	ND<5.6	5	65	45

ppbv = parts per billion volume
ug/m^3 = micro grams per cubic meter
All samples analyzed by Air Toxics LTD.
ft bgs = feet below ground surface
TCE = Trichloroethylene
PCE = Tetrachloroethylene
TPHg = Total Petroleum Hydrocarbons (gas)
ND = Not Detected
J - Estimated Value
E - Exceeds instrument calibration range

TABLE 2
Shallow Soil Gas Analytical Results
TCE and PCE
Silvercroft Release Site

Analyte	Units	SSG-12 Du	SSG-13	SSG-14	SSG-15	SSG-16	SSG-17	SSG-18	SSG-19	SSG-20A	SSG-20B	SSG-21	SSG-22	SSG-23
TCE	ppbv	ND<3.7	ND<0.96	ND<0.94	2	ND<0.86	ND<0.88	ND<11	ND<3500	ND<0.86	ND<11	ND<0.94	ND<0.92	ND<0.88
	ug/m3	ND<20	ND<5.2	ND<5.1	11	ND<4.7	ND<4.8	ND<62	ND<19000	ND<4.7	ND<61	ND<5.1	ND<5.0	ND<4.8
PCE	ppbv	6.6	ND<0.96	1.1	2.1	ND<0.86	ND<0.88	ND<11	ND<3500	ND<0.86	ND<11	2.1	ND<0.92	ND<0.88
	ug/m3	45	ND<6.6	7.7	14	ND<5.9	ND<6.0	ND<78	ND<24000	ND<5.9	ND<77	15	ND<6.3	ND<6.0

ppbv = parts per billion volume
ug/m^3 = micro grams per cubic meter
All samples analyzed by Air Toxics LTD.
ft bgs = feet below ground surface
TCE = Trichloroethylene
PCE = Tetrachloroethylene
TPHg = Total Petroleum Hydrocarbons (gas)
ND = Not Detected
J - Estimated Value
E - Exceeds instrument calibration range

TABLE 2
Shallow Soil Gas Analytical Results
TCE and PCE
Silvercroft Release Site

Analyte	Units	SSG-24	SSG-25	SSG-26	SSG-27	SSG-28	SSG-29	SSG-30	SSG-31	SSG-32	SSG-33	SSG-34	SSG-35	SSG-36A
TCE	ppbv	ND<0.80	ND<0.90	1.1	ND<12	ND<0.90	ND<1.9	ND<0.96	1.2	ND<8.8	ND<0.94	ND<0.88	ND<18	ND<1.1
	ug/m3	ND<4.4	ND<4.9	6.2	ND<67	ND<4.9	ND<10	ND<5.2	6.4	ND<48	ND<5.1	ND<4.8	ND<96	ND<5.8
PCE	ppbv	0.97	ND<0.90	ND<0.84	ND<12	ND<0.90	ND<1.9	ND<0.96	ND<0.96	ND<8.8	ND<0.94	ND<0.88	ND<18	ND<1.1
	ug/m3	6.7	ND<6.2	ND<5.8	ND<84	ND<6.2	ND<9.6	ND<6.6	ND<6.6	ND<60	ND<6.4	ND<6.0	ND<120	ND<7.3

ppbv = parts per billion volume
ug/m^3 = micro grams per cubic meter
All samples analyzed by Air Toxics LTD.
ft bgs = feet below ground surface
TCE = Trichloroethylene
PCE = Tetrachloroethylene
TPHg = Total Petroleum Hydrocarbons (gas)
ND = Not Detected
J - Estimated Value
E - Exceeds instrument calibration range

TABLE 2
Shallow Soil Gas Analytical Results
TCE and PCE
Silvercroft Release Site

Analyte	Units	SSG-36B	SG-36B Du	SSG-37	SSG-37B	SSG-38	SG-38 (08/	SSG-39	SSG-40	Profile-1	EB-3-24-04	EB-3-24-04 DUPLICATE	EB-3-25-04	EB-3-25-04 DUPLICATE
TCE	ppbv	ND<0.86	ND<0.86	ND<0.88	ND<0.86	ND<0.88	2.9	ND<0.88	ND<0.82	ND<0.88	ND<1.0	ND<1.0	ND<0.88	ND<0.88
	ug/m3	ND<4.7	ND<4.7	ND<4.8	ND<4.7	ND<4.8	16	ND<4.8	ND<4.5	ND<4.8	ND<5.6	ND<5.6	ND<4.8	ND<4.8
PCE	ppbv	ND<0.86	ND<0.86	ND<0.88	ND<0.86	ND<0.88	14	ND<0.88	ND<0.82	ND<0.88	ND<1.0	ND<1.0	ND<0.88	ND<0.88
	ug/m3	ND<5.9	ND<5.9	ND<6.0	ND<5.9	ND<6.0	97	ND<6.0	ND<5.6	ND<6.0	ND<7.1	ND<7.1	ND<6.0	ND<6.0

ppbv = parts per billion volume
ug/m^3 = micro grams per cubic meter
All samples analyzed by Air Toxics LTD.
ft bgs = feet below ground surface
TCE = Trichloroethylene
PCE = Tetrachloroethylene
TPHg = Total Petroleum Hydrocarbons (gas)
ND = Not Detected
J - Estimated Value
E - Exceeds instrument calibration range

TABLE 3
Shallow Soil Gas Analytical Results
Other Detected Analytes
Silvercroft Wash Release Site

Analyte	Units	SSG-1	SSG-2	SSG-3A	SSG-3B	SSG-4	SSG-5	SSG-6	SSG-7	SSG-8	SSG-9	SSG-10X	SSG-11	SSG-12
Freon 12	ppbv	ND<0.88	8.9	20	24	33	21	3.8	1.8	8.3	ND<0.82	6.6	13	28
	ug/m3	ND<4.4	44	100	120	160	110	19	9.2	42	ND<4.1	33	67	140
Freon 114	ppbv	ND<0.88	ND<0.86	0.94	1.1	1.4	0.97	1.3	ND<0.96	ND<0.94	ND<0.82	ND<0.94	ND<1.0	1.3
	ug/m3	ND<6.2	ND<6.1	6.6	7.6	10	6.9	9	ND<6.8	ND<6.6	ND<5.8	ND<6.6	ND<7.1	9.6
Chloroethane	ppbv	ND<0.88	ND<0.86	ND<0.84	ND<0.84	ND<0.84	ND<0.90	ND<0.92	ND<0.96	ND<0.94	ND<0.82	ND<0.94	ND<1.0	ND<0.92
	ug/m3	ND<2.3	ND<2.3	ND<2.2	ND<2.2	ND<2.2	ND<2.4	ND<2.4	ND<2.6	ND<2.5	ND<2.2	ND<2.5	ND<2.7	ND<2.4
Freon 11	ppbv	ND<0.88	ND<0.86	1.6	1.9	2.4	1.6	ND<0.92	ND<0.96	ND<0.94	ND<0.82	ND<0.94	1.1	2
	ug/m3	ND<5.0	ND<4.9	9.4	11	14	9	ND<5.2	ND<5.4	ND<5.3	ND<4.7	ND<5.3	6.1	11
Methylene Chloride	ppbv	ND<0.88	ND<0.86	ND<0.84	ND<0.84	ND<0.84	ND<0.90	ND<0.92	ND<0.96	ND<0.94	1.3	ND<0.94	ND<1.0	ND<0.92
	ug/m3	ND<3.1	ND<3.0	ND<3.0	ND<3.0	ND<3.0	ND<3.2	ND<3.2	ND<3.4	ND<3.3	4.4	ND<3.3	ND<3.5	ND<3.2
Chloroform	ppbv	ND<0.88	ND<0.86	ND<0.84	ND<0.84	ND<0.84	ND<0.90	ND<0.92	ND<0.96	ND<0.94	ND<0.82	ND<0.94	ND<1.0	ND<0.92
	ug/m3	ND<4.3	ND<4.2	ND<4.2	ND<4.2	ND<4.2	ND<4.4	ND<4.5	ND<4.7	ND<4.6	ND<4.1	ND<4.6	ND<5.0	ND<4.5
Styrene	ppbv	ND<0.88	ND<0.86	ND<0.84	ND<0.84	ND<0.84	ND<0.90	ND<0.92	ND<0.96	ND<0.94	ND<0.82	ND<0.94	ND<1.0	ND<0.92
	ug/m3	ND<3.8	ND<3.7	ND<3.6	ND<3.6	ND<3.6	ND<3.9	ND<4.0	ND<4.1	ND<4.0	ND<3.5	ND<4.0	ND<4.4	ND<4.0
1,3,5-Trimethylbenzene	ppbv	4.4	4.6	4.7	5.4	2.7	2	2.4	3.9	4	ND<0.82	5.2	4.5	6.4
	ug/m3	22	23	23	27	14	10	12	19	20	ND<4.1	26	22	32
1,2,4-Trimethylbenzene	ppbv	17	17	17	19	9.7	7	8.5	14	14	ND<0.82	20	16	22
	ug/m3	84	84	84	97	48	35	42	70	70	ND<4.1	98	82	110
1,4-Dichlorobenzene	ppbv	ND<0.88	ND<0.86	ND<0.84	ND<0.84	0.92	ND<0.90	ND<0.92	ND<0.96	ND<0.94	ND<0.82	ND<0.94	ND<1.0	ND<0.92
	ug/m3	ND<5.3	ND<5.2	ND<5.1	ND<5.1	5.6	ND<5.5	ND<5.6	ND<5.8	ND<5.7	ND<5.0	ND<5.7	ND<6.1	ND<5.6
1,3-Butadiene	ppbv	13	7.1	1.8	ND<0.84	1.2	1.6	ND<0.92	ND<0.96	2.6	ND<0.82	2.6	1.8	4.4
	ug/m3	29	16	4.1	ND<1.9	2.8	3.5	ND<2.0	ND<2.1	5.8	ND<1.8	5.8	4	10
Hexane	ppbv	8.4	7.1	3.4	1.7	6.1	3.5	2.2	5.7	6.7	1.2	6.7	9.3	6.3
	ug/m3	30	25	12	6.1	22	12	7.7	20	24	4.3	24	33	23
Cyclohexane	ppbv	1.2	1.1	ND<0.84	ND<0.84	ND<0.84	1.9	ND<0.92	1.4	ND<0.94	1.7	2.8	5.5	ND<0.92
	ug/m3	4.1	3.7	ND<2.9	ND<2.9	ND<2.9	6.6	ND<3.2	5	ND<3.3	5.8	10	19	ND<3.2
Bromodichloromethane	ppbv	ND<0.88	ND<0.86	ND<0.84	ND<0.84	ND<0.84	ND<0.90	ND<0.92	ND<0.96	ND<0.94	ND<0.82	ND<0.94	ND<1.0	ND<0.92
	ug/m3	ND<6.0	ND<5.8	ND<5.7	ND<5.7	ND<5.7	ND<6.1	ND<6.2	ND<6.5	ND<6.4	ND<5.6	ND<6.4	ND<6.8	ND<6.2
Heptane	ppbv	4.4	5	3.4	1.9	3.7	2.7	1.8	2.6	4.6	ND<0.82	3.2	3.2	4.6
	ug/m3	18	21	14	8	16	11	7.7	11	3.9	ND<3.4	13	4.2	19
Cumene	ppbv	ND<0.88	ND<0.86	ND<0.84	ND<0.84	ND<0.84	ND<0.90	ND<0.92	ND<0.96	ND<0.94	ND<0.82	ND<0.94	ND<1.0	ND<0.92
	ug/m3	ND<4.4	ND<4.3	ND<4.2	ND<4.2	ND<4.2	ND<4.5	ND<4.6	ND<4.8	ND<4.7	ND<4.1	ND<4.7	ND<5.0	ND<4.6
Propylbenzene	ppbv	2.7	2.9	3	3.2	1.7	1.4	1.4	2.2	2.3	ND<0.82	3	2.7	3.5
	ug/m3	13	14	15	16	8.4	6.8	7.2	11	12	ND<4.1	15	13	18
Chloromethane	ppbv	ND<3.5	ND<3.4	ND<3.4	ND<3.4	ND<3.4	ND<3.6	ND<3.7	ND<3.8	ND<3.7	ND<3.3	ND<3.7	ND<4.0	ND<3.7
	ug/m3	ND<7.3	ND<7.2	ND<7.0	ND<7.0	ND<7.0	ND<7.5	ND<7.7	ND<8.0	ND<7.8	ND<6.9	ND<7.8	ND<8.4	ND<7.7
Acetone	ppbv	210	220	120	88	70	44	270	450 E	380 E	5.8	290	380	380 E
	ug/m3	520	520	300	210	170	110	650	1100 E	930 E	14	710	930	900 E
Carbon Disulfide	ppbv	ND<3.5	10	ND<3.4	ND<3.4	ND<3.4	ND<3.6	ND<3.7	ND<3.8	7.6	ND<3.3	ND<3.7	ND<4.0	5.2
	ug/m3	ND<11	32	ND<11	ND<11	ND<11	ND<11	ND<12	ND<12	24	ND<10	ND<12	ND<13	16
2-Propanol	ppbv	ND<3.5	ND<3.4	ND<3.4	ND<3.4	ND<3.4	ND<3.6	ND<3.7	3.8	3.8	ND<3.3	ND<3.7	ND<4.0	5.4
	ug/m3	ND<8.7	ND<8.5	ND<8.4	ND<8.4	ND<8.4	ND<8.9	ND<9.1	9.6	9.5	ND<8.2	ND<9.3	ND<10	13
2-Butanone (MEK)	ppbv	31	33	18	12	14	11	17	24	35	ND<3.3	22	35	56
	ug/m3	92	99	53	36	41	34	50	71	110	ND<9.8	66	100	170
1,4-Dioxane	ppbv	ND<3.5	ND<3.4	ND<3.4	ND<3.4	ND<3.4	ND<3.6	ND<3.7	ND<3.8	ND<3.7	ND<3.3	ND<3.7	ND<4.0	ND<3.7
	ug/m3	ND<13	ND<12	ND<12	ND<12	ND<12	ND<13	ND<13	ND<14	ND<14	ND<12	ND<14	ND<15	ND<13
2-Hexanone	ppbv	3.8	5.8	4.8	ND<3.4	ND<3.4	ND<3.6	ND<3.7	4.6	4.9	ND<3.3	4	5	7
	ug/m3	16	24	20	ND<14	ND<14	ND<15	ND<15	19	20	ND<14	16	21	29
Ethanol	ppbv	12	8.2	6.9	3.9	3.9	6.8	6.7	9.2	12	5.9	11	11	42
	ug/m3	22	16	13	7.4	7.5	13	13	18	23	11	20	21	82
4-Ethyltoluene	ppbv	17	18	18	20	10	7.9	8.6	14	14	ND<3.3	19	17	23
	ug/m3	84	89	89	100	52	39	43	67	69	ND<16	96	83	120

ppbv = parts per billion volume
ug/m^3 = micro grams per cubic meter
All samples analyzed by Air Toxics LTD.
ft bgs = feet below ground surface
TCE = Trichloroethylene
PCE = Tetrachloroethylene
TPHg = Total Petroleum Hydrocarbons (gas)
ND = Not Detected
J - Estimated Value
E - Exceeds instrument calibration range

TABLE 3
Shallow Soil Gas Analytical Results
Other Detected Analytes
Silvercroft Wash Release Site

Analyte	Units	SSG-12 Dup	SSG-13	SSG-14	SSG-15	SSG-16	SSG-17	SSG-18	SSG-19	SSG-20A	SSG-20B	SSG-21	SSG-22	SSG-23
Freon 12	ppbv	25	2.2	7.2	5.9	ND<0.86	1.6	ND<11	ND<3500	ND<0.86	ND<11	5.5	6	ND<0.88
	ug/m3	130	11	36	30	ND<4.3	8.3	ND<57	ND<18000	ND<4.3	ND<56	28	30	ND<4.4
Freon 114	ppbv	ND<3.7	ND<0.96	ND<0.94	ND<0.92	ND<0.86	ND<0.88	ND<11	ND<3500	ND<0.86	ND<11	ND<0.94	ND<0.92	ND<0.88
	ug/m3	ND<26	ND<6.8	ND<6.6	ND<6.5	ND<6.1	ND<6.2	ND<81	ND<25000	ND<6.1	ND<80	ND<6.6	ND<6.5	ND<6.2
Chloroethane	ppbv	ND<3.7	ND<0.96	ND<0.94	ND<0.92	ND<0.86	ND<0.88	ND<11	ND<3500	ND<0.86	ND<11	ND<0.94	ND<0.92	ND<0.88
	ug/m3	ND<9.8	ND<2.6	ND<2.5	ND<2.4	ND<2.3	ND<2.3	ND<30	ND<9400	ND<2.3	ND<30	ND<2.5	ND<2.4	ND<2.3
Freon 11	ppbv	ND<3.7	ND<0.96	2.4	1.3	ND<0.86	ND<0.88	ND<11	ND<3500	ND<0.86	ND<11	1	0.91 J	ND<0.88
	ug/m3	ND<21	ND<5.4	14	7.6	ND<4.9	ND<5.0	ND<65	ND<20000	ND<4.9	ND<64	5.8	5.2 J	ND<5.0
Methylene Chloride	ppbv	ND<3.7	ND<0.96	ND<0.94	ND<0.92	ND<0.86	ND<0.88	ND<11	ND<3500	ND<0.86	ND<11	ND<0.94	ND<0.92	ND<0.88
	ug/m3	ND<13	ND<3.4	ND<3.3	ND<3.2	ND<3.0	ND<3.1	ND<40	ND<12000	ND<3.0	ND<40	ND<3.3	ND<3.2	ND<3.1
Chloroform	ppbv	ND<3.7	1.3	4.5	ND<0.92	0.93	ND<0.88	ND<11	ND<3500	ND<0.86	ND<11	ND<0.94	ND<0.92	ND<0.88
	ug/m3	ND<18	6.5	22	ND<4.5	4.6	ND<4.3	ND<56	ND<17000	ND<4.2	ND<56	ND<4.6	ND<4.5	ND<4.3
Styrene	ppbv	ND<3.7	ND<0.96	1.4	ND<0.92	ND<0.86	ND<0.88	ND<11	ND<3500	ND<0.86	ND<11	ND<0.94	ND<0.92	ND<0.88
	ug/m3	ND<16	ND<4.1	6.1	ND<4.0	ND<3.7	ND<3.8	ND<49	ND<15000	ND<3.7	ND<48	ND<4.0	ND<4.0	ND<3.8
1,3,5-Trimethylbenzene	ppbv	6.4	6	4.6	3.2	1.7	2.7	ND<11	ND<3500	ND<0.86	ND<11	3.8	4.2	1.4
	ug/m3	32	30	23	16	8.5	14	ND<57	ND<17000	ND<4.3	ND<56	19	21	7
1,2,4-Trimethylbenzene	ppbv	22	20	17	11	5.6	9.4	17	ND<3500	ND<0.86	ND<11	12	14	4.8
	ug/m3	110	100	84	56	28	47	84	ND<17000	ND<4.3	ND<56	63	72	24
1,4-Dichlorobenzene	ppbv	ND<3.7	ND<0.96	ND<0.94	ND<0.92	ND<0.86	ND<0.88	ND<11	ND<3500	ND<0.86	ND<11	ND<0.94	ND<0.92	ND<0.88
	ug/m3	ND<22	ND<5.8	ND<5.7	ND<5.6	ND<5.2	ND<5.3	ND<70	ND<21000	ND<5.2	ND<68	ND<5.7	ND<5.6	ND<5.3
1,3-Butadiene	ppbv	4.8	1.3	ND<0.94	1.9	ND<0.86	ND<0.88	ND<11	ND<3500	ND<0.86	ND<11	1.7	ND<0.92	ND<0.88
	ug/m3	8.2	2.9	ND<2.1	4.4	ND<1.9	ND<2.0	ND<26	ND<7900	ND<1.9	ND<25	3.9	ND<2.0	ND<2.0
Hexane	ppbv	6.2	4.1	5	5.2	7.2	9.1	29	110000	ND<0.86	ND<11	3.8	3.1	2.1
	ug/m3	22	15	18	19	26	32	100	410000	ND<3.1	ND<40	14	11	1.8
Cyclohexane	ppbv	ND<3.7	ND<0.96	ND<0.94	3.3	ND<0.86	ND<0.88	72	200000	ND<0.86	ND<11	ND<0.94	ND<0.92	ND<0.88
	ug/m3	ND<13	ND<3.3	ND<3.3	11	ND<3.0	ND<3.1	250	720000	ND<3.0	ND<39	ND<3.3	ND<3.2	ND<3.1
Bromodichloromethane	ppbv	ND<3.7	ND<0.96	ND<0.94	ND<0.92	ND<0.86	ND<0.88	ND<11	ND<3500	ND<0.86	ND<11	ND<0.94	ND<0.92	ND<0.88
	ug/m3	ND<25	ND<6.5	ND<6.4	ND<6.2	ND<5.8	ND<6.0	ND<78	ND<24000	ND<5.8	ND<76	ND<6.4	ND<6.2	ND<6.0
Heptane	ppbv	4.2	3.7	4.1	3	3	2.9	29	43000	ND<0.86	ND<11	3.7	2.1	1.8
	ug/m3	17	16	17	13	13	12	120	180000	ND<3.6	ND<47	15	8.7	7.7
Cumene	ppbv	ND<3.7	ND<0.96	ND<0.94	ND<0.92	ND<0.86	ND<0.88	ND<11	ND<3500	ND<0.86	ND<11	ND<0.94	ND<0.92	ND<0.88
	ug/m3	ND<18	ND<4.8	ND<4.7	ND<4.6	ND<4.3	ND<4.4	ND<57	ND<17000	ND<4..3	ND<56	ND<4.7	ND<4.6	ND<4.4
Propylbenzene	ppbv	ND<3.7	3.3	2.6	1.4	0.98	1.3	ND<11	ND<3500	ND<0.86	ND<11	2	2.1	ND<0.88
	ug/m3	ND<18	17	13	7	4.9	6.7	ND<57	ND<17000	ND<4.3	ND<56	10	10	ND<4.4
Chloromethane	ppbv	ND<15	ND<3.8	ND<3.7	ND<3.7	22	ND<3.5	ND<46	ND<14000	ND<3.4	ND<45	ND<0.94	ND<3.7	ND<3.5
	ug/m3	ND<31	ND<8.0	ND<7.8	ND<7.7	46	ND<7.8	ND<96	ND<29000	ND<7.2	ND<94	ND<7.8	ND<7.7	ND<7.3
Acetone	ppbv	360	620 E	540 E	200	290	470 E	530	ND<14000	3.6	90	380 E	250	140
	ug/m3	870	1500 E	1300 E	480	710	1100 E	1300	ND<34000	8.2	220	920 E	600	330
Carbon Disulfide	ppbv	ND<15	23	8.5	6.8	4.6	4.1	ND<46	ND<14000	ND<3.4	ND<45	4.8	ND<3.7	ND<3.5
	ug/m3	ND<46	72	27	22	11	13	ND<140	ND<44000	ND<11	ND<140	15	ND<12	ND<11
2-Propanol	ppbv	ND<15	7.2	8.6	7.3	4.6	7.7	ND<46	22000	ND<3.4	ND<45	6	ND<3.7	ND<3.5
	ug/m3	ND<36	18	21	18	11	19	ND<110	56000	ND<8.5	ND<110	15	ND<9.1	ND<8.7
2-Butanone (MEK)	ppbv	54	36	37	30	24	36	ND<46	ND<14000	ND<3.4	ND<45	25	24	12
	ug/m3	160	110	110	90	71	110	ND<140	ND<42000	ND<10	ND<130	74	71	35
1,4-Dioxane	ppbv	ND<15	ND<3.8	ND<3.7	48	ND<3.4	ND<3.5	ND<46	ND<14000	ND<3.4	ND<45	ND<3.7	ND<3.7	ND<3.5
	ug/m3	ND<54	ND<14	ND<14	180	ND<12	ND<13	ND<170	ND<51000	ND<12	ND<160	ND<14	ND<13	ND<13
2-Hexanone	ppbv	ND<15	7	8.5	4.3	4.6	7.4	ND<46	ND<14000	ND<3.4	ND<45	5.2	6.1	ND<3.5
	ug/m3	ND<61	29	36	18	19	31	ND<190	ND<58000	ND<14	ND<190	21	25	ND<14
Ethanol	ppbv	42	21	30	45	17	27	ND<46	ND<14000	ND<3.4	ND<45	18	16	14
	ug/m3	81	40	58	86	32	51	ND<87	ND<27000	ND<6.5	ND<86	34	31	28
4-Ethyltoluene	ppbv	21	21	17	9.5	5.9	9	ND<46	ND<14000	ND<3.4	ND<45	13	13	ND<3.5
	ug/m3	110	100	86	48	29	45	ND<230	ND<70000	ND<17	ND<220	65	67	ND<17

ppbv = parts per billion volume
ug/m^3 = micro grams per cubic meter
All samples analyzed by Air Toxics LTD.
ft bgs = feet below ground surface
TCE = Trichloroethylene
PCE = Tetrachloroethylene
TPHg = Total Petroleum Hydrocarbons (gas)
ND = Not Detected
J - Estimated Value
E - Exceeds instrument calibration range

TABLE 3
Shallow Soil Gas Analytical Results
Other Detected Analytes
Silvercroft Wash Release Site

Analyte	Units	SSG-24	SSG-25	SSG-26	SSG-27	SSG-28	SSG-29	SSG-30	SSG-31	SSG-32	SSG-33	SSG-34	SSG-35	SSG-36A	SSG-36B
Freon 12	ppbv	1.8	ND<0.90	6.9	14	2.2	8.9	8.6	5.6	ND<8.8	ND<0.94	ND<0.88	ND<18	ND<1.1	ND<0.86
	ug/m3	4	ND<4.5	35	71	11	45	43	28	ND<44	ND<4.7	ND<4.4	ND<88	ND<5.3	ND<4.3
Freon 114	ppbv	ND<0.80	ND<0.90	ND<0.84	ND<12	ND<0.90	ND<1.9	ND<0.96	ND<0.96	ND<8.8	ND<0.94	ND<0.88	ND<18	ND<1.1	ND<0.86
	ug/m3	ND<5.7	ND<6.4	ND<6.0	ND<87	ND<6.4	ND<14	ND<6.8	ND<6.8	ND<62	ND<6.6	ND<6.2	ND<120	ND<7.5	ND<6.1
Chloroethane	ppbv	ND<0.80	ND<0.90	ND<0.84	ND<12	ND<0.90	ND<1.9	ND<0.96	ND<0.96	ND<8.8	ND<0.94	ND<0.88	ND<18	ND<1.1	ND<0.86
	ug/m3	ND<2.2	ND<2.4	ND<2.2	ND<33	ND<2.4	ND<5.1	ND<2.6	ND<2.6	ND<23	ND<2.5	ND<2.3	ND<47	ND<2.8	ND<2.3
Freon 11	ppbv	ND<0.80	ND<0.90	1	ND<12	ND<0.90	ND<1.9	2.1	1.9	ND<8.8	ND<0.94	ND<0.88	ND<18	ND<1.1	ND<0.86
	ug/m3	ND<4.6	ND<5.1	5.8	ND<70	ND<5.1	ND<11	12	11	ND<50	ND<5.3	ND<5.0	ND<100	ND<6.0	ND<4.9
Methylene Chloride	ppbv	ND<0.80	ND<0.90	ND<0.84	ND<12	ND<0.90	ND<1.9	ND<0.96	ND<0.96	ND<8.8	ND<0.94	ND<0.88	ND<18	ND<1.1	ND<0.86
	ug/m3	ND<2.8	ND<3.2	ND<3.0	ND<43	ND<3.2	ND<6.7	ND<3.4	ND<3.4	ND<31	ND<3.3	ND<3.1	ND<62	ND<3.7	ND<3.0
Chloroform	ppbv	ND<0.80	ND<0.90	ND<0.84	ND<12	ND<0.90	ND<1.9	1.7	5.6	ND<8.8	ND<0.94	3.8	ND<18	ND<1.1	ND<0.86
	ug/m3	ND<4.0	ND<4.4	ND<4.2	ND<60	ND<4.4	ND<9.5	8.4	28	ND<43	ND<4.6	19	ND<87	ND<5.3	ND<4.2
Styrene	ppbv	ND<0.80	ND<0.90	ND<0.84	ND<12	ND<0.90	2.6	ND<0.96	ND<0.96	ND<8.8	ND<0.94	ND<0.88	ND<18	ND<1.1	ND<0.86
	ug/m3	ND<3.5	ND<3.9	ND<3.6	ND<53	ND<3.9	11	ND<4.1	ND<4.1	ND<38	ND<4.0	ND<3.8	ND<76	ND<4.6	ND<3.7
1,3,5-Trimethylbenzene	ppbv	2.1	ND<0.90	3.4	ND<12	2	9.7	4.2	5	12	4.2	5.4	ND<18	ND<1.1	ND<0.86
	ug/m3	10	ND<4.5	17	ND<61	9.9	48	21	25	59	21	27	ND<87	ND<5.3	ND<4.3
1,2,4-Trimethylbenzene	ppbv	7.2	ND<0.90	11	ND<12	6.4	32	15	17	9.5	14	18	ND<18	ND<1.1	ND<0.86
	ug/m3	36	ND<4.5	57	ND<61	32	160	74	83	48	71	92	ND<87	ND<5.3	ND<4.3
1,4-Dichlorobenzene	ppbv	ND<0.80	ND<0.90	ND<0.84	ND<12	ND<0.90	ND<1.9	ND<0.96	ND<0.96	ND<8.8	ND<0.94	ND<0.88	ND<18	ND<1.1	ND<0.86
	ug/m3	ND<4.9	ND<5.5	ND<5.1	ND<74	ND<5.5	ND<12	ND<5.8	ND<5.8	ND<53	ND<5.7	ND<5.3	ND<110	ND<6.5	ND<5.2
1,3-Butadiene	ppbv	ND<0.80	ND<0.90	3.8	ND<12	ND<0.90	ND<1.9	ND<0.96	ND<0.96	ND<8.8	2.2	ND<0.88	ND<18	ND<1.1	ND<0.86
	ug/m3	ND<1.8	ND<2.0	8.5	ND<27	ND<2.0	ND<4.3	ND<2.1	ND<2.1	ND<20	4.9	ND<2.0	ND<39	ND<2.4	ND<1.9
Hexane	ppbv	3.1	1	6.4	ND<12	4.7	18	3.4	5.8	ND<8.8	4.2	7.5	ND<18	ND<1.1	ND<0.86
	ug/m3	11	3.7	23	ND<44	17	63	12	21	ND<31	15	27	ND<63	ND<3.8	ND<3.1
Cyclohexane	ppbv	ND<0.80	ND<0.90	ND<0.84	ND<12	ND<0.90	12	ND<0.96	ND<0.96	ND<8.8	ND<0.94	ND<0.88	ND<18	ND<1.1	ND<0.86
	ug/m3	ND<2.8	ND<3.1	ND<2.9	ND<43	ND<3.1	42	ND<3.3	ND<3.3	ND<31	ND<3.3	ND<3.1	ND<61	ND<3.7	ND<3.0
Bromodichloromethane	ppbv	ND<0.80	ND<0.90	ND<0.84	ND<12	ND<0.90	ND<1.9	ND<0.96	2	ND<8.8	ND<0.94	1.5	ND<18	ND<1.1	ND<0.86
	ug/m3	ND<5.5	ND<6.1	ND<5.7	ND<83	ND<6.1	ND<13	ND<6.5	13	ND<60	ND<6.4	6	ND<120	ND<7.2	ND<5.8
Heptane	ppbv	2	ND<0.90	3.6	ND<12	3.3	10	3.3	4.6	ND<8.8	3.3	5.9	ND<18	ND<1.1	ND<0.86
	ug/m3	8.4	ND<3.7	15	ND<51	14	44	14	19	ND<36	14	3.6	ND<73	ND<4.4	ND<3.6
Cumene	ppbv	ND<0.80	ND<0.90	ND<0.84	ND<12	ND<0.90	ND<1.9	ND<0.96	ND<0.96	ND<8.8	ND<0.94	1.5	ND<18	ND<1.1	ND<0.86
	ug/m3	ND<4.0	ND<4.5	ND<4.2	ND<4061	ND<4.5	ND<9.5	ND<4.8	ND<4.8	ND<44	ND<4.7	7.4	ND<87	ND<5.3	ND<4.3
Propylbenzene	ppbv	1.1	ND<0.90	1.8	ND<12	1.2	3.9	2.2	2.6	ND<8.8	2	3.6	ND<18	ND<1.1	ND<0.86
	ug/m3	5.5	ND<4.5	8.8	ND<61	6.2	19	11	13	ND<44	10	18	ND<87	ND<5.3	ND<4.3
Chloromethane	ppbv	ND<3.2	ND<3.6	4.2	ND<49	ND<3.6	ND<7.6	ND<3.8	ND<3.8	ND<35	ND<3.7	ND<3.5	ND<70	ND<4.2	ND<3.4
	ug/m3	ND<6.8	ND<7.5	8.8	ND<100	ND<7.5	ND<16	ND<8.0	ND<8.0	ND<73	ND<7.8	ND<7.3	ND<150	ND<8.9	ND<7.2
Acetone	ppbv	320	5.6	720 E	250	260	550	550 E	550 E	340	590 E	520 E	500	8.2	ND<3.4
	ug/m3	770	13	1700 E	600	640	1300	1300 E	1300 E	820	1400 E	1200 E	1200	20	ND<8.2
Carbon Disulfide	ppbv	3.9	ND<3.6	9.3	ND<49	ND<3.6	ND<7.6	ND<3.8	14	ND<35	ND<3.7	6.7	ND<70	ND<4.2	ND<3.4
	ug/m3	12	ND<11	30	ND<150	ND<11	ND<24	ND<12	45	ND<110	ND<12	21	ND<220	ND<13	ND<11
2-Propanol	ppbv	4.6	ND<3.6	11	ND<49	4.6	7.8	5.2	9.5	ND<35	7.3	5.5	ND<70	ND<4.2	ND<3.4
	ug/m3	11	ND<8.9	27	ND<120	12	19	13	24	ND<87	18	14	ND<170	ND<10	ND<8.5
2-Butanone (MEK)	ppbv	25	ND<3.6	39	ND<49	39	40	23	26	34 J	33	36	ND<70	ND<4.2	ND<3.4
	ug/m3	74	ND<11	120	ND<150	120	120	69	77	100 J	99	110	ND<210	ND<13	ND<10
1,4-Dioxane	ppbv	ND<3.2	ND<3.6	ND<3.4	ND<49	ND<3.6	ND<7.6	ND<3.8	ND<3.8	ND<35	ND<3.7	ND<3.5	ND<70	ND<4.2	ND<3.4
	ug/m3	ND<12	ND<13	ND<12	ND<180	ND<13	ND<28	ND<14	ND<14	ND<130	ND<14	ND<13	ND<260	ND<16	ND<12
2-Hexanone	ppbv	6.6	ND<3.6	7.2	ND<49	6.5	8.4	5	5.9	ND<35	7.7	9	ND<70	ND<4.2	ND<3.4
	ug/m3	28	ND<15	30	ND<200	27	35	21	24	ND<140	32	38	ND<290	ND<18	ND<14
Ethanol	ppbv	13	3.8	28	ND<49	10	32	19	26	ND<35	22	18	ND<70	6.2	ND<3.4
	ug/m3	24	6.8	53	ND<93	20	62	37	50	ND<67	42	34	ND<130	12	ND<6.5
4-Ethyltoluene	ppbv	7.3	ND<3.6	11	ND<49	7.1	30	14	17	ND<35	14	20	ND<70	ND<4.2	ND<3.4
	ug/m3	36	ND<18	57	ND<240	35	150	72	83	ND<170	69	100	ND<350	ND<21	ND<17

ppbv = parts per billion volume
ug/m^3 = micro grams per cubic meter
All samples analyzed by Air Toxics LTD.
ft bgs = feet below ground surface
TCE = Trichloroethylene
PCE = Tetrachloroethylene
TPHg = Total Petroleum Hydrocarbons (gas)
ND = Not Detected
J - Estimated Value
E - Exceeds instrument calibration range

TABLE 3
Shallow Soil Gas Analytical Results
Other Detected Analytes
Silvercroft Wash Release Site

Analyte	Units	SSG-36B Dup	SSG-37	SSG-37B	SSG-38	SSG-38 (08A)	SSG-39	SSG-40	Profile-1	EB-3-24-04	EB-3-24-04 DUPLICATE	EB-3-25-04
Freon 12	ppbv	ND<0.86	4.8	4.2	5.6	ND<0.94	4.4	1.3	ND<0.88	ND<1.0	ND<1.0	ND<0.88
	ug/m3	ND<4.3	24	21	28	ND<4.7	22	6.5	ND<4.4	ND<5.2	ND<5.2	ND<4.4
Freon 114	ppbv	ND<0.86	ND<0.88	ND<0.86	ND<0.88	ND<0.94	ND<0.88	ND<0.82	ND<0.88	ND<1.0	ND<1.0	ND<0.88
	ug/m3	ND<6.1	ND<6.2	ND<6.1	ND<6.2	ND<6.6	ND<6.2	ND<5.8	ND<6.2	ND<7.3	ND<7.3	ND<6.2
Chloroethane	ppbv	ND<0.86	ND<0.88	ND<0.86	ND<0.88	5	ND<0.88	ND<0.82	ND<0.88	ND<1.0	ND<1.0	ND<0.88
	ug/m3	ND<2.3	ND<2.3	ND<2.3	ND<2.3	14	ND<2.3	ND<2.2	ND<2.3	ND<2.8	ND<2.8	ND<2.3
Freon 11	ppbv	ND<0.86	ND<0.88	ND<0.86	1.3	ND<0.94	1.3	ND<0.82	ND<0.88	ND<1.0	ND<1.0	ND<0.88
	ug/m3	ND<4.9	ND<5.0	ND<4.9	7.7	ND<5.3	7.6	ND<4.7	ND<5.0	ND<5.9	ND<5.9	ND<5.0
Methylene Chloride	ppbv	ND<0.86	ND<0.88	ND<0.86	ND<0.88	ND<0.94	ND<0.88	ND<0.82	ND<0.88	ND<1.0	ND<1.0	ND<0.88
	ug/m3	ND<3.0	ND<3.1	ND<3.0	ND<3.1	ND<3.3	ND<3.1	ND<2.9	ND<3.1	ND<3.6	ND<3.6	ND<3.1
Chloroform	ppbv	ND<0.86	ND<0.88	ND<0.86	1.9	ND<0.94	5.7	2	ND<0.88	ND<1.0	ND<1.0	ND<0.88
	ug/m3	ND<4.2	ND<4.3	ND<4.2	9.4	ND<4.6	28	10	ND<4.3	ND<5.1	ND<5.1	ND<4.3
Styrene	ppbv	ND<0.86	ND<0.88	ND<0.86	ND<0.88	ND<0.94	ND<0.88	ND<0.82	ND<0.88	ND<1.0	ND<1.0	ND<0.88
	ug/m3	ND<3.7	ND<3.8	ND<3.7	ND<3.8	ND<4.0	ND<3.8	ND<3.5	ND<3.8	ND<4.4	ND<4.4	ND<3.8
1,3,5-Trimethylbenzene	ppbv	ND<0.86	4.2	5	4.3	5	3.9	3.2	1.4	ND<1.0	ND<1.0	ND<0.88
	ug/m3	ND<4.3	21	25	22	25	20	16	7	ND<5.1	ND<5.1	ND<4.4
1,2,4-Trimethylbenzene	ppbv	ND<0.86	14	17	15	18	14	10	2	ND<1.0	ND<1.0	3.5
	ug/m3	ND<4.3	71	84	75	91	69	52	10	ND<5.1	ND<5.1	18
1,4-Dichlorobenzene	ppbv	ND<0.86	ND<0.88	ND<0.86	ND<0.88	ND<0.94	ND<0.88	ND<0.82	ND<0.88	ND<1.0	ND<1.0	ND<0.88
	ug/m3	ND<5.2	ND<5.3	ND<5.2	ND<5.3	ND<5.7	ND<5.3	ND<5.0	ND<5.3	ND<6.3	ND<6.3	ND<5.3
1,3-Butadiene	ppbv	ND<0.86	ND<0.88	ND<0.86	ND<0.88	4	ND<0.88	ND<0.82	ND<0.88	ND<1.0	ND<1.0	ND<0.88
	ug/m3	ND<1.9	ND<2.0	ND<1.9	ND<2.0	8.9	ND<2.0	ND<1.8	ND<2.0	ND<2.3	ND<2.3	ND<2.0
Hexane	ppbv	ND<0.86	4.2	2.6	3	6	2.2	2.6	1.7	ND<1.0	ND<1.0	ND<0.88
	ug/m3	ND<3.1	15	9.4	11	21	8.1	9.2	3.1	ND<3.7	ND<3.7	ND<3.1
Cyclohexane	ppbv	ND<0.86	ND<0.88	ND<0.86	ND<0.88	1.4	ND<0.88	ND<0.82	ND<0.88	ND<1.0	ND<1.0	1.3
	ug/m3	ND<3.0	ND<3.1	ND<3.0	ND<3.1	5	ND<3.1	ND<2.9	ND<3.1	ND<3.6	ND<3.6	4.6
Bromodichloromethane	ppbv	ND<0.86	ND<0.88	ND<0.86	ND<0.88	ND<0.94	1.2	ND<0.82	ND<0.88	ND<1.0	ND<1.0	ND<0.88
	ug/m3	ND<5.8	ND<6.0	ND<5.8	ND<6.0	ND<6.4	7.8	ND<5.6	ND<6.0	ND<7.0	ND<7.0	ND<6.0
Heptane	ppbv	ND<0.86	4.2	2.6	3.1	3.1	2.6	2.2	ND<0.88	ND<1.0	ND<1.0	ND<0.88
	ug/m3	ND<3.6	18	11	13	13	11	9.2	ND<3.6	ND<4.3	ND<4.3	ND<3.6
Cumene	ppbv	ND<0.86	ND<0.88	ND<0.86	ND<0.88	ND<0.94	ND<0.88	ND<0.82	4.3	ND<1.0	ND<1.0	ND<0.88
	ug/m3	ND<4.3	ND<4.4	ND<4.3	ND<4.4	ND<4.7	ND<4.4	ND<4.1	21	ND<5.1	ND<5.1	ND<4.4
Propylbenzene	ppbv	ND<0.86	2.1	2.5	2	3.1	2	1.5	ND<0.88	ND<1.0	ND<1.0	ND<0.88
	ug/m3	ND<4.3	10	13	9.9	15	9.8	7.4	ND<4.4	ND<5.1	ND<5.1	ND<4.4
Chloromethane	ppbv	ND<3.4	ND<3.5	ND<3.4	ND<3.5	ND<3.7	ND<3.5	ND<3.3	ND<0.88	ND<4.1	ND<4.1	ND<3.5
	ug/m3	ND<7.2	ND<7.3	ND<7.2	ND<7.3	ND<7.8	ND<7.3	ND<6.9	ND<7.3	ND<8.6	ND<8.6	ND<8.4
Acetone	ppbv	3.6	560 E	450 E	660 E	290	600 E	520 E	34	ND<4.1	ND<4.1	35
	ug/m3	8.8	1400 E	1100 E	1600 E	690	1400 E	1300 E	82	ND<9.9	ND<9.9	85
Carbon Disulfide	ppbv	ND<3.4	5.3	3.9	ND<3.5	ND<3.7	4.2	ND<3.3	ND<3.5	ND<4.1	ND<4.1	ND<3.5
	ug/m3	ND<11	17	12	ND<11	ND<12	13	ND<10	ND<11	ND<13	ND<13	ND<11
2-Propanol	ppbv	ND<3.4	7.8	5.5	7.4	ND<3.7	7.3	6.3	ND<3.5	ND<4.1	ND<4.1	ND<3.5
	ug/m3	ND<8.5	20	14	18	ND<9.3	18	16	ND<8.7	ND<10	ND<10	ND<8.7
2-Butanone (MEK)	ppbv	ND<3.4	36	26	46	63	35	29	ND<3.5	ND<4.1	ND<4.1	ND<3.5
	ug/m3	ND<10	110	79	140	190	100	86	ND<10	ND<12	ND<12	ND<10
1,4-Dioxane	ppbv	ND<3.4	ND<3.5	ND<3.4	ND<3.5	ND<3.7	ND<3.5	ND<3.3	ND<3.5	ND<4.1	ND<4.1	ND<3.5
	ug/m3	ND<12	ND<13	ND<12	ND<13	ND<13	ND<13	ND<12	ND<13	ND<15	ND<15	ND<13
2-Hexanone	ppbv	ND<3.4	8.7	6.1	9.1	11	7.8	6.6	ND<3.5	ND<4.1	ND<4.1	ND<3.5
	ug/m3	ND<14	36	25	38	45	32	28	ND<14	ND<17	ND<17	ND<14
Ethanol	ppbv	7.4	28	16	26	42	21	17	9.2	ND<4.1	ND<4.1	ND<3.5
	ug/m3	14	54	30	49	80	41	33	18	ND<7.9	ND<7.9	ND<6.7
4-Ethyltoluene	ppbv	ND<3.4	13	17	14	19	13	10	ND<3.5	ND<4.1	ND<4.1	ND<3.5
	ug/m3	ND<17	67	84	68	94	65	52	ND<17	ND<20	ND<20	ND<17

ppbv = parts per billion volume
ug/m^3 = micro grams per cubic meter
All samples analyzed by Air Toxics LTD.
ft bgs = feet below ground surface
TCE = Trichloroethylene
PCE = Tetrachloroethylene
TPHg = Total Petroleum Hydrocarbons (gas)
ND = Not Detected
J - Estimated Value
E - Exceeds instrument calibration range

TABLE 3
Shallow Soil Gas Analytical Results
Other Detected Analytes
Silvercroft Wash Release Site

Analyte	Units	EB-3-25-04 DUPLICATE
Freon 12	ppbv	ND<0.88
	ug/m3	ND<4.4
Freon 114	ppbv	ND<0.88
	ug/m3	ND<6.2
Chloroethane	ppbv	ND<0.88
	ug/m3	ND<2.3
Freon 11	ppbv	ND<0.88
	ug/m3	ND<5.0
Methylene Chloride	ppbv	ND<0.88
	ug/m3	ND<3.1
Chloroform	ppbv	ND<0.88
	ug/m3	ND<4.3
Styrene	ppbv	ND<0.88
	ug/m3	ND<3.8
1,3,5-Trimethylbenzene	ppbv	0.92
	ug/m3	4.6
1,2,4-Trimethylbenzene	ppbv	3.6
	ug/m3	18
1,4-Dichlorobenzene	ppbv	ND<0.88
	ug/m3	ND<5.3
1,3-Butadiene	ppbv	ND<0.88
	ug/m3	ND<2.0
Hexane	ppbv	ND<0.88
	ug/m3	ND<3.1
Cyclohexane	ppbv	1.4
	ug/m3	4.9
Bromodichloromethane	ppbv	ND<0.88
	ug/m3	ND<6.0
Heptane	ppbv	ND<0.88
	ug/m3	ND<3.6
Cumene	ppbv	ND<0.88
	ug/m3	ND<4.4
Propylbenzene	ppbv	ND<0.88
	ug/m3	ND<4.4
Chloromethane	ppbv	ND<3.5
	ug/m3	ND<8.4
Acetone	ppbv	37
	ug/m3	90
Carbon Disulfide	ppbv	ND<3.5
	ug/m3	ND<11
2-Propanol	ppbv	ND<3.5
	ug/m3	ND<8.7
2-Butanone (MEK)	ppbv	ND<3.5
	ug/m3	ND<10
1,4-Dioxane	ppbv	ND<3.5
	ug/m3	ND<13
2-Hexanone	ppbv	ND<3.5
	ug/m3	ND<14
Ethanol	ppbv	ND<3.5
	ug/m3	ND<6.7
4-Ethyltoluene	ppbv	ND<3.5
	ug/m3	ND<17

ppbv = parts per billion volume
ug/m^3 = micro grams per cubic meter
All samples analyzed by Air Toxics LTD.
ft bgs = feet below ground surface
TCE = Trichloroethylene
PCE = Tetrachloroethylene
TPHg = Total Petroleum Hydrocarbons (gas)
ND = Not Detected
J - Estimated Value
E - Exceeds instrument calibration range

Table 4
Soil Sample Results
Physical Parameters
Silvercroft Wash Release Site

Sample Identification	SS-7-5	SS-32-5	SS-37-5
Sample Date	3/23/2004	3/24/2004	3/24/2004
Lab Sample Number	040-3360-01A	0403360-02A	0403360-03A
ATL Lab Number	4-2593	4-2594	4-2595
Dry Unit Weight (pfc)	91.4	91.6	75.3
Porosity (%)	44.9	45.3	55.5
Percent Saturation (%)	13.1	41.5	27.7
Saturated Unit Weight (pcf)	119.4	119.9	111.9
In-Situ Moisture Content (%)	5.9	18.8	15.4
Specific Gravity	2.658	1.684	2.713

Dry Unit Weight - Body force per unit volume

Porosity - Ration of the volume of voids or pores to the total volume of the soil

Percent Saturation - moisture content divided by porosity

Saturated Unit Weight - Body force per unit volume when all void spaces are filled with water

In-Situ Moisture Content - Percent of moisture present in the soil at the time of sampling

Specific Gravity - Ratio of soil density to the density of water

Table 5
Summary of Input Parameters to the Johnson and Ettinger Model

Silvercroft Wash Release Site

Parameter	Units	Inputs
Soil Type		sand
Sample Depth	cm	152
Dry Bulk Density	g/cm3	1.5
Total Soil Porosity	(unitless)	0.486
Soil-Air Filled Porosity	cm^3/cm^3	0.302
Soil Intrinsic Permeability	cm^2	1.00E-07
Soil Relative Air Permeability	cm^2	0.686
Soil Effective Vapor Permeability	cm^2	6.81E-08
Floor, Wall, Seam, Perimeter, Crack	cm	3844
Crack Radius	cm	0.1
Building Air Exchange Rate	per hour	1
Residential Receptor Exposure Frequency	days/years	350
Residential Receptor Exposure Duration	years	30
Residential Receptor Inhalation Rate	m^3/day	20

Table 6

Results of Statistical Analysis, Vapor Transport Modeling, and Risk Evaluation

SOURCE AREA

Silvercroft Wash Release Site

COPC	Source Concentration ug/m3	Estimated Indoor Air Concentration ug/m3	Estimated Cancer Risk	Estimated Non-Cancer Hazard
1,2,4-Trimethylbenzene	84	3.7E-02	NA	6.E-03
1,3-Butadiene	2	8.9E-04	1.E-07	NA
Acetone	1300	5.8E-01	NA	2.E-03
Benzene	150000	6.7E+00	2.E-05	NA
Cyclohexane	720000	3.2E+02	NA	2.E+00
Ethyl Benzene	16000	7.1E+00	3.E-06	4.E-03
Heptane	180000	8.1E+01	NA	4.E-01
Hexane	410000	1.8E+02	NA	8.E-01
MTBE	4400000	2.0E+03	NA	6.E-01
Toluene	300000	1.3E+02	NA	3.E-01
Xylene (m,p)	50000	2.2E+01	NA	3.E-03
Xylene (o)	24000	1.1E+01	NA	2.E-03
Total Estimated Risk/Hazard			**2.E-05**	**4.E+00**

notes:
NS = not selected for quantitative analysis
NA = not applicable
source concentration based on maximum detected concentrations from SSG-18 & SSG-19

Table 7

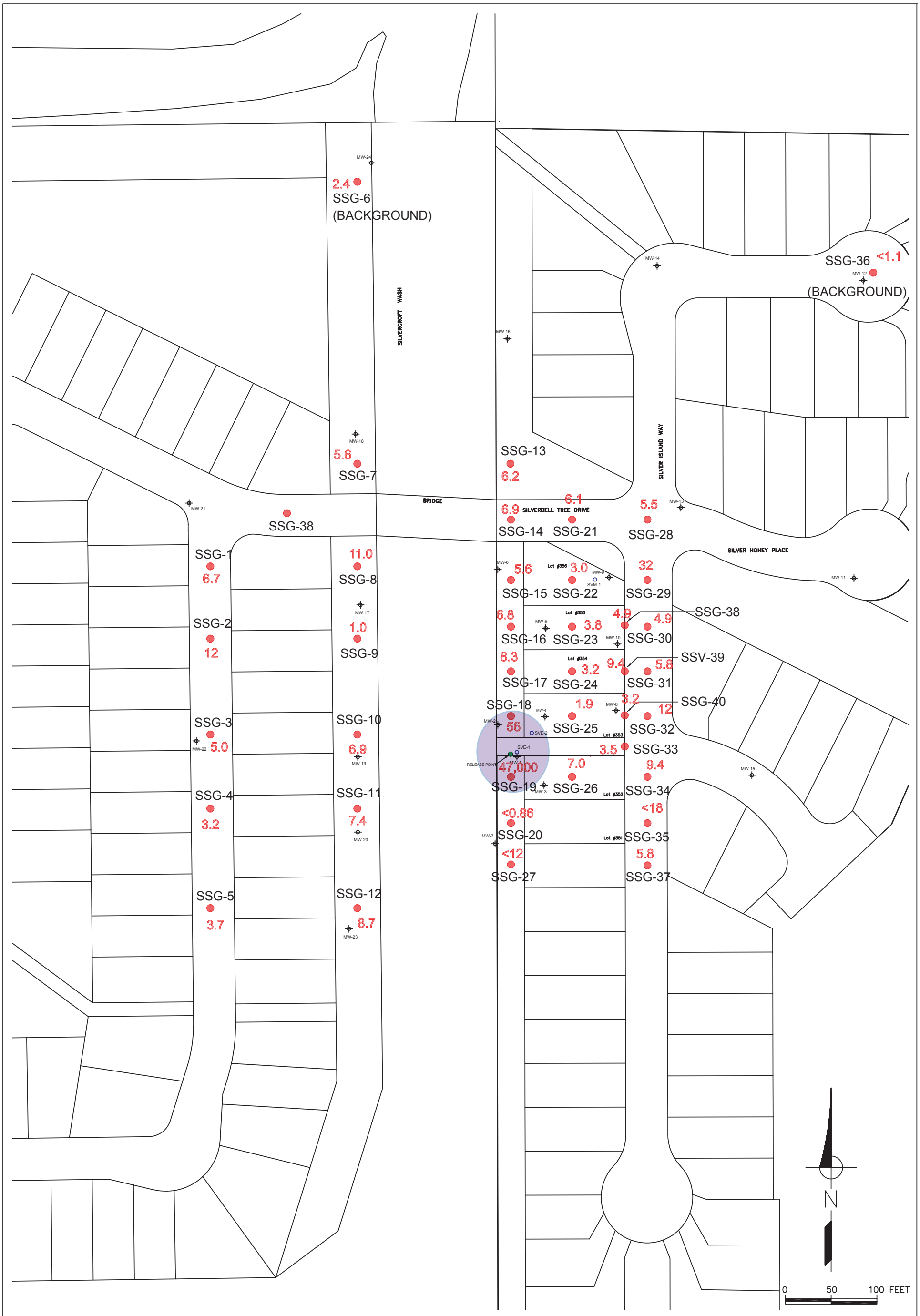
Results of Statistical Analysis, Vapor Transport Modeling, and Risk Evaluation

NON-SOURCE AREA

Silvercroft Site

COPC	Detection Frequency %	Source Concentration ug/m3	Estimated Indoor Air Concentration ug/m3	Estimated Cancer Risk	Estimated Non-Cancer Hazard
1,2,4-Trimethylbenzene	86	149	6.6E-02	NA	1.E-02
1,3,5-Trimethylbenzene	86	28	1.3E-02	NA	2.E-03
1,3-Butadiene	38	4.6	2.1E-03	2.E-07	NA
1,4-Dichlorobenzene	2.5	NS	NS	NS	NS
1,4-Dioxane	2.1	NS	NS	NS	NS
2-Butanone (MEK)	88	94	1.3E-02	NA	4.E-05
2-Hexanone	60	29	2.1E-02	NA	1.E-05
4-Ethyltoluene	71	82	3.7E-02	NA	9.E-05
Acetone	96	1700	7.6E-01	NA	2.E-03
Benzene	91	29	1.3E-02	4.E-08	NA
Bromodichloromethane	8	3.7	1.6E-03	1.E-08	8.E-05
Carbon Disulfide	33	32	3.3E-02	NA	2.E-05
Chloroethane	2.1	NS	NS	NS	NS
Chloroform	22	5.9	2.6E-03	3.E-08	NA
Chloromethane	5	NS	NS	NS	NS
Cumene	5	NS	NS	NS	NS
Cyclohexane	24	4.3	1.9E-03	NA	9.E-06
Ethyl Benzene	81	151	6.7E-02	3.E-08	7.E-05
Freon 11	38	6.1	2.7E-03	NA	4.E-06
Freon 114	15	4.3	1.9E-03	NA	9.E-06
Freon 12	70	84	3.7E-02	NA	2.E-04
Heptane	83	17	7.6E-03	NA	4.E-05
Hexane	91	25	1.1E-02	NA	5.E-05
MTBE	89	14000	6.3E+00	NA	2.E-03
Tetrachloroethene	41	63	2.8E-02	4.E-08	NA
Propylbenzene	81	13	5.8E-03	NA	4.E-05
Styrene	4	NS	NS	NS	NS
Trichloroethene	10	3.5	1.5E-03	6.E-08	2.E-04
Toluene	98	2815	1.3E+00	NA	4.E-04
Xylene (m,p)	93	909	4.0E-01	NA	6.E-05
Xylene (o)	84	241	1.1E-01	NA	2.E-05
Total Estimated Risk/Hazard				**4.E-07**	**2.E-02**

notes:
MEK = methyl ethyl ketone
NS = not selected for quantitative analysis
NA = not applicable



Lot #351 Lot Number

LEGEND

- Soil Vapor Extraction or Monitoring Well
- Release Point
- Groundwater Monitoring Well Location

SSV-5 2.5 — Shallow Soil Vapor Sample Location with Benzene concentration in ppbv. Blank indicates Benzene not detected at sampling location.

Source Area (Approximate Extent of Soil Deeper than 10 feet Exceeding ADEQ Cleanup Levels)

SFPP L.P. SILVERCROFT WASH RELEASE SITE

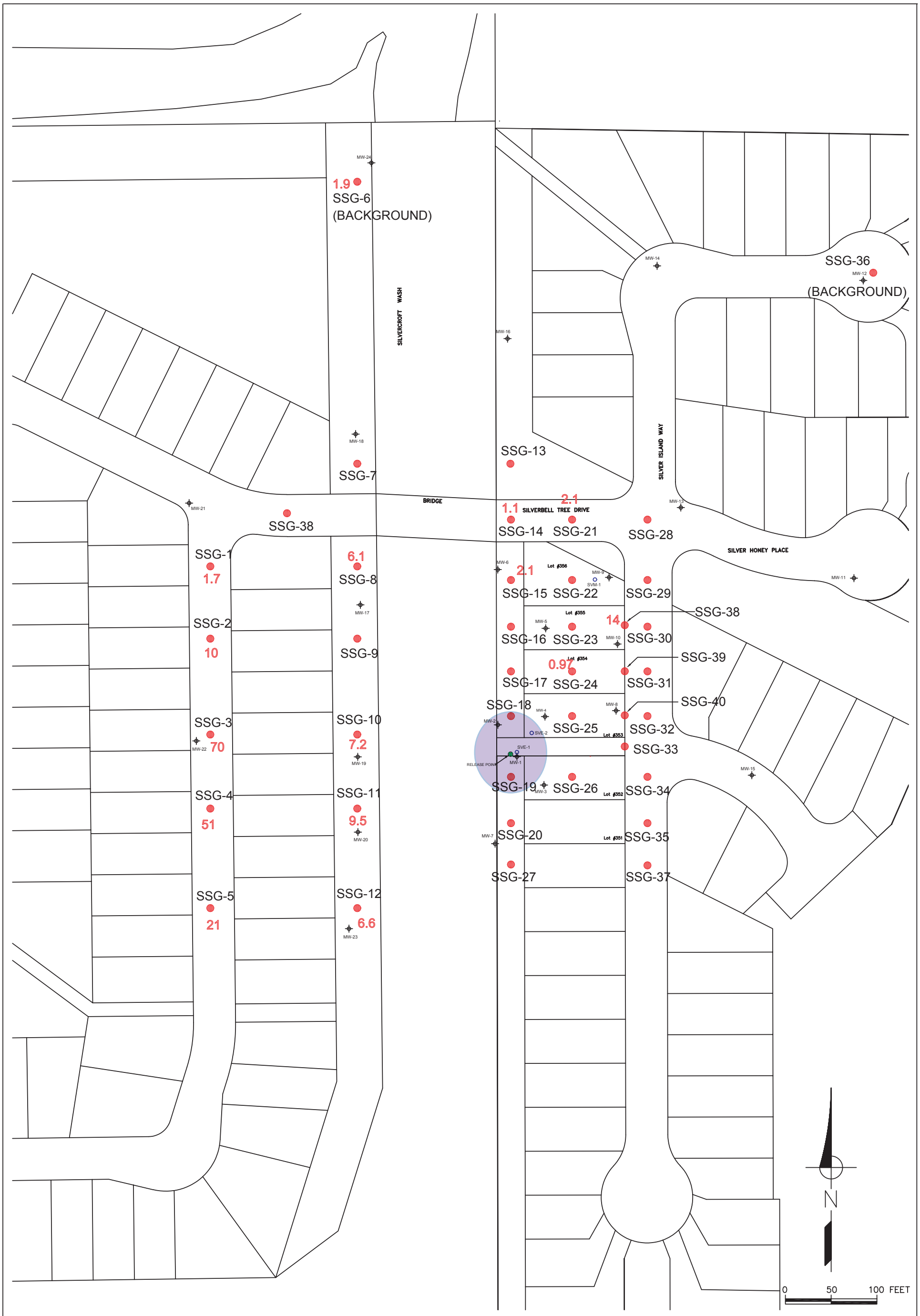
SFPP L.P. a subsidiary of KMEP

Figure 1

Shallow-Soil Vapor Sample Locations with Benzene Results

Project No. 014-10022-04

LFR LEVINE • FRICKE



LEGEND

- Soil Vapor Extraction or Monitoring Well
- Release Point
- Groundwater Monitoring Well Location

SSV-5 2.5 — Shallow Soil Vapor Sample Location with PCE concentration in ppbv. Blank indicates PCE not detected at sampling location.

Source Area (Approximate Extent of Soil Deeper than 10 feet Exceeding ADEQ Cleanup Levels)

SFPP L.P. SILVERCROFT WASH RELEASE SITE

SFPP L.P. a subsidiary of KMEP

Figure 2

Shallow-Soil Vapor Sample Locations With PCE Results

Project No. 014-10022-04

LFR LEVINE • FRICKE

APPENDIX A

ANALYTICAL LABORATORY REPORTS

AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Air Toxics Ltd. Introduces the Electronic Report

Thank you for choosing Air Toxics Ltd. To better serve our customers, we are providing your report by e-mail. This document is provided in Portable Document Format which can be viewed with Acrobat Reader by Adobe.

This electronic report includes the following:

- Work order Summary;
- Laboratory Narrative;
- Results; and
- Chain of Custody (copy).

180 BLUE RAVINE ROAD, SUITE B FOLSOM, CA - 95630

(916) 985-1000 .FAX (916) 985-1020
Hours 8:00 A.M to 6:00 P.M. Pacific
E-mail to:samplereceiving@airtoxics.com

@ AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

WORK ORDER #: 0403418R1

Work Order Summary

CLIENT:	Mr. Doug Fisher LFR Levine-Fricke 13880 N. Northsight Blvd. Suite 115 Scottsdale, AZ 85260	**BILL TO:**	Mr. Doug Fisher LFR Levine-Fricke 13880 N. Northsight Blvd. Suite 115 Scottsdale, AZ 85260
PHONE:	480-905-9311	**P.O. #**	014-10022-04
FAX:	480-905-9353	**PROJECT #**	014-10022-04 KMEP Silver Croft
DATE RECEIVED:	03/24/04	**CONTACT:**	Taryn Badal
DATE COMPLETED:	03/31/04		
DATE REISSUED:	3/31/04		

FRACTION #	NAME	TEST	RECEIPT VAC./PRES.
01A(cancelled)	EB-3-22-04A	Modified TO-15	7.0 "Hg
02A	SSG-5	Modified TO-15	7.5 "Hg
03A	SSG-4	Modified TO-15	6.0 "Hg
04A	SSG-3A	Modified TO-15	6.0 "Hg
05A	SSG-3B	Modified TO-15	6.0 "Hg
06A	SSG-2	Modified TO-15	6.5 "Hg
07A	SSG-1	Modified TO-15	7.0 "Hg
08A	SSG-38	Modified TO-15	8.5 "Hg
09A	SSG-12	Modified TO-15	8.0 "Hg
09AA	SSG-12 Duplicate	Modified TO-15	8.0 "Hg
10A	SSG-11	Modified TO-15	10.0 "Hg
11A(cancelled)	SSG-10	Modified TO-15	4.5 "Hg
12A	SSG-10X	Modified TO-15	8.5 "Hg
13A(cancelled)	EB-3-23-04-A	Modified TO-15	8.0 "Hg
14A	SSG-36A	Modified TO-15	11.0 "Hg
15A	SSG-36B	Modified TO-15	6.5 "Hg
15AA	SSG-36B Duplicate	Modified TO-15	6.5 "Hg
16A	SSG-9	Modified TO-15	5.5 "Hg
17A	SSG-8	Modified TO-15	8.5 "Hg
18A	SSG-6	Modified TO-15	8.0 "Hg

Continued on next page

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AN ENVIRONMENTAL ANALYTICAL LABORATORY

WORK ORDER #: 0403418R1

Work Order Summary

CLIENT:	Mr. Doug Fisher LFR Levine-Fricke 13880 N. Northsight Blvd. Suite 115 Scottsdale, AZ 85260	**BILL TO:**	Mr. Doug Fisher LFR Levine-Fricke 13880 N. Northsight Blvd. Suite 115 Scottsdale, AZ 85260
PHONE:	480-905-9311	**P.O. #**	014-10022-04
FAX:	480-905-9353	**PROJECT #**	014-10022-04 KMEP Silver Croft
DATE RECEIVED:	03/24/04	**CONTACT:**	Taryn Badal
DATE COMPLETED:	03/31/04		
DATE REISSUED:	3/31/04		

FRACTION #	NAME	TEST	RECEIPT VAC./PRES.
19A	SSG-7	Modified TO-15	9.0 "Hg
20A	SSG-13	Modified TO-15	9.0 "Hg
21A	Lab Blank	Modified TO-15	NA
21B	Lab Blank	Modified TO-15	NA
21C	Lab Blank	Modified TO-15	NA
22A	CCV	Modified TO-15	NA
22B	CCV	Modified TO-15	NA
22C	CCV	Modified TO-15	NA
23A	LCS	Modified TO-15	NA
23B	LCS	Modified TO-15	NA
23C	LCS	Modified TO-15	NA

CERTIFIED BY: Linda L. Freeman DATE: 03/31/04

Laboratory Director

Certfication numbers: AR DEQ - 03-084-0, CA NELAP - 02110CA, LA NELAP/LELAP- AI 30763, NJ NELAP - CA004
NY NELAP - 11291, UT NELAP - 9166389892
Name of Accrediting Agency: NELAP/Florida Department of Health, Scope of Application: Clean Air Act,
Accreditation number: E87680, Effective date: 07/01/03, Expiration date: 06/30/04
Air Toxics Ltd. certifies that the test results contained in this report meet all requirements of the NELAC standards

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180 BLUE RAVINE ROAD, SUITE B FOLSOM, CA - 95630
(916) 985-1000 . (800) 985-5955 . FAX (916) 985-1020

LABORATORY NARRATIVE
Modified TO-15
LFR Levine-Fricke
Workorder# 0403418R1

Twenty 1 Liter Summa Canister (100% Certified) samples were received on March 24, 2004. The laboratory performed analysis via modified EPA Method TO-15 using GC/MS in the full scan mode. The method involves concentrating up to 0.2 liters of air. The concentrated aliquot is then flash vaporized and swept through a water management system to remove water vapor. Following dehumidification, the sample passes directly into the GC/MS for analysis. See the data sheets for the reporting limits for each compound.

Method modifications taken to run these samples include:

Requirement	***TO-14A/TO-15***	***ATL Modifications***
BFB acceptance criteria	CLP protocol (TO-15)	SW-846 protocol
Concentration of IS spike	10 ppbv (TO-15)	25 ppbv
Dilutions for initial calibration	Dynamic dilutions or static using canisters	Syringe dilutions
Daily CCV	</= 30% Difference	</= 30% Difference with two allowed out up to </=40%.; flag and narrate outliers
Primary ions for Quantification	Freon 114: 85, Carbon Tetrachloride: 117, Trichloroethene: 130, Ethyl Benzene, m,p- and o-Xylene: 91, Vinyl Acetate: 43, 2-Butanone: 43, 4-Methyl-2-Pentanone: 43.	Freon 114: 135, Carbon Tetrachloride: 119, Trichloroethene: 95, Ethyl Benzene, m,p- and o-Xylene: 106, Vinyl Acetate: 86, 2-Butanone: 72, 4-Methyl-2-Pentanone: 58.
Sample collection media	Summa canister	ATL recommends use of summa canisters to insure data defensibility, but will report results from Tedlar bags at client request
Sample Drying System	Nafion Dryer (TO-14A)	Multisorbent
Sample Load Volume	400 mL (TO-14A)	Varied to 0.2 L.
Blank Acceptance Criteria.	< 0.20 ppbv (TO-14A)	< RL
BFB Absolute Abundance Criteria (TO-14A)	Within 10% of that from the previous day.	CCV internal standard area counts are compared to ICAL, corrective action for > 40 % D.
Initial Calibration	</= 30 %RSD (TO-14A)	</= 30 % RSD with 2 compounds allowed out to </= 40 % RSD.
IS Recoveries	Within 40% of mean over ICAL for blanks, and within 40 % of daily CCV for samples. (TO-15)	Within 40% of CCV recoveries for blank and samples.

Receiving Notes

Samples EB-3-22-04A, SSG-10 and EB-3-23-04-A were cancelled per client's request.

Samples SSG-11 and SSG-36A were received with significant vacuum remaining in the canister. The discrepancy was noted in the Sample Receipt Confirmation email/fax. The residual canister vacuum resulted

in elevated reporting limits.

The chain of custody information for sample EB-3-23-04-A did not match the entry on the sample tag. The discrepancy was noted in the Sample Receipt Confirmation email/fax and the information on the chain of custody was used to process and report the sample.

Analytical Notes

There were no analytical discrepancies.

THE WORKORDER WAS REISSUED ON MARCH 31, 2004 TO REPORT SAMPLE SSG-13.

Definition of Data Qualifying Flags

Eight qualifiers may have been used on the data analysis sheets and indicates as follows:

B - Compound present in laboratory blank greater than reporting limit (background subtraction not performed).

J - Estimated value.

E - Exceeds instrument calibration range.

S - Saturated Peak.

Q - Exceeds quality control limits.

U - Compound analyzed for but not detected above the reporting limit.

UJ- Non-detected compound associated with low bias in the CCV

N - The identification is based on presumptive evidence.

File extensions may have been used on the data analysis sheets and indicates as follows:

a-File was requantified

b-File was quantified by a second column and detector

r1-File was requantified for the purpose of reissue

AIR TOXICS LTD.

SAMPLE NAME: SSG-5

ID#: 0403418R1-02A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**s032408**	**Date of Collection:**	**3/22/04**
Dil. Factor:	**1.79**	**Date of Analysis:**	**3/24/04 03:20 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	0.90	21	4.5	110
Freon 114	0.90	0.97	6.4	6.9
Vinyl Chloride	0.90	Not Detected	2.3	Not Detected
Bromomethane	0.90	Not Detected	3.5	Not Detected
Chloroethane	0.90	Not Detected	2.4	Not Detected
Freon 11	0.90	1.6	5.1	9.0
1,1-Dichloroethene	0.90	Not Detected	3.6	Not Detected
Freon 113	0.90	Not Detected	7.0	Not Detected
Methylene Chloride	0.90	Not Detected	3.2	Not Detected
1,1-Dichloroethane	0.90	Not Detected	3.7	Not Detected
cis-1,2-Dichloroethene	0.90	Not Detected	3.6	Not Detected
Chloroform	0.90	Not Detected	4.4	Not Detected
1,1,1-Trichloroethane	0.90	Not Detected	5.0	Not Detected
Carbon Tetrachloride	0.90	Not Detected	5.7	Not Detected
Benzene	0.90	3.7	2.9	12
1,2-Dichloroethane	0.90	Not Detected	3.7	Not Detected
Trichloroethene	0.90	Not Detected	4.9	Not Detected
1,2-Dichloropropane	0.90	Not Detected	4.2	Not Detected
cis-1,3-Dichloropropene	0.90	Not Detected	4.1	Not Detected
Toluene	0.90	68	3.4	260
trans-1,3-Dichloropropene	0.90	Not Detected	4.1	Not Detected
1,1,2-Trichloroethane	0.90	Not Detected	5.0	Not Detected
Tetrachloroethene	0.90	21	6.2	150
1,2-Dibromoethane (EDB)	0.90	Not Detected	7.0	Not Detected
Chlorobenzene	0.90	Not Detected	4.2	Not Detected
Ethyl Benzene	0.90	6.7	3.9	30
m,p-Xylene	0.90	28	4.0	120
o-Xylene	0.90	9.3	4.0	41
Styrene	0.90	Not Detected	3.9	Not Detected
1,1,2,2-Tetrachloroethane	0.90	Not Detected	6.2	Not Detected
1,3,5-Trimethylbenzene	0.90	2.0	4.5	10
1,2,4-Trimethylbenzene	0.90	7.0	4.5	35
1,3-Dichlorobenzene	0.90	Not Detected	5.5	Not Detected
1,4-Dichlorobenzene	0.90	Not Detected	5.5	Not Detected
alpha-Chlorotoluene	0.90	Not Detected	4.7	Not Detected
1,2-Dichlorobenzene	0.90	Not Detected	5.5	Not Detected
1,3-Butadiene	0.90	1.6	2.0	3.5
Hexane	0.90	3.5	3.2	12
Cyclohexane	0.90	1.9	3.1	6.6
Bromodichloromethane	0.90	Not Detected	6.1	Not Detected
Dibromochloromethane	0.90	Not Detected	7.7	Not Detected
Heptane	0.90	2.7	3.7	11

AIR TOXICS LTD.

SAMPLE NAME: SSG-5

ID#: 0403418R1-02A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**s032408**	**Date of Collection:**	**3/22/04**
Dil. Factor:	**1.79**	**Date of Analysis:**	**3/24/04 03:20 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Cumene	0.90	Not Detected	4.5	Not Detected
Propylbenzene	0.90	1.4	4.5	6.8
Chloromethane	3.6	Not Detected	7.5	Not Detected
1,2,4-Trichlorobenzene	3.6	Not Detected	27	Not Detected
Hexachlorobutadiene	3.6	Not Detected	39	Not Detected
Acetone	3.6	44	8.6	110
Carbon Disulfide	3.6	Not Detected	11	Not Detected
2-Propanol	3.6	Not Detected	8.9	Not Detected
trans-1,2-Dichloroethene	3.6	Not Detected	14	Not Detected
Vinyl Acetate	3.6	Not Detected	13	Not Detected
2-Butanone (Methyl Ethyl Ketone)	3.6	11	11	34
Tetrahydrofuran	3.6	Not Detected	11	Not Detected
1,4-Dioxane	3.6	Not Detected	13	Not Detected
4-Methyl-2-pentanone	3.6	Not Detected	15	Not Detected
2-Hexanone	3.6	Not Detected	15	Not Detected
Ethanol	3.6	6.8	6.8	13
Bromoform	3.6	Not Detected	38	Not Detected
4-Ethyltoluene	3.6	7.9	18	39
Methyl tert-butyl ether	3.6	Not Detected	13	Not Detected
TPH ref. to Gasoline (MW=100)	18	340	74	1400

Container Type: 1 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	100	70-130
Toluene-d8	102	70-130
4-Bromofluorobenzene	98	70-130

AIR TOXICS LTD.

SAMPLE NAME: SSG-4

ID#: 0403418R1-03A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**s032409**	**Date of Collection:**	**3/22/04**
Dil. Factor:	**1.68**	**Date of Analysis:**	**3/24/04 04:01 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	0.84	33	4.2	160
Freon 114	0.84	1.4	6.0	10
Vinyl Chloride	0.84	Not Detected	2.2	Not Detected
Bromomethane	0.84	Not Detected	3.3	Not Detected
Chloroethane	0.84	Not Detected	2.2	Not Detected
Freon 11	0.84	2.4	4.8	14
1,1-Dichloroethene	0.84	Not Detected	3.4	Not Detected
Freon 113	0.84	Not Detected	6.5	Not Detected
Methylene Chloride	0.84	Not Detected	3.0	Not Detected
1,1-Dichloroethane	0.84	Not Detected	3.4	Not Detected
cis-1,2-Dichloroethene	0.84	Not Detected	3.4	Not Detected
Chloroform	0.84	Not Detected	4.2	Not Detected
1,1,1-Trichloroethane	0.84	Not Detected	4.6	Not Detected
Carbon Tetrachloride	0.84	Not Detected	5.4	Not Detected
Benzene	0.84	3.2	2.7	10
1,2-Dichloroethane	0.84	Not Detected	3.4	Not Detected
Trichloroethene	0.84	Not Detected	4.6	Not Detected
1,2-Dichloropropane	0.84	Not Detected	3.9	Not Detected
cis-1,3-Dichloropropene	0.84	Not Detected	3.9	Not Detected
Toluene	0.84	92	3.2	350
trans-1,3-Dichloropropene	0.84	Not Detected	3.9	Not Detected
1,1,2-Trichloroethane	0.84	Not Detected	4.6	Not Detected
Tetrachloroethene	0.84	51	5.8	350
1,2-Dibromoethane (EDB)	0.84	Not Detected	6.6	Not Detected
Chlorobenzene	0.84	Not Detected	3.9	Not Detected
Ethyl Benzene	0.84	8.0	3.7	35
m,p-Xylene	0.84	36	3.7	160
o-Xylene	0.84	12	3.7	52
Styrene	0.84	Not Detected	3.6	Not Detected
1,1,2,2-Tetrachloroethane	0.84	Not Detected	5.9	Not Detected
1,3,5-Trimethylbenzene	0.84	2.7	4.2	14
1,2,4-Trimethylbenzene	0.84	9.7	4.2	48
1,3-Dichlorobenzene	0.84	Not Detected	5.1	Not Detected
1,4-Dichlorobenzene	0.84	0.92	5.1	5.6
alpha-Chlorotoluene	0.84	Not Detected	4.4	Not Detected
1,2-Dichlorobenzene	0.84	Not Detected	5.1	Not Detected
1,3-Butadiene	0.84	1.2	1.9	2.8
Hexane	0.84	6.1	3.0	22
Cyclohexane	0.84	Not Detected	2.9	Not Detected
Bromodichloromethane	0.84	Not Detected	5.7	Not Detected
Dibromochloromethane	0.84	Not Detected	7.3	Not Detected
Heptane	0.84	3.7	3.5	16

AIR TOXICS LTD.

SAMPLE NAME: SSG-4

ID#: 0403418R1-03A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**s032409**	**Date of Collection:**	**3/22/04**
Dil. Factor:	**1.68**	**Date of Analysis:**	**3/24/04 04:01 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Cumene	0.84	Not Detected	4.2	Not Detected
Propylbenzene	0.84	1.7	4.2	8.4
Chloromethane	3.4	Not Detected	7.0	Not Detected
1,2,4-Trichlorobenzene	3.4	Not Detected	25	Not Detected
Hexachlorobutadiene	3.4	Not Detected	36	Not Detected
Acetone	3.4	70	8.1	170
Carbon Disulfide	3.4	Not Detected	11	Not Detected
2-Propanol	3.4	Not Detected	8.4	Not Detected
trans-1,2-Dichloroethene	3.4	Not Detected	14	Not Detected
Vinyl Acetate	3.4	Not Detected	12	Not Detected
2-Butanone (Methyl Ethyl Ketone)	3.4	14	10	41
Tetrahydrofuran	3.4	Not Detected	10	Not Detected
1,4-Dioxane	3.4	Not Detected	12	Not Detected
4-Methyl-2-pentanone	3.4	Not Detected	14	Not Detected
2-Hexanone	3.4	Not Detected	14	Not Detected
Ethanol	3.4	3.9	6.4	7.5
Bromoform	3.4	Not Detected	35	Not Detected
4-Ethyltoluene	3.4	10	17	52
Methyl tert-butyl ether	3.4	Not Detected	12	Not Detected
TPH ref. to Gasoline (MW=100)	17	410	70	1700

Container Type: 1 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	100	70-130
Toluene-d8	101	70-130
4-Bromofluorobenzene	97	70-130

AIR TOXICS LTD.

SAMPLE NAME: SSG-3A

ID#: 0403418R1-04A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**s032410**	**Date of Collection:**	**3/22/04**
Dil. Factor:	**1.68**	**Date of Analysis:**	**3/24/04 04:43 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	0.84	20	4.2	100
Freon 114	0.84	0.94	6.0	6.6
Vinyl Chloride	0.84	Not Detected	2.2	Not Detected
Bromomethane	0.84	Not Detected	3.3	Not Detected
Chloroethane	0.84	Not Detected	2.2	Not Detected
Freon 11	0.84	1.6	4.8	9.4
1,1-Dichloroethene	0.84	Not Detected	3.4	Not Detected
Freon 113	0.84	Not Detected	6.5	Not Detected
Methylene Chloride	0.84	Not Detected	3.0	Not Detected
1,1-Dichloroethane	0.84	Not Detected	3.4	Not Detected
cis-1,2-Dichloroethene	0.84	Not Detected	3.4	Not Detected
Chloroform	0.84	Not Detected	4.2	Not Detected
1,1,1-Trichloroethane	0.84	Not Detected	4.6	Not Detected
Carbon Tetrachloride	0.84	Not Detected	5.4	Not Detected
Benzene	0.84	5.0	2.7	16
1,2-Dichloroethane	0.84	Not Detected	3.4	Not Detected
Trichloroethene	0.84	Not Detected	4.6	Not Detected
1,2-Dichloropropane	0.84	Not Detected	3.9	Not Detected
cis-1,3-Dichloropropene	0.84	Not Detected	3.9	Not Detected
Toluene	0.84	130	3.2	510
trans-1,3-Dichloropropene	0.84	Not Detected	3.9	Not Detected
1,1,2-Trichloroethane	0.84	Not Detected	4.6	Not Detected
Tetrachloroethene	0.84	44	5.8	300
1,2-Dibromoethane (EDB)	0.84	Not Detected	6.6	Not Detected
Chlorobenzene	0.84	Not Detected	3.9	Not Detected
Ethyl Benzene	0.84	14	3.7	64
m,p-Xylene	0.84	64	3.7	280
o-Xylene	0.84	21	3.7	93
Styrene	0.84	Not Detected	3.6	Not Detected
1,1,2,2-Tetrachloroethane	0.84	Not Detected	5.9	Not Detected
1,3,5-Trimethylbenzene	0.84	4.7	4.2	23
1,2,4-Trimethylbenzene	0.84	17	4.2	84
1,3-Dichlorobenzene	0.84	Not Detected	5.1	Not Detected
1,4-Dichlorobenzene	0.84	Not Detected	5.1	Not Detected
alpha-Chlorotoluene	0.84	Not Detected	4.4	Not Detected
1,2-Dichlorobenzene	0.84	Not Detected	5.1	Not Detected
1,3-Butadiene	0.84	1.8	1.9	4.1
Hexane	0.84	3.4	3.0	12
Cyclohexane	0.84	Not Detected	2.9	Not Detected
Bromodichloromethane	0.84	Not Detected	5.7	Not Detected
Dibromochloromethane	0.84	Not Detected	7.3	Not Detected
Heptane	0.84	3.4	3.5	14

AIR TOXICS LTD.

SAMPLE NAME: SSG-3A

ID#: 0403418R1-04A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**s032410**	**Date of Collection:**	**3/22/04**
Dil. Factor:	**1.68**	**Date of Analysis:**	**3/24/04 04:43 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Cumene	0.84	Not Detected	4.2	Not Detected
Propylbenzene	0.84	3.0	4.2	15
Chloromethane	3.4	Not Detected	7.0	Not Detected
1,2,4-Trichlorobenzene	3.4	Not Detected	25	Not Detected
Hexachlorobutadiene	3.4	Not Detected	36	Not Detected
Acetone	3.4	120	8.1	300
Carbon Disulfide	3.4	Not Detected	11	Not Detected
2-Propanol	3.4	Not Detected	8.4	Not Detected
trans-1,2-Dichloroethene	3.4	Not Detected	14	Not Detected
Vinyl Acetate	3.4	Not Detected	12	Not Detected
2-Butanone (Methyl Ethyl Ketone)	3.4	18	10	53
Tetrahydrofuran	3.4	Not Detected	10	Not Detected
1,4-Dioxane	3.4	Not Detected	12	Not Detected
4-Methyl-2-pentanone	3.4	Not Detected	14	Not Detected
2-Hexanone	3.4	4.8	14	20
Ethanol	3.4	6.9	6.4	13
Bromoform	3.4	Not Detected	35	Not Detected
4-Ethyltoluene	3.4	18	17	89
Methyl tert-butyl ether	3.4	Not Detected	12	Not Detected
TPH ref. to Gasoline (MW=100)	17	580	70	2400

Container Type: 1 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	100	70-130
Toluene-d8	100	70-130
4-Bromofluorobenzene	99	70-130

AIR TOXICS LTD.

SAMPLE NAME: SSG-3B

ID#: 0403418R1-05A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**s032411**	**Date of Collection:**	**3/22/04**
Dil. Factor:	**1.68**	**Date of Analysis:**	**3/24/04 05:24 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	0.84	24	4.2	120
Freon 114	0.84	1.1	6.0	7.6
Vinyl Chloride	0.84	Not Detected	2.2	Not Detected
Bromomethane	0.84	Not Detected	3.3	Not Detected
Chloroethane	0.84	Not Detected	2.2	Not Detected
Freon 11	0.84	1.9	4.8	11
1,1-Dichloroethene	0.84	Not Detected	3.4	Not Detected
Freon 113	0.84	Not Detected	6.5	Not Detected
Methylene Chloride	0.84	Not Detected	3.0	Not Detected
1,1-Dichloroethane	0.84	Not Detected	3.4	Not Detected
cis-1,2-Dichloroethene	0.84	Not Detected	3.4	Not Detected
Chloroform	0.84	Not Detected	4.2	Not Detected
1,1,1-Trichloroethane	0.84	Not Detected	4.6	Not Detected
Carbon Tetrachloride	0.84	Not Detected	5.4	Not Detected
Benzene	0.84	3.0	2.7	9.9
1,2-Dichloroethane	0.84	Not Detected	3.4	Not Detected
Trichloroethene	0.84	Not Detected	4.6	Not Detected
1,2-Dichloropropane	0.84	Not Detected	3.9	Not Detected
cis-1,3-Dichloropropene	0.84	Not Detected	3.9	Not Detected
Toluene	0.84	94	3.2	360
trans-1,3-Dichloropropene	0.84	Not Detected	3.9	Not Detected
1,1,2-Trichloroethane	0.84	Not Detected	4.6	Not Detected
Tetrachloroethene	0.84	70	5.8	480
1,2-Dibromoethane (EDB)	0.84	Not Detected	6.6	Not Detected
Chlorobenzene	0.84	Not Detected	3.9	Not Detected
Ethyl Benzene	0.84	13	3.7	57
m,p-Xylene	0.84	60	3.7	260
o-Xylene	0.84	20	3.7	90
Styrene	0.84	Not Detected	3.6	Not Detected
1,1,2,2-Tetrachloroethane	0.84	Not Detected	5.9	Not Detected
1,3,5-Trimethylbenzene	0.84	5.4	4.2	27
1,2,4-Trimethylbenzene	0.84	19	4.2	97
1,3-Dichlorobenzene	0.84	Not Detected	5.1	Not Detected
1,4-Dichlorobenzene	0.84	Not Detected	5.1	Not Detected
alpha-Chlorotoluene	0.84	Not Detected	4.4	Not Detected
1,2-Dichlorobenzene	0.84	Not Detected	5.1	Not Detected
1,3-Butadiene	0.84	Not Detected	1.9	Not Detected
Hexane	0.84	1.7	3.0	6.1
Cyclohexane	0.84	Not Detected	2.9	Not Detected
Bromodichloromethane	0.84	Not Detected	5.7	Not Detected
Dibromochloromethane	0.84	Not Detected	7.3	Not Detected
Heptane	0.84	1.9	3.5	8.0

AIR TOXICS LTD.

SAMPLE NAME: SSG-3B

ID#: 0403418R1-05A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**s032411**	**Date of Collection:**	**3/22/04**
Dil. Factor:	**1.68**	**Date of Analysis:**	**3/24/04 05:24 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Cumene	0.84	Not Detected	4.2	Not Detected
Propylbenzene	0.84	3.2	4.2	16
Chloromethane	3.4	Not Detected	7.0	Not Detected
1,2,4-Trichlorobenzene	3.4	Not Detected	25	Not Detected
Hexachlorobutadiene	3.4	Not Detected	36	Not Detected
Acetone	3.4	88	8.1	210
Carbon Disulfide	3.4	Not Detected	11	Not Detected
2-Propanol	3.4	Not Detected	8.4	Not Detected
trans-1,2-Dichloroethene	3.4	Not Detected	14	Not Detected
Vinyl Acetate	3.4	Not Detected	12	Not Detected
2-Butanone (Methyl Ethyl Ketone)	3.4	12	10	36
Tetrahydrofuran	3.4	Not Detected	10	Not Detected
1,4-Dioxane	3.4	Not Detected	12	Not Detected
4-Methyl-2-pentanone	3.4	Not Detected	14	Not Detected
2-Hexanone	3.4	Not Detected	14	Not Detected
Ethanol	3.4	3.9	6.4	7.4
Bromoform	3.4	Not Detected	35	Not Detected
4-Ethyltoluene	3.4	20	17	100
Methyl tert-butyl ether	3.4	Not Detected	12	Not Detected
TPH ref. to Gasoline (MW=100)	17	430	70	1800

Container Type: 1 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	101	70-130
Toluene-d8	99	70-130
4-Bromofluorobenzene	98	70-130

AIR TOXICS LTD.

SAMPLE NAME: SSG-2

ID#: 0403418R1-06A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**s032412**	**Date of Collection:**	**3/22/04**
Dil. Factor:	**1.71**	**Date of Analysis:**	**3/24/04 06:25 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	0.86	8.9	4.3	44
Freon 114	0.86	Not Detected	6.1	Not Detected
Vinyl Chloride	0.86	Not Detected	2.2	Not Detected
Bromomethane	0.86	Not Detected	3.4	Not Detected
Chloroethane	0.86	Not Detected	2.3	Not Detected
Freon 11	0.86	Not Detected	4.9	Not Detected
1,1-Dichloroethene	0.86	Not Detected	3.4	Not Detected
Freon 113	0.86	Not Detected	6.7	Not Detected
Methylene Chloride	0.86	Not Detected	3.0	Not Detected
1,1-Dichloroethane	0.86	Not Detected	3.5	Not Detected
cis-1,2-Dichloroethene	0.86	Not Detected	3.4	Not Detected
Chloroform	0.86	Not Detected	4.2	Not Detected
1,1,1-Trichloroethane	0.86	Not Detected	4.7	Not Detected
Carbon Tetrachloride	0.86	Not Detected	5.5	Not Detected
Benzene	0.86	12	2.8	38
1,2-Dichloroethane	0.86	Not Detected	3.5	Not Detected
Trichloroethene	0.86	Not Detected	4.7	Not Detected
1,2-Dichloropropane	0.86	Not Detected	4.0	Not Detected
cis-1,3-Dichloropropene	0.86	Not Detected	3.9	Not Detected
Toluene	0.86	150	3.3	570
trans-1,3-Dichloropropene	0.86	Not Detected	3.9	Not Detected
1,1,2-Trichloroethane	0.86	Not Detected	4.7	Not Detected
Tetrachloroethene	0.86	10	5.9	72
1,2-Dibromoethane (EDB)	0.86	Not Detected	6.7	Not Detected
Chlorobenzene	0.86	Not Detected	4.0	Not Detected
Ethyl Benzene	0.86	14	3.8	64
m,p-Xylene	0.86	63	3.8	280
o-Xylene	0.86	21	3.8	92
Styrene	0.86	Not Detected	3.7	Not Detected
1,1,2,2-Tetrachloroethane	0.86	Not Detected	6.0	Not Detected
1,3,5-Trimethylbenzene	0.86	4.6	4.3	23
1,2,4-Trimethylbenzene	0.86	17	4.3	84
1,3-Dichlorobenzene	0.86	Not Detected	5.2	Not Detected
1,4-Dichlorobenzene	0.86	Not Detected	5.2	Not Detected
alpha-Chlorotoluene	0.86	Not Detected	4.5	Not Detected
1,2-Dichlorobenzene	0.86	Not Detected	5.2	Not Detected
1,3-Butadiene	0.86	7.1	1.9	16
Hexane	0.86	7.1	3.1	25
Cyclohexane	0.86	1.1	3.0	3.7
Bromodichloromethane	0.86	Not Detected	5.8	Not Detected
Dibromochloromethane	0.86	Not Detected	7.4	Not Detected
Heptane	0.86	5.0	3.6	21

AIR TOXICS LTD.

SAMPLE NAME: SSG-2

ID#: 0403418R1-06A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**s032412**	**Date of Collection:**	**3/22/04**
Dil. Factor:	**1.71**	**Date of Analysis:**	**3/24/04 06:25 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Cumene	0.86	Not Detected	4.3	Not Detected
Propylbenzene	0.86	2.9	4.3	14
Chloromethane	3.4	Not Detected	7.2	Not Detected
1,2,4-Trichlorobenzene	3.4	Not Detected	26	Not Detected
Hexachlorobutadiene	3.4	Not Detected	37	Not Detected
Acetone	3.4	220	8.2	520
Carbon Disulfide	3.4	10	11	32
2-Propanol	3.4	Not Detected	8.5	Not Detected
trans-1,2-Dichloroethene	3.4	Not Detected	14	Not Detected
Vinyl Acetate	3.4	Not Detected	12	Not Detected
2-Butanone (Methyl Ethyl Ketone)	3.4	33	10	99
Tetrahydrofuran	3.4	Not Detected	10	Not Detected
1,4-Dioxane	3.4	Not Detected	12	Not Detected
4-Methyl-2-pentanone	3.4	Not Detected	14	Not Detected
2-Hexanone	3.4	5.8	14	24
Ethanol	3.4	8.2	6.5	16
Bromoform	3.4	Not Detected	36	Not Detected
4-Ethyltoluene	3.4	18	17	89
Methyl tert-butyl ether	3.4	Not Detected	12	Not Detected
TPH ref. to Gasoline (MW=100)	17	800	71	3300

Container Type: 1 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	99	70-130
Toluene-d8	102	70-130
4-Bromofluorobenzene	98	70-130

AIR TOXICS LTD.

SAMPLE NAME: SSG-1

ID#: 0403418R1-07A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**s032413**	**Date of Collection:**	**3/22/04**
Dil. Factor:	**1.75**	**Date of Analysis:**	**3/24/04 07:06 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	0.88	Not Detected	4.4	Not Detected
Freon 114	0.88	Not Detected	6.2	Not Detected
Vinyl Chloride	0.88	Not Detected	2.3	Not Detected
Bromomethane	0.88	Not Detected	3.4	Not Detected
Chloroethane	0.88	Not Detected	2.3	Not Detected
Freon 11	0.88	Not Detected	5.0	Not Detected
1,1-Dichloroethene	0.88	Not Detected	3.5	Not Detected
Freon 113	0.88	Not Detected	6.8	Not Detected
Methylene Chloride	0.88	Not Detected	3.1	Not Detected
1,1-Dichloroethane	0.88	Not Detected	3.6	Not Detected
cis-1,2-Dichloroethene	0.88	Not Detected	3.5	Not Detected
Chloroform	0.88	Not Detected	4.3	Not Detected
1,1,1-Trichloroethane	0.88	Not Detected	4.8	Not Detected
Carbon Tetrachloride	0.88	Not Detected	5.6	Not Detected
Benzene	0.88	6.7	2.8	22
1,2-Dichloroethane	0.88	Not Detected	3.6	Not Detected
Trichloroethene	0.88	Not Detected	4.8	Not Detected
1,2-Dichloropropane	0.88	Not Detected	4.1	Not Detected
cis-1,3-Dichloropropene	0.88	Not Detected	4.0	Not Detected
Toluene	0.88	91	3.4	350
trans-1,3-Dichloropropene	0.88	Not Detected	4.0	Not Detected
1,1,2-Trichloroethane	0.88	Not Detected	4.8	Not Detected
Tetrachloroethene	0.88	1.7	6.0	12
1,2-Dibromoethane (EDB)	0.88	Not Detected	6.8	Not Detected
Chlorobenzene	0.88	Not Detected	4.1	Not Detected
Ethyl Benzene	0.88	11	3.9	48
m,p-Xylene	0.88	51	3.9	220
o-Xylene	0.88	17	3.9	76
Styrene	0.88	Not Detected	3.8	Not Detected
1,1,2,2-Tetrachloroethane	0.88	Not Detected	6.1	Not Detected
1,3,5-Trimethylbenzene	0.88	4.4	4.4	22
1,2,4-Trimethylbenzene	0.88	17	4.4	84
1,3-Dichlorobenzene	0.88	Not Detected	5.3	Not Detected
1,4-Dichlorobenzene	0.88	Not Detected	5.3	Not Detected
alpha-Chlorotoluene	0.88	Not Detected	4.6	Not Detected
1,2-Dichlorobenzene	0.88	Not Detected	5.3	Not Detected
1,3-Butadiene	0.88	13	2.0	29
Hexane	0.88	8.4	3.1	30
Cyclohexane	0.88	1.2	3.1	4.1
Bromodichloromethane	0.88	Not Detected	6.0	Not Detected
Dibromochloromethane	0.88	Not Detected	7.6	Not Detected
Heptane	0.88	4.4	3.6	18

AIR TOXICS LTD.

SAMPLE NAME: SSG-1

ID#: 0403418R1-07A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**s032413**	**Date of Collection:**	**3/22/04**
Dil. Factor:	**1.75**	**Date of Analysis:**	**3/24/04 07:06 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Cumene	0.88	Not Detected	4.4	Not Detected
Propylbenzene	0.88	2.7	4.4	13
Chloromethane	3.5	Not Detected	7.3	Not Detected
1,2,4-Trichlorobenzene	3.5	Not Detected	26	Not Detected
Hexachlorobutadiene	3.5	Not Detected	38	Not Detected
Acetone	3.5	210	8.4	520
Carbon Disulfide	3.5	Not Detected	11	Not Detected
2-Propanol	3.5	Not Detected	8.7	Not Detected
trans-1,2-Dichloroethene	3.5	Not Detected	14	Not Detected
Vinyl Acetate	3.5	Not Detected	12	Not Detected
2-Butanone (Methyl Ethyl Ketone)	3.5	31	10	92
Tetrahydrofuran	3.5	Not Detected	10	Not Detected
1,4-Dioxane	3.5	Not Detected	13	Not Detected
4-Methyl-2-pentanone	3.5	Not Detected	14	Not Detected
2-Hexanone	3.5	3.8	14	16
Ethanol	3.5	12	6.7	22
Bromoform	3.5	Not Detected	37	Not Detected
4-Ethyltoluene	3.5	17	17	84
Methyl tert-butyl ether	3.5	Not Detected	13	Not Detected
TPH ref. to Gasoline (MW=100)	18	780	73	3200

Container Type: 1 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	98	70-130
Toluene-d8	102	70-130
4-Bromofluorobenzene	100	70-130

AIR TOXICS LTD.

SAMPLE NAME: SSG-38

ID#: 0403418R1-08A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**s032414**	**Date of Collection:**	**3/22/04**
Dil. Factor:	**1.87**	**Date of Analysis:**	**3/24/04 07:47 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	0.94	Not Detected	4.7	Not Detected
Freon 114	0.94	Not Detected	6.6	Not Detected
Vinyl Chloride	0.94	Not Detected	2.4	Not Detected
Bromomethane	0.94	Not Detected	3.7	Not Detected
Chloroethane	0.94	5.0	2.5	14
Freon 11	0.94	Not Detected	5.3	Not Detected
1,1-Dichloroethene	0.94	Not Detected	3.8	Not Detected
Freon 113	0.94	Not Detected	7.3	Not Detected
Methylene Chloride	0.94	Not Detected	3.3	Not Detected
1,1-Dichloroethane	0.94	Not Detected	3.8	Not Detected
cis-1,2-Dichloroethene	0.94	Not Detected	3.8	Not Detected
Chloroform	0.94	Not Detected	4.6	Not Detected
1,1,1-Trichloroethane	0.94	Not Detected	5.2	Not Detected
Carbon Tetrachloride	0.94	Not Detected	6.0	Not Detected
Benzene	0.94	4.9	3.0	16
1,2-Dichloroethane	0.94	Not Detected	3.8	Not Detected
Trichloroethene	0.94	2.9	5.1	16
1,2-Dichloropropane	0.94	Not Detected	4.4	Not Detected
cis-1,3-Dichloropropene	0.94	Not Detected	4.3	Not Detected
Toluene	0.94	130	3.6	510
trans-1,3-Dichloropropene	0.94	Not Detected	4.3	Not Detected
1,1,2-Trichloroethane	0.94	Not Detected	5.2	Not Detected
Tetrachloroethene	0.94	14	6.4	97
1,2-Dibromoethane (EDB)	0.94	Not Detected	7.3	Not Detected
Chlorobenzene	0.94	Not Detected	4.4	Not Detected
Ethyl Benzene	0.94	14	4.1	63
m,p-Xylene	0.94	62	4.1	280
o-Xylene	0.94	21	4.1	93
Styrene	0.94	Not Detected	4.0	Not Detected
1,1,2,2-Tetrachloroethane	0.94	Not Detected	6.5	Not Detected
1,3,5-Trimethylbenzene	0.94	5.0	4.7	25
1,2,4-Trimethylbenzene	0.94	18	4.7	91
1,3-Dichlorobenzene	0.94	Not Detected	5.7	Not Detected
1,4-Dichlorobenzene	0.94	Not Detected	5.7	Not Detected
alpha-Chlorotoluene	0.94	Not Detected	4.9	Not Detected
1,2-Dichlorobenzene	0.94	Not Detected	5.7	Not Detected
1,3-Butadiene	0.94	4.0	2.1	8.9
Hexane	0.94	6.0	3.3	21
Cyclohexane	0.94	1.4	3.3	5.0
Bromodichloromethane	0.94	Not Detected	6.4	Not Detected
Dibromochloromethane	0.94	Not Detected	8.1	Not Detected
Heptane	0.94	3.1	3.9	13

AIR TOXICS LTD.

SAMPLE NAME: SSG-38

ID#: 0403418R1-08A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**s032414**	**Date of Collection:**	**3/22/04**
Dil. Factor:	**1.87**	**Date of Analysis:**	**3/24/04 07:47 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Cumene	0.94	Not Detected	4.7	Not Detected
Propylbenzene	0.94	3.1	4.7	15
Chloromethane	3.7	Not Detected	7.8	Not Detected
1,2,4-Trichlorobenzene	3.7	Not Detected	28	Not Detected
Hexachlorobutadiene	3.7	Not Detected	40	Not Detected
Acetone	3.7	290	9.0	690
Carbon Disulfide	3.7	Not Detected	12	Not Detected
2-Propanol	3.7	Not Detected	9.3	Not Detected
trans-1,2-Dichloroethene	3.7	Not Detected	15	Not Detected
Vinyl Acetate	3.7	Not Detected	13	Not Detected
2-Butanone (Methyl Ethyl Ketone)	3.7	63	11	190
Tetrahydrofuran	3.7	Not Detected	11	Not Detected
1,4-Dioxane	3.7	Not Detected	14	Not Detected
4-Methyl-2-pentanone	3.7	Not Detected	16	Not Detected
2-Hexanone	3.7	11	16	45
Ethanol	3.7	42	7.2	80
Bromoform	3.7	Not Detected	39	Not Detected
4-Ethyltoluene	3.7	19	19	94
Methyl tert-butyl ether	3.7	Not Detected	14	Not Detected
TPH ref. to Gasoline (MW=100)	19	1000	78	4200

Container Type: 1 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	99	70-130
Toluene-d8	101	70-130
4-Bromofluorobenzene	104	70-130

AIR TOXICS LTD.

SAMPLE NAME: SSG-12

ID#: 0403418R1-09A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**i032409**	**Date of Collection:**	**3/22/04**
Dil. Factor:	**1.83**	**Date of Analysis:**	**3/24/04 03:36 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	0.92	28	4.6	140
Freon 114	0.92	1.3	6.5	9.6
Vinyl Chloride	0.92	Not Detected	2.4	Not Detected
Bromomethane	0.92	Not Detected	3.6	Not Detected
Chloroethane	0.92	Not Detected	2.4	Not Detected
Freon 11	0.92	2.0	5.2	11
1,1-Dichloroethene	0.92	Not Detected	3.7	Not Detected
Freon 113	0.92	Not Detected	7.1	Not Detected
Methylene Chloride	0.92	Not Detected	3.2	Not Detected
1,1-Dichloroethane	0.92	Not Detected	3.8	Not Detected
cis-1,2-Dichloroethene	0.92	Not Detected	3.7	Not Detected
Chloroform	0.92	Not Detected	4.5	Not Detected
1,1,1-Trichloroethane	0.92	Not Detected	5.1	Not Detected
Carbon Tetrachloride	0.92	Not Detected	5.8	Not Detected
Benzene	0.92	8.7	3.0	28
1,2-Dichloroethane	0.92	Not Detected	3.8	Not Detected
Trichloroethene	0.92	Not Detected	5.0	Not Detected
1,2-Dichloropropane	0.92	Not Detected	4.3	Not Detected
cis-1,3-Dichloropropene	0.92	Not Detected	4.2	Not Detected
Toluene	0.92	130	3.5	510
trans-1,3-Dichloropropene	0.92	Not Detected	4.2	Not Detected
1,1,2-Trichloroethane	0.92	Not Detected	5.1	Not Detected
Tetrachloroethene	0.92	6.6	6.3	45
1,2-Dibromoethane (EDB)	0.92	Not Detected	7.1	Not Detected
Chlorobenzene	0.92	Not Detected	4.3	Not Detected
Ethyl Benzene	0.92	16	4.0	69
m,p-Xylene	0.92	74	4.0	330
o-Xylene	0.92	26	4.0	110
Styrene	0.92	1.5	4.0	6.6
1,1,2,2-Tetrachloroethane	0.92	Not Detected	6.4	Not Detected
1,3,5-Trimethylbenzene	0.92	6.4	4.6	32
1,2,4-Trimethylbenzene	0.92	22	4.6	110
1,3-Dichlorobenzene	0.92	Not Detected	5.6	Not Detected
1,4-Dichlorobenzene	0.92	Not Detected	5.6	Not Detected
alpha-Chlorotoluene	0.92	Not Detected	4.8	Not Detected
1,2-Dichlorobenzene	0.92	Not Detected	5.6	Not Detected
1,3-Butadiene	0.92	4.4	2.0	10
Hexane	0.92	6.3	3.3	23
Cyclohexane	0.92	Not Detected	3.2	Not Detected
Bromodichloromethane	0.92	Not Detected	6.2	Not Detected
Dibromochloromethane	0.92	Not Detected	7.9	Not Detected
Heptane	0.92	4.6	3.8	19

AIR TOXICS LTD.

SAMPLE NAME: SSG-12

ID#: 0403418R1-09A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**i032409**	**Date of Collection:**	**3/22/04**
Dil. Factor:	**1.83**	**Date of Analysis:**	**3/24/04 03:36 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Cumene	0.92	Not Detected	4.6	Not Detected
Propylbenzene	0.92	3.5	4.6	18
Chloromethane	3.7	Not Detected	7.7	Not Detected
1,2,4-Trichlorobenzene	3.7	Not Detected	28	Not Detected
Hexachlorobutadiene	3.7	Not Detected	40	Not Detected
Acetone	3.7	380 E	8.8	900 E
Carbon Disulfide	3.7	5.2	12	16
2-Propanol	3.7	5.4	9.1	13
trans-1,2-Dichloroethene	3.7	Not Detected	15	Not Detected
Vinyl Acetate	3.7	Not Detected	13	Not Detected
2-Butanone (Methyl Ethyl Ketone)	3.7	56	11	170
Tetrahydrofuran	3.7	Not Detected	11	Not Detected
1,4-Dioxane	3.7	Not Detected	13	Not Detected
4-Methyl-2-pentanone	3.7	Not Detected	15	Not Detected
2-Hexanone	3.7	7.0	15	29
Ethanol	3.7	42	7.0	82
Bromoform	3.7	Not Detected	38	Not Detected
4-Ethyltoluene	3.7	23	18	120
Methyl tert-butyl ether	3.7	Not Detected	13	Not Detected
TPH ref. to Gasoline (MW=100)	18	1700	76	7100

E = Exceeds instrument calibration range.

Container Type: 1 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	100	70-130
Toluene-d8	101	70-130
4-Bromofluorobenzene	101	70-130

AIR TOXICS LTD.

SAMPLE NAME: SSG-12 Duplicate

ID#: 0403418R1-09AA

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**i032408**	**Date of Collection: 3/22/04**	
Dil. Factor:	**7.32**	**Date of Analysis: 3/24/04 02:43 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	3.7	25	18	130
Freon 114	3.7	Not Detected	26	Not Detected
Vinyl Chloride	3.7	Not Detected	9.5	Not Detected
Bromomethane	3.7	Not Detected	14	Not Detected
Chloroethane	3.7	Not Detected	9.8	Not Detected
Freon 11	3.7	Not Detected	21	Not Detected
1,1-Dichloroethene	3.7	Not Detected	15	Not Detected
Freon 113	3.7	Not Detected	28	Not Detected
Methylene Chloride	3.7	Not Detected	13	Not Detected
1,1-Dichloroethane	3.7	Not Detected	15	Not Detected
cis-1,2-Dichloroethene	3.7	Not Detected	15	Not Detected
Chloroform	3.7	Not Detected	18	Not Detected
1,1,1-Trichloroethane	3.7	Not Detected	20	Not Detected
Carbon Tetrachloride	3.7	Not Detected	23	Not Detected
Benzene	3.7	9.1	12	30
1,2-Dichloroethane	3.7	Not Detected	15	Not Detected
Trichloroethene	3.7	Not Detected	20	Not Detected
1,2-Dichloropropane	3.7	Not Detected	17	Not Detected
cis-1,3-Dichloropropene	3.7	Not Detected	17	Not Detected
Toluene	3.7	130	14	490
trans-1,3-Dichloropropene	3.7	Not Detected	17	Not Detected
1,1,2-Trichloroethane	3.7	Not Detected	20	Not Detected
Tetrachloroethene	3.7	6.6	25	45
1,2-Dibromoethane (EDB)	3.7	Not Detected	28	Not Detected
Chlorobenzene	3.7	Not Detected	17	Not Detected
Ethyl Benzene	3.7	16	16	69
m,p-Xylene	3.7	70	16	310
o-Xylene	3.7	24	16	100
Styrene	3.7	Not Detected	16	Not Detected
1,1,2,2-Tetrachloroethane	3.7	Not Detected	26	Not Detected
1,3,5-Trimethylbenzene	3.7	6.4	18	32
1,2,4-Trimethylbenzene	3.7	22	18	110
1,3-Dichlorobenzene	3.7	Not Detected	22	Not Detected
1,4-Dichlorobenzene	3.7	Not Detected	22	Not Detected
alpha-Chlorotoluene	3.7	Not Detected	19	Not Detected
1,2-Dichlorobenzene	3.7	Not Detected	22	Not Detected
1,3-Butadiene	3.7	4.8	8.2	11
Hexane	3.7	6.2	13	22
Cyclohexane	3.7	Not Detected	13	Not Detected
Bromodichloromethane	3.7	Not Detected	25	Not Detected
Dibromochloromethane	3.7	Not Detected	32	Not Detected
Heptane	3.7	4.2	15	17

AIR TOXICS LTD.

SAMPLE NAME: SSG-12 Duplicate

ID#: 0403418R1-09AA

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**i032408**	**Date of Collection:**	**3/22/04**
Dil. Factor:	**7.32**	**Date of Analysis:**	**3/24/04 02:43 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Cumene	3.7	Not Detected	18	Not Detected
Propylbenzene	3.7	Not Detected	18	Not Detected
Chloromethane	15	Not Detected	31	Not Detected
1,2,4-Trichlorobenzene	15	Not Detected	110	Not Detected
Hexachlorobutadiene	15	Not Detected	160	Not Detected
Acetone	15	360	35	870
Carbon Disulfide	15	Not Detected	46	Not Detected
2-Propanol	15	Not Detected	36	Not Detected
trans-1,2-Dichloroethene	15	Not Detected	59	Not Detected
Vinyl Acetate	15	Not Detected	52	Not Detected
2-Butanone (Methyl Ethyl Ketone)	15	54	44	160
Tetrahydrofuran	15	Not Detected	44	Not Detected
1,4-Dioxane	15	Not Detected	54	Not Detected
4-Methyl-2-pentanone	15	Not Detected	61	Not Detected
2-Hexanone	15	Not Detected	61	Not Detected
Ethanol	15	42	28	81
Bromoform	15	Not Detected	150	Not Detected
4-Ethyltoluene	15	21	73	110
Methyl tert-butyl ether	15	Not Detected	54	Not Detected
TPH ref. to Gasoline (MW=100)	73	1500	300	6200

Container Type: 1 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	99	70-130
Toluene-d8	100	70-130
4-Bromofluorobenzene	95	70-130

AIR TOXICS LTD.

SAMPLE NAME: SSG-11

ID#: 0403418R1-10A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**s032415**	**Date of Collection:**	**3/22/04**
Dil. Factor:	**2.01**	**Date of Analysis:**	**3/24/04 08:28 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	1.0	13	5.0	67
Freon 114	1.0	Not Detected	7.1	Not Detected
Vinyl Chloride	1.0	Not Detected	2.6	Not Detected
Bromomethane	1.0	Not Detected	4.0	Not Detected
Chloroethane	1.0	Not Detected	2.7	Not Detected
Freon 11	1.0	1.1	5.7	6.1
1,1-Dichloroethene	1.0	Not Detected	4.0	Not Detected
Freon 113	1.0	Not Detected	7.8	Not Detected
Methylene Chloride	1.0	Not Detected	3.5	Not Detected
1,1-Dichloroethane	1.0	Not Detected	4.1	Not Detected
cis-1,2-Dichloroethene	1.0	Not Detected	4.0	Not Detected
Chloroform	1.0	Not Detected	5.0	Not Detected
1,1,1-Trichloroethane	1.0	Not Detected	5.6	Not Detected
Carbon Tetrachloride	1.0	Not Detected	6.4	Not Detected
Benzene	1.0	7.4	3.3	24
1,2-Dichloroethane	1.0	Not Detected	4.1	Not Detected
Trichloroethene	1.0	Not Detected	5.5	Not Detected
1,2-Dichloropropane	1.0	Not Detected	4.7	Not Detected
cis-1,3-Dichloropropene	1.0	Not Detected	4.6	Not Detected
Toluene	1.0	120	3.8	470
trans-1,3-Dichloropropene	1.0	Not Detected	4.6	Not Detected
1,1,2-Trichloroethane	1.0	Not Detected	5.6	Not Detected
Tetrachloroethene	1.0	9.5	6.9	65
1,2-Dibromoethane (EDB)	1.0	Not Detected	7.8	Not Detected
Chlorobenzene	1.0	Not Detected	4.7	Not Detected
Ethyl Benzene	1.0	13	4.4	56
m,p-Xylene	1.0	56	4.4	250
o-Xylene	1.0	19	4.4	83
Styrene	1.0	Not Detected	4.4	Not Detected
1,1,2,2-Tetrachloroethane	1.0	Not Detected	7.0	Not Detected
1,3,5-Trimethylbenzene	1.0	4.5	5.0	22
1,2,4-Trimethylbenzene	1.0	16	5.0	82
1,3-Dichlorobenzene	1.0	Not Detected	6.1	Not Detected
1,4-Dichlorobenzene	1.0	Not Detected	6.1	Not Detected
alpha-Chlorotoluene	1.0	Not Detected	5.3	Not Detected
1,2-Dichlorobenzene	1.0	Not Detected	6.1	Not Detected
1,3-Butadiene	1.0	1.8	2.2	4.0
Hexane	1.0	9.3	3.6	33
Cyclohexane	1.0	5.5	3.5	19
Bromodichloromethane	1.0	Not Detected	6.8	Not Detected
Dibromochloromethane	1.0	Not Detected	8.7	Not Detected
Heptane	1.0	3.2	4.2	13

AIR TOXICS LTD.

SAMPLE NAME: SSG-11

ID#: 0403418R1-10A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**s032415**	**Date of Collection:**	**3/22/04**
Dil. Factor:	**2.01**	**Date of Analysis:**	**3/24/04 08:28 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Cumene	1.0	Not Detected	5.0	Not Detected
Propylbenzene	1.0	2.7	5.0	13
Chloromethane	4.0	Not Detected	8.4	Not Detected
1,2,4-Trichlorobenzene	4.0	Not Detected	30	Not Detected
Hexachlorobutadiene	4.0	Not Detected	44	Not Detected
Acetone	4.0	380	9.7	930
Carbon Disulfide	4.0	Not Detected	13	Not Detected
2-Propanol	4.0	Not Detected	10	Not Detected
trans-1,2-Dichloroethene	4.0	Not Detected	16	Not Detected
Vinyl Acetate	4.0	Not Detected	14	Not Detected
2-Butanone (Methyl Ethyl Ketone)	4.0	35	12	100
Tetrahydrofuran	4.0	Not Detected	12	Not Detected
1,4-Dioxane	4.0	Not Detected	15	Not Detected
4-Methyl-2-pentanone	4.0	Not Detected	17	Not Detected
2-Hexanone	4.0	5.0	17	21
Ethanol	4.0	11	7.7	21
Bromoform	4.0	Not Detected	42	Not Detected
4-Ethyltoluene	4.0	17	20	83
Methyl tert-butyl ether	4.0	Not Detected	15	Not Detected
TPH ref. to Gasoline (MW=100)	20	1000	84	4200

Container Type: 1 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	100	70-130
Toluene-d8	101	70-130
4-Bromofluorobenzene	99	70-130

AIR TOXICS LTD.

SAMPLE NAME: SSG-10X

ID#: 0403418R1-12A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**s032416**	**Date of Collection:**	**3/22/04**
Dil. Factor:	**1.87**	**Date of Analysis:**	**3/24/04 10:14 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	0.94	6.6	4.7	33
Freon 114	0.94	Not Detected	6.6	Not Detected
Vinyl Chloride	0.94	Not Detected	2.4	Not Detected
Bromomethane	0.94	Not Detected	3.7	Not Detected
Chloroethane	0.94	Not Detected	2.5	Not Detected
Freon 11	0.94	Not Detected	5.3	Not Detected
1,1-Dichloroethene	0.94	Not Detected	3.8	Not Detected
Freon 113	0.94	Not Detected	7.3	Not Detected
Methylene Chloride	0.94	Not Detected	3.3	Not Detected
1,1-Dichloroethane	0.94	Not Detected	3.8	Not Detected
cis-1,2-Dichloroethene	0.94	Not Detected	3.8	Not Detected
Chloroform	0.94	Not Detected	4.6	Not Detected
1,1,1-Trichloroethane	0.94	Not Detected	5.2	Not Detected
Carbon Tetrachloride	0.94	Not Detected	6.0	Not Detected
Benzene	0.94	6.9	3.0	22
1,2-Dichloroethane	0.94	Not Detected	3.8	Not Detected
Trichloroethene	0.94	Not Detected	5.1	Not Detected
1,2-Dichloropropane	0.94	Not Detected	4.4	Not Detected
cis-1,3-Dichloropropene	0.94	Not Detected	4.3	Not Detected
Toluene	0.94	110	3.6	420
trans-1,3-Dichloropropene	0.94	Not Detected	4.3	Not Detected
1,1,2-Trichloroethane	0.94	Not Detected	5.2	Not Detected
Tetrachloroethene	0.94	7.2	6.4	50
1,2-Dibromoethane (EDB)	0.94	Not Detected	7.3	Not Detected
Chlorobenzene	0.94	Not Detected	4.4	Not Detected
Ethyl Benzene	0.94	13	4.1	57
m,p-Xylene	0.94	58	4.1	260
o-Xylene	0.94	20	4.1	89
Styrene	0.94	Not Detected	4.0	Not Detected
1,1,2,2-Tetrachloroethane	0.94	Not Detected	6.5	Not Detected
1,3,5-Trimethylbenzene	0.94	5.2	4.7	26
1,2,4-Trimethylbenzene	0.94	20	4.7	98
1,3-Dichlorobenzene	0.94	Not Detected	5.7	Not Detected
1,4-Dichlorobenzene	0.94	Not Detected	5.7	Not Detected
alpha-Chlorotoluene	0.94	Not Detected	4.9	Not Detected
1,2-Dichlorobenzene	0.94	Not Detected	5.7	Not Detected
1,3-Butadiene	0.94	2.6	2.1	5.8
Hexane	0.94	6.7	3.3	24
Cyclohexane	0.94	2.8	3.3	10
Bromodichloromethane	0.94	Not Detected	6.4	Not Detected
Dibromochloromethane	0.94	Not Detected	8.1	Not Detected
Heptane	0.94	3.2	3.9	13

AIR TOXICS LTD.

SAMPLE NAME: SSG-10X

ID#: 0403418R1-12A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**s032416**	**Date of Collection:**	**3/22/04**
Dil. Factor:	**1.87**	**Date of Analysis:**	**3/24/04 10:14 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Cumene	0.94	Not Detected	4.7	Not Detected
Propylbenzene	0.94	3.0	4.7	15
Chloromethane	3.7	Not Detected	7.8	Not Detected
1,2,4-Trichlorobenzene	3.7	Not Detected	28	Not Detected
Hexachlorobutadiene	3.7	Not Detected	40	Not Detected
Acetone	3.7	290	9.0	710
Carbon Disulfide	3.7	Not Detected	12	Not Detected
2-Propanol	3.7	Not Detected	9.3	Not Detected
trans-1,2-Dichloroethene	3.7	Not Detected	15	Not Detected
Vinyl Acetate	3.7	Not Detected	13	Not Detected
2-Butanone (Methyl Ethyl Ketone)	3.7	22	11	66
Tetrahydrofuran	3.7	Not Detected	11	Not Detected
1,4-Dioxane	3.7	Not Detected	14	Not Detected
4-Methyl-2-pentanone	3.7	Not Detected	16	Not Detected
2-Hexanone	3.7	4.0	16	16
Ethanol	3.7	11	7.2	20
Bromoform	3.7	Not Detected	39	Not Detected
4-Ethyltoluene	3.7	19	19	96
Methyl tert-butyl ether	3.7	Not Detected	14	Not Detected
TPH ref. to Gasoline (MW=100)	19	890	78	3700

Container Type: 1 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	99	70-130
Toluene-d8	100	70-130
4-Bromofluorobenzene	101	70-130

AIR TOXICS LTD.

SAMPLE NAME: SSG-36A

ID#: 0403418R1-14A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**s032417**	**Date of Collection:**	**3/23/04**
Dil. Factor:	**2.12**	**Date of Analysis:**	**3/24/04 10:56 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	1.1	Not Detected	5.3	Not Detected
Freon 114	1.1	Not Detected	7.5	Not Detected
Vinyl Chloride	1.1	Not Detected	2.8	Not Detected
Bromomethane	1.1	Not Detected	4.2	Not Detected
Chloroethane	1.1	Not Detected	2.8	Not Detected
Freon 11	1.1	Not Detected	6.0	Not Detected
1,1-Dichloroethene	1.1	Not Detected	4.3	Not Detected
Freon 113	1.1	Not Detected	8.2	Not Detected
Methylene Chloride	1.1	Not Detected	3.7	Not Detected
1,1-Dichloroethane	1.1	Not Detected	4.4	Not Detected
cis-1,2-Dichloroethene	1.1	Not Detected	4.3	Not Detected
Chloroform	1.1	Not Detected	5.3	Not Detected
1,1,1-Trichloroethane	1.1	Not Detected	5.9	Not Detected
Carbon Tetrachloride	1.1	Not Detected	6.8	Not Detected
Benzene	1.1	Not Detected	3.4	Not Detected
1,2-Dichloroethane	1.1	Not Detected	4.4	Not Detected
Trichloroethene	1.1	Not Detected	5.8	Not Detected
1,2-Dichloropropane	1.1	Not Detected	5.0	Not Detected
cis-1,3-Dichloropropene	1.1	Not Detected	4.9	Not Detected
Toluene	1.1	1.6	4.0	6.2
trans-1,3-Dichloropropene	1.1	Not Detected	4.9	Not Detected
1,1,2-Trichloroethane	1.1	Not Detected	5.9	Not Detected
Tetrachloroethene	1.1	Not Detected	7.3	Not Detected
1,2-Dibromoethane (EDB)	1.1	Not Detected	8.3	Not Detected
Chlorobenzene	1.1	Not Detected	5.0	Not Detected
Ethyl Benzene	1.1	Not Detected	4.7	Not Detected
m,p-Xylene	1.1	1.7	4.7	7.7
o-Xylene	1.1	Not Detected	4.7	Not Detected
Styrene	1.1	Not Detected	4.6	Not Detected
1,1,2,2-Tetrachloroethane	1.1	Not Detected	7.4	Not Detected
1,3,5-Trimethylbenzene	1.1	Not Detected	5.3	Not Detected
1,2,4-Trimethylbenzene	1.1	Not Detected	5.3	Not Detected
1,3-Dichlorobenzene	1.1	Not Detected	6.5	Not Detected
1,4-Dichlorobenzene	1.1	Not Detected	6.5	Not Detected
alpha-Chlorotoluene	1.1	Not Detected	5.6	Not Detected
1,2-Dichlorobenzene	1.1	Not Detected	6.5	Not Detected
1,3-Butadiene	1.1	Not Detected	2.4	Not Detected
Hexane	1.1	Not Detected	3.8	Not Detected
Cyclohexane	1.1	Not Detected	3.7	Not Detected
Bromodichloromethane	1.1	Not Detected	7.2	Not Detected
Dibromochloromethane	1.1	Not Detected	9.2	Not Detected
Heptane	1.1	Not Detected	4.4	Not Detected

AIR TOXICS LTD.

SAMPLE NAME: SSG-36A

ID#: 0403418R1-14A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**s032417**	**Date of Collection:**	**3/23/04**
Dil. Factor:	**2.12**	**Date of Analysis:**	**3/24/04 10:56 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Cumene	1.1	Not Detected	5.3	Not Detected
Propylbenzene	1.1	Not Detected	5.3	Not Detected
Chloromethane	4.2	Not Detected	8.9	Not Detected
1,2,4-Trichlorobenzene	4.2	Not Detected	32	Not Detected
Hexachlorobutadiene	4.2	Not Detected	46	Not Detected
Acetone	4.2	8.2	10	20
Carbon Disulfide	4.2	Not Detected	13	Not Detected
2-Propanol	4.2	Not Detected	10	Not Detected
trans-1,2-Dichloroethene	4.2	Not Detected	17	Not Detected
Vinyl Acetate	4.2	Not Detected	15	Not Detected
2-Butanone (Methyl Ethyl Ketone)	4.2	Not Detected	13	Not Detected
Tetrahydrofuran	4.2	Not Detected	13	Not Detected
1,4-Dioxane	4.2	Not Detected	16	Not Detected
4-Methyl-2-pentanone	4.2	Not Detected	18	Not Detected
2-Hexanone	4.2	Not Detected	18	Not Detected
Ethanol	4.2	6.2	8.1	12
Bromoform	4.2	Not Detected	44	Not Detected
4-Ethyltoluene	4.2	Not Detected	21	Not Detected
Methyl tert-butyl ether	4.2	Not Detected	16	Not Detected
TPH ref. to Gasoline (MW=100)	21	35	88	140

Container Type: 1 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	98	70-130
Toluene-d8	102	70-130
4-Bromofluorobenzene	97	70-130

AIR TOXICS LTD.

SAMPLE NAME: SSG-36B

ID#: 0403418R1-15A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**s032418**	**Date of Collection:**	**3/23/04**
Dil. Factor:	**1.71**	**Date of Analysis:**	**3/24/04 11:37 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	0.86	Not Detected	4.3	Not Detected
Freon 114	0.86	Not Detected	6.1	Not Detected
Vinyl Chloride	0.86	Not Detected	2.2	Not Detected
Bromomethane	0.86	Not Detected	3.4	Not Detected
Chloroethane	0.86	Not Detected	2.3	Not Detected
Freon 11	0.86	Not Detected	4.9	Not Detected
1,1-Dichloroethene	0.86	Not Detected	3.4	Not Detected
Freon 113	0.86	Not Detected	6.7	Not Detected
Methylene Chloride	0.86	Not Detected	3.0	Not Detected
1,1-Dichloroethane	0.86	Not Detected	3.5	Not Detected
cis-1,2-Dichloroethene	0.86	Not Detected	3.4	Not Detected
Chloroform	0.86	Not Detected	4.2	Not Detected
1,1,1-Trichloroethane	0.86	Not Detected	4.7	Not Detected
Carbon Tetrachloride	0.86	Not Detected	5.5	Not Detected
Benzene	0.86	Not Detected	2.8	Not Detected
1,2-Dichloroethane	0.86	Not Detected	3.5	Not Detected
Trichloroethene	0.86	Not Detected	4.7	Not Detected
1,2-Dichloropropane	0.86	Not Detected	4.0	Not Detected
cis-1,3-Dichloropropene	0.86	Not Detected	3.9	Not Detected
Toluene	0.86	1.0	3.3	4.0
trans-1,3-Dichloropropene	0.86	Not Detected	3.9	Not Detected
1,1,2-Trichloroethane	0.86	Not Detected	4.7	Not Detected
Tetrachloroethene	0.86	Not Detected	5.9	Not Detected
1,2-Dibromoethane (EDB)	0.86	Not Detected	6.7	Not Detected
Chlorobenzene	0.86	Not Detected	4.0	Not Detected
Ethyl Benzene	0.86	Not Detected	3.8	Not Detected
m,p-Xylene	0.86	Not Detected	3.8	Not Detected
o-Xylene	0.86	Not Detected	3.8	Not Detected
Styrene	0.86	Not Detected	3.7	Not Detected
1,1,2,2-Tetrachloroethane	0.86	Not Detected	6.0	Not Detected
1,3,5-Trimethylbenzene	0.86	Not Detected	4.3	Not Detected
1,2,4-Trimethylbenzene	0.86	Not Detected	4.3	Not Detected
1,3-Dichlorobenzene	0.86	Not Detected	5.2	Not Detected
1,4-Dichlorobenzene	0.86	Not Detected	5.2	Not Detected
alpha-Chlorotoluene	0.86	Not Detected	4.5	Not Detected
1,2-Dichlorobenzene	0.86	Not Detected	5.2	Not Detected
1,3-Butadiene	0.86	Not Detected	1.9	Not Detected
Hexane	0.86	Not Detected	3.1	Not Detected
Cyclohexane	0.86	Not Detected	3.0	Not Detected
Bromodichloromethane	0.86	Not Detected	5.8	Not Detected
Dibromochloromethane	0.86	Not Detected	7.4	Not Detected
Heptane	0.86	Not Detected	3.6	Not Detected

AIR TOXICS LTD.

SAMPLE NAME: SSG-36B

ID#: 0403418R1-15A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**s032418**	**Date of Collection:**	**3/23/04**
Dil. Factor:	**1.71**	**Date of Analysis:**	**3/24/04 11:37 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Cumene	0.86	Not Detected	4.3	Not Detected
Propylbenzene	0.86	Not Detected	4.3	Not Detected
Chloromethane	3.4	Not Detected	7.2	Not Detected
1,2,4-Trichlorobenzene	3.4	Not Detected	26	Not Detected
Hexachlorobutadiene	3.4	Not Detected	37	Not Detected
Acetone	3.4	Not Detected	8.2	Not Detected
Carbon Disulfide	3.4	Not Detected	11	Not Detected
2-Propanol	3.4	Not Detected	8.5	Not Detected
trans-1,2-Dichloroethene	3.4	Not Detected	14	Not Detected
Vinyl Acetate	3.4	Not Detected	12	Not Detected
2-Butanone (Methyl Ethyl Ketone)	3.4	Not Detected	10	Not Detected
Tetrahydrofuran	3.4	Not Detected	10	Not Detected
1,4-Dioxane	3.4	Not Detected	12	Not Detected
4-Methyl-2-pentanone	3.4	Not Detected	14	Not Detected
2-Hexanone	3.4	Not Detected	14	Not Detected
Ethanol	3.4	Not Detected	6.5	Not Detected
Bromoform	3.4	Not Detected	36	Not Detected
4-Ethyltoluene	3.4	Not Detected	17	Not Detected
Methyl tert-butyl ether	3.4	Not Detected	12	Not Detected
TPH ref. to Gasoline (MW=100)	17	Not Detected	71	Not Detected

Container Type: 1 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	99	70-130
Toluene-d8	100	70-130
4-Bromofluorobenzene	97	70-130

AIR TOXICS LTD.

SAMPLE NAME: SSG-36B Duplicate

ID#: 0403418R1-15AA

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**i032415**	**Date of Collection: 3/23/04**	
Dil. Factor:	**1.71**	**Date of Analysis: 3/24/04 09:05 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	0.86	Not Detected	4.3	Not Detected
Freon 114	0.86	Not Detected	6.1	Not Detected
Vinyl Chloride	0.86	Not Detected	2.2	Not Detected
Bromomethane	0.86	Not Detected	3.4	Not Detected
Chloroethane	0.86	Not Detected	2.3	Not Detected
Freon 11	0.86	Not Detected	4.9	Not Detected
1,1-Dichloroethene	0.86	Not Detected	3.4	Not Detected
Freon 113	0.86	Not Detected	6.7	Not Detected
Methylene Chloride	0.86	Not Detected	3.0	Not Detected
1,1-Dichloroethane	0.86	Not Detected	3.5	Not Detected
cis-1,2-Dichloroethene	0.86	Not Detected	3.4	Not Detected
Chloroform	0.86	Not Detected	4.2	Not Detected
1,1,1-Trichloroethane	0.86	Not Detected	4.7	Not Detected
Carbon Tetrachloride	0.86	Not Detected	5.5	Not Detected
Benzene	0.86	Not Detected	2.8	Not Detected
1,2-Dichloroethane	0.86	Not Detected	3.5	Not Detected
Trichloroethene	0.86	Not Detected	4.7	Not Detected
1,2-Dichloropropane	0.86	Not Detected	4.0	Not Detected
cis-1,3-Dichloropropene	0.86	Not Detected	3.9	Not Detected
Toluene	0.86	1.8	3.3	6.9
trans-1,3-Dichloropropene	0.86	Not Detected	3.9	Not Detected
1,1,2-Trichloroethane	0.86	Not Detected	4.7	Not Detected
Tetrachloroethene	0.86	Not Detected	5.9	Not Detected
1,2-Dibromoethane (EDB)	0.86	Not Detected	6.7	Not Detected
Chlorobenzene	0.86	Not Detected	4.0	Not Detected
Ethyl Benzene	0.86	Not Detected	3.8	Not Detected
m,p-Xylene	0.86	1.2	3.8	5.1
o-Xylene	0.86	Not Detected	3.8	Not Detected
Styrene	0.86	Not Detected	3.7	Not Detected
1,1,2,2-Tetrachloroethane	0.86	Not Detected	6.0	Not Detected
1,3,5-Trimethylbenzene	0.86	Not Detected	4.3	Not Detected
1,2,4-Trimethylbenzene	0.86	Not Detected	4.3	Not Detected
1,3-Dichlorobenzene	0.86	Not Detected	5.2	Not Detected
1,4-Dichlorobenzene	0.86	Not Detected	5.2	Not Detected
alpha-Chlorotoluene	0.86	Not Detected	4.5	Not Detected
1,2-Dichlorobenzene	0.86	Not Detected	5.2	Not Detected
1,3-Butadiene	0.86	Not Detected	1.9	Not Detected
Hexane	0.86	Not Detected	3.1	Not Detected
Cyclohexane	0.86	Not Detected	3.0	Not Detected
Bromodichloromethane	0.86	Not Detected	5.8	Not Detected
Dibromochloromethane	0.86	Not Detected	7.4	Not Detected
Heptane	0.86	Not Detected	3.6	Not Detected

AIR TOXICS LTD.

SAMPLE NAME: SSG-36B Duplicate

ID#: 0403418R1-15AA

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**i032415**	**Date of Collection: 3/23/04**	
Dil. Factor:	**1.71**	**Date of Analysis: 3/24/04 09:05 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Cumene	0.86	Not Detected	4.3	Not Detected
Propylbenzene	0.86	Not Detected	4.3	Not Detected
Chloromethane	3.4	Not Detected	7.2	Not Detected
1,2,4-Trichlorobenzene	3.4	Not Detected	26	Not Detected
Hexachlorobutadiene	3.4	Not Detected	37	Not Detected
Acetone	3.4	3.6	8.2	8.8
Carbon Disulfide	3.4	Not Detected	11	Not Detected
2-Propanol	3.4	Not Detected	8.5	Not Detected
trans-1,2-Dichloroethene	3.4	Not Detected	14	Not Detected
Vinyl Acetate	3.4	Not Detected	12	Not Detected
2-Butanone (Methyl Ethyl Ketone)	3.4	Not Detected	10	Not Detected
Tetrahydrofuran	3.4	Not Detected	10	Not Detected
1,4-Dioxane	3.4	Not Detected	12	Not Detected
4-Methyl-2-pentanone	3.4	Not Detected	14	Not Detected
2-Hexanone	3.4	Not Detected	14	Not Detected
Ethanol	3.4	7.4	6.5	14
Bromoform	3.4	Not Detected	36	Not Detected
4-Ethyltoluene	3.4	Not Detected	17	Not Detected
Methyl tert-butyl ether	3.4	Not Detected	12	Not Detected
TPH ref. to Gasoline (MW=100)	17	20	71	83

Container Type: 1 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	101	70-130
Toluene-d8	97	70-130
4-Bromofluorobenzene	94	70-130

AIR TOXICS LTD.

SAMPLE NAME: SSG-9

ID#: 0403418R1-16A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**s032419**	**Date of Collection:**	**3/23/04**
Dil. Factor:	**1.64**	**Date of Analysis:**	**3/25/04 12:18 AM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	0.82	Not Detected	4.1	Not Detected
Freon 114	0.82	Not Detected	5.8	Not Detected
Vinyl Chloride	0.82	Not Detected	2.1	Not Detected
Bromomethane	0.82	Not Detected	3.2	Not Detected
Chloroethane	0.82	Not Detected	2.2	Not Detected
Freon 11	0.82	Not Detected	4.7	Not Detected
1,1-Dichloroethene	0.82	Not Detected	3.3	Not Detected
Freon 113	0.82	Not Detected	6.4	Not Detected
Methylene Chloride	0.82	1.3	2.9	4.4
1,1-Dichloroethane	0.82	Not Detected	3.4	Not Detected
cis-1,2-Dichloroethene	0.82	Not Detected	3.3	Not Detected
Chloroform	0.82	Not Detected	4.1	Not Detected
1,1,1-Trichloroethane	0.82	Not Detected	4.5	Not Detected
Carbon Tetrachloride	0.82	Not Detected	5.2	Not Detected
Benzene	0.82	1.0	2.7	3.3
1,2-Dichloroethane	0.82	Not Detected	3.4	Not Detected
Trichloroethene	0.82	Not Detected	4.5	Not Detected
1,2-Dichloropropane	0.82	Not Detected	3.8	Not Detected
cis-1,3-Dichloropropene	0.82	Not Detected	3.8	Not Detected
Toluene	0.82	6.3	3.1	24
trans-1,3-Dichloropropene	0.82	Not Detected	3.8	Not Detected
1,1,2-Trichloroethane	0.82	Not Detected	4.5	Not Detected
Tetrachloroethene	0.82	Not Detected	5.6	Not Detected
1,2-Dibromoethane (EDB)	0.82	Not Detected	6.4	Not Detected
Chlorobenzene	0.82	Not Detected	3.8	Not Detected
Ethyl Benzene	0.82	Not Detected	3.6	Not Detected
m,p-Xylene	0.82	1.3	3.6	5.7
o-Xylene	0.82	Not Detected	3.6	Not Detected
Styrene	0.82	Not Detected	3.5	Not Detected
1,1,2,2-Tetrachloroethane	0.82	Not Detected	5.7	Not Detected
1,3,5-Trimethylbenzene	0.82	Not Detected	4.1	Not Detected
1,2,4-Trimethylbenzene	0.82	Not Detected	4.1	Not Detected
1,3-Dichlorobenzene	0.82	Not Detected	5.0	Not Detected
1,4-Dichlorobenzene	0.82	Not Detected	5.0	Not Detected
alpha-Chlorotoluene	0.82	Not Detected	4.3	Not Detected
1,2-Dichlorobenzene	0.82	Not Detected	5.0	Not Detected
1,3-Butadiene	0.82	Not Detected	1.8	Not Detected
Hexane	0.82	1.2	2.9	4.3
Cyclohexane	0.82	1.7	2.9	5.8
Bromodichloromethane	0.82	Not Detected	5.6	Not Detected
Dibromochloromethane	0.82	Not Detected	7.1	Not Detected
Heptane	0.82	Not Detected	3.4	Not Detected

AIR TOXICS LTD.

SAMPLE NAME: SSG-9

ID#: 0403418R1-16A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**s032419**	**Date of Collection:**	**3/23/04**
Dil. Factor:	**1.64**	**Date of Analysis:**	**3/25/04 12:18 AM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Cumene	0.82	Not Detected	4.1	Not Detected
Propylbenzene	0.82	Not Detected	4.1	Not Detected
Chloromethane	3.3	Not Detected	6.9	Not Detected
1,2,4-Trichlorobenzene	3.3	Not Detected	25	Not Detected
Hexachlorobutadiene	3.3	Not Detected	36	Not Detected
Acetone	3.3	5.8	7.9	14
Carbon Disulfide	3.3	Not Detected	10	Not Detected
2-Propanol	3.3	Not Detected	8.2	Not Detected
trans-1,2-Dichloroethene	3.3	Not Detected	13	Not Detected
Vinyl Acetate	3.3	Not Detected	12	Not Detected
2-Butanone (Methyl Ethyl Ketone)	3.3	Not Detected	9.8	Not Detected
Tetrahydrofuran	3.3	Not Detected	9.8	Not Detected
1,4-Dioxane	3.3	Not Detected	12	Not Detected
4-Methyl-2-pentanone	3.3	Not Detected	14	Not Detected
2-Hexanone	3.3	Not Detected	14	Not Detected
Ethanol	3.3	5.9	6.3	11
Bromoform	3.3	Not Detected	34	Not Detected
4-Ethyltoluene	3.3	Not Detected	16	Not Detected
Methyl tert-butyl ether	3.3	Not Detected	12	Not Detected
TPH ref. to Gasoline (MW=100)	16	51	68	210

Container Type: 1 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	100	70-130
Toluene-d8	99	70-130
4-Bromofluorobenzene	98	70-130

AIR TOXICS LTD.

SAMPLE NAME: SSG-8

ID#: 0403418R1-17A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**s032420**	**Date of Collection:**	**3/23/04**
Dil. Factor:	**1.87**	**Date of Analysis:**	**3/25/04 12:59 AM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	0.94	8.3	4.7	42
Freon 114	0.94	Not Detected	6.6	Not Detected
Vinyl Chloride	0.94	Not Detected	2.4	Not Detected
Bromomethane	0.94	Not Detected	3.7	Not Detected
Chloroethane	0.94	Not Detected	2.5	Not Detected
Freon 11	0.94	Not Detected	5.3	Not Detected
1,1-Dichloroethene	0.94	Not Detected	3.8	Not Detected
Freon 113	0.94	Not Detected	7.3	Not Detected
Methylene Chloride	0.94	Not Detected	3.3	Not Detected
1,1-Dichloroethane	0.94	Not Detected	3.8	Not Detected
cis-1,2-Dichloroethene	0.94	Not Detected	3.8	Not Detected
Chloroform	0.94	Not Detected	4.6	Not Detected
1,1,1-Trichloroethane	0.94	Not Detected	5.2	Not Detected
Carbon Tetrachloride	0.94	Not Detected	6.0	Not Detected
Benzene	0.94	11	3.0	34
1,2-Dichloroethane	0.94	Not Detected	3.8	Not Detected
Trichloroethene	0.94	Not Detected	5.1	Not Detected
1,2-Dichloropropane	0.94	Not Detected	4.4	Not Detected
cis-1,3-Dichloropropene	0.94	Not Detected	4.3	Not Detected
Toluene	0.94	110	3.6	420
trans-1,3-Dichloropropene	0.94	Not Detected	4.3	Not Detected
1,1,2-Trichloroethane	0.94	Not Detected	5.2	Not Detected
Tetrachloroethene	0.94	6.1	6.4	42
1,2-Dibromoethane (EDB)	0.94	Not Detected	7.3	Not Detected
Chlorobenzene	0.94	Not Detected	4.4	Not Detected
Ethyl Benzene	0.94	11	4.1	49
m,p-Xylene	0.94	47	4.1	210
o-Xylene	0.94	17	4.1	74
Styrene	0.94	0.94	4.0	4.1
1,1,2,2-Tetrachloroethane	0.94	Not Detected	6.5	Not Detected
1,3,5-Trimethylbenzene	0.94	4.0	4.7	20
1,2,4-Trimethylbenzene	0.94	14	4.7	70
1,3-Dichlorobenzene	0.94	Not Detected	5.7	Not Detected
1,4-Dichlorobenzene	0.94	Not Detected	5.7	Not Detected
alpha-Chlorotoluene	0.94	Not Detected	4.9	Not Detected
1,2-Dichlorobenzene	0.94	Not Detected	5.7	Not Detected
1,3-Butadiene	0.94	2.6	2.1	5.8
Hexane	0.94	6.7	3.3	24
Cyclohexane	0.94	Not Detected	3.3	Not Detected
Bromodichloromethane	0.94	Not Detected	6.4	Not Detected
Dibromochloromethane	0.94	Not Detected	8.1	Not Detected
Heptane	0.94	4.6	3.9	19

AIR TOXICS LTD.

SAMPLE NAME: SSG-8

ID#: 0403418R1-17A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**s032420**	**Date of Collection:**	**3/23/04**
Dil. Factor:	**1.87**	**Date of Analysis:**	**3/25/04 12:59 AM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Cumene	0.94	Not Detected	4.7	Not Detected
Propylbenzene	0.94	2.3	4.7	12
Chloromethane	3.7	Not Detected	7.8	Not Detected
1,2,4-Trichlorobenzene	3.7	Not Detected	28	Not Detected
Hexachlorobutadiene	3.7	Not Detected	40	Not Detected
Acetone	3.7	380 E	9.0	930 E
Carbon Disulfide	3.7	7.6	12	24
2-Propanol	3.7	3.8	9.3	9.5
trans-1,2-Dichloroethene	3.7	Not Detected	15	Not Detected
Vinyl Acetate	3.7	Not Detected	13	Not Detected
2-Butanone (Methyl Ethyl Ketone)	3.7	35	11	110
Tetrahydrofuran	3.7	Not Detected	11	Not Detected
1,4-Dioxane	3.7	Not Detected	14	Not Detected
4-Methyl-2-pentanone	3.7	Not Detected	16	Not Detected
2-Hexanone	3.7	4.9	16	20
Ethanol	3.7	12	7.2	23
Bromoform	3.7	Not Detected	39	Not Detected
4-Ethyltoluene	3.7	14	19	69
Methyl tert-butyl ether	3.7	Not Detected	14	Not Detected
TPH ref. to Gasoline (MW=100)	19	830	78	3400

E = Exceeds instrument calibration range.

Container Type: 1 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	101	70-130
Toluene-d8	101	70-130
4-Bromofluorobenzene	100	70-130

AIR TOXICS LTD.

SAMPLE NAME: SSG-6

ID#: 0403418R1-18A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**s032421**	**Date of Collection:**	**3/23/04**
Dil. Factor:	**1.83**	**Date of Analysis:**	**3/25/04 01:40 AM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	0.92	3.8	4.6	19
Freon 114	0.92	1.3	6.5	9.0
Vinyl Chloride	0.92	Not Detected	2.4	Not Detected
Bromomethane	0.92	Not Detected	3.6	Not Detected
Chloroethane	0.92	Not Detected	2.4	Not Detected
Freon 11	0.92	Not Detected	5.2	Not Detected
1,1-Dichloroethene	0.92	Not Detected	3.7	Not Detected
Freon 113	0.92	Not Detected	7.1	Not Detected
Methylene Chloride	0.92	Not Detected	3.2	Not Detected
1,1-Dichloroethane	0.92	Not Detected	3.8	Not Detected
cis-1,2-Dichloroethene	0.92	Not Detected	3.7	Not Detected
Chloroform	0.92	Not Detected	4.5	Not Detected
1,1,1-Trichloroethane	0.92	Not Detected	5.1	Not Detected
Carbon Tetrachloride	0.92	Not Detected	5.8	Not Detected
Benzene	0.92	2.4	3.0	7.7
1,2-Dichloroethane	0.92	Not Detected	3.8	Not Detected
Trichloroethene	0.92	Not Detected	5.0	Not Detected
1,2-Dichloropropane	0.92	Not Detected	4.3	Not Detected
cis-1,3-Dichloropropene	0.92	Not Detected	4.2	Not Detected
Toluene	0.92	66	3.5	250
trans-1,3-Dichloropropene	0.92	Not Detected	4.2	Not Detected
1,1,2-Trichloroethane	0.92	Not Detected	5.1	Not Detected
Tetrachloroethene	0.92	1.9	6.3	13
1,2-Dibromoethane (EDB)	0.92	Not Detected	7.1	Not Detected
Chlorobenzene	0.92	Not Detected	4.3	Not Detected
Ethyl Benzene	0.92	7.2	4.0	32
m,p-Xylene	0.92	31	4.0	140
o-Xylene	0.92	11	4.0	48
Styrene	0.92	Not Detected	4.0	Not Detected
1,1,2,2-Tetrachloroethane	0.92	Not Detected	6.4	Not Detected
1,3,5-Trimethylbenzene	0.92	2.4	4.6	12
1,2,4-Trimethylbenzene	0.92	8.5	4.6	42
1,3-Dichlorobenzene	0.92	Not Detected	5.6	Not Detected
1,4-Dichlorobenzene	0.92	Not Detected	5.6	Not Detected
alpha-Chlorotoluene	0.92	Not Detected	4.8	Not Detected
1,2-Dichlorobenzene	0.92	Not Detected	5.6	Not Detected
1,3-Butadiene	0.92	Not Detected	2.0	Not Detected
Hexane	0.92	2.2	3.3	7.7
Cyclohexane	0.92	Not Detected	3.2	Not Detected
Bromodichloromethane	0.92	Not Detected	6.2	Not Detected
Dibromochloromethane	0.92	Not Detected	7.9	Not Detected
Heptane	0.92	1.8	3.8	7.7

AIR TOXICS LTD.

SAMPLE NAME: SSG-6

ID#: 0403418R1-18A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**s032421**	**Date of Collection:**	**3/23/04**
Dil. Factor:	**1.83**	**Date of Analysis:**	**3/25/04 01:40 AM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Cumene	0.92	Not Detected	4.6	Not Detected
Propylbenzene	0.92	1.4	4.6	7.2
Chloromethane	3.7	Not Detected	7.7	Not Detected
1,2,4-Trichlorobenzene	3.7	Not Detected	28	Not Detected
Hexachlorobutadiene	3.7	Not Detected	40	Not Detected
Acetone	3.7	270	8.8	650
Carbon Disulfide	3.7	Not Detected	12	Not Detected
2-Propanol	3.7	Not Detected	9.1	Not Detected
trans-1,2-Dichloroethene	3.7	Not Detected	15	Not Detected
Vinyl Acetate	3.7	Not Detected	13	Not Detected
2-Butanone (Methyl Ethyl Ketone)	3.7	17	11	50
Tetrahydrofuran	3.7	Not Detected	11	Not Detected
1,4-Dioxane	3.7	Not Detected	13	Not Detected
4-Methyl-2-pentanone	3.7	Not Detected	15	Not Detected
2-Hexanone	3.7	Not Detected	15	Not Detected
Ethanol	3.7	6.7	7.0	13
Bromoform	3.7	Not Detected	38	Not Detected
4-Ethyltoluene	3.7	8.6	18	43
Methyl tert-butyl ether	3.7	Not Detected	13	Not Detected
TPH ref. to Gasoline (MW=100)	18	470	76	2000

Container Type: 1 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	101	70-130
Toluene-d8	100	70-130
4-Bromofluorobenzene	97	70-130

AIR TOXICS LTD.

SAMPLE NAME: SSG-7

ID#: 0403418R1-19A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**s032422**	**Date of Collection:**	**3/23/04**
Dil. Factor:	**1.91**	**Date of Analysis:**	**3/25/04 02:22 AM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	0.96	1.8	4.8	9.2
Freon 114	0.96	Not Detected	6.8	Not Detected
Vinyl Chloride	0.96	Not Detected	2.5	Not Detected
Bromomethane	0.96	Not Detected	3.8	Not Detected
Chloroethane	0.96	Not Detected	2.6	Not Detected
Freon 11	0.96	Not Detected	5.4	Not Detected
1,1-Dichloroethene	0.96	Not Detected	3.8	Not Detected
Freon 113	0.96	Not Detected	7.4	Not Detected
Methylene Chloride	0.96	Not Detected	3.4	Not Detected
1,1-Dichloroethane	0.96	Not Detected	3.9	Not Detected
cis-1,2-Dichloroethene	0.96	Not Detected	3.8	Not Detected
Chloroform	0.96	Not Detected	4.7	Not Detected
1,1,1-Trichloroethane	0.96	Not Detected	5.3	Not Detected
Carbon Tetrachloride	0.96	Not Detected	6.1	Not Detected
Benzene	0.96	5.6	3.1	18
1,2-Dichloroethane	0.96	Not Detected	3.9	Not Detected
Trichloroethene	0.96	Not Detected	5.2	Not Detected
1,2-Dichloropropane	0.96	Not Detected	4.5	Not Detected
cis-1,3-Dichloropropene	0.96	Not Detected	4.4	Not Detected
Toluene	0.96	92	3.6	350
trans-1,3-Dichloropropene	0.96	Not Detected	4.4	Not Detected
1,1,2-Trichloroethane	0.96	Not Detected	5.3	Not Detected
Tetrachloroethene	0.96	Not Detected	6.6	Not Detected
1,2-Dibromoethane (EDB)	0.96	Not Detected	7.4	Not Detected
Chlorobenzene	0.96	Not Detected	4.5	Not Detected
Ethyl Benzene	0.96	10	4.2	46
m,p-Xylene	0.96	45	4.2	200
o-Xylene	0.96	16	4.2	73
Styrene	0.96	Not Detected	4.1	Not Detected
1,1,2,2-Tetrachloroethane	0.96	Not Detected	6.7	Not Detected
1,3,5-Trimethylbenzene	0.96	3.9	4.8	19
1,2,4-Trimethylbenzene	0.96	14	4.8	70
1,3-Dichlorobenzene	0.96	Not Detected	5.8	Not Detected
1,4-Dichlorobenzene	0.96	Not Detected	5.8	Not Detected
alpha-Chlorotoluene	0.96	Not Detected	5.0	Not Detected
1,2-Dichlorobenzene	0.96	Not Detected	5.8	Not Detected
1,3-Butadiene	0.96	Not Detected	2.1	Not Detected
Hexane	0.96	5.7	3.4	20
Cyclohexane	0.96	1.4	3.3	5.0
Bromodichloromethane	0.96	Not Detected	6.5	Not Detected
Dibromochloromethane	0.96	Not Detected	8.3	Not Detected
Heptane	0.96	2.6	4.0	11

AIR TOXICS LTD.

SAMPLE NAME: SSG-7

ID#: 0403418R1-19A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**s032422**	**Date of Collection:**	**3/23/04**
Dil. Factor:	**1.91**	**Date of Analysis:**	**3/25/04 02:22 AM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Cumene	0.96	Not Detected	4.8	Not Detected
Propylbenzene	0.96	2.2	4.8	11
Chloromethane	3.8	Not Detected	8.0	Not Detected
1,2,4-Trichlorobenzene	3.8	Not Detected	29	Not Detected
Hexachlorobutadiene	3.8	Not Detected	41	Not Detected
Acetone	3.8	450 E	9.2	1100 E
Carbon Disulfide	3.8	Not Detected	12	Not Detected
2-Propanol	3.8	3.8	9.5	9.6
trans-1,2-Dichloroethene	3.8	Not Detected	15	Not Detected
Vinyl Acetate	3.8	Not Detected	14	Not Detected
2-Butanone (Methyl Ethyl Ketone)	3.8	24	11	71
Tetrahydrofuran	3.8	Not Detected	11	Not Detected
1,4-Dioxane	3.8	Not Detected	14	Not Detected
4-Methyl-2-pentanone	3.8	Not Detected	16	Not Detected
2-Hexanone	3.8	4.6	16	19
Ethanol	3.8	9.2	7.3	18
Bromoform	3.8	Not Detected	40	Not Detected
4-Ethyltoluene	3.8	14	19	67
Methyl tert-butyl ether	3.8	Not Detected	14	Not Detected
TPH ref. to Gasoline (MW=100)	19	860	79	3600

E = Exceeds instrument calibration range.

Container Type: 1 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	100	70-130
Toluene-d8	100	70-130
4-Bromofluorobenzene	97	70-130

AIR TOXICS LTD.

SAMPLE NAME: SSG-13

ID#: 0403418R1-20A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**i033109**	**Date of Collection:**	**3/23/04**
Dil. Factor:	**1.91**	**Date of Analysis:**	**3/31/04 02:35 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	0.96	2.2	4.8	11
Freon 114	0.96	Not Detected	6.8	Not Detected
Vinyl Chloride	0.96	Not Detected	2.5	Not Detected
Bromomethane	0.96	Not Detected	3.8	Not Detected
Chloroethane	0.96	Not Detected	2.6	Not Detected
Freon 11	0.96	Not Detected	5.4	Not Detected
1,1-Dichloroethene	0.96	Not Detected	3.8	Not Detected
Freon 113	0.96	Not Detected	7.4	Not Detected
Methylene Chloride	0.96	Not Detected	3.4	Not Detected
1,1-Dichloroethane	0.96	Not Detected	3.9	Not Detected
cis-1,2-Dichloroethene	0.96	Not Detected	3.8	Not Detected
Chloroform	0.96	1.3	4.7	6.5
1,1,1-Trichloroethane	0.96	Not Detected	5.3	Not Detected
Carbon Tetrachloride	0.96	Not Detected	6.1	Not Detected
Benzene	0.96	6.2	3.1	20
1,2-Dichloroethane	0.96	Not Detected	3.9	Not Detected
Trichloroethene	0.96	Not Detected	5.2	Not Detected
1,2-Dichloropropane	0.96	Not Detected	4.5	Not Detected
cis-1,3-Dichloropropene	0.96	Not Detected	4.4	Not Detected
Toluene	0.96	140	3.6	530
trans-1,3-Dichloropropene	0.96	Not Detected	4.4	Not Detected
1,1,2-Trichloroethane	0.96	Not Detected	5.3	Not Detected
Tetrachloroethene	0.96	Not Detected	6.6	Not Detected
1,2-Dibromoethane (EDB)	0.96	Not Detected	7.4	Not Detected
Chlorobenzene	0.96	Not Detected	4.5	Not Detected
Ethyl Benzene	0.96	16	4.2	71
m,p-Xylene	0.96	71	4.2	310
o-Xylene	0.96	26	4.2	110
Styrene	0.96	Not Detected	4.1	Not Detected
1,1,2,2-Tetrachloroethane	0.96	Not Detected	6.7	Not Detected
1,3,5-Trimethylbenzene	0.96	6.0	4.8	30
1,2,4-Trimethylbenzene	0.96	20	4.8	100
1,3-Dichlorobenzene	0.96	Not Detected	5.8	Not Detected
1,4-Dichlorobenzene	0.96	Not Detected	5.8	Not Detected
alpha-Chlorotoluene	0.96	Not Detected	5.0	Not Detected
1,2-Dichlorobenzene	0.96	Not Detected	5.8	Not Detected
1,3-Butadiene	0.96	1.3	2.1	2.9
Hexane	0.96	4.1	3.4	15
Cyclohexane	0.96	Not Detected	3.3	Not Detected
Bromodichloromethane	0.96	Not Detected	6.5	Not Detected
Dibromochloromethane	0.96	Not Detected	8.3	Not Detected
Heptane	0.96	3.7	4.0	16

AIR TOXICS LTD.

SAMPLE NAME: SSG-13

ID#: 0403418R1-20A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**i033109**	**Date of Collection:**	**3/23/04**
Dil. Factor:	**1.91**	**Date of Analysis:**	**3/31/04 02:35 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Cumene	0.96	Not Detected	4.8	Not Detected
Propylbenzene	0.96	3.3	4.8	17
Chloromethane	3.8	Not Detected	8.0	Not Detected
1,2,4-Trichlorobenzene	3.8	Not Detected	29	Not Detected
Hexachlorobutadiene	3.8	Not Detected	41	Not Detected
Acetone	3.8	620 E	9.2	1500 E
Carbon Disulfide	3.8	23	12	72
2-Propanol	3.8	7.2	9.5	18
trans-1,2-Dichloroethene	3.8	Not Detected	15	Not Detected
Vinyl Acetate	3.8	Not Detected	14	Not Detected
2-Butanone (Methyl Ethyl Ketone)	3.8	36	11	110
Tetrahydrofuran	3.8	Not Detected	11	Not Detected
1,4-Dioxane	3.8	Not Detected	14	Not Detected
4-Methyl-2-pentanone	3.8	Not Detected	16	Not Detected
2-Hexanone	3.8	7.0	16	29
Ethanol	3.8	21	7.3	40
Bromoform	3.8	Not Detected	40	Not Detected
4-Ethyltoluene	3.8	21	19	100
Methyl tert-butyl ether	3.8	Not Detected	14	Not Detected
TPH ref. to Gasoline (MW=100)	19	1500	79	6200

E = Exceeds instrument calibration range.

Container Type: 1 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	98	70-130
Toluene-d8	98	70-130
4-Bromofluorobenzene	99	70-130

AIR TOXICS LTD.

SAMPLE NAME: Lab Blank

ID#: 0403418R1-21A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**s032405**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 3/24/04 10:29 AM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	0.50	Not Detected	2.5	Not Detected
Freon 114	0.50	Not Detected	3.6	Not Detected
Vinyl Chloride	0.50	Not Detected	1.3	Not Detected
Bromomethane	0.50	Not Detected	2.0	Not Detected
Chloroethane	0.50	Not Detected	1.3	Not Detected
Freon 11	0.50	Not Detected	2.8	Not Detected
1,1-Dichloroethene	0.50	Not Detected	2.0	Not Detected
Freon 113	0.50	Not Detected	3.9	Not Detected
Methylene Chloride	0.50	Not Detected	1.8	Not Detected
1,1-Dichloroethane	0.50	Not Detected	2.0	Not Detected
cis-1,2-Dichloroethene	0.50	Not Detected	2.0	Not Detected
Chloroform	0.50	Not Detected	2.5	Not Detected
1,1,1-Trichloroethane	0.50	Not Detected	2.8	Not Detected
Carbon Tetrachloride	0.50	Not Detected	3.2	Not Detected
Benzene	0.50	Not Detected	1.6	Not Detected
1,2-Dichloroethane	0.50	Not Detected	2.0	Not Detected
Trichloroethene	0.50	Not Detected	2.7	Not Detected
1,2-Dichloropropane	0.50	Not Detected	2.3	Not Detected
cis-1,3-Dichloropropene	0.50	Not Detected	2.3	Not Detected
Toluene	0.50	Not Detected	1.9	Not Detected
trans-1,3-Dichloropropene	0.50	Not Detected	2.3	Not Detected
1,1,2-Trichloroethane	0.50	Not Detected	2.8	Not Detected
Tetrachloroethene	0.50	Not Detected	3.4	Not Detected
1,2-Dibromoethane (EDB)	0.50	Not Detected	3.9	Not Detected
Chlorobenzene	0.50	Not Detected	2.3	Not Detected
Ethyl Benzene	0.50	Not Detected	2.2	Not Detected
m,p-Xylene	0.50	Not Detected	2.2	Not Detected
o-Xylene	0.50	Not Detected	2.2	Not Detected
Styrene	0.50	Not Detected	2.2	Not Detected
1,1,2,2-Tetrachloroethane	0.50	Not Detected	3.5	Not Detected
1,3,5-Trimethylbenzene	0.50	Not Detected	2.5	Not Detected
1,2,4-Trimethylbenzene	0.50	Not Detected	2.5	Not Detected
1,3-Dichlorobenzene	0.50	Not Detected	3.0	Not Detected
1,4-Dichlorobenzene	0.50	Not Detected	3.0	Not Detected
alpha-Chlorotoluene	0.50	Not Detected	2.6	Not Detected
1,2-Dichlorobenzene	0.50	Not Detected	3.0	Not Detected
1,3-Butadiene	0.50	Not Detected	1.1	Not Detected
Hexane	0.50	Not Detected	1.8	Not Detected
Cyclohexane	0.50	Not Detected	1.7	Not Detected
Bromodichloromethane	0.50	Not Detected	3.4	Not Detected
Dibromochloromethane	0.50	Not Detected	4.3	Not Detected
Heptane	0.50	Not Detected	2.1	Not Detected

AIR TOXICS LTD.

SAMPLE NAME: Lab Blank

ID#: 0403418R1-21A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**s032405**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 3/24/04 10:29 AM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Cumene	0.50	Not Detected	2.5	Not Detected
Propylbenzene	0.50	Not Detected	2.5	Not Detected
Chloromethane	2.0	Not Detected	4.2	Not Detected
1,2,4-Trichlorobenzene	2.0	Not Detected	15	Not Detected
Hexachlorobutadiene	2.0	Not Detected	22	Not Detected
Acetone	2.0	Not Detected	4.8	Not Detected
Carbon Disulfide	2.0	Not Detected	6.3	Not Detected
2-Propanol	2.0	Not Detected	5.0	Not Detected
trans-1,2-Dichloroethene	2.0	Not Detected	8.0	Not Detected
Vinyl Acetate	2.0	Not Detected	7.2	Not Detected
2-Butanone (Methyl Ethyl Ketone)	2.0	Not Detected	6.0	Not Detected
Tetrahydrofuran	2.0	Not Detected	6.0	Not Detected
1,4-Dioxane	2.0	Not Detected	7.3	Not Detected
4-Methyl-2-pentanone	2.0	Not Detected	8.3	Not Detected
2-Hexanone	2.0	Not Detected	8.3	Not Detected
Ethanol	2.0	Not Detected	3.8	Not Detected
Bromoform	2.0	Not Detected	21	Not Detected
4-Ethyltoluene	2.0	Not Detected	10	Not Detected
Methyl tert-butyl ether	2.0	Not Detected	7.3	Not Detected
TPH ref. to Gasoline (MW=100)	10	Not Detected	42	Not Detected

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	97	70-130
Toluene-d8	99	70-130
4-Bromofluorobenzene	95	70-130

AIR TOXICS LTD.

SAMPLE NAME: Lab Blank

ID#: 0403418R1-21B

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**i032407**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 3/24/04 01:57 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	0.50	Not Detected	2.5	Not Detected
Freon 114	0.50	Not Detected	3.6	Not Detected
Vinyl Chloride	0.50	Not Detected	1.3	Not Detected
Bromomethane	0.50	Not Detected	2.0	Not Detected
Chloroethane	0.50	Not Detected	1.3	Not Detected
Freon 11	0.50	Not Detected	2.8	Not Detected
1,1-Dichloroethene	0.50	Not Detected	2.0	Not Detected
Freon 113	0.50	Not Detected	3.9	Not Detected
Methylene Chloride	0.50	Not Detected	1.8	Not Detected
1,1-Dichloroethane	0.50	Not Detected	2.0	Not Detected
cis-1,2-Dichloroethene	0.50	Not Detected	2.0	Not Detected
Chloroform	0.50	Not Detected	2.5	Not Detected
1,1,1-Trichloroethane	0.50	Not Detected	2.8	Not Detected
Carbon Tetrachloride	0.50	Not Detected	3.2	Not Detected
Benzene	0.50	Not Detected	1.6	Not Detected
1,2-Dichloroethane	0.50	Not Detected	2.0	Not Detected
Trichloroethene	0.50	Not Detected	2.7	Not Detected
1,2-Dichloropropane	0.50	Not Detected	2.3	Not Detected
cis-1,3-Dichloropropene	0.50	Not Detected	2.3	Not Detected
Toluene	0.50	Not Detected	1.9	Not Detected
trans-1,3-Dichloropropene	0.50	Not Detected	2.3	Not Detected
1,1,2-Trichloroethane	0.50	Not Detected	2.8	Not Detected
Tetrachloroethene	0.50	Not Detected	3.4	Not Detected
1,2-Dibromoethane (EDB)	0.50	Not Detected	3.9	Not Detected
Chlorobenzene	0.50	Not Detected	2.3	Not Detected
Ethyl Benzene	0.50	Not Detected	2.2	Not Detected
m,p-Xylene	0.50	Not Detected	2.2	Not Detected
o-Xylene	0.50	Not Detected	2.2	Not Detected
Styrene	0.50	Not Detected	2.2	Not Detected
1,1,2,2-Tetrachloroethane	0.50	Not Detected	3.5	Not Detected
1,3,5-Trimethylbenzene	0.50	Not Detected	2.5	Not Detected
1,2,4-Trimethylbenzene	0.50	Not Detected	2.5	Not Detected
1,3-Dichlorobenzene	0.50	Not Detected	3.0	Not Detected
1,4-Dichlorobenzene	0.50	Not Detected	3.0	Not Detected
alpha-Chlorotoluene	0.50	Not Detected	2.6	Not Detected
1,2-Dichlorobenzene	0.50	Not Detected	3.0	Not Detected
1,3-Butadiene	0.50	Not Detected	1.1	Not Detected
Hexane	0.50	Not Detected	1.8	Not Detected
Cyclohexane	0.50	Not Detected	1.7	Not Detected
Bromodichloromethane	0.50	Not Detected	3.4	Not Detected
Dibromochloromethane	0.50	Not Detected	4.3	Not Detected
Heptane	0.50	Not Detected	2.1	Not Detected

AIR TOXICS LTD.

SAMPLE NAME: Lab Blank

ID#: 0403418R1-21B

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**i032407**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 3/24/04 01:57 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Cumene	0.50	Not Detected	2.5	Not Detected
Propylbenzene	0.50	Not Detected	2.5	Not Detected
Chloromethane	2.0	Not Detected	4.2	Not Detected
1,2,4-Trichlorobenzene	2.0	Not Detected	15	Not Detected
Hexachlorobutadiene	2.0	Not Detected	22	Not Detected
Acetone	2.0	Not Detected	4.8	Not Detected
Carbon Disulfide	2.0	Not Detected	6.3	Not Detected
2-Propanol	2.0	Not Detected	5.0	Not Detected
trans-1,2-Dichloroethene	2.0	Not Detected	8.0	Not Detected
Vinyl Acetate	2.0	Not Detected	7.2	Not Detected
2-Butanone (Methyl Ethyl Ketone)	2.0	Not Detected	6.0	Not Detected
Tetrahydrofuran	2.0	Not Detected	6.0	Not Detected
1,4-Dioxane	2.0	Not Detected	7.3	Not Detected
4-Methyl-2-pentanone	2.0	0.64	8.3	2.6 J
2-Hexanone	2.0	Not Detected	8.3	Not Detected
Ethanol	2.0	Not Detected	3.8	Not Detected
Bromoform	2.0	Not Detected	21	Not Detected
4-Ethyltoluene	2.0	Not Detected	10	Not Detected
Methyl tert-butyl ether	2.0	Not Detected	7.3	Not Detected
TPH ref. to Gasoline (MW=100)	10	Not Detected	42	Not Detected

J = Estimated value.

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	98	70-130
Toluene-d8	98	70-130
4-Bromofluorobenzene	96	70-130

AIR TOXICS LTD.

SAMPLE NAME: Lab Blank

ID#: 0403418R1-21C

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**i033106**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 3/31/04 11:40 AM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	0.50	Not Detected	2.5	Not Detected
Freon 114	0.50	Not Detected	3.6	Not Detected
Vinyl Chloride	0.50	Not Detected	1.3	Not Detected
Bromomethane	0.50	Not Detected	2.0	Not Detected
Chloroethane	0.50	Not Detected	1.3	Not Detected
Freon 11	0.50	Not Detected	2.8	Not Detected
1,1-Dichloroethene	0.50	Not Detected	2.0	Not Detected
Freon 113	0.50	Not Detected	3.9	Not Detected
Methylene Chloride	0.50	Not Detected	1.8	Not Detected
1,1-Dichloroethane	0.50	Not Detected	2.0	Not Detected
cis-1,2-Dichloroethene	0.50	Not Detected	2.0	Not Detected
Chloroform	0.50	Not Detected	2.5	Not Detected
1,1,1-Trichloroethane	0.50	Not Detected	2.8	Not Detected
Carbon Tetrachloride	0.50	Not Detected	3.2	Not Detected
Benzene	0.50	Not Detected	1.6	Not Detected
1,2-Dichloroethane	0.50	Not Detected	2.0	Not Detected
Trichloroethene	0.50	Not Detected	2.7	Not Detected
1,2-Dichloropropane	0.50	Not Detected	2.3	Not Detected
cis-1,3-Dichloropropene	0.50	Not Detected	2.3	Not Detected
Toluene	0.50	Not Detected	1.9	Not Detected
trans-1,3-Dichloropropene	0.50	Not Detected	2.3	Not Detected
1,1,2-Trichloroethane	0.50	Not Detected	2.8	Not Detected
Tetrachloroethene	0.50	Not Detected	3.4	Not Detected
1,2-Dibromoethane (EDB)	0.50	Not Detected	3.9	Not Detected
Chlorobenzene	0.50	Not Detected	2.3	Not Detected
Ethyl Benzene	0.50	Not Detected	2.2	Not Detected
m,p-Xylene	0.50	Not Detected	2.2	Not Detected
o-Xylene	0.50	Not Detected	2.2	Not Detected
Styrene	0.50	Not Detected	2.2	Not Detected
1,1,2,2-Tetrachloroethane	0.50	Not Detected	3.5	Not Detected
1,3,5-Trimethylbenzene	0.50	Not Detected	2.5	Not Detected
1,2,4-Trimethylbenzene	0.50	Not Detected	2.5	Not Detected
1,3-Dichlorobenzene	0.50	Not Detected	3.0	Not Detected
1,4-Dichlorobenzene	0.50	Not Detected	3.0	Not Detected
alpha-Chlorotoluene	0.50	Not Detected	2.6	Not Detected
1,2-Dichlorobenzene	0.50	Not Detected	3.0	Not Detected
1,3-Butadiene	0.50	Not Detected	1.1	Not Detected
Hexane	0.50	Not Detected	1.8	Not Detected
Cyclohexane	0.50	Not Detected	1.7	Not Detected
Bromodichloromethane	0.50	Not Detected	3.4	Not Detected
Dibromochloromethane	0.50	Not Detected	4.3	Not Detected
Heptane	0.50	Not Detected	2.1	Not Detected

AIR TOXICS LTD.

SAMPLE NAME: Lab Blank

ID#: 0403418R1-21C

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**i033106**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 3/31/04 11:40 AM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Cumene	0.50	Not Detected	2.5	Not Detected
Propylbenzene	0.50	Not Detected	2.5	Not Detected
Chloromethane	2.0	Not Detected	4.2	Not Detected
1,2,4-Trichlorobenzene	2.0	Not Detected	15	Not Detected
Hexachlorobutadiene	2.0	Not Detected	22	Not Detected
Acetone	2.0	Not Detected	4.8	Not Detected
Carbon Disulfide	2.0	Not Detected	6.3	Not Detected
2-Propanol	2.0	Not Detected	5.0	Not Detected
trans-1,2-Dichloroethene	2.0	Not Detected	8.0	Not Detected
Vinyl Acetate	2.0	Not Detected	7.2	Not Detected
2-Butanone (Methyl Ethyl Ketone)	2.0	Not Detected	6.0	Not Detected
Tetrahydrofuran	2.0	Not Detected	6.0	Not Detected
1,4-Dioxane	2.0	Not Detected	7.3	Not Detected
4-Methyl-2-pentanone	2.0	Not Detected	8.3	Not Detected
2-Hexanone	2.0	Not Detected	8.3	Not Detected
Ethanol	2.0	Not Detected	3.8	Not Detected
Bromoform	2.0	Not Detected	21	Not Detected
4-Ethyltoluene	2.0	Not Detected	10	Not Detected
Methyl tert-butyl ether	2.0	Not Detected	7.3	Not Detected
TPH ref. to Gasoline (MW=100)	10	Not Detected	42	Not Detected

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	99	70-130
Toluene-d8	98	70-130
4-Bromofluorobenzene	98	70-130

AIR TOXICS LTD.

SAMPLE NAME: CCV

ID#: 0403418R1-22A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**s032403**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 3/24/04 08:49 AM**	

Compound	%Recovery
Freon 12	89
Freon 114	94
Vinyl Chloride	88
Bromomethane	82
Chloroethane	103
Freon 11	92
1,1-Dichloroethene	84
Freon 113	87
Methylene Chloride	82
1,1-Dichloroethane	87
cis-1,2-Dichloroethene	87
Chloroform	89
1,1,1-Trichloroethane	94
Carbon Tetrachloride	107
Benzene	87
1,2-Dichloroethane	90
Trichloroethene	71
1,2-Dichloropropane	88
cis-1,3-Dichloropropene	94
Toluene	90
trans-1,3-Dichloropropene	99
1,1,2-Trichloroethane	90
Tetrachloroethene	91
1,2-Dibromoethane (EDB)	92
Chlorobenzene	90
Ethyl Benzene	90
m,p-Xylene	90
o-Xylene	89
Styrene	90
1,1,2,2-Tetrachloroethane	124
1,3,5-Trimethylbenzene	84
1,2,4-Trimethylbenzene	83
1,3-Dichlorobenzene	79
1,4-Dichlorobenzene	80
alpha-Chlorotoluene	83
1,2-Dichlorobenzene	77
1,3-Butadiene	88
Hexane	86
Cyclohexane	88
Bromodichloromethane	93
Dibromochloromethane	97
Heptane	91

AIR TOXICS LTD.

SAMPLE NAME: CCV

ID#: 0403418R1-22A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**s032403**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 3/24/04 08:49 AM**	

Compound	**%Recovery**
Cumene	95
Propylbenzene	97
Chloromethane	78
1,2,4-Trichlorobenzene	85
Hexachlorobutadiene	88
Acetone	88
Carbon Disulfide	86
2-Propanol	92
trans-1,2-Dichloroethene	85
Vinyl Acetate	72
2-Butanone (Methyl Ethyl Ketone)	92
Tetrahydrofuran	79
1,4-Dioxane	93
4-Methyl-2-pentanone	94
2-Hexanone	96
Ethanol	107
Bromoform	97
4-Ethyltoluene	88
Methyl tert-butyl ether	97
TPH ref. to Gasoline (MW=100)	Not Spiked

Container Type: NA - Not Applicable

Surrogates	**%Recovery**	**Method Limits**
1,2-Dichloroethane-d4	101	70-130
Toluene-d8	101	70-130
4-Bromofluorobenzene	97	70-130

AIR TOXICS LTD.

SAMPLE NAME: CCV

ID#: 0403418R1-22B

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**i032402**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 3/24/04 09:09 AM**	

Compound	%Recovery
Freon 12	109
Freon 114	101
Vinyl Chloride	103
Bromomethane	98
Chloroethane	99
Freon 11	104
1,1-Dichloroethene	100
Freon 113	102
Methylene Chloride	95
1,1-Dichloroethane	101
cis-1,2-Dichloroethene	107
Chloroform	109
1,1,1-Trichloroethane	112
Carbon Tetrachloride	113
Benzene	105
1,2-Dichloroethane	109
Trichloroethene	108
1,2-Dichloropropane	105
cis-1,3-Dichloropropene	108
Toluene	107
trans-1,3-Dichloropropene	108
1,1,2-Trichloroethane	108
Tetrachloroethene	111
1,2-Dibromoethane (EDB)	110
Chlorobenzene	108
Ethyl Benzene	107
m,p-Xylene	109
o-Xylene	109
Styrene	116
1,1,2,2-Tetrachloroethane	107
1,3,5-Trimethylbenzene	100
1,2,4-Trimethylbenzene	100
1,3-Dichlorobenzene	99
1,4-Dichlorobenzene	98
alpha-Chlorotoluene	99
1,2-Dichlorobenzene	97
1,3-Butadiene	96
Hexane	99
Cyclohexane	106
Bromodichloromethane	112
Dibromochloromethane	117
Heptane	110

AIR TOXICS LTD.

SAMPLE NAME: CCV

ID#: 0403418R1-22B

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**i032402**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 3/24/04 09:09 AM**	

Compound	**%Recovery**
Cumene	107
Propylbenzene	106
Chloromethane	104
1,2,4-Trichlorobenzene	100
Hexachlorobutadiene	103
Acetone	90
Carbon Disulfide	97
2-Propanol	96
trans-1,2-Dichloroethene	95
Vinyl Acetate	104
2-Butanone (Methyl Ethyl Ketone)	105
Tetrahydrofuran	103
1,4-Dioxane	103
4-Methyl-2-pentanone	112
2-Hexanone	101
Ethanol	96
Bromoform	120
4-Ethyltoluene	109
Methyl tert-butyl ether	109
TPH ref. to Gasoline (MW=100)	Not Spiked

Container Type: NA - Not Applicable

Surrogates	**%Recovery**	**Method Limits**
1,2-Dichloroethane-d4	98	70-130
Toluene-d8	101	70-130
4-Bromofluorobenzene	100	70-130

AIR TOXICS LTD.

SAMPLE NAME: CCV

ID#: 0403418R1-22C

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**i033103**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 3/31/04 09:12 AM**	

Compound	%Recovery
Freon 12	102
Freon 114	99
Vinyl Chloride	96
Bromomethane	96
Chloroethane	97
Freon 11	102
1,1-Dichloroethene	99
Freon 113	100
Methylene Chloride	94
1,1-Dichloroethane	100
cis-1,2-Dichloroethene	105
Chloroform	108
1,1,1-Trichloroethane	109
Carbon Tetrachloride	111
Benzene	102
1,2-Dichloroethane	106
Trichloroethene	107
1,2-Dichloropropane	103
cis-1,3-Dichloropropene	107
Toluene	106
trans-1,3-Dichloropropene	106
1,1,2-Trichloroethane	107
Tetrachloroethene	108
1,2-Dibromoethane (EDB)	108
Chlorobenzene	105
Ethyl Benzene	106
m,p-Xylene	107
o-Xylene	105
Styrene	113
1,1,2,2-Tetrachloroethane	105
1,3,5-Trimethylbenzene	97
1,2,4-Trimethylbenzene	97
1,3-Dichlorobenzene	97
1,4-Dichlorobenzene	98
alpha-Chlorotoluene	98
1,2-Dichlorobenzene	95
1,3-Butadiene	94
Hexane	98
Cyclohexane	105
Bromodichloromethane	110
Dibromochloromethane	115
Heptane	109

AIR TOXICS LTD.

SAMPLE NAME: CCV

ID#: 0403418R1-22C

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**i033103**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 3/31/04 09:12 AM**	

Compound	%Recovery
Cumene	104
Propylbenzene	103
Chloromethane	95
1,2,4-Trichlorobenzene	105
Hexachlorobutadiene	105
Acetone	88
Carbon Disulfide	97
2-Propanol	94
trans-1,2-Dichloroethene	94
Vinyl Acetate	103
2-Butanone (Methyl Ethyl Ketone)	104
Tetrahydrofuran	101
1,4-Dioxane	101
4-Methyl-2-pentanone	109
2-Hexanone	99
Ethanol	95
Bromoform	116
4-Ethyltoluene	106
Methyl tert-butyl ether	104
TPH ref. to Gasoline (MW=100)	Not Spiked

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	98	70-130
Toluene-d8	101	70-130
4-Bromofluorobenzene	98	70-130

AIR TOXICS LTD.

SAMPLE NAME: LCS

ID#: 0403418R1-23A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**s032404**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 3/24/04 09:38 AM**	

Compound	%Recovery
Freon 12	91
Freon 114	92
Vinyl Chloride	90
Bromomethane	99
Chloroethane	94
Freon 11	95
1,1-Dichloroethene	85
Freon 113	84
Methylene Chloride	82
1,1-Dichloroethane	88
cis-1,2-Dichloroethene	73
Chloroform	90
1,1,1-Trichloroethane	103
Carbon Tetrachloride	115
Benzene	96
1,2-Dichloroethane	96
Trichloroethene	76
1,2-Dichloropropane	99
cis-1,3-Dichloropropene	105
Toluene	91
trans-1,3-Dichloropropene	113
1,1,2-Trichloroethane	94
Tetrachloroethene	92
1,2-Dibromoethane (EDB)	89
Chlorobenzene	92
Ethyl Benzene	89
m,p-Xylene	86
o-Xylene	84
Styrene	93
1,1,2,2-Tetrachloroethane	132 Q
1,3,5-Trimethylbenzene	80
1,2,4-Trimethylbenzene	74
1,3-Dichlorobenzene	81
1,4-Dichlorobenzene	77
alpha-Chlorotoluene	110
1,2-Dichlorobenzene	78
1,3-Butadiene	88
Hexane	78
Cyclohexane	80
Bromodichloromethane	82
Dibromochloromethane	87
Heptane	84

AIR TOXICS LTD.

SAMPLE NAME: LCS

ID#: 0403418R1-23A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**s032404**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 3/24/04 09:38 AM**	

Compound	**%Recovery**
Cumene	84
Propylbenzene	64
Chloromethane	74
1,2,4-Trichlorobenzene	71
Hexachlorobutadiene	71
Acetone	82
Carbon Disulfide	79
2-Propanol	95
trans-1,2-Dichloroethene	77
Vinyl Acetate	86
2-Butanone (Methyl Ethyl Ketone)	85
Tetrahydrofuran	74
1,4-Dioxane	86
4-Methyl-2-pentanone	90
2-Hexanone	94
Ethanol	88
Bromoform	86
4-Ethyltoluene	99
Methyl tert-butyl ether	82
TPH ref. to Gasoline (MW=100)	Not Spiked

Q = Exceeds Quality Control limits.

Container Type: NA - Not Applicable

Surrogates	**%Recovery**	**Method Limits**
1,2-Dichloroethane-d4	100	70-130
Toluene-d8	100	70-130
4-Bromofluorobenzene	99	70-130

AIR TOXICS LTD.

SAMPLE NAME: LCS

ID#: 0403418R1-23B

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**i032404**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 3/24/04 11:04 AM**	

Compound	%Recovery
Freon 12	119
Freon 114	110
Vinyl Chloride	121
Bromomethane	111
Chloroethane	122
Freon 11	114
1,1-Dichloroethene	106
Freon 113	106
Methylene Chloride	95
1,1-Dichloroethane	109
cis-1,2-Dichloroethene	110
Chloroform	118
1,1,1-Trichloroethane	131 Q
Carbon Tetrachloride	129
Benzene	121
1,2-Dichloroethane	125
Trichloroethene	125
1,2-Dichloropropane	125
cis-1,3-Dichloropropene	123
Toluene	114
trans-1,3-Dichloropropene	122
1,1,2-Trichloroethane	117
Tetrachloroethene	117
1,2-Dibromoethane (EDB)	110
Chlorobenzene	113
Ethyl Benzene	110
m,p-Xylene	110
o-Xylene	106
Styrene	118
1,1,2,2-Tetrachloroethane	114
1,3,5-Trimethylbenzene	94
1,2,4-Trimethylbenzene	88
1,3-Dichlorobenzene	102
1,4-Dichlorobenzene	95
alpha-Chlorotoluene	125
1,2-Dichlorobenzene	98
1,3-Butadiene	100
Hexane	93
Cyclohexane	102
Bromodichloromethane	98
Dibromochloromethane	104
Heptane	105

AIR TOXICS LTD.

SAMPLE NAME: LCS

ID#: 0403418R1-23B

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**i032404**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 3/24/04 11:04 AM**	

Compound	**%Recovery**
Cumene	97
Propylbenzene	71
Chloromethane	111
1,2,4-Trichlorobenzene	84
Hexachlorobutadiene	84
Acetone	86
Carbon Disulfide	92
2-Propanol	105
trans-1,2-Dichloroethene	90
Vinyl Acetate	105
2-Butanone (Methyl Ethyl Ketone)	100
Tetrahydrofuran	101
1,4-Dioxane	100
4-Methyl-2-pentanone	109
2-Hexanone	102
Ethanol	116
Bromoform	103
4-Ethyltoluene	118
Methyl tert-butyl ether	107
TPH ref. to Gasoline (MW=100)	Not Spiked

Q = Exceeds Quality Control limits.

Container Type: NA - Not Applicable

Surrogates	**%Recovery**	**Method Limits**
1,2-Dichloroethane-d4	103	70-130
Toluene-d8	102	70-130
4-Bromofluorobenzene	100	70-130

AIR TOXICS LTD.

SAMPLE NAME: LCS

ID#: 0403418R1-23C

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**i033104**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 3/31/04 09:57 AM**	

Compound	%Recovery
Freon 12	116
Freon 114	110
Vinyl Chloride	116
Bromomethane	113
Chloroethane	120
Freon 11	114
1,1-Dichloroethene	106
Freon 113	105
Methylene Chloride	93
1,1-Dichloroethane	108
cis-1,2-Dichloroethene	109
Chloroform	118
1,1,1-Trichloroethane	131 Q
Carbon Tetrachloride	130
Benzene	120
1,2-Dichloroethane	123
Trichloroethene	124
1,2-Dichloropropane	123
cis-1,3-Dichloropropene	124
Toluene	114
trans-1,3-Dichloropropene	122
1,1,2-Trichloroethane	117
Tetrachloroethene	116
1,2-Dibromoethane (EDB)	110
Chlorobenzene	113
Ethyl Benzene	109
m,p-Xylene	110
o-Xylene	106
Styrene	118
1,1,2,2-Tetrachloroethane	112
1,3,5-Trimethylbenzene	94
1,2,4-Trimethylbenzene	88
1,3-Dichlorobenzene	102
1,4-Dichlorobenzene	94
alpha-Chlorotoluene	124
1,2-Dichlorobenzene	98
1,3-Butadiene	99
Hexane	93
Cyclohexane	101
Bromodichloromethane	98
Dibromochloromethane	104
Heptane	103

AIR TOXICS LTD.

SAMPLE NAME: LCS

ID#: 0403418R1-23C

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**i033104**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 3/31/04 09:57 AM**	

Compound	**%Recovery**
Cumene	96
Propylbenzene	71
Chloromethane	109
1,2,4-Trichlorobenzene	83
Hexachlorobutadiene	82
Acetone	85
Carbon Disulfide	91
2-Propanol	102
trans-1,2-Dichloroethene	90
Vinyl Acetate	103
2-Butanone (Methyl Ethyl Ketone)	99
Tetrahydrofuran	99
1,4-Dioxane	98
4-Methyl-2-pentanone	108
2-Hexanone	101
Ethanol	115
Bromoform	104
4-Ethyltoluene	118
Methyl tert-butyl ether	101
TPH ref. to Gasoline (MW=100)	Not Spiked

Q = Exceeds Quality Control limits.

Container Type: NA - Not Applicable

Surrogates	**%Recovery**	**Method Limits**
1,2-Dichloroethane-d4	102	70-130
Toluene-d8	102	70-130
4-Bromofluorobenzene	101	70-130

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AN ENVIRONMENTAL ANALYTICAL LABORATORY

CHAIN-OF-CUSTODY RECORD

Sample Transportation Notice
Relinquishing signature on this document indicates that sample is being shipped in compliance with all applicable local, State, Federal, national, and international laws, regulations and ordinances of any kind. Air Toxics Limited assumes no liability with respect to the collection, handling or shipping of these samples. Relinquishing signature also indicates agreement to hold harmless, defend, and indemnify Air Toxics Limited against any claim, demand, or action of any kind, related to the collection, handling, or shipping of samples. D.O.T. Hot line (800) 467-4922

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FOLSOM, CA 95630-4719
(916) 985-1000 FAX: (916) 985-1020

Page ___ of ___

Contact Person: Michael Nesky
Company: LFR Inc
Address: 13880 N Northsight Ste #5 City: Scottsdale State: AZ Zip: 85260
Phone: 480-905-9811 FAX:
Collected By: Signature

Project info:
P.O. # 014-10022-04
Project # 014-10022-04-01
Project Name: Silver Creek

Turn Around Time:
☐ Normal
☑ Rush 24 HR
Specify

MW 3-24-04

Lab I.D.	Field Sample I.D.	Date & Time	Analyses Requested	Canister Pressure / Vacuum Initial	Final	Receipt
01A	EB - 3-22-04A	3-22-04/8:27	TO-15 + TPH	25.0"Hg	2.5"Hg	7.0"Hg
02A	SSG-5	3-22-04/09:10		24.0"Hg	3.0"Hg	7.5"Hg
03A	SSG-4	3-22-04/10:01		26.5"Hg	3.0"Hg	6.0"Hg
04A	SSG-3A	3-22-04/10:40		27.0"Hg	3.0"Hg	6.0"Hg
05A	SSG-3B	3-22-04/11:08		25.5"Hg	3.0"Hg	6.0"Hg
06A	SSG-2	3-22-04/11:54		26.0"Hg	3.0"Hg	6.5"Hg
07A	SSG-1	3-22-04/12:42		27.0"Hg	3.0"Hg	7.0"Hg
09A	SSG-3B	3-22-04/13:51		25.0"Hg	5.0"Hg	8.5"Hg
01A	SSG-12	3-22-04/14:35		25.0"Hg	4.5"Hg	8.0"Hg
10A	SSG-11	3-22-04/17:18		24.5"Hg	4.5"Hg	10.0"Hg

Relinquished By: (Signature)	Date/Time	Received By: (Signature)	Date/Time
Douglas Fisher	3-23-04/11:50	Lawrence Thomas ATL	3/24/04 1005
Relinquished By: (Signature)	Date/Time	Received By: (Signature)	Date/Time
Relinquished By: (Signature)	Date/Time	Received By: (Signature)	Date/Time

Notes:

Lab Use Only	Shipper Name	Air Bill #	Opened By	Temp. (°C)	Condition	Custody Seals Intact?	Work Order #
	FedEx	9432 6705 1608		—	Good	Yes No None	0403418

Form 1283 rev. 09

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CHAIN-OF-CUSTODY RECORD

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FOLSOM, CA 95630-4719
(916) 985-1000 FAX: (916) 985-1020

Page ___ of ___

Contact Person: Michael Nesky
Company: CFR
Address: ___ City: ___ State: ___ Zip: ___
Phone: ___ FAX: ___
Collected By: Signature ___

Project info:
P.O. # 014-10022-04
Project # 014-10022-04
Project Name: KMEP
Silver Creek West

Turn Around Time:
☐ Normal
☒ Rush 24 HR
Specify

MW 3/24/04

Lab I.D.	Field Sample I.D.	Date & Time	Analyses Requested	Canister Pressure / Vacuum Initial	Final	Receipt
11A	SSG-10	3-22-04/1552	TO-15 + TPH	14.0" Hg	2.5" Hg	6.5" Hg
12A	SSG-10X	3-22-04/1606	TO-15 + TPH	26.5" Hg	5.0" Hg	6.5" Hg
13A	FB-3-23-04-A	3-23-04/07:10	TO-15 + TPH	26.5" Hg	5.0" Hg	6.0" Hg
14A	SSG-36A	3-23-04/07:53	TO-15 + TPH	27.0" Hg	3.0" Hg	11.0" Hg
15A	SSG-36B	3-23-04/0804	TO-15 + TPH	27.0" Hg	3.0" Hg	6.5" Hg
16A	SSG-9	3-23-04/08:44	TO-15 + TPH	22.5" Hg	2.5" Hg	5.5" Hg
17A	SSG-8	3-23-04/0935	TO-15 + TPH	27.0" Hg	5.0" Hg	6.5" Hg
18A	SSG-6	3-23-04/10:12	TO-15 + TPH	27.0" Hg	4.5" Hg	8.0" Hg
19A	SSG-7	3-23-04/10:46	TO-15 + TPH	26.5" Hg	4.5" Hg	9.0" Hg
20A	SSG-13	3-23-04/11:24	TO-15 + TPH	26.0" Hg	4.0" Hg	9.0" Hg

Relinquished By: (Signature) Date/Time	Received By: (Signature) Date/Time
Douglas Lisher 3-23-04/11:50	Samuel Thomas ATL 3/24/04 1005
Relinquished By: (Signature) Date/Time	Received By: (Signature) Date/Time
Relinquished By: (Signature) Date/Time	Received By: (Signature) Date/Time

Notes:

Lab Use Only	Shipper Name	Air Bill #	Opened By	Temp. (°C)	Condition	Custody Seals Intact?	Work Order #
	FedEx	8432 6705 1608		—	Good	Yes No (None)	0403418

Form 1293 rev. 09

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Air Toxics Ltd. Introduces the Electronic Report

Thank you for choosing Air Toxics Ltd. To better serve our customers, we are providing your report by e-mail. This document is provided in Portable Document Format which can be viewed with Acrobat Reader by Adobe.

This electronic report includes the following:

- Work order Summary;
- Laboratory Narrative;
- Results; and
- Chain of Custody (copy).

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E-mail to:samplereceiving@airtoxics.com

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AN ENVIRONMENTAL ANALYTICAL LABORATORY

WORK ORDER #: 0403458A

Work Order Summary

CLIENT:	Mr. Doug Fisher LFR Levine-Fricke 13880 N. Northsight Blvd. Suite 115 Scottsdale, AZ 85260	**BILL TO:**	Mr. Doug Fisher LFR Levine-Fricke 13880 N. Northsight Blvd. Suite 115 Scottsdale, AZ 85260
PHONE:	480-905-9311	**P.O. #**	
FAX:	480-905-9353	**PROJECT #**	014-10022-04 KMEP Silver Croft Wash
DATE RECEIVED:	03/26/04	**CONTACT:**	Taryn Badal
DATE COMPLETED:	03/29/04		

FRACTION #	NAME	TEST	RECEIPT VAC./PRES.
01A	SSG-28	Modified TO-15	7.5 "Hg
02A	SSG-21	Modified TO-15	8.5 "Hg
03A	SSG-14	Modified TO-15	8.5 "Hg
04A	SSG-29	Modified TO-15	9.0 "Hg
05A	SSG-30	Modified TO-15	9.0 "Hg
06A	SSG-31	Modified TO-15	9.0 "Hg
07A	SSG-32	Modified TO-15	7.0 "Hg
08A	SSG-34	Modified TO-15	7.0 "Hg
09A	SSG-35	Modified TO-15	7.0 "Hg
10A	SSG-37	Modified TO-15	7.0 "Hg
11A	SSG-37-B	Modified TO-15	6.5 "Hg
12A	SSG-33	Modified TO-15	8.5 "Hg
13A	SSG-40	Modified TO-15	5.5 "Hg
14A	SSG-39	Modified TO-15	7.0 "Hg
15A	SSG-38	Modified TO-15	7.0 "Hg
16A	EB-3-24-04	Modified TO-15	10.5 "Hg
16AA	EB-3-24-04 Duplicate	Modified TO-15	10.5 "Hg
17A	SSG-27	Modified TO-15	8.0 "Hg
18A	SSG-15	Modified TO-15	8.0 "Hg
19A	SSG-22	Modified TO-15	8.0 "Hg

Continued on next page

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AN ENVIRONMENTAL ANALYTICAL LABORATORY

WORK ORDER #: 0403458A

Work Order Summary

CLIENT:	Mr. Doug Fisher LFR Levine-Fricke 13880 N. Northsight Blvd. Suite 115 Scottsdale, AZ 85260	**BILL TO:**	Mr. Doug Fisher LFR Levine-Fricke 13880 N. Northsight Blvd. Suite 115 Scottsdale, AZ 85260
PHONE:	480-905-9311	**P.O. #**	
FAX:	480-905-9353	**PROJECT #**	014-10022-04 KMEP Silver Croft Wash
DATE RECEIVED:	03/26/04	**CONTACT:**	Taryn Badal
DATE COMPLETED:	03/29/04		

FRACTION #	NAME	TEST	RECEIPT VAC./PRES.
20A	Lab Blank	Modified TO-15	NA
20B	Lab Blank	Modified TO-15	NA
20C	Lab Blank	Modified TO-15	NA
20D	Lab Blank	Modified TO-15	NA
21A	CCV	Modified TO-15	NA
21B	CCV	Modified TO-15	NA
21C	CCV	Modified TO-15	NA
21D	CCV	Modified TO-15	NA
22A	LCS	Modified TO-15	NA
22B	LCS	Modified TO-15	NA
22C	LCS	Modified TO-15	NA
22D	LCS	Modified TO-15	NA

CERTIFIED BY: Linda L. Freeman

Laboratory Director

DATE: 03/29/04

Certfication numbers: AR DEQ - 03-084-0, CA NELAP - 02110CA, LA NELAP/LELAP- AI 30763, NJ NELAP - CA004
NY NELAP - 11291, UT NELAP - 9166389892
Name of Accrediting Agency: NELAP/Florida Department of Health, Scope of Application: Clean Air Act,
Accreditation number: E87680, Effective date: 07/01/03, Expiration date: 06/30/04
Air Toxics Ltd. certifies that the test results contained in this report meet all requirements of the NELAC standards

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180 BLUE RAVINE ROAD, SUITE B FOLSOM, CA - 95630
(916) 985-1000 . (800) 985-5955 . FAX (916) 985-1020

LABORATORY NARRATIVE
Modified TO-15
LFR Levine-Fricke
Workorder# 0403458A

Eighteen 1 Liter Summa Canister (100% Certified) and one 6 Liter Summa Canister (100% Certified) samples were received on March 26, 2004. The laboratory performed analysis via modified EPA Method TO-15 using GC/MS in the full scan mode. The method involves concentrating up to 0.2 liters of air. The concentrated aliquot is then flash vaporized and swept through a water management system to remove water vapor. Following dehumidification, the sample passes directly into the GC/MS for analysis. See the data sheets for the reporting limits for each compound.

Method modifications taken to run these samples include:

Requirement	***TO-14A/TO-15***	***ATL Modifications***
BFB acceptance criteria	CLP protocol (TO-15)	SW-846 protocol
Concentration of IS spike	10 ppbv (TO-15)	25 ppbv
Dilutions for initial calibration	Dynamic dilutions or static using canisters	Syringe dilutions
Daily CCV	</= 30% Difference	</= 30% Difference with two allowed out up to </=40%.; flag and narrate outliers
Primary ions for Quantification	Freon 114: 85, Carbon Tetrachloride: 117, Trichloroethene: 130, Ethyl Benzene, m,p- and o-Xylene: 91, Vinyl Acetate: 43, 2-Butanone: 43, 4-Methyl-2-Pentanone: 43.	Freon 114: 135, Carbon Tetrachloride: 119, Trichloroethene: 95, Ethyl Benzene, m,p- and o-Xylene: 106, Vinyl Acetate: 86, 2-Butanone: 72, 4-Methyl-2-Pentanone: 58.
Sample collection media	Summa canister	ATL recommends use of summa canisters to insure data defensibility, but will report results from Tedlar bags at client request
Sample Drying System	Nafion Dryer (TO-14A)	Multisorbent
Sample Load Volume	400 mL (TO-14A)	Varied to 0.2 L.
Blank Acceptance Criteria.	< 0.20 ppbv (TO-14A)	< RL
BFB Absolute Abundance Criteria (TO-14A)	Within 10% of that from the previous day.	CCV internal standard area counts are compared to ICAL, corrective action for > 40 % D.
Initial Calibration	</= 30 %RSD (TO-14A)	</= 30 % RSD with 2 compounds allowed out to </= 40 % RSD.
IS Recoveries	Within 40% of mean over ICAL for blanks, and within 40 % of daily CCV for samples. (TO-15)	Within 40% of CCV recoveries for blank and samples.

Receiving Notes

The chain of custody information for sample SSG-37 did not match the entry on the sample tag. The discrepancy was noted in the Sample Receipt Confirmation email/fax and the information on the chain of custody was used to process and report the sample.

There was a significant difference (ie. greater than 5.0" Hg) between the measured canister receipt vacuum and that which was reported on the chain of custody or the canister tag for samples SSG-29 and SSG-31. The discrepancy was noted in the Sample Receipt Confirmation email/fax and the vacuum measured in the laboratory was used to calculate results.

Analytical Notes

There were no analytical discrepancies.

Definition of Data Qualifying Flags

Eight qualifiers may have been used on the data analysis sheets and indicates as follows:

B - Compound present in laboratory blank greater than reporting limit (background subtraction not performed).

J - Estimated value.

E - Exceeds instrument calibration range.

S - Saturated Peak.

Q - Exceeds quality control limits.

U - Compound analyzed for but not detected above the reporting limit.

UJ- Non-detected compound associated with low bias in the CCV

N - The identification is based on presumptive evidence.

File extensions may have been used on the data analysis sheets and indicates as follows:

a-File was requantified

b-File was quantified by a second column and detector

r1-File was requantified for the purpose of reissue

AIR TOXICS LTD.

SAMPLE NAME: SSG-28

ID#: 0403458A-01A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**i032608**	**Date of Collection:**	**3/23/04**
Dil. Factor:	**1.79**	**Date of Analysis:**	**3/26/04 12:39 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	0.90	2.2	4.5	11
Freon 114	0.90	Not Detected	6.4	Not Detected
Vinyl Chloride	0.90	Not Detected	2.3	Not Detected
Bromomethane	0.90	Not Detected	3.5	Not Detected
Chloroethane	0.90	Not Detected	2.4	Not Detected
Freon 11	0.90	Not Detected	5.1	Not Detected
1,1-Dichloroethene	0.90	Not Detected	3.6	Not Detected
Freon 113	0.90	Not Detected	7.0	Not Detected
Methylene Chloride	0.90	Not Detected	3.2	Not Detected
1,1-Dichloroethane	0.90	Not Detected	3.7	Not Detected
cis-1,2-Dichloroethene	0.90	Not Detected	3.6	Not Detected
Chloroform	0.90	Not Detected	4.4	Not Detected
1,1,1-Trichloroethane	0.90	Not Detected	5.0	Not Detected
Carbon Tetrachloride	0.90	Not Detected	5.7	Not Detected
Benzene	0.90	5.5	2.9	18
1,2-Dichloroethane	0.90	Not Detected	3.7	Not Detected
Trichloroethene	0.90	Not Detected	4.9	Not Detected
1,2-Dichloropropane	0.90	Not Detected	4.2	Not Detected
cis-1,3-Dichloropropene	0.90	Not Detected	4.1	Not Detected
Toluene	0.90	63	3.4	240
trans-1,3-Dichloropropene	0.90	Not Detected	4.1	Not Detected
1,1,2-Trichloroethane	0.90	Not Detected	5.0	Not Detected
Tetrachloroethene	0.90	Not Detected	6.2	Not Detected
1,2-Dibromoethane (EDB)	0.90	Not Detected	7.0	Not Detected
Chlorobenzene	0.90	Not Detected	4.2	Not Detected
Ethyl Benzene	0.90	6.0	3.9	26
m,p-Xylene	0.90	24	4.0	110
o-Xylene	0.90	8.9	4.0	39
Styrene	0.90	Not Detected	3.9	Not Detected
1,1,2,2-Tetrachloroethane	0.90	Not Detected	6.2	Not Detected
1,3,5-Trimethylbenzene	0.90	2.0	4.5	9.9
1,2,4-Trimethylbenzene	0.90	6.4	4.5	32
1,3-Dichlorobenzene	0.90	Not Detected	5.5	Not Detected
1,4-Dichlorobenzene	0.90	Not Detected	5.5	Not Detected
alpha-Chlorotoluene	0.90	Not Detected	4.7	Not Detected
1,2-Dichlorobenzene	0.90	Not Detected	5.5	Not Detected
1,3-Butadiene	0.90	Not Detected	2.0	Not Detected
Hexane	0.90	4.7	3.2	17
Cyclohexane	0.90	Not Detected	3.1	Not Detected
Bromodichloromethane	0.90	Not Detected	6.1	Not Detected
Dibromochloromethane	0.90	Not Detected	7.7	Not Detected
Heptane	0.90	3.3	3.7	14

AIR TOXICS LTD.

SAMPLE NAME: SSG-28

ID#: 0403458A-01A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**i032608**	**Date of Collection:**	**3/23/04**
Dil. Factor:	**1.79**	**Date of Analysis:**	**3/26/04 12:39 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Cumene	0.90	Not Detected	4.5	Not Detected
Propylbenzene	0.90	1.2	4.5	6.2
Chloromethane	3.6	Not Detected	7.5	Not Detected
1,2,4-Trichlorobenzene	3.6	Not Detected	27	Not Detected
Hexachlorobutadiene	3.6	Not Detected	39	Not Detected
Acetone	3.6	260	8.6	640
Carbon Disulfide	3.6	Not Detected	11	Not Detected
2-Propanol	3.6	4.6	8.9	12
trans-1,2-Dichloroethene	3.6	Not Detected	14	Not Detected
Vinyl Acetate	3.6	Not Detected	13	Not Detected
2-Butanone (Methyl Ethyl Ketone)	3.6	39	11	120
Tetrahydrofuran	3.6	Not Detected	11	Not Detected
1,4-Dioxane	3.6	Not Detected	13	Not Detected
4-Methyl-2-pentanone	3.6	Not Detected	15	Not Detected
2-Hexanone	3.6	6.5	15	27
Ethanol	3.6	10	6.8	20
Bromoform	3.6	Not Detected	38	Not Detected
4-Ethyltoluene	3.6	7.1	18	35
Methyl tert-butyl ether	3.6	Not Detected	13	Not Detected
TPH ref. to Gasoline (MW=100)	18	6200	74	26000

Container Type: 1 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	100	70-130
Toluene-d8	101	70-130
4-Bromofluorobenzene	100	70-130

AIR TOXICS LTD.

SAMPLE NAME: SSG-21

ID#: 0403458A-02A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**i032609**	**Date of Collection:**	**3/23/04**
Dil. Factor:	**1.87**	**Date of Analysis:**	**3/26/04 01:25 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	0.94	5.5	4.7	28
Freon 114	0.94	Not Detected	6.6	Not Detected
Vinyl Chloride	0.94	Not Detected	2.4	Not Detected
Bromomethane	0.94	Not Detected	3.7	Not Detected
Chloroethane	0.94	Not Detected	2.5	Not Detected
Freon 11	0.94	1.0	5.3	5.8
1,1-Dichloroethene	0.94	Not Detected	3.8	Not Detected
Freon 113	0.94	Not Detected	7.3	Not Detected
Methylene Chloride	0.94	Not Detected	3.3	Not Detected
1,1-Dichloroethane	0.94	Not Detected	3.8	Not Detected
cis-1,2-Dichloroethene	0.94	Not Detected	3.8	Not Detected
Chloroform	0.94	Not Detected	4.6	Not Detected
1,1,1-Trichloroethane	0.94	Not Detected	5.2	Not Detected
Carbon Tetrachloride	0.94	Not Detected	6.0	Not Detected
Benzene	0.94	6.1	3.0	20
1,2-Dichloroethane	0.94	Not Detected	3.8	Not Detected
Trichloroethene	0.94	Not Detected	5.1	Not Detected
1,2-Dichloropropane	0.94	Not Detected	4.4	Not Detected
cis-1,3-Dichloropropene	0.94	Not Detected	4.3	Not Detected
Toluene	0.94	83	3.6	320
trans-1,3-Dichloropropene	0.94	Not Detected	4.3	Not Detected
1,1,2-Trichloroethane	0.94	Not Detected	5.2	Not Detected
Tetrachloroethene	0.94	2.1	6.4	15
1,2-Dibromoethane (EDB)	0.94	Not Detected	7.3	Not Detected
Chlorobenzene	0.94	Not Detected	4.4	Not Detected
Ethyl Benzene	0.94	10	4.1	45
m,p-Xylene	0.94	44	4.1	200
o-Xylene	0.94	16	4.1	71
Styrene	0.94	Not Detected	4.0	Not Detected
1,1,2,2-Tetrachloroethane	0.94	Not Detected	6.5	Not Detected
1,3,5-Trimethylbenzene	0.94	3.8	4.7	19
1,2,4-Trimethylbenzene	0.94	12	4.7	63
1,3-Dichlorobenzene	0.94	Not Detected	5.7	Not Detected
1,4-Dichlorobenzene	0.94	Not Detected	5.7	Not Detected
alpha-Chlorotoluene	0.94	Not Detected	4.9	Not Detected
1,2-Dichlorobenzene	0.94	Not Detected	5.7	Not Detected
1,3-Butadiene	0.94	1.7	2.1	3.9
Hexane	0.94	3.8	3.3	14
Cyclohexane	0.94	Not Detected	3.3	Not Detected
Bromodichloromethane	0.94	Not Detected	6.4	Not Detected
Dibromochloromethane	0.94	Not Detected	8.1	Not Detected
Heptane	0.94	3.7	3.9	15

AIR TOXICS LTD.

SAMPLE NAME: SSG-21

ID#: 0403458A-02A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**i032609**	**Date of Collection:**	**3/23/04**
Dil. Factor:	**1.87**	**Date of Analysis:**	**3/26/04 01:25 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Cumene	0.94	Not Detected	4.7	Not Detected
Propylbenzene	0.94	2.0	4.7	10
Chloromethane	3.7	Not Detected	7.8	Not Detected
1,2,4-Trichlorobenzene	3.7	Not Detected	28	Not Detected
Hexachlorobutadiene	3.7	Not Detected	40	Not Detected
Acetone	3.7	380 E	9.0	920 E
Carbon Disulfide	3.7	4.8	12	15
2-Propanol	3.7	6.0	9.3	15
trans-1,2-Dichloroethene	3.7	Not Detected	15	Not Detected
Vinyl Acetate	3.7	Not Detected	13	Not Detected
2-Butanone (Methyl Ethyl Ketone)	3.7	25	11	74
Tetrahydrofuran	3.7	Not Detected	11	Not Detected
1,4-Dioxane	3.7	Not Detected	14	Not Detected
4-Methyl-2-pentanone	3.7	Not Detected	16	Not Detected
2-Hexanone	3.7	5.2	16	21
Ethanol	3.7	18	7.2	34
Bromoform	3.7	Not Detected	39	Not Detected
4-Ethyltoluene	3.7	13	19	65
Methyl tert-butyl ether	3.7	Not Detected	14	Not Detected
TPH ref. to Gasoline (MW=100)	19	1000	78	4200

E = Exceeds instrument calibration range.

Container Type: 1 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	99	70-130
Toluene-d8	99	70-130
4-Bromofluorobenzene	98	70-130

AIR TOXICS LTD.

SAMPLE NAME: SSG-14

ID#: 0403458A-03A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**i032610**	**Date of Collection:**	**3/23/04**
Dil. Factor:	**1.87**	**Date of Analysis:**	**3/26/04 02:05 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	0.94	7.2	4.7	36
Freon 114	0.94	Not Detected	6.6	Not Detected
Vinyl Chloride	0.94	Not Detected	2.4	Not Detected
Bromomethane	0.94	Not Detected	3.7	Not Detected
Chloroethane	0.94	Not Detected	2.5	Not Detected
Freon 11	0.94	2.4	5.3	14
1,1-Dichloroethene	0.94	Not Detected	3.8	Not Detected
Freon 113	0.94	Not Detected	7.3	Not Detected
Methylene Chloride	0.94	Not Detected	3.3	Not Detected
1,1-Dichloroethane	0.94	Not Detected	3.8	Not Detected
cis-1,2-Dichloroethene	0.94	Not Detected	3.8	Not Detected
Chloroform	0.94	4.5	4.6	22
1,1,1-Trichloroethane	0.94	Not Detected	5.2	Not Detected
Carbon Tetrachloride	0.94	Not Detected	6.0	Not Detected
Benzene	0.94	6.9	3.0	22
1,2-Dichloroethane	0.94	Not Detected	3.8	Not Detected
Trichloroethene	0.94	Not Detected	5.1	Not Detected
1,2-Dichloropropane	0.94	Not Detected	4.4	Not Detected
cis-1,3-Dichloropropene	0.94	Not Detected	4.3	Not Detected
Toluene	0.94	220	3.6	850
trans-1,3-Dichloropropene	0.94	Not Detected	4.3	Not Detected
1,1,2-Trichloroethane	0.94	Not Detected	5.2	Not Detected
Tetrachloroethene	0.94	1.1	6.4	7.7
1,2-Dibromoethane (EDB)	0.94	Not Detected	7.3	Not Detected
Chlorobenzene	0.94	Not Detected	4.4	Not Detected
Ethyl Benzene	0.94	19	4.1	82
m,p-Xylene	0.94	77	4.1	340
o-Xylene	0.94	26	4.1	120
Styrene	0.94	1.4	4.0	6.1
1,1,2,2-Tetrachloroethane	0.94	Not Detected	6.5	Not Detected
1,3,5-Trimethylbenzene	0.94	4.6	4.7	23
1,2,4-Trimethylbenzene	0.94	17	4.7	84
1,3-Dichlorobenzene	0.94	Not Detected	5.7	Not Detected
1,4-Dichlorobenzene	0.94	Not Detected	5.7	Not Detected
alpha-Chlorotoluene	0.94	Not Detected	4.9	Not Detected
1,2-Dichlorobenzene	0.94	Not Detected	5.7	Not Detected
1,3-Butadiene	0.94	Not Detected	2.1	Not Detected
Hexane	0.94	5.0	3.3	18
Cyclohexane	0.94	Not Detected	3.3	Not Detected
Bromodichloromethane	0.94	Not Detected	6.4	Not Detected
Dibromochloromethane	0.94	Not Detected	8.1	Not Detected
Heptane	0.94	4.1	3.9	17

AIR TOXICS LTD.

SAMPLE NAME: SSG-14

ID#: 0403458A-03A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**i032610**	**Date of Collection:**	**3/23/04**
Dil. Factor:	**1.87**	**Date of Analysis:**	**3/26/04 02:05 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Cumene	0.94	Not Detected	4.7	Not Detected
Propylbenzene	0.94	2.6	4.7	13
Chloromethane	3.7	Not Detected	7.8	Not Detected
1,2,4-Trichlorobenzene	3.7	Not Detected	28	Not Detected
Hexachlorobutadiene	3.7	Not Detected	40	Not Detected
Acetone	3.7	540 E	9.0	1300 E
Carbon Disulfide	3.7	8.5	12	27
2-Propanol	3.7	8.6	9.3	21
trans-1,2-Dichloroethene	3.7	Not Detected	15	Not Detected
Vinyl Acetate	3.7	Not Detected	13	Not Detected
2-Butanone (Methyl Ethyl Ketone)	3.7	37	11	110
Tetrahydrofuran	3.7	Not Detected	11	Not Detected
1,4-Dioxane	3.7	Not Detected	14	Not Detected
4-Methyl-2-pentanone	3.7	Not Detected	16	Not Detected
2-Hexanone	3.7	8.5	16	36
Ethanol	3.7	30	7.2	58
Bromoform	3.7	Not Detected	39	Not Detected
4-Ethyltoluene	3.7	17	19	86
Methyl tert-butyl ether	3.7	18	14	66
TPH ref. to Gasoline (MW=100)	19	1600	78	6700

E = Exceeds instrument calibration range.

Container Type: 1 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	99	70-130
Toluene-d8	102	70-130
4-Bromofluorobenzene	103	70-130

AIR TOXICS LTD.

SAMPLE NAME: SSG-29

ID#: 0403458A-04A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**i032615**	**Date of Collection:**	**3/23/04**
Dil. Factor:	**3.82**	**Date of Analysis:**	**3/26/04 06:51 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	1.9	8.9	9.6	45
Freon 114	1.9	Not Detected	14	Not Detected
Vinyl Chloride	1.9	Not Detected	5.0	Not Detected
Bromomethane	1.9	Not Detected	7.5	Not Detected
Chloroethane	1.9	Not Detected	5.1	Not Detected
Freon 11	1.9	Not Detected	11	Not Detected
1,1-Dichloroethene	1.9	Not Detected	7.7	Not Detected
Freon 113	1.9	Not Detected	15	Not Detected
Methylene Chloride	1.9	Not Detected	6.7	Not Detected
1,1-Dichloroethane	1.9	Not Detected	7.8	Not Detected
cis-1,2-Dichloroethene	1.9	Not Detected	7.7	Not Detected
Chloroform	1.9	Not Detected	9.5	Not Detected
1,1,1-Trichloroethane	1.9	Not Detected	10	Not Detected
Carbon Tetrachloride	1.9	Not Detected	12	Not Detected
Benzene	1.9	32	6.2	100
1,2-Dichloroethane	1.9	Not Detected	7.8	Not Detected
Trichloroethene	1.9	Not Detected	10	Not Detected
1,2-Dichloropropane	1.9	Not Detected	9.0	Not Detected
cis-1,3-Dichloropropene	1.9	Not Detected	8.8	Not Detected
Toluene	1.9	640	7.3	2400
trans-1,3-Dichloropropene	1.9	Not Detected	8.8	Not Detected
1,1,2-Trichloroethane	1.9	Not Detected	10	Not Detected
Tetrachloroethene	1.9	Not Detected	13	Not Detected
1,2-Dibromoethane (EDB)	1.9	Not Detected	15	Not Detected
Chlorobenzene	1.9	Not Detected	8.9	Not Detected
Ethyl Benzene	1.9	38	8.4	160
m,p-Xylene	1.9	140	8.4	630
o-Xylene	1.9	46	8.4	200
Styrene	1.9	2.6	8.3	11
1,1,2,2-Tetrachloroethane	1.9	Not Detected	13	Not Detected
1,3,5-Trimethylbenzene	1.9	9.7	9.5	48
1,2,4-Trimethylbenzene	1.9	32	9.5	160
1,3-Dichlorobenzene	1.9	Not Detected	12	Not Detected
1,4-Dichlorobenzene	1.9	Not Detected	12	Not Detected
alpha-Chlorotoluene	1.9	Not Detected	10	Not Detected
1,2-Dichlorobenzene	1.9	Not Detected	12	Not Detected
1,3-Butadiene	1.9	Not Detected	4.3	Not Detected
Hexane	1.9	18	6.8	63
Cyclohexane	1.9	12	6.7	42
Bromodichloromethane	1.9	Not Detected	13	Not Detected
Dibromochloromethane	1.9	Not Detected	16	Not Detected
Heptane	1.9	10	8.0	44

AIR TOXICS LTD.

SAMPLE NAME: SSG-29

ID#: 0403458A-04A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**i032615**	**Date of Collection:**	**3/23/04**
Dil. Factor:	**3.82**	**Date of Analysis:**	**3/26/04 06:51 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Cumene	1.9	Not Detected	9.5	Not Detected
Propylbenzene	1.9	3.9	9.5	19
Chloromethane	7.6	Not Detected	16	Not Detected
1,2,4-Trichlorobenzene	7.6	Not Detected	58	Not Detected
Hexachlorobutadiene	7.6	Not Detected	83	Not Detected
Acetone	7.6	550	18	1300
Carbon Disulfide	7.6	Not Detected	24	Not Detected
2-Propanol	7.6	7.8	19	19
trans-1,2-Dichloroethene	7.6	Not Detected	31	Not Detected
Vinyl Acetate	7.6	Not Detected	27	Not Detected
2-Butanone (Methyl Ethyl Ketone)	7.6	40	23	120
Tetrahydrofuran	7.6	Not Detected	23	Not Detected
1,4-Dioxane	7.6	Not Detected	28	Not Detected
4-Methyl-2-pentanone	7.6	Not Detected	32	Not Detected
2-Hexanone	7.6	8.4	32	35
Ethanol	7.6	32	15	62
Bromoform	7.6	Not Detected	80	Not Detected
4-Ethyltoluene	7.6	30	38	150
Methyl tert-butyl ether	7.6	Not Detected	28	Not Detected
TPH ref. to Gasoline (MW=100)	38	2700	160	11000

Container Type: 1 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	99	70-130
Toluene-d8	103	70-130
4-Bromofluorobenzene	100	70-130

AIR TOXICS LTD.

SAMPLE NAME: SSG-30

ID#: 0403458A-05A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**d032619**	**Date of Collection:**	**3/23/04**
Dil. Factor:	**1.91**	**Date of Analysis:**	**3/26/04 07:42 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	0.96	8.6	4.8	43
Freon 114	0.96	Not Detected	6.8	Not Detected
Vinyl Chloride	0.96	Not Detected	2.5	Not Detected
Bromomethane	0.96	Not Detected	3.8	Not Detected
Chloroethane	0.96	Not Detected	2.6	Not Detected
Freon 11	0.96	2.1	5.4	12
1,1-Dichloroethene	0.96	Not Detected	3.8	Not Detected
Freon 113	0.96	Not Detected	7.4	Not Detected
Methylene Chloride	0.96	Not Detected	3.4	Not Detected
1,1-Dichloroethane	0.96	Not Detected	3.9	Not Detected
cis-1,2-Dichloroethene	0.96	Not Detected	3.8	Not Detected
Chloroform	0.96	1.7	4.7	8.4
1,1,1-Trichloroethane	0.96	Not Detected	5.3	Not Detected
Carbon Tetrachloride	0.96	Not Detected	6.1	Not Detected
Benzene	0.96	4.9	3.1	16
1,2-Dichloroethane	0.96	Not Detected	3.9	Not Detected
Trichloroethene	0.96	Not Detected	5.2	Not Detected
1,2-Dichloropropane	0.96	Not Detected	4.5	Not Detected
cis-1,3-Dichloropropene	0.96	Not Detected	4.4	Not Detected
Toluene	0.96	220	3.6	830
trans-1,3-Dichloropropene	0.96	Not Detected	4.4	Not Detected
1,1,2-Trichloroethane	0.96	Not Detected	5.3	Not Detected
Tetrachloroethene	0.96	Not Detected	6.6	Not Detected
1,2-Dibromoethane (EDB)	0.96	Not Detected	7.4	Not Detected
Chlorobenzene	0.96	Not Detected	4.5	Not Detected
Ethyl Benzene	0.96	16	4.2	69
m,p-Xylene	0.96	60	4.2	260
o-Xylene	0.96	20	4.2	89
Styrene	0.96	Not Detected	4.1	Not Detected
1,1,2,2-Tetrachloroethane	0.96	Not Detected	6.7	Not Detected
1,3,5-Trimethylbenzene	0.96	4.2	4.8	21
1,2,4-Trimethylbenzene	0.96	15	4.8	74
1,3-Dichlorobenzene	0.96	Not Detected	5.8	Not Detected
1,4-Dichlorobenzene	0.96	Not Detected	5.8	Not Detected
alpha-Chlorotoluene	0.96	Not Detected	5.0	Not Detected
1,2-Dichlorobenzene	0.96	Not Detected	5.8	Not Detected
1,3-Butadiene	0.96	Not Detected	2.1	Not Detected
Hexane	0.96	3.4	3.4	12
Cyclohexane	0.96	Not Detected	3.3	Not Detected
Bromodichloromethane	0.96	Not Detected	6.5	Not Detected
Dibromochloromethane	0.96	Not Detected	8.3	Not Detected
Heptane	0.96	3.3	4.0	14

AIR TOXICS LTD.

SAMPLE NAME: SSG-30

ID#: 0403458A-05A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**d032619**	**Date of Collection:**	**3/23/04**
Dil. Factor:	**1.91**	**Date of Analysis:**	**3/26/04 07:42 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Cumene	0.96	Not Detected	4.8	Not Detected
Propylbenzene	0.96	2.2	4.8	11
Chloromethane	3.8	Not Detected	8.0	Not Detected
1,2,4-Trichlorobenzene	3.8	Not Detected	29	Not Detected
Hexachlorobutadiene	3.8	Not Detected	41	Not Detected
Acetone	3.8	550 E	9.2	1300 E
Carbon Disulfide	3.8	Not Detected	12	Not Detected
2-Propanol	3.8	5.2	9.5	13
trans-1,2-Dichloroethene	3.8	Not Detected	15	Not Detected
Vinyl Acetate	3.8	Not Detected	14	Not Detected
2-Butanone (Methyl Ethyl Ketone)	3.8	23	11	69
Tetrahydrofuran	3.8	Not Detected	11	Not Detected
1,4-Dioxane	3.8	Not Detected	14	Not Detected
4-Methyl-2-pentanone	3.8	Not Detected	16	Not Detected
2-Hexanone	3.8	5.0	16	21
Ethanol	3.8	19	7.3	37
Bromoform	3.8	Not Detected	40	Not Detected
4-Ethyltoluene	3.8	14	19	72
Methyl tert-butyl ether	3.8	Not Detected	14	Not Detected
TPH ref. to Gasoline (MW=100)	19	2200	79	9200

E = Exceeds instrument calibration range.

Container Type: 1 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	105	70-130
Toluene-d8	101	70-130
4-Bromofluorobenzene	106	70-130

AIR TOXICS LTD.

SAMPLE NAME: SSG-31

ID#: 0403458A-06A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**d032621**	**Date of Collection:**	**3/23/04**
Dil. Factor:	**1.91**	**Date of Analysis:**	**3/26/04 09:11 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	0.96	5.6	4.8	28
Freon 114	0.96	Not Detected	6.8	Not Detected
Vinyl Chloride	0.96	Not Detected	2.5	Not Detected
Bromomethane	0.96	Not Detected	3.8	Not Detected
Chloroethane	0.96	Not Detected	2.6	Not Detected
Freon 11	0.96	1.9	5.4	11
1,1-Dichloroethene	0.96	Not Detected	3.8	Not Detected
Freon 113	0.96	Not Detected	7.4	Not Detected
Methylene Chloride	0.96	Not Detected	3.4	Not Detected
1,1-Dichloroethane	0.96	Not Detected	3.9	Not Detected
cis-1,2-Dichloroethene	0.96	Not Detected	3.8	Not Detected
Chloroform	0.96	5.6	4.7	28
1,1,1-Trichloroethane	0.96	Not Detected	5.3	Not Detected
Carbon Tetrachloride	0.96	Not Detected	6.1	Not Detected
Benzene	0.96	5.8	3.1	19
1,2-Dichloroethane	0.96	Not Detected	3.9	Not Detected
Trichloroethene	0.96	1.2	5.2	6.4
1,2-Dichloropropane	0.96	Not Detected	4.5	Not Detected
cis-1,3-Dichloropropene	0.96	Not Detected	4.4	Not Detected
Toluene	0.96	130	3.6	490
trans-1,3-Dichloropropene	0.96	Not Detected	4.4	Not Detected
1,1,2-Trichloroethane	0.96	Not Detected	5.3	Not Detected
Tetrachloroethene	0.96	Not Detected	6.6	Not Detected
1,2-Dibromoethane (EDB)	0.96	Not Detected	7.4	Not Detected
Chlorobenzene	0.96	Not Detected	4.5	Not Detected
Ethyl Benzene	0.96	14	4.2	63
m,p-Xylene	0.96	59	4.2	260
o-Xylene	0.96	21	4.2	94
Styrene	0.96	Not Detected	4.1	Not Detected
1,1,2,2-Tetrachloroethane	0.96	Not Detected	6.7	Not Detected
1,3,5-Trimethylbenzene	0.96	5.0	4.8	25
1,2,4-Trimethylbenzene	0.96	17	4.8	83
1,3-Dichlorobenzene	0.96	Not Detected	5.8	Not Detected
1,4-Dichlorobenzene	0.96	Not Detected	5.8	Not Detected
alpha-Chlorotoluene	0.96	Not Detected	5.0	Not Detected
1,2-Dichlorobenzene	0.96	Not Detected	5.8	Not Detected
1,3-Butadiene	0.96	Not Detected	2.1	Not Detected
Hexane	0.96	5.8	3.4	21
Cyclohexane	0.96	Not Detected	3.3	Not Detected
Bromodichloromethane	0.96	2.0	6.5	13
Dibromochloromethane	0.96	Not Detected	8.3	Not Detected
Heptane	0.96	4.6	4.0	19

AIR TOXICS LTD.

SAMPLE NAME: SSG-31

ID#: 0403458A-06A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**d032621**	**Date of Collection:**	**3/23/04**
Dil. Factor:	**1.91**	**Date of Analysis:**	**3/26/04 09:11 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Cumene	0.96	Not Detected	4.8	Not Detected
Propylbenzene	0.96	2.6	4.8	13
Chloromethane	3.8	Not Detected	8.0	Not Detected
1,2,4-Trichlorobenzene	3.8	Not Detected	29	Not Detected
Hexachlorobutadiene	3.8	Not Detected	41	Not Detected
Acetone	3.8	550 E	9.2	1300 E
Carbon Disulfide	3.8	14	12	45
2-Propanol	3.8	9.5	9.5	24
trans-1,2-Dichloroethene	3.8	Not Detected	15	Not Detected
Vinyl Acetate	3.8	Not Detected	14	Not Detected
2-Butanone (Methyl Ethyl Ketone)	3.8	26	11	77
Tetrahydrofuran	3.8	Not Detected	11	Not Detected
1,4-Dioxane	3.8	Not Detected	14	Not Detected
4-Methyl-2-pentanone	3.8	Not Detected	16	Not Detected
2-Hexanone	3.8	5.9	16	24
Ethanol	3.8	26	7.3	50
Bromoform	3.8	Not Detected	40	Not Detected
4-Ethyltoluene	3.8	17	19	83
Methyl tert-butyl ether	3.8	Not Detected	14	Not Detected
TPH ref. to Gasoline (MW=100)	19	880	79	3600

E = Exceeds instrument calibration range.

Container Type: 1 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	106	70-130
Toluene-d8	101	70-130
4-Bromofluorobenzene	108	70-130

AIR TOXICS LTD.

SAMPLE NAME: SSG-32

ID#: 0403458A-07A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**d032622**	**Date of Collection:**	**3/24/04**
Dil. Factor:	**17.5**	**Date of Analysis:**	**3/26/04 09:51 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	8.8	Not Detected	44	Not Detected
Freon 114	8.8	Not Detected	62	Not Detected
Vinyl Chloride	8.8	Not Detected	23	Not Detected
Bromomethane	8.8	Not Detected	34	Not Detected
Chloroethane	8.8	Not Detected	23	Not Detected
Freon 11	8.8	Not Detected	50	Not Detected
1,1-Dichloroethene	8.8	Not Detected	35	Not Detected
Freon 113	8.8	Not Detected	68	Not Detected
Methylene Chloride	8.8	Not Detected	31	Not Detected
1,1-Dichloroethane	8.8	Not Detected	36	Not Detected
cis-1,2-Dichloroethene	8.8	Not Detected	35	Not Detected
Chloroform	8.8	Not Detected	43	Not Detected
1,1,1-Trichloroethane	8.8	Not Detected	48	Not Detected
Carbon Tetrachloride	8.8	Not Detected	56	Not Detected
Benzene	8.8	12	28	37
1,2-Dichloroethane	8.8	Not Detected	36	Not Detected
Trichloroethene	8.8	Not Detected	48	Not Detected
1,2-Dichloropropane	8.8	Not Detected	41	Not Detected
cis-1,3-Dichloropropene	8.8	Not Detected	40	Not Detected
Toluene	8.8	2900	34	11000
trans-1,3-Dichloropropene	8.8	Not Detected	40	Not Detected
1,1,2-Trichloroethane	8.8	Not Detected	48	Not Detected
Tetrachloroethene	8.8	Not Detected	60	Not Detected
1,2-Dibromoethane (EDB)	8.8	Not Detected	68	Not Detected
Chlorobenzene	8.8	Not Detected	41	Not Detected
Ethyl Benzene	8.8	100	39	470
m,p-Xylene	8.8	330	39	1500
o-Xylene	8.8	65	39	290
Styrene	8.8	Not Detected	38	Not Detected
1,1,2,2-Tetrachloroethane	8.8	Not Detected	61	Not Detected
1,3,5-Trimethylbenzene	8.8	12	44	59
1,2,4-Trimethylbenzene	8.8	9.5	44	48
1,3-Dichlorobenzene	8.8	Not Detected	53	Not Detected
1,4-Dichlorobenzene	8.8	Not Detected	53	Not Detected
alpha-Chlorotoluene	8.8	Not Detected	46	Not Detected
1,2-Dichlorobenzene	8.8	Not Detected	53	Not Detected
1,3-Butadiene	8.8	Not Detected	20	Not Detected
Hexane	8.8	Not Detected	31	Not Detected
Cyclohexane	8.8	Not Detected	31	Not Detected
Bromodichloromethane	8.8	Not Detected	60	Not Detected
Dibromochloromethane	8.8	Not Detected	76	Not Detected
Heptane	8.8	Not Detected	36	Not Detected

AIR TOXICS LTD.

SAMPLE NAME: SSG-32

ID#: 0403458A-07A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**d032622**	**Date of Collection:**	**3/24/04**
Dil. Factor:	**17.5**	**Date of Analysis:**	**3/26/04 09:51 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Cumene	8.8	Not Detected	44	Not Detected
Propylbenzene	8.8	Not Detected	44	Not Detected
Chloromethane	35	Not Detected	73	Not Detected
1,2,4-Trichlorobenzene	35	Not Detected	260	Not Detected
Hexachlorobutadiene	35	Not Detected	380	Not Detected
Acetone	35	340	84	820
Carbon Disulfide	35	Not Detected	110	Not Detected
2-Propanol	35	Not Detected	87	Not Detected
trans-1,2-Dichloroethene	35	Not Detected	140	Not Detected
Vinyl Acetate	35	Not Detected	120	Not Detected
2-Butanone (Methyl Ethyl Ketone)	35	34 J	100	100
Tetrahydrofuran	35	Not Detected	100	Not Detected
1,4-Dioxane	35	Not Detected	130	Not Detected
4-Methyl-2-pentanone	35	Not Detected	140	Not Detected
2-Hexanone	35	Not Detected	140	Not Detected
Ethanol	35	Not Detected	67	Not Detected
Bromoform	35	Not Detected	370	Not Detected
4-Ethyltoluene	35	Not Detected	170	Not Detected
Methyl tert-butyl ether	35	Not Detected	130	Not Detected
TPH ref. to Gasoline (MW=100)	180	3600	730	15000

J = Estimated value.

Container Type: 1 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	104	70-130
Toluene-d8	100	70-130
4-Bromofluorobenzene	95	70-130

AIR TOXICS LTD.

SAMPLE NAME: SSG-34

ID#: 0403458A-08A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**d032623**	**Date of Collection:**	**3/24/04**
Dil. Factor:	**1.75**	**Date of Analysis:**	**3/26/04 10:32 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	0.88	Not Detected	4.4	Not Detected
Freon 114	0.88	Not Detected	6.2	Not Detected
Vinyl Chloride	0.88	Not Detected	2.3	Not Detected
Bromomethane	0.88	Not Detected	3.4	Not Detected
Chloroethane	0.88	Not Detected	2.3	Not Detected
Freon 11	0.88	Not Detected	5.0	Not Detected
1,1-Dichloroethene	0.88	Not Detected	3.5	Not Detected
Freon 113	0.88	Not Detected	6.8	Not Detected
Methylene Chloride	0.88	Not Detected	3.1	Not Detected
1,1-Dichloroethane	0.88	Not Detected	3.6	Not Detected
cis-1,2-Dichloroethene	0.88	Not Detected	3.5	Not Detected
Chloroform	0.88	3.8	4.3	19
1,1,1-Trichloroethane	0.88	Not Detected	4.8	Not Detected
Carbon Tetrachloride	0.88	Not Detected	5.6	Not Detected
Benzene	0.88	9.4	2.8	30
1,2-Dichloroethane	0.88	Not Detected	3.6	Not Detected
Trichloroethene	0.88	Not Detected	4.8	Not Detected
1,2-Dichloropropane	0.88	Not Detected	4.1	Not Detected
cis-1,3-Dichloropropene	0.88	Not Detected	4.0	Not Detected
Toluene	0.88	240	3.4	930
trans-1,3-Dichloropropene	0.88	Not Detected	4.0	Not Detected
1,1,2-Trichloroethane	0.88	Not Detected	4.8	Not Detected
Tetrachloroethene	0.88	Not Detected	6.0	Not Detected
1,2-Dibromoethane (EDB)	0.88	Not Detected	6.8	Not Detected
Chlorobenzene	0.88	Not Detected	4.1	Not Detected
Ethyl Benzene	0.88	17	3.9	76
m,p-Xylene	0.88	62	3.9	270
o-Xylene	0.88	22	3.9	98
Styrene	0.88	Not Detected	3.8	Not Detected
1,1,2,2-Tetrachloroethane	0.88	Not Detected	6.1	Not Detected
1,3,5-Trimethylbenzene	0.88	5.4	4.4	27
1,2,4-Trimethylbenzene	0.88	18	4.4	92
1,3-Dichlorobenzene	0.88	Not Detected	5.3	Not Detected
1,4-Dichlorobenzene	0.88	Not Detected	5.3	Not Detected
alpha-Chlorotoluene	0.88	Not Detected	4.6	Not Detected
1,2-Dichlorobenzene	0.88	Not Detected	5.3	Not Detected
1,3-Butadiene	0.88	Not Detected	2.0	Not Detected
Hexane	0.88	7.5	3.1	27
Cyclohexane	0.88	Not Detected	3.1	Not Detected
Bromodichloromethane	0.88	1.5	6.0	10
Dibromochloromethane	0.88	Not Detected	7.6	Not Detected
Heptane	0.88	5.9	3.6	25

AIR TOXICS LTD.

SAMPLE NAME: SSG-34

ID#: 0403458A-08A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**d032623**	**Date of Collection:**	**3/24/04**
Dil. Factor:	**1.75**	**Date of Analysis:**	**3/26/04 10:32 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Cumene	0.88	1.5	4.4	7.4
Propylbenzene	0.88	3.6	4.4	18
Chloromethane	3.5	Not Detected	7.3	Not Detected
1,2,4-Trichlorobenzene	3.5	Not Detected	26	Not Detected
Hexachlorobutadiene	3.5	Not Detected	38	Not Detected
Acetone	3.5	520 E	8.4	1200 E
Carbon Disulfide	3.5	6.7	11	21
2-Propanol	3.5	5.5	8.7	14
trans-1,2-Dichloroethene	3.5	Not Detected	14	Not Detected
Vinyl Acetate	3.5	Not Detected	12	Not Detected
2-Butanone (Methyl Ethyl Ketone)	3.5	36	10	110
Tetrahydrofuran	3.5	Not Detected	10	Not Detected
1,4-Dioxane	3.5	Not Detected	13	Not Detected
4-Methyl-2-pentanone	3.5	Not Detected	14	Not Detected
2-Hexanone	3.5	9.0	14	38
Ethanol	3.5	18	6.7	34
Bromoform	3.5	Not Detected	37	Not Detected
4-Ethyltoluene	3.5	20	17	100
Methyl tert-butyl ether	3.5	Not Detected	13	Not Detected
TPH ref. to Gasoline (MW=100)	18	8300	73	34000

E = Exceeds instrument calibration range.

Container Type: 1 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	103	70-130
Toluene-d8	100	70-130
4-Bromofluorobenzene	99	70-130

AIR TOXICS LTD.

SAMPLE NAME: SSG-35

ID#: 0403458A-09A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**d032624**	**Date of Collection:**	**3/24/04**
Dil. Factor:	**35.0**	**Date of Analysis:**	**3/26/04 11:15 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	18	Not Detected	88	Not Detected
Freon 114	18	Not Detected	120	Not Detected
Vinyl Chloride	18	Not Detected	45	Not Detected
Bromomethane	18	Not Detected	69	Not Detected
Chloroethane	18	Not Detected	47	Not Detected
Freon 11	18	Not Detected	100	Not Detected
1,1-Dichloroethene	18	Not Detected	70	Not Detected
Freon 113	18	Not Detected	140	Not Detected
Methylene Chloride	18	Not Detected	62	Not Detected
1,1-Dichloroethane	18	Not Detected	72	Not Detected
cis-1,2-Dichloroethene	18	Not Detected	70	Not Detected
Chloroform	18	Not Detected	87	Not Detected
1,1,1-Trichloroethane	18	Not Detected	97	Not Detected
Carbon Tetrachloride	18	Not Detected	110	Not Detected
Benzene	18	Not Detected	57	Not Detected
1,2-Dichloroethane	18	Not Detected	72	Not Detected
Trichloroethene	18	Not Detected	96	Not Detected
1,2-Dichloropropane	18	Not Detected	82	Not Detected
cis-1,3-Dichloropropene	18	Not Detected	81	Not Detected
Toluene	18	6000	67	23000
trans-1,3-Dichloropropene	18	Not Detected	81	Not Detected
1,1,2-Trichloroethane	18	Not Detected	97	Not Detected
Tetrachloroethene	18	Not Detected	120	Not Detected
1,2-Dibromoethane (EDB)	18	Not Detected	140	Not Detected
Chlorobenzene	18	Not Detected	82	Not Detected
Ethyl Benzene	18	160	77	700
m,p-Xylene	18	480	77	2100
o-Xylene	18	85	77	380
Styrene	18	Not Detected	76	Not Detected
1,1,2,2-Tetrachloroethane	18	Not Detected	120	Not Detected
1,3,5-Trimethylbenzene	18	Not Detected	87	Not Detected
1,2,4-Trimethylbenzene	18	Not Detected	87	Not Detected
1,3-Dichlorobenzene	18	Not Detected	110	Not Detected
1,4-Dichlorobenzene	18	Not Detected	110	Not Detected
alpha-Chlorotoluene	18	Not Detected	92	Not Detected
1,2-Dichlorobenzene	18	Not Detected	110	Not Detected
1,3-Butadiene	18	Not Detected	39	Not Detected
Hexane	18	Not Detected	63	Not Detected
Cyclohexane	18	Not Detected	61	Not Detected
Bromodichloromethane	18	Not Detected	120	Not Detected
Dibromochloromethane	18	Not Detected	150	Not Detected
Heptane	18	Not Detected	73	Not Detected

AIR TOXICS LTD.

SAMPLE NAME: SSG-35

ID#: 0403458A-09A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**d032624**	**Date of Collection:**	**3/24/04**
Dil. Factor:	**35.0**	**Date of Analysis:**	**3/26/04 11:15 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Cumene	18	Not Detected	87	Not Detected
Propylbenzene	18	Not Detected	87	Not Detected
Chloromethane	70	Not Detected	150	Not Detected
1,2,4-Trichlorobenzene	70	Not Detected	530	Not Detected
Hexachlorobutadiene	70	Not Detected	760	Not Detected
Acetone	70	500	170	1200
Carbon Disulfide	70	Not Detected	220	Not Detected
2-Propanol	70	Not Detected	170	Not Detected
trans-1,2-Dichloroethene	70	Not Detected	280	Not Detected
Vinyl Acetate	70	Not Detected	250	Not Detected
2-Butanone (Methyl Ethyl Ketone)	70	Not Detected	210	Not Detected
Tetrahydrofuran	70	Not Detected	210	Not Detected
1,4-Dioxane	70	Not Detected	260	Not Detected
4-Methyl-2-pentanone	70	Not Detected	290	Not Detected
2-Hexanone	70	Not Detected	290	Not Detected
Ethanol	70	Not Detected	130	Not Detected
Bromoform	70	Not Detected	740	Not Detected
4-Ethyltoluene	70	Not Detected	350	Not Detected
Methyl tert-butyl ether	70	Not Detected	260	Not Detected
TPH ref. to Gasoline (MW=100)	350	6100	1400	25000

Container Type: 1 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	100	70-130
Toluene-d8	102	70-130
4-Bromofluorobenzene	93	70-130

AIR TOXICS LTD.

SAMPLE NAME: SSG-37

ID#: 0403458A-10A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**d032625**	**Date of Collection:**	**3/24/04**
Dil. Factor:	**1.75**	**Date of Analysis:**	**3/27/04 12:01 AM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	0.88	4.8	4.4	24
Freon 114	0.88	Not Detected	6.2	Not Detected
Vinyl Chloride	0.88	Not Detected	2.3	Not Detected
Bromomethane	0.88	Not Detected	3.4	Not Detected
Chloroethane	0.88	Not Detected	2.3	Not Detected
Freon 11	0.88	Not Detected	5.0	Not Detected
1,1-Dichloroethene	0.88	Not Detected	3.5	Not Detected
Freon 113	0.88	Not Detected	6.8	Not Detected
Methylene Chloride	0.88	Not Detected	3.1	Not Detected
1,1-Dichloroethane	0.88	Not Detected	3.6	Not Detected
cis-1,2-Dichloroethene	0.88	Not Detected	3.5	Not Detected
Chloroform	0.88	Not Detected	4.3	Not Detected
1,1,1-Trichloroethane	0.88	Not Detected	4.8	Not Detected
Carbon Tetrachloride	0.88	Not Detected	5.6	Not Detected
Benzene	0.88	5.8	2.8	19
1,2-Dichloroethane	0.88	Not Detected	3.6	Not Detected
Trichloroethene	0.88	Not Detected	4.8	Not Detected
1,2-Dichloropropane	0.88	Not Detected	4.1	Not Detected
cis-1,3-Dichloropropene	0.88	Not Detected	4.0	Not Detected
Toluene	0.88	180	3.4	710
trans-1,3-Dichloropropene	0.88	Not Detected	4.0	Not Detected
1,1,2-Trichloroethane	0.88	Not Detected	4.8	Not Detected
Tetrachloroethene	0.88	Not Detected	6.0	Not Detected
1,2-Dibromoethane (EDB)	0.88	Not Detected	6.8	Not Detected
Chlorobenzene	0.88	Not Detected	4.1	Not Detected
Ethyl Benzene	0.88	11	3.9	50
m,p-Xylene	0.88	46	3.9	200
o-Xylene	0.88	17	3.9	74
Styrene	0.88	Not Detected	3.8	Not Detected
1,1,2,2-Tetrachloroethane	0.88	Not Detected	6.1	Not Detected
1,3,5-Trimethylbenzene	0.88	4.2	4.4	21
1,2,4-Trimethylbenzene	0.88	14	4.4	71
1,3-Dichlorobenzene	0.88	Not Detected	5.3	Not Detected
1,4-Dichlorobenzene	0.88	Not Detected	5.3	Not Detected
alpha-Chlorotoluene	0.88	Not Detected	4.6	Not Detected
1,2-Dichlorobenzene	0.88	Not Detected	5.3	Not Detected
1,3-Butadiene	0.88	Not Detected	2.0	Not Detected
Hexane	0.88	4.2	3.1	15
Cyclohexane	0.88	Not Detected	3.1	Not Detected
Bromodichloromethane	0.88	Not Detected	6.0	Not Detected
Dibromochloromethane	0.88	Not Detected	7.6	Not Detected
Heptane	0.88	4.2	3.6	18

AIR TOXICS LTD.

SAMPLE NAME: SSG-37

ID#: 0403458A-10A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**d032625**	**Date of Collection:**	**3/24/04**
Dil. Factor:	**1.75**	**Date of Analysis:**	**3/27/04 12:01 AM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Cumene	0.88	Not Detected	4.4	Not Detected
Propylbenzene	0.88	2.1	4.4	10
Chloromethane	3.5	Not Detected	7.3	Not Detected
1,2,4-Trichlorobenzene	3.5	Not Detected	26	Not Detected
Hexachlorobutadiene	3.5	Not Detected	38	Not Detected
Acetone	3.5	560 E	8.4	1400 E
Carbon Disulfide	3.5	5.3	11	17
2-Propanol	3.5	7.8	8.7	20
trans-1,2-Dichloroethene	3.5	Not Detected	14	Not Detected
Vinyl Acetate	3.5	Not Detected	12	Not Detected
2-Butanone (Methyl Ethyl Ketone)	3.5	36	10	110
Tetrahydrofuran	3.5	Not Detected	10	Not Detected
1,4-Dioxane	3.5	Not Detected	13	Not Detected
4-Methyl-2-pentanone	3.5	Not Detected	14	Not Detected
2-Hexanone	3.5	8.7	14	36
Ethanol	3.5	28	6.7	54
Bromoform	3.5	Not Detected	37	Not Detected
4-Ethyltoluene	3.5	13	17	67
Methyl tert-butyl ether	3.5	Not Detected	13	Not Detected
TPH ref. to Gasoline (MW=100)	18	1000	73	4100

E = Exceeds instrument calibration range.

Container Type: 1 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	101	70-130
Toluene-d8	101	70-130
4-Bromofluorobenzene	103	70-130

AIR TOXICS LTD.

SAMPLE NAME: SSG-37-B

ID#: 0403458A-11A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**d032716**	**Date of Collection:**	**3/24/04**
Dil. Factor:	**1.71**	**Date of Analysis:**	**3/27/04 09:31 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	0.86	4.2	4.3	21
Freon 114	0.86	Not Detected	6.1	Not Detected
Vinyl Chloride	0.86	Not Detected	2.2	Not Detected
Bromomethane	0.86	Not Detected	3.4	Not Detected
Chloroethane	0.86	Not Detected	2.3	Not Detected
Freon 11	0.86	Not Detected	4.9	Not Detected
1,1-Dichloroethene	0.86	Not Detected	3.4	Not Detected
Freon 113	0.86	Not Detected	6.7	Not Detected
Methylene Chloride	0.86	Not Detected	3.0	Not Detected
1,1-Dichloroethane	0.86	Not Detected	3.5	Not Detected
cis-1,2-Dichloroethene	0.86	Not Detected	3.4	Not Detected
Chloroform	0.86	Not Detected	4.2	Not Detected
1,1,1-Trichloroethane	0.86	Not Detected	4.7	Not Detected
Carbon Tetrachloride	0.86	Not Detected	5.5	Not Detected
Benzene	0.86	3.9	2.8	13
1,2-Dichloroethane	0.86	Not Detected	3.5	Not Detected
Trichloroethene	0.86	Not Detected	4.7	Not Detected
1,2-Dichloropropane	0.86	Not Detected	4.0	Not Detected
cis-1,3-Dichloropropene	0.86	Not Detected	3.9	Not Detected
Toluene	0.86	140	3.3	520
trans-1,3-Dichloropropene	0.86	Not Detected	3.9	Not Detected
1,1,2-Trichloroethane	0.86	Not Detected	4.7	Not Detected
Tetrachloroethene	0.86	Not Detected	5.9	Not Detected
1,2-Dibromoethane (EDB)	0.86	Not Detected	6.7	Not Detected
Chlorobenzene	0.86	Not Detected	4.0	Not Detected
Ethyl Benzene	0.86	10	3.8	47
m,p-Xylene	0.86	47	3.8	210
o-Xylene	0.86	17	3.8	76
Styrene	0.86	Not Detected	3.7	Not Detected
1,1,2,2-Tetrachloroethane	0.86	Not Detected	6.0	Not Detected
1,3,5-Trimethylbenzene	0.86	5.0	4.3	25
1,2,4-Trimethylbenzene	0.86	17	4.3	84
1,3-Dichlorobenzene	0.86	Not Detected	5.2	Not Detected
1,4-Dichlorobenzene	0.86	Not Detected	5.2	Not Detected
alpha-Chlorotoluene	0.86	Not Detected	4.5	Not Detected
1,2-Dichlorobenzene	0.86	Not Detected	5.2	Not Detected
1,3-Butadiene	0.86	Not Detected	1.9	Not Detected
Hexane	0.86	2.6	3.1	9.4
Cyclohexane	0.86	Not Detected	3.0	Not Detected
Bromodichloromethane	0.86	Not Detected	5.8	Not Detected
Dibromochloromethane	0.86	Not Detected	7.4	Not Detected
Heptane	0.86	2.6	3.6	11

AIR TOXICS LTD.

SAMPLE NAME: SSG-37-B

ID#: 0403458A-11A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**d032716**	**Date of Collection:**	**3/24/04**
Dil. Factor:	**1.71**	**Date of Analysis:**	**3/27/04 09:31 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Cumene	0.86	Not Detected	4.3	Not Detected
Propylbenzene	0.86	2.5	4.3	13
Chloromethane	3.4	Not Detected	7.2	Not Detected
1,2,4-Trichlorobenzene	3.4	Not Detected	26	Not Detected
Hexachlorobutadiene	3.4	Not Detected	37	Not Detected
Acetone	3.4	450 E	8.2	1100 E
Carbon Disulfide	3.4	3.9	11	12
2-Propanol	3.4	5.5	8.5	14
trans-1,2-Dichloroethene	3.4	Not Detected	14	Not Detected
Vinyl Acetate	3.4	Not Detected	12	Not Detected
2-Butanone (Methyl Ethyl Ketone)	3.4	26	10	79
Tetrahydrofuran	3.4	Not Detected	10	Not Detected
1,4-Dioxane	3.4	Not Detected	12	Not Detected
4-Methyl-2-pentanone	3.4	Not Detected	14	Not Detected
2-Hexanone	3.4	6.1	14	25
Ethanol	3.4	16	6.5	30
Bromoform	3.4	Not Detected	36	Not Detected
4-Ethyltoluene	3.4	17	17	84
Methyl tert-butyl ether	3.4	Not Detected	12	Not Detected
TPH ref. to Gasoline (MW=100)	17	790	71	3300

E = Exceeds instrument calibration range.

Container Type: 1 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	100	70-130
Toluene-d8	101	70-130
4-Bromofluorobenzene	108	70-130

AIR TOXICS LTD.

SAMPLE NAME: SSG-33

ID#: 0403458A-12A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**d032627**	**Date of Collection:**	**3/24/04**
Dil. Factor:	**1.87**	**Date of Analysis:**	**3/27/04 01:25 AM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	0.94	Not Detected	4.7	Not Detected
Freon 114	0.94	Not Detected	6.6	Not Detected
Vinyl Chloride	0.94	Not Detected	2.4	Not Detected
Bromomethane	0.94	Not Detected	3.7	Not Detected
Chloroethane	0.94	Not Detected	2.5	Not Detected
Freon 11	0.94	Not Detected	5.3	Not Detected
1,1-Dichloroethene	0.94	Not Detected	3.8	Not Detected
Freon 113	0.94	Not Detected	7.3	Not Detected
Methylene Chloride	0.94	Not Detected	3.3	Not Detected
1,1-Dichloroethane	0.94	Not Detected	3.8	Not Detected
cis-1,2-Dichloroethene	0.94	Not Detected	3.8	Not Detected
Chloroform	0.94	Not Detected	4.6	Not Detected
1,1,1-Trichloroethane	0.94	Not Detected	5.2	Not Detected
Carbon Tetrachloride	0.94	Not Detected	6.0	Not Detected
Benzene	0.94	3.5	3.0	11
1,2-Dichloroethane	0.94	Not Detected	3.8	Not Detected
Trichloroethene	0.94	Not Detected	5.1	Not Detected
1,2-Dichloropropane	0.94	Not Detected	4.4	Not Detected
cis-1,3-Dichloropropene	0.94	Not Detected	4.3	Not Detected
Toluene	0.94	81	3.6	310
trans-1,3-Dichloropropene	0.94	Not Detected	4.3	Not Detected
1,1,2-Trichloroethane	0.94	Not Detected	5.2	Not Detected
Tetrachloroethene	0.94	Not Detected	6.4	Not Detected
1,2-Dibromoethane (EDB)	0.94	Not Detected	7.3	Not Detected
Chlorobenzene	0.94	Not Detected	4.4	Not Detected
Ethyl Benzene	0.94	10	4.1	46
m,p-Xylene	0.94	45	4.1	200
o-Xylene	0.94	17	4.1	76
Styrene	0.94	Not Detected	4.0	Not Detected
1,1,2,2-Tetrachloroethane	0.94	Not Detected	6.5	Not Detected
1,3,5-Trimethylbenzene	0.94	4.2	4.7	21
1,2,4-Trimethylbenzene	0.94	14	4.7	71
1,3-Dichlorobenzene	0.94	Not Detected	5.7	Not Detected
1,4-Dichlorobenzene	0.94	Not Detected	5.7	Not Detected
alpha-Chlorotoluene	0.94	Not Detected	4.9	Not Detected
1,2-Dichlorobenzene	0.94	Not Detected	5.7	Not Detected
1,3-Butadiene	0.94	2.2	2.1	4.9
Hexane	0.94	4.2	3.3	15
Cyclohexane	0.94	Not Detected	3.3	Not Detected
Bromodichloromethane	0.94	Not Detected	6.4	Not Detected
Dibromochloromethane	0.94	Not Detected	8.1	Not Detected
Heptane	0.94	3.3	3.9	14

AIR TOXICS LTD.

SAMPLE NAME: SSG-33

ID#: 0403458A-12A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**d032627**	**Date of Collection:**	**3/24/04**
Dil. Factor:	**1.87**	**Date of Analysis:**	**3/27/04 01:25 AM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Cumene	0.94	Not Detected	4.7	Not Detected
Propylbenzene	0.94	2.0	4.7	10
Chloromethane	3.7	Not Detected	7.8	Not Detected
1,2,4-Trichlorobenzene	3.7	Not Detected	28	Not Detected
Hexachlorobutadiene	3.7	Not Detected	40	Not Detected
Acetone	3.7	590 E	9.0	1400 E
Carbon Disulfide	3.7	Not Detected	12	Not Detected
2-Propanol	3.7	7.3	9.3	18
trans-1,2-Dichloroethene	3.7	Not Detected	15	Not Detected
Vinyl Acetate	3.7	Not Detected	13	Not Detected
2-Butanone (Methyl Ethyl Ketone)	3.7	33	11	99
Tetrahydrofuran	3.7	Not Detected	11	Not Detected
1,4-Dioxane	3.7	Not Detected	14	Not Detected
4-Methyl-2-pentanone	3.7	Not Detected	16	Not Detected
2-Hexanone	3.7	7.7	16	32
Ethanol	3.7	22	7.2	42
Bromoform	3.7	Not Detected	39	Not Detected
4-Ethyltoluene	3.7	14	19	69
Methyl tert-butyl ether	3.7	Not Detected	14	Not Detected
TPH ref. to Gasoline (MW=100)	19	860	78	3600

E = Exceeds instrument calibration range.

Container Type: 1 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	103	70-130
Toluene-d8	100	70-130
4-Bromofluorobenzene	99	70-130

AIR TOXICS LTD.

SAMPLE NAME: SSG-40

ID#: 0403458A-13A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**d032706**	**Date of Collection:**	**3/24/04**
Dil. Factor:	**1.64**	**Date of Analysis:**	**3/27/04 02:30 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	0.82	1.3	4.1	6.5
Freon 114	0.82	Not Detected	5.8	Not Detected
Vinyl Chloride	0.82	Not Detected	2.1	Not Detected
Bromomethane	0.82	Not Detected	3.2	Not Detected
Chloroethane	0.82	Not Detected	2.2	Not Detected
Freon 11	0.82	Not Detected	4.7	Not Detected
1,1-Dichloroethene	0.82	Not Detected	3.3	Not Detected
Freon 113	0.82	Not Detected	6.4	Not Detected
Methylene Chloride	0.82	Not Detected	2.9	Not Detected
1,1-Dichloroethane	0.82	Not Detected	3.4	Not Detected
cis-1,2-Dichloroethene	0.82	Not Detected	3.3	Not Detected
Chloroform	0.82	2.0	4.1	10
1,1,1-Trichloroethane	0.82	Not Detected	4.5	Not Detected
Carbon Tetrachloride	0.82	Not Detected	5.2	Not Detected
Benzene	0.82	3.2	2.7	10
1,2-Dichloroethane	0.82	Not Detected	3.4	Not Detected
Trichloroethene	0.82	Not Detected	4.5	Not Detected
1,2-Dichloropropane	0.82	Not Detected	3.8	Not Detected
cis-1,3-Dichloropropene	0.82	Not Detected	3.8	Not Detected
Toluene	0.82	70	3.1	270
trans-1,3-Dichloropropene	0.82	Not Detected	3.8	Not Detected
1,1,2-Trichloroethane	0.82	Not Detected	4.5	Not Detected
Tetrachloroethene	0.82	Not Detected	5.6	Not Detected
1,2-Dibromoethane (EDB)	0.82	Not Detected	6.4	Not Detected
Chlorobenzene	0.82	Not Detected	3.8	Not Detected
Ethyl Benzene	0.82	8.7	3.6	38
m,p-Xylene	0.82	36	3.6	160
o-Xylene	0.82	13	3.6	59
Styrene	0.82	Not Detected	3.5	Not Detected
1,1,2,2-Tetrachloroethane	0.82	Not Detected	5.7	Not Detected
1,3,5-Trimethylbenzene	0.82	3.2	4.1	16
1,2,4-Trimethylbenzene	0.82	10	4.1	52
1,3-Dichlorobenzene	0.82	Not Detected	5.0	Not Detected
1,4-Dichlorobenzene	0.82	Not Detected	5.0	Not Detected
alpha-Chlorotoluene	0.82	Not Detected	4.3	Not Detected
1,2-Dichlorobenzene	0.82	Not Detected	5.0	Not Detected
1,3-Butadiene	0.82	Not Detected	1.8	Not Detected
Hexane	0.82	2.6	2.9	9.2
Cyclohexane	0.82	Not Detected	2.9	Not Detected
Bromodichloromethane	0.82	Not Detected	5.6	Not Detected
Dibromochloromethane	0.82	Not Detected	7.1	Not Detected
Heptane	0.82	2.2	3.4	9.2

AIR TOXICS LTD.

SAMPLE NAME: SSG-40

ID#: 0403458A-13A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**d032706**	**Date of Collection:**	**3/24/04**
Dil. Factor:	**1.64**	**Date of Analysis:**	**3/27/04 02:30 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Cumene	0.82	Not Detected	4.1	Not Detected
Propylbenzene	0.82	1.5	4.1	7.4
Chloromethane	3.3	Not Detected	6.9	Not Detected
1,2,4-Trichlorobenzene	3.3	Not Detected	25	Not Detected
Hexachlorobutadiene	3.3	Not Detected	36	Not Detected
Acetone	3.3	520 E	7.9	1300 E
Carbon Disulfide	3.3	Not Detected	10	Not Detected
2-Propanol	3.3	6.3	8.2	16
trans-1,2-Dichloroethene	3.3	Not Detected	13	Not Detected
Vinyl Acetate	3.3	Not Detected	12	Not Detected
2-Butanone (Methyl Ethyl Ketone)	3.3	29	9.8	86
Tetrahydrofuran	3.3	Not Detected	9.8	Not Detected
1,4-Dioxane	3.3	Not Detected	12	Not Detected
4-Methyl-2-pentanone	3.3	Not Detected	14	Not Detected
2-Hexanone	3.3	6.6	14	28
Ethanol	3.3	17	6.3	33
Bromoform	3.3	Not Detected	34	Not Detected
4-Ethyltoluene	3.3	10	16	52
Methyl tert-butyl ether	3.3	120	12	430
TPH ref. to Gasoline (MW=100)	16	850	68	3500

E = Exceeds instrument calibration range.

Container Type: 1 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	100	70-130
Toluene-d8	100	70-130
4-Bromofluorobenzene	97	70-130

AIR TOXICS LTD.

SAMPLE NAME: SSG-39

ID#: 0403458A-14A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**d032707**	**Date of Collection:**	**3/24/04**
Dil. Factor:	**1.75**	**Date of Analysis:**	**3/27/04 03:14 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	0.88	4.4	4.4	22
Freon 114	0.88	Not Detected	6.2	Not Detected
Vinyl Chloride	0.88	Not Detected	2.3	Not Detected
Bromomethane	0.88	Not Detected	3.4	Not Detected
Chloroethane	0.88	Not Detected	2.3	Not Detected
Freon 11	0.88	1.3	5.0	7.6
1,1-Dichloroethene	0.88	Not Detected	3.5	Not Detected
Freon 113	0.88	Not Detected	6.8	Not Detected
Methylene Chloride	0.88	Not Detected	3.1	Not Detected
1,1-Dichloroethane	0.88	Not Detected	3.6	Not Detected
cis-1,2-Dichloroethene	0.88	Not Detected	3.5	Not Detected
Chloroform	0.88	5.7	4.3	28
1,1,1-Trichloroethane	0.88	Not Detected	4.8	Not Detected
Carbon Tetrachloride	0.88	Not Detected	5.6	Not Detected
Benzene	0.88	9.4	2.8	31
1,2-Dichloroethane	0.88	Not Detected	3.6	Not Detected
Trichloroethene	0.88	Not Detected	4.8	Not Detected
1,2-Dichloropropane	0.88	Not Detected	4.1	Not Detected
cis-1,3-Dichloropropene	0.88	Not Detected	4.0	Not Detected
Toluene	0.88	75	3.4	280
trans-1,3-Dichloropropene	0.88	Not Detected	4.0	Not Detected
1,1,2-Trichloroethane	0.88	Not Detected	4.8	Not Detected
Tetrachloroethene	0.88	Not Detected	6.0	Not Detected
1,2-Dibromoethane (EDB)	0.88	Not Detected	6.8	Not Detected
Chlorobenzene	0.88	Not Detected	4.1	Not Detected
Ethyl Benzene	0.88	9.7	3.9	43
m,p-Xylene	0.88	43	3.9	190
o-Xylene	0.88	16	3.9	73
Styrene	0.88	Not Detected	3.8	Not Detected
1,1,2,2-Tetrachloroethane	0.88	Not Detected	6.1	Not Detected
1,3,5-Trimethylbenzene	0.88	3.9	4.4	20
1,2,4-Trimethylbenzene	0.88	14	4.4	69
1,3-Dichlorobenzene	0.88	Not Detected	5.3	Not Detected
1,4-Dichlorobenzene	0.88	Not Detected	5.3	Not Detected
alpha-Chlorotoluene	0.88	Not Detected	4.6	Not Detected
1,2-Dichlorobenzene	0.88	Not Detected	5.3	Not Detected
1,3-Butadiene	0.88	Not Detected	2.0	Not Detected
Hexane	0.88	2.2	3.1	8.1
Cyclohexane	0.88	Not Detected	3.1	Not Detected
Bromodichloromethane	0.88	1.2	6.0	7.8
Dibromochloromethane	0.88	Not Detected	7.6	Not Detected
Heptane	0.88	2.6	3.6	11

AIR TOXICS LTD.

SAMPLE NAME: SSG-39

ID#: 0403458A-14A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**d032707**	**Date of Collection:**	**3/24/04**
Dil. Factor:	**1.75**	**Date of Analysis:**	**3/27/04 03:14 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Cumene	0.88	Not Detected	4.4	Not Detected
Propylbenzene	0.88	2.0	4.4	9.8
Chloromethane	3.5	Not Detected	7.3	Not Detected
1,2,4-Trichlorobenzene	3.5	Not Detected	26	Not Detected
Hexachlorobutadiene	3.5	Not Detected	38	Not Detected
Acetone	3.5	600 E	8.4	1400 E
Carbon Disulfide	3.5	4.2	11	13
2-Propanol	3.5	7.3	8.7	18
trans-1,2-Dichloroethene	3.5	Not Detected	14	Not Detected
Vinyl Acetate	3.5	Not Detected	12	Not Detected
2-Butanone (Methyl Ethyl Ketone)	3.5	35	10	100
Tetrahydrofuran	3.5	Not Detected	10	Not Detected
1,4-Dioxane	3.5	Not Detected	13	Not Detected
4-Methyl-2-pentanone	3.5	Not Detected	14	Not Detected
2-Hexanone	3.5	7.8	14	32
Ethanol	3.5	21	6.7	41
Bromoform	3.5	Not Detected	37	Not Detected
4-Ethyltoluene	3.5	13	17	65
Methyl tert-butyl ether	3.5	Not Detected	13	Not Detected
TPH ref. to Gasoline (MW=100)	18	850	73	3500

E = Exceeds instrument calibration range.

Container Type: 1 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	101	70-130
Toluene-d8	101	70-130
4-Bromofluorobenzene	100	70-130

AIR TOXICS LTD.

SAMPLE NAME: SSG-38

ID#: 0403458A-15A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**d032708**	**Date of Collection:**	**3/24/04**
Dil. Factor:	**1.75**	**Date of Analysis:**	**3/27/04 03:58 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	0.88	5.6	4.4	28
Freon 114	0.88	Not Detected	6.2	Not Detected
Vinyl Chloride	0.88	Not Detected	2.3	Not Detected
Bromomethane	0.88	Not Detected	3.4	Not Detected
Chloroethane	0.88	Not Detected	2.3	Not Detected
Freon 11	0.88	1.3	5.0	7.7
1,1-Dichloroethene	0.88	Not Detected	3.5	Not Detected
Freon 113	0.88	Not Detected	6.8	Not Detected
Methylene Chloride	0.88	Not Detected	3.1	Not Detected
1,1-Dichloroethane	0.88	Not Detected	3.6	Not Detected
cis-1,2-Dichloroethene	0.88	Not Detected	3.5	Not Detected
Chloroform	0.88	1.9	4.3	9.4
1,1,1-Trichloroethane	0.88	Not Detected	4.8	Not Detected
Carbon Tetrachloride	0.88	Not Detected	5.6	Not Detected
Benzene	0.88	3.3	2.8	11
1,2-Dichloroethane	0.88	Not Detected	3.6	Not Detected
Trichloroethene	0.88	Not Detected	4.8	Not Detected
1,2-Dichloropropane	0.88	Not Detected	4.1	Not Detected
cis-1,3-Dichloropropene	0.88	Not Detected	4.0	Not Detected
Toluene	0.88	76	3.4	290
trans-1,3-Dichloropropene	0.88	Not Detected	4.0	Not Detected
1,1,2-Trichloroethane	0.88	Not Detected	4.8	Not Detected
Tetrachloroethene	0.88	Not Detected	6.0	Not Detected
1,2-Dibromoethane (EDB)	0.88	Not Detected	6.8	Not Detected
Chlorobenzene	0.88	Not Detected	4.1	Not Detected
Ethyl Benzene	0.88	10	3.9	45
m,p-Xylene	0.88	45	3.9	200
o-Xylene	0.88	18	3.9	77
Styrene	0.88	Not Detected	3.8	Not Detected
1,1,2,2-Tetrachloroethane	0.88	Not Detected	6.1	Not Detected
1,3,5-Trimethylbenzene	0.88	4.3	4.4	22
1,2,4-Trimethylbenzene	0.88	15	4.4	75
1,3-Dichlorobenzene	0.88	Not Detected	5.3	Not Detected
1,4-Dichlorobenzene	0.88	Not Detected	5.3	Not Detected
alpha-Chlorotoluene	0.88	Not Detected	4.6	Not Detected
1,2-Dichlorobenzene	0.88	Not Detected	5.3	Not Detected
1,3-Butadiene	0.88	Not Detected	2.0	Not Detected
Hexane	0.88	3.0	3.1	11
Cyclohexane	0.88	Not Detected	3.1	Not Detected
Bromodichloromethane	0.88	Not Detected	6.0	Not Detected
Dibromochloromethane	0.88	Not Detected	7.6	Not Detected
Heptane	0.88	3.1	3.6	13

AIR TOXICS LTD.

SAMPLE NAME: SSG-38

ID#: 0403458A-15A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**d032708**	**Date of Collection:**	**3/24/04**
Dil. Factor:	**1.75**	**Date of Analysis:**	**3/27/04 03:58 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Cumene	0.88	Not Detected	4.4	Not Detected
Propylbenzene	0.88	2.0	4.4	9.9
Chloromethane	3.5	Not Detected	7.3	Not Detected
1,2,4-Trichlorobenzene	3.5	Not Detected	26	Not Detected
Hexachlorobutadiene	3.5	Not Detected	38	Not Detected
Acetone	3.5	660 E	8.4	1600 E
Carbon Disulfide	3.5	Not Detected	11	Not Detected
2-Propanol	3.5	7.4	8.7	18
trans-1,2-Dichloroethene	3.5	Not Detected	14	Not Detected
Vinyl Acetate	3.5	Not Detected	12	Not Detected
2-Butanone (Methyl Ethyl Ketone)	3.5	46	10	140
Tetrahydrofuran	3.5	Not Detected	10	Not Detected
1,4-Dioxane	3.5	Not Detected	13	Not Detected
4-Methyl-2-pentanone	3.5	Not Detected	14	Not Detected
2-Hexanone	3.5	9.1	14	38
Ethanol	3.5	26	6.7	49
Bromoform	3.5	Not Detected	37	Not Detected
4-Ethyltoluene	3.5	14	17	68
Methyl tert-butyl ether	3.5	Not Detected	13	Not Detected
TPH ref. to Gasoline (MW=100)	18	940	73	3900

E = Exceeds instrument calibration range.

Container Type: 1 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	100	70-130
Toluene-d8	100	70-130
4-Bromofluorobenzene	95	70-130

AIR TOXICS LTD.

SAMPLE NAME: EB-3-24-04

ID#: 0403458A-16A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**d032709**	**Date of Collection:**	**3/24/04**
Dil. Factor:	**2.06**	**Date of Analysis:**	**3/27/04 04:42 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	1.0	Not Detected	5.2	Not Detected
Freon 114	1.0	Not Detected	7.3	Not Detected
Vinyl Chloride	1.0	Not Detected	2.7	Not Detected
Bromomethane	1.0	Not Detected	4.1	Not Detected
Chloroethane	1.0	Not Detected	2.8	Not Detected
Freon 11	1.0	Not Detected	5.9	Not Detected
1,1-Dichloroethene	1.0	Not Detected	4.2	Not Detected
Freon 113	1.0	Not Detected	8.0	Not Detected
Methylene Chloride	1.0	Not Detected	3.6	Not Detected
1,1-Dichloroethane	1.0	Not Detected	4.2	Not Detected
cis-1,2-Dichloroethene	1.0	Not Detected	4.2	Not Detected
Chloroform	1.0	Not Detected	5.1	Not Detected
1,1,1-Trichloroethane	1.0	Not Detected	5.7	Not Detected
Carbon Tetrachloride	1.0	Not Detected	6.6	Not Detected
Benzene	1.0	Not Detected	3.3	Not Detected
1,2-Dichloroethane	1.0	Not Detected	4.2	Not Detected
Trichloroethene	1.0	Not Detected	5.6	Not Detected
1,2-Dichloropropane	1.0	Not Detected	4.8	Not Detected
cis-1,3-Dichloropropene	1.0	Not Detected	4.8	Not Detected
Toluene	1.0	Not Detected	3.9	Not Detected
trans-1,3-Dichloropropene	1.0	Not Detected	4.8	Not Detected
1,1,2-Trichloroethane	1.0	Not Detected	5.7	Not Detected
Tetrachloroethene	1.0	Not Detected	7.1	Not Detected
1,2-Dibromoethane (EDB)	1.0	Not Detected	8.0	Not Detected
Chlorobenzene	1.0	Not Detected	4.8	Not Detected
Ethyl Benzene	1.0	Not Detected	4.5	Not Detected
m,p-Xylene	1.0	Not Detected	4.5	Not Detected
o-Xylene	1.0	Not Detected	4.5	Not Detected
Styrene	1.0	Not Detected	4.4	Not Detected
1,1,2,2-Tetrachloroethane	1.0	Not Detected	7.2	Not Detected
1,3,5-Trimethylbenzene	1.0	Not Detected	5.1	Not Detected
1,2,4-Trimethylbenzene	1.0	Not Detected	5.1	Not Detected
1,3-Dichlorobenzene	1.0	Not Detected	6.3	Not Detected
1,4-Dichlorobenzene	1.0	Not Detected	6.3	Not Detected
alpha-Chlorotoluene	1.0	Not Detected	5.4	Not Detected
1,2-Dichlorobenzene	1.0	Not Detected	6.3	Not Detected
1,3-Butadiene	1.0	Not Detected	2.3	Not Detected
Hexane	1.0	Not Detected	3.7	Not Detected
Cyclohexane	1.0	Not Detected	3.6	Not Detected
Bromodichloromethane	1.0	Not Detected	7.0	Not Detected
Dibromochloromethane	1.0	Not Detected	8.9	Not Detected
Heptane	1.0	Not Detected	4.3	Not Detected

AIR TOXICS LTD.

SAMPLE NAME: EB-3-24-04

ID#: 0403458A-16A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**d032709**	**Date of Collection:**	**3/24/04**
Dil. Factor:	**2.06**	**Date of Analysis:**	**3/27/04 04:42 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Cumene	1.0	Not Detected	5.1	Not Detected
Propylbenzene	1.0	Not Detected	5.1	Not Detected
Chloromethane	4.1	Not Detected	8.6	Not Detected
1,2,4-Trichlorobenzene	4.1	Not Detected	31	Not Detected
Hexachlorobutadiene	4.1	Not Detected	45	Not Detected
Acetone	4.1	Not Detected	9.9	Not Detected
Carbon Disulfide	4.1	Not Detected	13	Not Detected
2-Propanol	4.1	Not Detected	10	Not Detected
trans-1,2-Dichloroethene	4.1	Not Detected	17	Not Detected
Vinyl Acetate	4.1	Not Detected	15	Not Detected
2-Butanone (Methyl Ethyl Ketone)	4.1	Not Detected	12	Not Detected
Tetrahydrofuran	4.1	Not Detected	12	Not Detected
1,4-Dioxane	4.1	Not Detected	15	Not Detected
4-Methyl-2-pentanone	4.1	Not Detected	17	Not Detected
2-Hexanone	4.1	Not Detected	17	Not Detected
Ethanol	4.1	Not Detected	7.9	Not Detected
Bromoform	4.1	Not Detected	43	Not Detected
4-Ethyltoluene	4.1	Not Detected	20	Not Detected
Methyl tert-butyl ether	4.1	Not Detected	15	Not Detected
TPH ref. to Gasoline (MW=100)	21	Not Detected	86	Not Detected

Container Type: 6 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	102	70-130
Toluene-d8	99	70-130
4-Bromofluorobenzene	94	70-130

AIR TOXICS LTD.

SAMPLE NAME: EB-3-24-04 Duplicate

ID#: 0403458A-16AA

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**d032710**	**Date of Collection:**	**3/24/04**
Dil. Factor:	**2.06**	**Date of Analysis:**	**3/27/04 05:27 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	1.0	Not Detected	5.2	Not Detected
Freon 114	1.0	Not Detected	7.3	Not Detected
Vinyl Chloride	1.0	Not Detected	2.7	Not Detected
Bromomethane	1.0	Not Detected	4.1	Not Detected
Chloroethane	1.0	Not Detected	2.8	Not Detected
Freon 11	1.0	Not Detected	5.9	Not Detected
1,1-Dichloroethene	1.0	Not Detected	4.2	Not Detected
Freon 113	1.0	Not Detected	8.0	Not Detected
Methylene Chloride	1.0	Not Detected	3.6	Not Detected
1,1-Dichloroethane	1.0	Not Detected	4.2	Not Detected
cis-1,2-Dichloroethene	1.0	Not Detected	4.2	Not Detected
Chloroform	1.0	Not Detected	5.1	Not Detected
1,1,1-Trichloroethane	1.0	Not Detected	5.7	Not Detected
Carbon Tetrachloride	1.0	Not Detected	6.6	Not Detected
Benzene	1.0	Not Detected	3.3	Not Detected
1,2-Dichloroethane	1.0	Not Detected	4.2	Not Detected
Trichloroethene	1.0	Not Detected	5.6	Not Detected
1,2-Dichloropropane	1.0	Not Detected	4.8	Not Detected
cis-1,3-Dichloropropene	1.0	Not Detected	4.8	Not Detected
Toluene	1.0	1.6	3.9	6.1
trans-1,3-Dichloropropene	1.0	Not Detected	4.8	Not Detected
1,1,2-Trichloroethane	1.0	Not Detected	5.7	Not Detected
Tetrachloroethene	1.0	Not Detected	7.1	Not Detected
1,2-Dibromoethane (EDB)	1.0	Not Detected	8.0	Not Detected
Chlorobenzene	1.0	Not Detected	4.8	Not Detected
Ethyl Benzene	1.0	Not Detected	4.5	Not Detected
m,p-Xylene	1.0	Not Detected	4.5	Not Detected
o-Xylene	1.0	Not Detected	4.5	Not Detected
Styrene	1.0	Not Detected	4.4	Not Detected
1,1,2,2-Tetrachloroethane	1.0	Not Detected	7.2	Not Detected
1,3,5-Trimethylbenzene	1.0	Not Detected	5.1	Not Detected
1,2,4-Trimethylbenzene	1.0	Not Detected	5.1	Not Detected
1,3-Dichlorobenzene	1.0	Not Detected	6.3	Not Detected
1,4-Dichlorobenzene	1.0	Not Detected	6.3	Not Detected
alpha-Chlorotoluene	1.0	Not Detected	5.4	Not Detected
1,2-Dichlorobenzene	1.0	Not Detected	6.3	Not Detected
1,3-Butadiene	1.0	Not Detected	2.3	Not Detected
Hexane	1.0	Not Detected	3.7	Not Detected
Cyclohexane	1.0	Not Detected	3.6	Not Detected
Bromodichloromethane	1.0	Not Detected	7.0	Not Detected
Dibromochloromethane	1.0	Not Detected	8.9	Not Detected
Heptane	1.0	Not Detected	4.3	Not Detected

AIR TOXICS LTD.

SAMPLE NAME: EB-3-24-04 Duplicate

ID#: 0403458A-16AA

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**d032710**	**Date of Collection:**	**3/24/04**
Dil. Factor:	**2.06**	**Date of Analysis:**	**3/27/04 05:27 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Cumene	1.0	Not Detected	5.1	Not Detected
Propylbenzene	1.0	Not Detected	5.1	Not Detected
Chloromethane	4.1	Not Detected	8.6	Not Detected
1,2,4-Trichlorobenzene	4.1	Not Detected	31	Not Detected
Hexachlorobutadiene	4.1	Not Detected	45	Not Detected
Acetone	4.1	Not Detected	9.9	Not Detected
Carbon Disulfide	4.1	Not Detected	13	Not Detected
2-Propanol	4.1	Not Detected	10	Not Detected
trans-1,2-Dichloroethene	4.1	Not Detected	17	Not Detected
Vinyl Acetate	4.1	Not Detected	15	Not Detected
2-Butanone (Methyl Ethyl Ketone)	4.1	Not Detected	12	Not Detected
Tetrahydrofuran	4.1	Not Detected	12	Not Detected
1,4-Dioxane	4.1	Not Detected	15	Not Detected
4-Methyl-2-pentanone	4.1	Not Detected	17	Not Detected
2-Hexanone	4.1	Not Detected	17	Not Detected
Ethanol	4.1	Not Detected	7.9	Not Detected
Bromoform	4.1	Not Detected	43	Not Detected
4-Ethyltoluene	4.1	Not Detected	20	Not Detected
Methyl tert-butyl ether	4.1	Not Detected	15	Not Detected
TPH ref. to Gasoline (MW=100)	21	Not Detected	86	Not Detected

Container Type: 6 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	101	70-130
Toluene-d8	100	70-130
4-Bromofluorobenzene	96	70-130

AIR TOXICS LTD.

SAMPLE NAME: SSG-27

ID#: 0403458A-17A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**i032806**	**Date of Collection:**	**3/24/04**
Dil. Factor:	**24.4**	**Date of Analysis:**	**3/28/04 02:20 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	12	14	61	71
Freon 114	12	Not Detected	87	Not Detected
Vinyl Chloride	12	Not Detected	32	Not Detected
Bromomethane	12	Not Detected	48	Not Detected
Chloroethane	12	Not Detected	33	Not Detected
Freon 11	12	Not Detected	70	Not Detected
1,1-Dichloroethene	12	Not Detected	49	Not Detected
Freon 113	12	Not Detected	95	Not Detected
Methylene Chloride	12	Not Detected	43	Not Detected
1,1-Dichloroethane	12	Not Detected	50	Not Detected
cis-1,2-Dichloroethene	12	Not Detected	49	Not Detected
Chloroform	12	Not Detected	60	Not Detected
1,1,1-Trichloroethane	12	Not Detected	68	Not Detected
Carbon Tetrachloride	12	Not Detected	78	Not Detected
Benzene	12	Not Detected	40	Not Detected
1,2-Dichloroethane	12	Not Detected	50	Not Detected
Trichloroethene	12	Not Detected	67	Not Detected
1,2-Dichloropropane	12	Not Detected	57	Not Detected
cis-1,3-Dichloropropene	12	Not Detected	56	Not Detected
Toluene	12	43	47	160
trans-1,3-Dichloropropene	12	Not Detected	56	Not Detected
1,1,2-Trichloroethane	12	Not Detected	68	Not Detected
Tetrachloroethene	12	Not Detected	84	Not Detected
1,2-Dibromoethane (EDB)	12	Not Detected	95	Not Detected
Chlorobenzene	12	Not Detected	57	Not Detected
Ethyl Benzene	12	Not Detected	54	Not Detected
m,p-Xylene	12	24	54	110
o-Xylene	12	Not Detected	54	Not Detected
Styrene	12	Not Detected	53	Not Detected
1,1,2,2-Tetrachloroethane	12	Not Detected	85	Not Detected
1,3,5-Trimethylbenzene	12	Not Detected	61	Not Detected
1,2,4-Trimethylbenzene	12	Not Detected	61	Not Detected
1,3-Dichlorobenzene	12	Not Detected	74	Not Detected
1,4-Dichlorobenzene	12	Not Detected	74	Not Detected
alpha-Chlorotoluene	12	Not Detected	64	Not Detected
1,2-Dichlorobenzene	12	Not Detected	74	Not Detected
1,3-Butadiene	12	Not Detected	27	Not Detected
Hexane	12	Not Detected	44	Not Detected
Cyclohexane	12	Not Detected	43	Not Detected
Bromodichloromethane	12	Not Detected	83	Not Detected
Dibromochloromethane	12	Not Detected	100	Not Detected
Heptane	12	Not Detected	51	Not Detected

AIR TOXICS LTD.

SAMPLE NAME: SSG-27

ID#: 0403458A-17A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**i032806**	**Date of Collection:**	**3/24/04**
Dil. Factor:	**24.4**	**Date of Analysis:**	**3/28/04 02:20 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Cumene	12	Not Detected	61	Not Detected
Propylbenzene	12	Not Detected	61	Not Detected
Chloromethane	49	Not Detected	100	Not Detected
1,2,4-Trichlorobenzene	49	Not Detected	370	Not Detected
Hexachlorobutadiene	49	Not Detected	530	Not Detected
Acetone	49	250	120	600
Carbon Disulfide	49	Not Detected	150	Not Detected
2-Propanol	49	Not Detected	120	Not Detected
trans-1,2-Dichloroethene	49	Not Detected	200	Not Detected
Vinyl Acetate	49	Not Detected	170	Not Detected
2-Butanone (Methyl Ethyl Ketone)	49	Not Detected	150	Not Detected
Tetrahydrofuran	49	Not Detected	150	Not Detected
1,4-Dioxane	49	Not Detected	180	Not Detected
4-Methyl-2-pentanone	49	Not Detected	200	Not Detected
2-Hexanone	49	Not Detected	200	Not Detected
Ethanol	49	Not Detected	93	Not Detected
Bromoform	49	Not Detected	510	Not Detected
4-Ethyltoluene	49	Not Detected	240	Not Detected
Methyl tert-butyl ether	49	3900	180	14000
TPH ref. to Gasoline (MW=100)	240	4700	1000	20000

Container Type: 1 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	100	70-130
Toluene-d8	100	70-130
4-Bromofluorobenzene	98	70-130

AIR TOXICS LTD.

SAMPLE NAME: SSG-15

ID#: 0403458A-18A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**d032712**	**Date of Collection:**	**3/24/04**
Dil. Factor:	**1.83**	**Date of Analysis:**	**3/27/04 06:55 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	0.92	5.9	4.6	30
Freon 114	0.92	Not Detected	6.5	Not Detected
Vinyl Chloride	0.92	Not Detected	2.4	Not Detected
Bromomethane	0.92	Not Detected	3.6	Not Detected
Chloroethane	0.92	Not Detected	2.4	Not Detected
Freon 11	0.92	1.3	5.2	7.6
1,1-Dichloroethene	0.92	Not Detected	3.7	Not Detected
Freon 113	0.92	Not Detected	7.1	Not Detected
Methylene Chloride	0.92	Not Detected	3.2	Not Detected
1,1-Dichloroethane	0.92	Not Detected	3.8	Not Detected
cis-1,2-Dichloroethene	0.92	Not Detected	3.7	Not Detected
Chloroform	0.92	Not Detected	4.5	Not Detected
1,1,1-Trichloroethane	0.92	Not Detected	5.1	Not Detected
Carbon Tetrachloride	0.92	Not Detected	5.8	Not Detected
Benzene	0.92	5.6	3.0	18
1,2-Dichloroethane	0.92	Not Detected	3.8	Not Detected
Trichloroethene	0.92	2.0	5.0	11
1,2-Dichloropropane	0.92	Not Detected	4.3	Not Detected
cis-1,3-Dichloropropene	0.92	Not Detected	4.2	Not Detected
Toluene	0.92	49	3.5	190
trans-1,3-Dichloropropene	0.92	Not Detected	4.2	Not Detected
1,1,2-Trichloroethane	0.92	Not Detected	5.1	Not Detected
Tetrachloroethene	0.92	2.1	6.3	14
1,2-Dibromoethane (EDB)	0.92	Not Detected	7.1	Not Detected
Chlorobenzene	0.92	Not Detected	4.3	Not Detected
Ethyl Benzene	0.92	6.2	4.0	27
m,p-Xylene	0.92	27	4.0	120
o-Xylene	0.92	12	4.0	51
Styrene	0.92	Not Detected	4.0	Not Detected
1,1,2,2-Tetrachloroethane	0.92	Not Detected	6.4	Not Detected
1,3,5-Trimethylbenzene	0.92	3.2	4.6	16
1,2,4-Trimethylbenzene	0.92	11	4.6	56
1,3-Dichlorobenzene	0.92	Not Detected	5.6	Not Detected
1,4-Dichlorobenzene	0.92	Not Detected	5.6	Not Detected
alpha-Chlorotoluene	0.92	Not Detected	4.8	Not Detected
1,2-Dichlorobenzene	0.92	Not Detected	5.6	Not Detected
1,3-Butadiene	0.92	1.9	2.0	4.4
Hexane	0.92	5.2	3.3	19
Cyclohexane	0.92	3.3	3.2	11
Bromodichloromethane	0.92	Not Detected	6.2	Not Detected
Dibromochloromethane	0.92	Not Detected	7.9	Not Detected
Heptane	0.92	3.0	3.8	13

AIR TOXICS LTD.

SAMPLE NAME: SSG-15

ID#: 0403458A-18A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**d032712**	**Date of Collection:**	**3/24/04**
Dil. Factor:	**1.83**	**Date of Analysis:**	**3/27/04 06:55 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Cumene	0.92	Not Detected	4.6	Not Detected
Propylbenzene	0.92	1.4	4.6	7.0
Chloromethane	3.7	Not Detected	7.7	Not Detected
1,2,4-Trichlorobenzene	3.7	Not Detected	28	Not Detected
Hexachlorobutadiene	3.7	Not Detected	40	Not Detected
Acetone	3.7	200	8.8	480
Carbon Disulfide	3.7	6.8	12	22
2-Propanol	3.7	7.3	9.1	18
trans-1,2-Dichloroethene	3.7	Not Detected	15	Not Detected
Vinyl Acetate	3.7	Not Detected	13	Not Detected
2-Butanone (Methyl Ethyl Ketone)	3.7	30	11	90
Tetrahydrofuran	3.7	Not Detected	11	Not Detected
1,4-Dioxane	3.7	48	13	180
4-Methyl-2-pentanone	3.7	Not Detected	15	Not Detected
2-Hexanone	3.7	4.3	15	18
Ethanol	3.7	45	7.0	86
Bromoform	3.7	Not Detected	38	Not Detected
4-Ethyltoluene	3.7	9.5	18	48
Methyl tert-butyl ether	3.7	Not Detected	13	Not Detected
TPH ref. to Gasoline (MW=100)	18	580	76	2400

Container Type: 1 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	99	70-130
Toluene-d8	100	70-130
4-Bromofluorobenzene	96	70-130

AIR TOXICS LTD.

SAMPLE NAME: SSG-22

ID#: 0403458A-19A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**d032713**	**Date of Collection:**	**3/24/04**
Dil. Factor:	**1.83**	**Date of Analysis:**	**3/27/04 07:39 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	0.92	6.0	4.6	30
Freon 114	0.92	Not Detected	6.5	Not Detected
Vinyl Chloride	0.92	Not Detected	2.4	Not Detected
Bromomethane	0.92	Not Detected	3.6	Not Detected
Chloroethane	0.92	Not Detected	2.4	Not Detected
Freon 11	0.92	0.91 J	5.2	5.2
1,1-Dichloroethene	0.92	Not Detected	3.7	Not Detected
Freon 113	0.92	Not Detected	7.1	Not Detected
Methylene Chloride	0.92	Not Detected	3.2	Not Detected
1,1-Dichloroethane	0.92	Not Detected	3.8	Not Detected
cis-1,2-Dichloroethene	0.92	Not Detected	3.7	Not Detected
Chloroform	0.92	Not Detected	4.5	Not Detected
1,1,1-Trichloroethane	0.92	Not Detected	5.1	Not Detected
Carbon Tetrachloride	0.92	Not Detected	5.8	Not Detected
Benzene	0.92	3.0	3.0	9.6
1,2-Dichloroethane	0.92	Not Detected	3.8	Not Detected
Trichloroethene	0.92	Not Detected	5.0	Not Detected
1,2-Dichloropropane	0.92	Not Detected	4.3	Not Detected
cis-1,3-Dichloropropene	0.92	Not Detected	4.2	Not Detected
Toluene	0.92	62	3.5	240
trans-1,3-Dichloropropene	0.92	Not Detected	4.2	Not Detected
1,1,2-Trichloroethane	0.92	Not Detected	5.1	Not Detected
Tetrachloroethene	0.92	Not Detected	6.3	Not Detected
1,2-Dibromoethane (EDB)	0.92	Not Detected	7.1	Not Detected
Chlorobenzene	0.92	Not Detected	4.3	Not Detected
Ethyl Benzene	0.92	9.3	4.0	41
m,p-Xylene	0.92	40	4.0	180
o-Xylene	0.92	16	4.0	71
Styrene	0.92	Not Detected	4.0	Not Detected
1,1,2,2-Tetrachloroethane	0.92	Not Detected	6.4	Not Detected
1,3,5-Trimethylbenzene	0.92	4.2	4.6	21
1,2,4-Trimethylbenzene	0.92	14	4.6	72
1,3-Dichlorobenzene	0.92	Not Detected	5.6	Not Detected
1,4-Dichlorobenzene	0.92	Not Detected	5.6	Not Detected
alpha-Chlorotoluene	0.92	Not Detected	4.8	Not Detected
1,2-Dichlorobenzene	0.92	Not Detected	5.6	Not Detected
1,3-Butadiene	0.92	Not Detected	2.0	Not Detected
Hexane	0.92	3.1	3.3	11
Cyclohexane	0.92	Not Detected	3.2	Not Detected
Bromodichloromethane	0.92	Not Detected	6.2	Not Detected
Dibromochloromethane	0.92	Not Detected	7.9	Not Detected
Heptane	0.92	2.1	3.8	8.7

AIR TOXICS LTD.

SAMPLE NAME: SSG-22

ID#: 0403458A-19A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**d032713**	**Date of Collection:**	**3/24/04**
Dil. Factor:	**1.83**	**Date of Analysis:**	**3/27/04 07:39 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Cumene	0.92	Not Detected	4.6	Not Detected
Propylbenzene	0.92	2.1	4.6	10
Chloromethane	3.7	Not Detected	7.7	Not Detected
1,2,4-Trichlorobenzene	3.7	Not Detected	28	Not Detected
Hexachlorobutadiene	3.7	Not Detected	40	Not Detected
Acetone	3.7	250	8.8	600
Carbon Disulfide	3.7	Not Detected	12	Not Detected
2-Propanol	3.7	Not Detected	9.1	Not Detected
trans-1,2-Dichloroethene	3.7	Not Detected	15	Not Detected
Vinyl Acetate	3.7	Not Detected	13	Not Detected
2-Butanone (Methyl Ethyl Ketone)	3.7	24	11	71
Tetrahydrofuran	3.7	Not Detected	11	Not Detected
1,4-Dioxane	3.7	Not Detected	13	Not Detected
4-Methyl-2-pentanone	3.7	Not Detected	15	Not Detected
2-Hexanone	3.7	6.1	15	25
Ethanol	3.7	16	7.0	31
Bromoform	3.7	Not Detected	38	Not Detected
4-Ethyltoluene	3.7	13	18	67
Methyl tert-butyl ether	3.7	Not Detected	13	Not Detected
TPH ref. to Gasoline (MW=100)	18	560	76	2300

J = Estimated value.

Container Type: 1 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	102	70-130
Toluene-d8	100	70-130
4-Bromofluorobenzene	99	70-130

AIR TOXICS LTD.

SAMPLE NAME: Lab Blank

ID#: 0403458A-20A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**i032607**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 3/26/04 11:50 AM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	0.50	Not Detected	2.5	Not Detected
Freon 114	0.50	Not Detected	3.6	Not Detected
Vinyl Chloride	0.50	Not Detected	1.3	Not Detected
Bromomethane	0.50	Not Detected	2.0	Not Detected
Chloroethane	0.50	Not Detected	1.3	Not Detected
Freon 11	0.50	Not Detected	2.8	Not Detected
1,1-Dichloroethene	0.50	Not Detected	2.0	Not Detected
Freon 113	0.50	Not Detected	3.9	Not Detected
Methylene Chloride	0.50	Not Detected	1.8	Not Detected
1,1-Dichloroethane	0.50	Not Detected	2.0	Not Detected
cis-1,2-Dichloroethene	0.50	Not Detected	2.0	Not Detected
Chloroform	0.50	Not Detected	2.5	Not Detected
1,1,1-Trichloroethane	0.50	Not Detected	2.8	Not Detected
Carbon Tetrachloride	0.50	Not Detected	3.2	Not Detected
Benzene	0.50	Not Detected	1.6	Not Detected
1,2-Dichloroethane	0.50	Not Detected	2.0	Not Detected
Trichloroethene	0.50	Not Detected	2.7	Not Detected
1,2-Dichloropropane	0.50	Not Detected	2.3	Not Detected
cis-1,3-Dichloropropene	0.50	Not Detected	2.3	Not Detected
Toluene	0.50	Not Detected	1.9	Not Detected
trans-1,3-Dichloropropene	0.50	Not Detected	2.3	Not Detected
1,1,2-Trichloroethane	0.50	Not Detected	2.8	Not Detected
Tetrachloroethene	0.50	Not Detected	3.4	Not Detected
1,2-Dibromoethane (EDB)	0.50	Not Detected	3.9	Not Detected
Chlorobenzene	0.50	Not Detected	2.3	Not Detected
Ethyl Benzene	0.50	Not Detected	2.2	Not Detected
m,p-Xylene	0.50	Not Detected	2.2	Not Detected
o-Xylene	0.50	Not Detected	2.2	Not Detected
Styrene	0.50	Not Detected	2.2	Not Detected
1,1,2,2-Tetrachloroethane	0.50	Not Detected	3.5	Not Detected
1,3,5-Trimethylbenzene	0.50	Not Detected	2.5	Not Detected
1,2,4-Trimethylbenzene	0.50	Not Detected	2.5	Not Detected
1,3-Dichlorobenzene	0.50	Not Detected	3.0	Not Detected
1,4-Dichlorobenzene	0.50	Not Detected	3.0	Not Detected
alpha-Chlorotoluene	0.50	Not Detected	2.6	Not Detected
1,2-Dichlorobenzene	0.50	Not Detected	3.0	Not Detected
1,3-Butadiene	0.50	Not Detected	1.1	Not Detected
Hexane	0.50	Not Detected	1.8	Not Detected
Cyclohexane	0.50	Not Detected	1.7	Not Detected
Bromodichloromethane	0.50	Not Detected	3.4	Not Detected
Dibromochloromethane	0.50	Not Detected	4.3	Not Detected
Heptane	0.50	Not Detected	2.1	Not Detected

AIR TOXICS LTD.

SAMPLE NAME: Lab Blank

ID#: 0403458A-20A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**i032607**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 3/26/04 11:50 AM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Cumene	0.50	Not Detected	2.5	Not Detected
Propylbenzene	0.50	Not Detected	2.5	Not Detected
Chloromethane	2.0	Not Detected	4.2	Not Detected
1,2,4-Trichlorobenzene	2.0	Not Detected	15	Not Detected
Hexachlorobutadiene	2.0	Not Detected	22	Not Detected
Acetone	2.0	Not Detected	4.8	Not Detected
Carbon Disulfide	2.0	Not Detected	6.3	Not Detected
2-Propanol	2.0	Not Detected	5.0	Not Detected
trans-1,2-Dichloroethene	2.0	Not Detected	8.0	Not Detected
Vinyl Acetate	2.0	Not Detected	7.2	Not Detected
2-Butanone (Methyl Ethyl Ketone)	2.0	Not Detected	6.0	Not Detected
Tetrahydrofuran	2.0	Not Detected	6.0	Not Detected
1,4-Dioxane	2.0	Not Detected	7.3	Not Detected
4-Methyl-2-pentanone	2.0	Not Detected	8.3	Not Detected
2-Hexanone	2.0	Not Detected	8.3	Not Detected
Ethanol	2.0	Not Detected	3.8	Not Detected
Bromoform	2.0	Not Detected	21	Not Detected
4-Ethyltoluene	2.0	Not Detected	10	Not Detected
Methyl tert-butyl ether	2.0	Not Detected	7.3	Not Detected
TPH ref. to Gasoline (MW=100)	10	Not Detected	42	Not Detected

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	98	70-130
Toluene-d8	97	70-130
4-Bromofluorobenzene	96	70-130

AIR TOXICS LTD.

SAMPLE NAME: Lab Blank

ID#: 0403458A-20B

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**d032609**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 3/26/04 11:35 AM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	0.50	Not Detected	2.5	Not Detected
Freon 114	0.50	Not Detected	3.6	Not Detected
Vinyl Chloride	0.50	Not Detected	1.3	Not Detected
Bromomethane	0.50	Not Detected	2.0	Not Detected
Chloroethane	0.50	Not Detected	1.3	Not Detected
Freon 11	0.50	Not Detected	2.8	Not Detected
1,1-Dichloroethene	0.50	Not Detected	2.0	Not Detected
Freon 113	0.50	Not Detected	3.9	Not Detected
Methylene Chloride	0.50	Not Detected	1.8	Not Detected
1,1-Dichloroethane	0.50	Not Detected	2.0	Not Detected
cis-1,2-Dichloroethene	0.50	Not Detected	2.0	Not Detected
Chloroform	0.50	Not Detected	2.5	Not Detected
1,1,1-Trichloroethane	0.50	Not Detected	2.8	Not Detected
Carbon Tetrachloride	0.50	Not Detected	3.2	Not Detected
Benzene	0.50	Not Detected	1.6	Not Detected
1,2-Dichloroethane	0.50	Not Detected	2.0	Not Detected
Trichloroethene	0.50	Not Detected	2.7	Not Detected
1,2-Dichloropropane	0.50	Not Detected	2.3	Not Detected
cis-1,3-Dichloropropene	0.50	Not Detected	2.3	Not Detected
Toluene	0.50	Not Detected	1.9	Not Detected
trans-1,3-Dichloropropene	0.50	Not Detected	2.3	Not Detected
1,1,2-Trichloroethane	0.50	Not Detected	2.8	Not Detected
Tetrachloroethene	0.50	Not Detected	3.4	Not Detected
1,2-Dibromoethane (EDB)	0.50	Not Detected	3.9	Not Detected
Chlorobenzene	0.50	Not Detected	2.3	Not Detected
Ethyl Benzene	0.50	Not Detected	2.2	Not Detected
m,p-Xylene	0.50	Not Detected	2.2	Not Detected
o-Xylene	0.50	Not Detected	2.2	Not Detected
Styrene	0.50	Not Detected	2.2	Not Detected
1,1,2,2-Tetrachloroethane	0.50	Not Detected	3.5	Not Detected
1,3,5-Trimethylbenzene	0.50	Not Detected	2.5	Not Detected
1,2,4-Trimethylbenzene	0.50	Not Detected	2.5	Not Detected
1,3-Dichlorobenzene	0.50	Not Detected	3.0	Not Detected
1,4-Dichlorobenzene	0.50	Not Detected	3.0	Not Detected
alpha-Chlorotoluene	0.50	Not Detected	2.6	Not Detected
1,2-Dichlorobenzene	0.50	Not Detected	3.0	Not Detected
1,3-Butadiene	0.50	Not Detected	1.1	Not Detected
Hexane	0.50	Not Detected	1.8	Not Detected
Cyclohexane	0.50	Not Detected	1.7	Not Detected
Bromodichloromethane	0.50	Not Detected	3.4	Not Detected
Dibromochloromethane	0.50	Not Detected	4.3	Not Detected
Heptane	0.50	Not Detected	2.1	Not Detected

AIR TOXICS LTD.

SAMPLE NAME: Lab Blank

ID#: 0403458A-20B

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**d032609**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 3/26/04 11:35 AM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Cumene	0.50	Not Detected	2.5	Not Detected
Propylbenzene	0.50	Not Detected	2.5	Not Detected
Chloromethane	2.0	Not Detected	4.2	Not Detected
1,2,4-Trichlorobenzene	2.0	Not Detected	15	Not Detected
Hexachlorobutadiene	2.0	Not Detected	22	Not Detected
Acetone	2.0	Not Detected	4.8	Not Detected
Carbon Disulfide	2.0	Not Detected	6.3	Not Detected
2-Propanol	2.0	Not Detected	5.0	Not Detected
trans-1,2-Dichloroethene	2.0	Not Detected	8.0	Not Detected
Vinyl Acetate	2.0	Not Detected	7.2	Not Detected
2-Butanone (Methyl Ethyl Ketone)	2.0	Not Detected	6.0	Not Detected
Tetrahydrofuran	2.0	Not Detected	6.0	Not Detected
1,4-Dioxane	2.0	Not Detected	7.3	Not Detected
4-Methyl-2-pentanone	2.0	Not Detected	8.3	Not Detected
2-Hexanone	2.0	Not Detected	8.3	Not Detected
Ethanol	2.0	Not Detected	3.8	Not Detected
Bromoform	2.0	Not Detected	21	Not Detected
4-Ethyltoluene	2.0	Not Detected	10	Not Detected
Methyl tert-butyl ether	2.0	Not Detected	7.3	Not Detected
TPH ref. to Gasoline (MW=100)	10	Not Detected	42	Not Detected

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	107	70-130
Toluene-d8	99	70-130
4-Bromofluorobenzene	101	70-130

AIR TOXICS LTD.

SAMPLE NAME: Lab Blank

ID#: 0403458A-20C

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**d032705**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 3/27/04 01:11 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	0.50	Not Detected	2.5	Not Detected
Freon 114	0.50	Not Detected	3.6	Not Detected
Vinyl Chloride	0.50	Not Detected	1.3	Not Detected
Bromomethane	0.50	Not Detected	2.0	Not Detected
Chloroethane	0.50	Not Detected	1.3	Not Detected
Freon 11	0.50	Not Detected	2.8	Not Detected
1,1-Dichloroethene	0.50	Not Detected	2.0	Not Detected
Freon 113	0.50	Not Detected	3.9	Not Detected
Methylene Chloride	0.50	Not Detected	1.8	Not Detected
1,1-Dichloroethane	0.50	Not Detected	2.0	Not Detected
cis-1,2-Dichloroethene	0.50	Not Detected	2.0	Not Detected
Chloroform	0.50	Not Detected	2.5	Not Detected
1,1,1-Trichloroethane	0.50	Not Detected	2.8	Not Detected
Carbon Tetrachloride	0.50	Not Detected	3.2	Not Detected
Benzene	0.50	Not Detected	1.6	Not Detected
1,2-Dichloroethane	0.50	Not Detected	2.0	Not Detected
Trichloroethene	0.50	Not Detected	2.7	Not Detected
1,2-Dichloropropane	0.50	Not Detected	2.3	Not Detected
cis-1,3-Dichloropropene	0.50	Not Detected	2.3	Not Detected
Toluene	0.50	Not Detected	1.9	Not Detected
trans-1,3-Dichloropropene	0.50	Not Detected	2.3	Not Detected
1,1,2-Trichloroethane	0.50	Not Detected	2.8	Not Detected
Tetrachloroethene	0.50	Not Detected	3.4	Not Detected
1,2-Dibromoethane (EDB)	0.50	Not Detected	3.9	Not Detected
Chlorobenzene	0.50	Not Detected	2.3	Not Detected
Ethyl Benzene	0.50	Not Detected	2.2	Not Detected
m,p-Xylene	0.50	Not Detected	2.2	Not Detected
o-Xylene	0.50	Not Detected	2.2	Not Detected
Styrene	0.50	Not Detected	2.2	Not Detected
1,1,2,2-Tetrachloroethane	0.50	Not Detected	3.5	Not Detected
1,3,5-Trimethylbenzene	0.50	Not Detected	2.5	Not Detected
1,2,4-Trimethylbenzene	0.50	Not Detected	2.5	Not Detected
1,3-Dichlorobenzene	0.50	Not Detected	3.0	Not Detected
1,4-Dichlorobenzene	0.50	Not Detected	3.0	Not Detected
alpha-Chlorotoluene	0.50	Not Detected	2.6	Not Detected
1,2-Dichlorobenzene	0.50	Not Detected	3.0	Not Detected
1,3-Butadiene	0.50	Not Detected	1.1	Not Detected
Hexane	0.50	Not Detected	1.8	Not Detected
Cyclohexane	0.50	Not Detected	1.7	Not Detected
Bromodichloromethane	0.50	Not Detected	3.4	Not Detected
Dibromochloromethane	0.50	Not Detected	4.3	Not Detected
Heptane	0.50	Not Detected	2.1	Not Detected

AIR TOXICS LTD.

SAMPLE NAME: Lab Blank

ID#: 0403458A-20C

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**d032705**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 3/27/04 01:11 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Cumene	0.50	Not Detected	2.5	Not Detected
Propylbenzene	0.50	Not Detected	2.5	Not Detected
Chloromethane	2.0	Not Detected	4.2	Not Detected
1,2,4-Trichlorobenzene	2.0	Not Detected	15	Not Detected
Hexachlorobutadiene	2.0	Not Detected	22	Not Detected
Acetone	2.0	Not Detected	4.8	Not Detected
Carbon Disulfide	2.0	Not Detected	6.3	Not Detected
2-Propanol	2.0	Not Detected	5.0	Not Detected
trans-1,2-Dichloroethene	2.0	Not Detected	8.0	Not Detected
Vinyl Acetate	2.0	Not Detected	7.2	Not Detected
2-Butanone (Methyl Ethyl Ketone)	2.0	Not Detected	6.0	Not Detected
Tetrahydrofuran	2.0	Not Detected	6.0	Not Detected
1,4-Dioxane	2.0	Not Detected	7.3	Not Detected
4-Methyl-2-pentanone	2.0	Not Detected	8.3	Not Detected
2-Hexanone	2.0	Not Detected	8.3	Not Detected
Ethanol	2.0	Not Detected	3.8	Not Detected
Bromoform	2.0	Not Detected	21	Not Detected
4-Ethyltoluene	2.0	Not Detected	10	Not Detected
Methyl tert-butyl ether	2.0	Not Detected	7.3	Not Detected
TPH ref. to Gasoline (MW=100)	10	Not Detected	42	Not Detected

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	102	70-130
Toluene-d8	100	70-130
4-Bromofluorobenzene	96	70-130

AIR TOXICS LTD.

SAMPLE NAME: Lab Blank

ID#: 0403458A-20D

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**i032805**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 3/28/04 01:05 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	0.50	Not Detected	2.5	Not Detected
Freon 114	0.50	Not Detected	3.6	Not Detected
Vinyl Chloride	0.50	Not Detected	1.3	Not Detected
Bromomethane	0.50	Not Detected	2.0	Not Detected
Chloroethane	0.50	Not Detected	1.3	Not Detected
Freon 11	0.50	Not Detected	2.8	Not Detected
1,1-Dichloroethene	0.50	Not Detected	2.0	Not Detected
Freon 113	0.50	Not Detected	3.9	Not Detected
Methylene Chloride	0.50	Not Detected	1.8	Not Detected
1,1-Dichloroethane	0.50	Not Detected	2.0	Not Detected
cis-1,2-Dichloroethene	0.50	Not Detected	2.0	Not Detected
Chloroform	0.50	Not Detected	2.5	Not Detected
1,1,1-Trichloroethane	0.50	Not Detected	2.8	Not Detected
Carbon Tetrachloride	0.50	Not Detected	3.2	Not Detected
Benzene	0.50	Not Detected	1.6	Not Detected
1,2-Dichloroethane	0.50	Not Detected	2.0	Not Detected
Trichloroethene	0.50	Not Detected	2.7	Not Detected
1,2-Dichloropropane	0.50	Not Detected	2.3	Not Detected
cis-1,3-Dichloropropene	0.50	Not Detected	2.3	Not Detected
Toluene	0.50	Not Detected	1.9	Not Detected
trans-1,3-Dichloropropene	0.50	Not Detected	2.3	Not Detected
1,1,2-Trichloroethane	0.50	Not Detected	2.8	Not Detected
Tetrachloroethene	0.50	Not Detected	3.4	Not Detected
1,2-Dibromoethane (EDB)	0.50	Not Detected	3.9	Not Detected
Chlorobenzene	0.50	Not Detected	2.3	Not Detected
Ethyl Benzene	0.50	Not Detected	2.2	Not Detected
m,p-Xylene	0.50	Not Detected	2.2	Not Detected
o-Xylene	0.50	Not Detected	2.2	Not Detected
Styrene	0.50	Not Detected	2.2	Not Detected
1,1,2,2-Tetrachloroethane	0.50	Not Detected	3.5	Not Detected
1,3,5-Trimethylbenzene	0.50	Not Detected	2.5	Not Detected
1,2,4-Trimethylbenzene	0.50	Not Detected	2.5	Not Detected
1,3-Dichlorobenzene	0.50	Not Detected	3.0	Not Detected
1,4-Dichlorobenzene	0.50	Not Detected	3.0	Not Detected
alpha-Chlorotoluene	0.50	Not Detected	2.6	Not Detected
1,2-Dichlorobenzene	0.50	Not Detected	3.0	Not Detected
1,3-Butadiene	0.50	Not Detected	1.1	Not Detected
Hexane	0.50	Not Detected	1.8	Not Detected
Cyclohexane	0.50	Not Detected	1.7	Not Detected
Bromodichloromethane	0.50	Not Detected	3.4	Not Detected
Dibromochloromethane	0.50	Not Detected	4.3	Not Detected
Heptane	0.50	Not Detected	2.1	Not Detected

AIR TOXICS LTD.

SAMPLE NAME: Lab Blank

ID#: 0403458A-20D

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**i032805**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 3/28/04 01:05 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Cumene	0.50	Not Detected	2.5	Not Detected
Propylbenzene	0.50	Not Detected	2.5	Not Detected
Chloromethane	2.0	Not Detected	4.2	Not Detected
1,2,4-Trichlorobenzene	2.0	Not Detected	15	Not Detected
Hexachlorobutadiene	2.0	Not Detected	22	Not Detected
Acetone	2.0	Not Detected	4.8	Not Detected
Carbon Disulfide	2.0	Not Detected	6.3	Not Detected
2-Propanol	2.0	Not Detected	5.0	Not Detected
trans-1,2-Dichloroethene	2.0	Not Detected	8.0	Not Detected
Vinyl Acetate	2.0	Not Detected	7.2	Not Detected
2-Butanone (Methyl Ethyl Ketone)	2.0	Not Detected	6.0	Not Detected
Tetrahydrofuran	2.0	Not Detected	6.0	Not Detected
1,4-Dioxane	2.0	Not Detected	7.3	Not Detected
4-Methyl-2-pentanone	2.0	Not Detected	8.3	Not Detected
2-Hexanone	2.0	Not Detected	8.3	Not Detected
Ethanol	2.0	Not Detected	3.8	Not Detected
Bromoform	2.0	Not Detected	21	Not Detected
4-Ethyltoluene	2.0	Not Detected	10	Not Detected
Methyl tert-butyl ether	2.0	Not Detected	7.3	Not Detected
TPH ref. to Gasoline (MW=100)	10	Not Detected	42	Not Detected

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	101	70-130
Toluene-d8	98	70-130
4-Bromofluorobenzene	96	70-130

AIR TOXICS LTD.

SAMPLE NAME: CCV

ID#: 0403458A-21A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**i032602**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 3/26/04 07:59 AM**	

Compound	%Recovery
Freon 12	105
Freon 114	98
Vinyl Chloride	98
Bromomethane	96
Chloroethane	96
Freon 11	101
1,1-Dichloroethene	98
Freon 113	100
Methylene Chloride	92
1,1-Dichloroethane	99
cis-1,2-Dichloroethene	103
Chloroform	106
1,1,1-Trichloroethane	108
Carbon Tetrachloride	111
Benzene	103
1,2-Dichloroethane	107
Trichloroethene	106
1,2-Dichloropropane	104
cis-1,3-Dichloropropene	108
Toluene	106
trans-1,3-Dichloropropene	108
1,1,2-Trichloroethane	108
Tetrachloroethene	111
1,2-Dibromoethane (EDB)	110
Chlorobenzene	107
Ethyl Benzene	108
m,p-Xylene	108
o-Xylene	107
Styrene	114
1,1,2,2-Tetrachloroethane	104
1,3,5-Trimethylbenzene	97
1,2,4-Trimethylbenzene	97
1,3-Dichlorobenzene	97
1,4-Dichlorobenzene	95
alpha-Chlorotoluene	95
1,2-Dichlorobenzene	93
1,3-Butadiene	93
Hexane	96
Cyclohexane	105
Bromodichloromethane	111
Dibromochloromethane	117
Heptane	109

AIR TOXICS LTD.

SAMPLE NAME: CCV

ID#: 0403458A-21A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**i032602**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 3/26/04 07:59 AM**	

Compound	%Recovery
Cumene	106
Propylbenzene	104
Chloromethane	99
1,2,4-Trichlorobenzene	96
Hexachlorobutadiene	100
Acetone	87
Carbon Disulfide	94
2-Propanol	92
trans-1,2-Dichloroethene	93
Vinyl Acetate	99
2-Butanone (Methyl Ethyl Ketone)	101
Tetrahydrofuran	100
1,4-Dioxane	103
4-Methyl-2-pentanone	112
2-Hexanone	101
Ethanol	92
Bromoform	117
4-Ethyltoluene	107
Methyl tert-butyl ether	103
TPH ref. to Gasoline (MW=100)	Not Spiked

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	101	70-130
Toluene-d8	102	70-130
4-Bromofluorobenzene	97	70-130

AIR TOXICS LTD.

SAMPLE NAME: CCV

ID#: 0403458A-21B

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**d032602**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 3/26/04 06:17 AM**	

Compound	%Recovery
Freon 12	110
Freon 114	109
Vinyl Chloride	114
Bromomethane	111
Chloroethane	119
Freon 11	107
1,1-Dichloroethene	103
Freon 113	106
Methylene Chloride	101
1,1-Dichloroethane	104
cis-1,2-Dichloroethene	102
Chloroform	105
1,1,1-Trichloroethane	106
Carbon Tetrachloride	108
Benzene	97
1,2-Dichloroethane	105
Trichloroethene	100
1,2-Dichloropropane	106
cis-1,3-Dichloropropene	108
Toluene	104
trans-1,3-Dichloropropene	114
1,1,2-Trichloroethane	109
Tetrachloroethene	107
1,2-Dibromoethane (EDB)	111
Chlorobenzene	106
Ethyl Benzene	108
m,p-Xylene	106
o-Xylene	104
Styrene	111
1,1,2,2-Tetrachloroethane	107
1,3,5-Trimethylbenzene	101
1,2,4-Trimethylbenzene	100
1,3-Dichlorobenzene	103
1,4-Dichlorobenzene	103
alpha-Chlorotoluene	109
1,2-Dichlorobenzene	101
1,3-Butadiene	110
Hexane	104
Cyclohexane	107
Bromodichloromethane	111
Dibromochloromethane	115
Heptane	108

AIR TOXICS LTD.

SAMPLE NAME: CCV

ID#: 0403458A-21B

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**d032602**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 3/26/04 06:17 AM**	

Compound	%Recovery
Cumene	101
Propylbenzene	104
Chloromethane	106
1,2,4-Trichlorobenzene	91
Hexachlorobutadiene	90
Acetone	98
Carbon Disulfide	104
2-Propanol	100
trans-1,2-Dichloroethene	100
Vinyl Acetate	102
2-Butanone (Methyl Ethyl Ketone)	107
Tetrahydrofuran	96
1,4-Dioxane	99
4-Methyl-2-pentanone	108
2-Hexanone	107
Ethanol	101
Bromoform	117
4-Ethyltoluene	104
Methyl tert-butyl ether	96
TPH ref. to Gasoline (MW=100)	Not Spiked

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	102	70-130
Toluene-d8	100	70-130
4-Bromofluorobenzene	100	70-130

AIR TOXICS LTD.

SAMPLE NAME: CCV

ID#: 0403458A-21C

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**d032702**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 3/27/04 11:13 AM**	

Compound	%Recovery
Freon 12	113
Freon 114	110
Vinyl Chloride	97
Bromomethane	117
Chloroethane	113
Freon 11	107
1,1-Dichloroethene	103
Freon 113	106
Methylene Chloride	100
1,1-Dichloroethane	103
cis-1,2-Dichloroethene	101
Chloroform	106
1,1,1-Trichloroethane	109
Carbon Tetrachloride	110
Benzene	98
1,2-Dichloroethane	105
Trichloroethene	100
1,2-Dichloropropane	105
cis-1,3-Dichloropropene	106
Toluene	102
trans-1,3-Dichloropropene	112
1,1,2-Trichloroethane	107
Tetrachloroethene	106
1,2-Dibromoethane (EDB)	110
Chlorobenzene	104
Ethyl Benzene	107
m,p-Xylene	106
o-Xylene	105
Styrene	109
1,1,2,2-Tetrachloroethane	107
1,3,5-Trimethylbenzene	100
1,2,4-Trimethylbenzene	100
1,3-Dichlorobenzene	100
1,4-Dichlorobenzene	102
alpha-Chlorotoluene	105
1,2-Dichlorobenzene	98
1,3-Butadiene	102
Hexane	101
Cyclohexane	107
Bromodichloromethane	111
Dibromochloromethane	114
Heptane	104

AIR TOXICS LTD.

SAMPLE NAME: CCV

ID#: 0403458A-21C

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**d032702**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 3/27/04 11:13 AM**	

Compound	%Recovery
Cumene	101
Propylbenzene	104
Chloromethane	109
1,2,4-Trichlorobenzene	89
Hexachlorobutadiene	87
Acetone	97
Carbon Disulfide	101
2-Propanol	98
trans-1,2-Dichloroethene	98
Vinyl Acetate	97
2-Butanone (Methyl Ethyl Ketone)	105
Tetrahydrofuran	98
1,4-Dioxane	97
4-Methyl-2-pentanone	106
2-Hexanone	104
Ethanol	98
Bromoform	116
4-Ethyltoluene	102
Methyl tert-butyl ether	93
TPH ref. to Gasoline (MW=100)	Not Spiked

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	105	70-130
Toluene-d8	100	70-130
4-Bromofluorobenzene	98	70-130

AIR TOXICS LTD.

SAMPLE NAME: CCV

ID#: 0403458A-21D

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**i032802**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 3/28/04 10:25 AM**	

Compound	%Recovery
Freon 12	105
Freon 114	101
Vinyl Chloride	97
Bromomethane	92
Chloroethane	98
Freon 11	104
1,1-Dichloroethene	100
Freon 113	102
Methylene Chloride	94
1,1-Dichloroethane	101
cis-1,2-Dichloroethene	104
Chloroform	109
1,1,1-Trichloroethane	113
Carbon Tetrachloride	115
Benzene	103
1,2-Dichloroethane	107
Trichloroethene	108
1,2-Dichloropropane	104
cis-1,3-Dichloropropene	107
Toluene	107
trans-1,3-Dichloropropene	104
1,1,2-Trichloroethane	104
Tetrachloroethene	107
1,2-Dibromoethane (EDB)	109
Chlorobenzene	105
Ethyl Benzene	106
m,p-Xylene	108
o-Xylene	106
Styrene	115
1,1,2,2-Tetrachloroethane	106
1,3,5-Trimethylbenzene	98
1,2,4-Trimethylbenzene	98
1,3-Dichlorobenzene	99
1,4-Dichlorobenzene	98
alpha-Chlorotoluene	97
1,2-Dichlorobenzene	95
1,3-Butadiene	95
Hexane	98
Cyclohexane	108
Bromodichloromethane	111
Dibromochloromethane	115
Heptane	108

AIR TOXICS LTD.

SAMPLE NAME: CCV

ID#: 0403458A-21D

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**i032802**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 3/28/04 10:25 AM**	

Compound	**%Recovery**
Cumene	105
Propylbenzene	105
Chloromethane	98
1,2,4-Trichlorobenzene	97
Hexachlorobutadiene	99
Acetone	88
Carbon Disulfide	97
2-Propanol	93
trans-1,2-Dichloroethene	95
Vinyl Acetate	102
2-Butanone (Methyl Ethyl Ketone)	105
Tetrahydrofuran	101
1,4-Dioxane	102
4-Methyl-2-pentanone	111
2-Hexanone	98
Ethanol	96
Bromoform	118
4-Ethyltoluene	109
Methyl tert-butyl ether	99
TPH ref. to Gasoline (MW=100)	Not Spiked

Container Type: NA - Not Applicable

Surrogates	**%Recovery**	**Method Limits**
1,2-Dichloroethane-d4	102	70-130
Toluene-d8	101	70-130
4-Bromofluorobenzene	102	70-130

AIR TOXICS LTD.

SAMPLE NAME: LCS

ID#: 0403458A-22A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**i032603**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 3/26/04 08:46 AM**	

Compound	%Recovery
Freon 12	118
Freon 114	106
Vinyl Chloride	119
Bromomethane	112
Chloroethane	118
Freon 11	109
1,1-Dichloroethene	104
Freon 113	102
Methylene Chloride	92
1,1-Dichloroethane	106
cis-1,2-Dichloroethene	107
Chloroform	114
1,1,1-Trichloroethane	127
Carbon Tetrachloride	126
Benzene	118
1,2-Dichloroethane	121
Trichloroethene	122
1,2-Dichloropropane	122
cis-1,3-Dichloropropene	121
Toluene	111
trans-1,3-Dichloropropene	122
1,1,2-Trichloroethane	116
Tetrachloroethene	116
1,2-Dibromoethane (EDB)	110
Chlorobenzene	112
Ethyl Benzene	111
m,p-Xylene	109
o-Xylene	106
Styrene	117
1,1,2,2-Tetrachloroethane	112
1,3,5-Trimethylbenzene	94
1,2,4-Trimethylbenzene	88
1,3-Dichlorobenzene	102
1,4-Dichlorobenzene	95
alpha-Chlorotoluene	124
1,2-Dichlorobenzene	97
1,3-Butadiene	98
Hexane	91
Cyclohexane	98
Bromodichloromethane	95
Dibromochloromethane	104
Heptane	101

AIR TOXICS LTD.

SAMPLE NAME: LCS

ID#: 0403458A-22A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**i032603**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 3/26/04 08:46 AM**	

Compound	%Recovery
Cumene	97
Propylbenzene	71
Chloromethane	110
1,2,4-Trichlorobenzene	83
Hexachlorobutadiene	83
Acetone	82
Carbon Disulfide	88
2-Propanol	101
trans-1,2-Dichloroethene	87
Vinyl Acetate	102
2-Butanone (Methyl Ethyl Ketone)	96
Tetrahydrofuran	98
1,4-Dioxane	96
4-Methyl-2-pentanone	105
2-Hexanone	100
Ethanol	113
Bromoform	102
4-Ethyltoluene	118
Methyl tert-butyl ether	104
TPH ref. to Gasoline (MW=100)	Not Spiked

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	98	70-130
Toluene-d8	100	70-130
4-Bromofluorobenzene	101	70-130

AIR TOXICS LTD.

SAMPLE NAME: LCS

ID#: 0403458A-22B

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**d032603**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 3/26/04 06:56 AM**	

Compound	%Recovery
Freon 12	110
Freon 114	109
Vinyl Chloride	118
Bromomethane	128
Chloroethane	134 Q
Freon 11	112
1,1-Dichloroethene	105
Freon 113	106
Methylene Chloride	103
1,1-Dichloroethane	109
cis-1,2-Dichloroethene	103
Chloroform	110
1,1,1-Trichloroethane	120
Carbon Tetrachloride	121
Benzene	108
1,2-Dichloroethane	116
Trichloroethene	113
1,2-Dichloropropane	120
cis-1,3-Dichloropropene	123
Toluene	105
trans-1,3-Dichloropropene	129
1,1,2-Trichloroethane	114
Tetrachloroethene	110
1,2-Dibromoethane (EDB)	108
Chlorobenzene	109
Ethyl Benzene	106
m,p-Xylene	104
o-Xylene	100
Styrene	112
1,1,2,2-Tetrachloroethane	110
1,3,5-Trimethylbenzene	93
1,2,4-Trimethylbenzene	88
1,3-Dichlorobenzene	102
1,4-Dichlorobenzene	98
alpha-Chlorotoluene	137 Q
1,2-Dichlorobenzene	99
1,3-Butadiene	109
Hexane	97
Cyclohexane	102
Bromodichloromethane	96
Dibromochloromethane	103
Heptane	101

AIR TOXICS LTD.

SAMPLE NAME: LCS

ID#: 0403458A-22B

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**d032603**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 3/26/04 06:56 AM**	

Compound	%Recovery
Cumene	86
Propylbenzene	66
Chloromethane	103
1,2,4-Trichlorobenzene	78
Hexachlorobutadiene	73
Acetone	91
Carbon Disulfide	95
2-Propanol	106
trans-1,2-Dichloroethene	94
Vinyl Acetate	106
2-Butanone (Methyl Ethyl Ketone)	100
Tetrahydrofuran	93
1,4-Dioxane	92
4-Methyl-2-pentanone	102
2-Hexanone	103
Ethanol	124
Bromoform	100
4-Ethyltoluene	115
Methyl tert-butyl ether	94
TPH ref. to Gasoline (MW=100)	Not Spiked

Q = Exceeds Quality Control limits.

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	104	70-130
Toluene-d8	100	70-130
4-Bromofluorobenzene	99	70-130

AIR TOXICS LTD.

SAMPLE NAME: LCS

ID#: 0403458A-22C

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**d032703**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 3/27/04 11:52 AM**	

Compound	%Recovery
Freon 12	107
Freon 114	106
Vinyl Chloride	109
Bromomethane	128
Chloroethane	110
Freon 11	109
1,1-Dichloroethene	103
Freon 113	101
Methylene Chloride	101
1,1-Dichloroethane	105
cis-1,2-Dichloroethene	99
Chloroform	107
1,1,1-Trichloroethane	116
Carbon Tetrachloride	117
Benzene	107
1,2-Dichloroethane	112
Trichloroethene	107
1,2-Dichloropropane	116
cis-1,3-Dichloropropene	120
Toluene	103
trans-1,3-Dichloropropene	127
1,1,2-Trichloroethane	110
Tetrachloroethene	104
1,2-Dibromoethane (EDB)	104
Chlorobenzene	104
Ethyl Benzene	103
m,p-Xylene	98
o-Xylene	96
Styrene	110
1,1,2,2-Tetrachloroethane	109
1,3,5-Trimethylbenzene	93
1,2,4-Trimethylbenzene	88
1,3-Dichlorobenzene	102
1,4-Dichlorobenzene	98
alpha-Chlorotoluene	148 Q
1,2-Dichlorobenzene	102
1,3-Butadiene	104
Hexane	94
Cyclohexane	96
Bromodichloromethane	96
Dibromochloromethane	101
Heptane	94

AIR TOXICS LTD.

SAMPLE NAME: LCS

ID#: 0403458A-22C

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**d032703**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 3/27/04 11:52 AM**	

Compound	**%Recovery**
Cumene	86
Propylbenzene	67
Chloromethane	88
1,2,4-Trichlorobenzene	82
Hexachlorobutadiene	76
Acetone	89
Carbon Disulfide	94
2-Propanol	105
trans-1,2-Dichloroethene	89
Vinyl Acetate	105
2-Butanone (Methyl Ethyl Ketone)	98
Tetrahydrofuran	90
1,4-Dioxane	91
4-Methyl-2-pentanone	101
2-Hexanone	105
Ethanol	110
Bromoform	100
4-Ethyltoluene	115
Methyl tert-butyl ether	90
TPH ref. to Gasoline (MW=100)	Not Spiked

Q = Exceeds Quality Control limits.

Container Type: NA - Not Applicable

Surrogates	**%Recovery**	**Method Limits**
1,2-Dichloroethane-d4	104	70-130
Toluene-d8	100	70-130
4-Bromofluorobenzene	99	70-130

AIR TOXICS LTD.

SAMPLE NAME: LCS

ID#: 0403458A-22D

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**i032803**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 3/28/04 11:12 AM**	

Compound	%Recovery
Freon 12	113
Freon 114	109
Vinyl Chloride	112
Bromomethane	106
Chloroethane	121
Freon 11	113
1,1-Dichloroethene	105
Freon 113	105
Methylene Chloride	92
1,1-Dichloroethane	107
cis-1,2-Dichloroethene	108
Chloroform	118
1,1,1-Trichloroethane	131 Q
Carbon Tetrachloride	129
Benzene	121
1,2-Dichloroethane	124
Trichloroethene	126
1,2-Dichloropropane	124
cis-1,3-Dichloropropene	125
Toluene	115
trans-1,3-Dichloropropene	122
1,1,2-Trichloroethane	117
Tetrachloroethene	116
1,2-Dibromoethane (EDB)	111
Chlorobenzene	114
Ethyl Benzene	111
m,p-Xylene	110
o-Xylene	108
Styrene	120
1,1,2,2-Tetrachloroethane	115
1,3,5-Trimethylbenzene	95
1,2,4-Trimethylbenzene	90
1,3-Dichlorobenzene	103
1,4-Dichlorobenzene	95
alpha-Chlorotoluene	126
1,2-Dichlorobenzene	98
1,3-Butadiene	99
Hexane	92
Cyclohexane	102
Bromodichloromethane	100
Dibromochloromethane	105
Heptane	105

AIR TOXICS LTD.

SAMPLE NAME: LCS

ID#: 0403458A-22D

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**i032803**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 3/28/04 11:12 AM**	

Compound	**%Recovery**
Cumene	98
Propylbenzene	72
Chloromethane	105
1,2,4-Trichlorobenzene	76
Hexachlorobutadiene	76
Acetone	84
Carbon Disulfide	90
2-Propanol	102
trans-1,2-Dichloroethene	89
Vinyl Acetate	106
2-Butanone (Methyl Ethyl Ketone)	98
Tetrahydrofuran	98
1,4-Dioxane	100
4-Methyl-2-pentanone	110
2-Hexanone	101
Ethanol	113
Bromoform	104
4-Ethyltoluene	120
Methyl tert-butyl ether	102
TPH ref. to Gasoline (MW=100)	Not Spiked

Q = Exceeds Quality Control limits.

Container Type: NA - Not Applicable

Surrogates	**%Recovery**	**Method Limits**
1,2-Dichloroethane-d4	98	70-130
Toluene-d8	102	70-130
4-Bromofluorobenzene	100	70-130

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CHAIN-OF-CUSTODY RECORD

Sample Transportation Notice

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(916) 985-1000 FAX: (916) 985-1020

Page ___ of ___

Contact Person: Michael Nesky
Company: LFR
Address: 13880 N Northsight City: Scottsdale State: AZ Zip: 85260
Phone: 480-905-9311 FAX: 480-905-9353
Collected By: Signature: Douglas Fabe

Project Info:
P.O. #:
Project #: 04-10020-04
Project Name: KMEP Silver Creek Wash

Turn Around Time:
☐ Normal
☒ Rush 24 HR Specify
MWS 3/26/04

Lab I.D.	Field Sample I.D.	Date & Time	Analyses Requested	Canister Pressure / Vacuum Initial	Final	Receipt
01A	SSG-28	3-23-04/13:14	TO-15 + TPH	27.0" Hg	4.5" Hg	7.5" Hg
02A	SSG-21	3-23-04/14:02		26.0" Hg	4.0" Hg	8.5" Hg
03A	SSG-14	3-23-04/14:42		27.0" Hg	4.5" Hg	8.5" Hg
04A	SSG-29	3-23-04/15:21		26.0" Hg	3.5" Hg	9.0" Hg
05A	SSG-30	3-23-04/16:10		26.0" Hg	4.0" Hg	9.0" Hg
06A	SSG-31	3-23-04/16:53		25.0" Hg	3.5" Hg	9.0" Hg
07A	SSG-32	3-24-04/07:35		26.0" Hg	3.5" Hg	7.0" Hg
08A	SSG-34	3-24-04/08:28		27.0" Hg	3.5" Hg	7.0" Hg
09A	SSG-35	3-24-04/09:07		27.0" Hg	3.5" Hg	7.0" Hg
10A	SSG-37	3-24-04/08:59		27.0" Hg	3.0" Hg	7.0" Hg

Relinquished By: (Signature) Date/Time	Received By: (Signature) Date/Time
Douglas Fabe 3-25-04/0639	
Relinquished By: (Signature) Date/Time	Received By: (Signature) Date/Time
Relinquished By: (Signature) Date/Time	Received By: (Signature) Date/Time
	Carl Alvarado ATL 3/26/04 945

Notes:

Lab Use Only	Shipper Name	Air Bill #	Opened By:	Temp. (°C)	Condition	Custody Seals Intact?	Work Order #
	F-EX	843267051	CA	—	Good	Yes No (None)	0403458A
		593					

Form 1288 rev. 09

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(916) 985-1000 FAX: (916) 985-1020

Page ___ of ___

Contact Person: Michael Nesky
Company: LFR Inc
Address: 13880 N Northsight S 115 City: Scottsdale State: AZ Zip:
Phone: 480-905-7311 FAX:
Collected By: Signature: Douglas Liden

Project Info:
P.O. #:
Project #: 014-10022-04
Project Name: KMEP
Silver Creek Wash

Turn Around Time:
☐ Normal
☒ Rush 24 hr
Specify
press to 5 psi
MW 3/26/04

Lab I.D.	Field Sample I.D.	Date & Time	Analyses Requested	Canister Pressure / Vacuum Initial	Final	Receipt
11A	SSG-37-B	3-24-04/10:25	TO-15 + TPH	26.5" Hg	3.5" Hg	6.5" Hg
12A	SSG-33	3-24-04/11:22		24.5" Hg	3.5" Hg	8.0" Hg
13A	SSG-40	3-24-04/12:07		26.5" Hg	3.0" Hg	5.5" Hg
14A	SSG-39	3-24-04/12:54		27.5" Hg	3.0" Hg	7.0" Hg
15A	SSG-38	3-24-04/1502		26.5" Hg	3.0" Hg	~~10.5" Hg~~ 7.0"
16A	EB-3-24-04	3-24-04/15:45		27.0" Hg	6.5" Hg	8.0" Hg 10.5
17A	SSG-27	3-24-04/16:00		27.0" Hg	4.0" Hg	8.0" Hg 8.0"
18A	SSG-15	3-24-04/17:05		20.5" Hg	4.0" Hg	~~8.0" Hg~~ 8.0"
19A	SSG-22	3-24-04/17:		26.0" Hg	4.0" Hg	8.0"

Relinquished By: (Signature) Date/Time: D Liden 3-25-04/06:39
Received By: (Signature) Date/Time:
Relinquished By: (Signature) Date/Time:
Received By: (Signature) Date/Time:
Relinquished By: (Signature) Date/Time:
Received By: (Signature) Date/Time: [illegible] 3/26/04 945

Notes:

Lab Use Only	Shipper Name	Air Bill #	Opened By	Temp. (°C)	Condition	Custody Seals Intact?	Work Order #
	FEX	8432670	CM	—	Good	Yes No None	0403458A
	515-93						

Form 1282 rev. 09

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Thank you for choosing Air Toxics Ltd. To better serve our customers, we are providing your report by e-mail. This document is provided in Portable Document Format which can be viewed with Acrobat Reader by Adobe.

This electronic report includes the following:

- Work order Summary;
- Laboratory Narrative;
- Results; and
- Chain of Custody (copy).

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E-mail to:samplereceiving@airtoxics.com

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WORK ORDER #: 0403458B

Work Order Summary

CLIENT:	Mr. Doug Fisher LFR Levine-Fricke 13880 N. Northsight Blvd. Suite 115 Scottsdale, AZ 85260	**BILL TO:**	Mr. Doug Fisher LFR Levine-Fricke 13880 N. Northsight Blvd. Suite 115 Scottsdale, AZ 85260
PHONE:	480-905-9311	**P.O. #**	
FAX:	480-905-9353	**PROJECT #**	014-10022-04 KMEP Silver Croft Wash
DATE RECEIVED:	03/26/04	**CONTACT:**	Taryn Badal
DATE COMPLETED:	03/29/04		

FRACTION #	NAME	TEST	RECEIPT VAC./PRES.
20A	SSG-18	Modified TO-15	6.5 "Hg
21A	Profile-1	Modified TO-15	7.0 "Hg
22A	SSG-23	Modified TO-15	7.0 "Hg
23A	SSG-16	Modified TO-15	6.5 "Hg
24A	SSG-24	Modified TO-15	5.0 "Hg
25A	SSG-17	Modified TO-15	7.0 "Hg
26A	SSG-25	Modified TO-15	7.5 "Hg
27A	SSG-26	Modified TO-15	6.0 "Hg
28A	SSG-20A	Modified TO-15	6.5 "Hg
29A	SSG-20B	Modified TO-15	6.0 "Hg
30A	EB-3-25-04	Modified TO-15	7.0 "Hg
30AA	EB-3-25-04 Duplicate	Modified TO-15	7.0 "Hg
31A	SSG-19	Modified TO-15	7.0 "Hg
32A	Lab Blank	Modified TO-15	NA
32B	Lab Blank	Modified TO-15	NA
33A	CCV	Modified TO-15	NA
33B	CCV	Modified TO-15	NA
34A	LCS	Modified TO-15	NA
34B	LCS	Modified TO-15	NA

CERTIFIED BY: Linda L. Freeman DATE: 03/29/04

Laboratory Director

Certfication numbers: AR DEQ - 03-084-0, CA NELAP - 02110CA, LA NELAP/LELAP- AI 30763, NJ NELAP - CA004
NY NELAP - 11291, UT NELAP - 9166389892
Name of Accrediting Agency: NELAP/Florida Department of Health, Scope of Application: Clean Air Act,
Accreditation number: E87680, Effective date: 07/01/03, Expiration date: 06/30/04
Air Toxics Ltd. certifies that the test results contained in this report meet all requirements of the NELAC standards

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LABORATORY NARRATIVE
Modified TO-15
LFR Levine-Fricke
Workorder# 0403458B

Eleven 1 Liter Summa Canister (100% Certified) and one 6 Liter Summa Canister (100% Certified) samples were received on March 26, 2004. The laboratory performed analysis via modified EPA Method TO-15 using GC/MS in the full scan mode. The method involves concentrating up to 0.2 liters of air. The concentrated aliquot is then flash vaporized and swept through a water management system to remove water vapor. Following dehumidification, the sample passes directly into the GC/MS for analysis. See the data sheets for the reporting limits for each compound.

Method modifications taken to run these samples include:

Requirement	***TO-14A/TO-15***	***ATL Modifications***
BFB acceptance criteria	CLP protocol (TO-15)	SW-846 protocol
Concentration of IS spike	10 ppbv (TO-15)	25 ppbv
Dilutions for initial calibration	Dynamic dilutions or static using canisters	Syringe dilutions
Daily CCV	</= 30% Difference	</= 30% Difference with two allowed out up to </=40%.; flag and narrate outliers
Primary ions for Quantification	Freon 114: 85, Carbon Tetrachloride: 117, Trichloroethene: 130, Ethyl Benzene, m,p- and o-Xylene: 91, Vinyl Acetate: 43, 2-Butanone: 43, 4-Methyl-2-Pentanone: 43.	Freon 114: 135, Carbon Tetrachloride: 119, Trichloroethene: 95, Ethyl Benzene, m,p- and o-Xylene: 106, Vinyl Acetate: 86, 2-Butanone: 72, 4-Methyl-2-Pentanone: 58.
Sample collection media	Summa canister	ATL recommends use of summa canisters to insure data defensibility, but will report results from Tedlar bags at client request
Sample Drying System	Nafion Dryer (TO-14A)	Multisorbent
Sample Load Volume	400 mL (TO-14A)	Varied to 0.2 L.
Blank Acceptance Criteria.	< 0.20 ppbv (TO-14A)	< RL
BFB Absolute Abundance Criteria (TO-14A)	Within 10% of that from the previous day.	CCV internal standard area counts are compared to ICAL, corrective action for > 40 % D.
Initial Calibration	</= 30 %RSD (TO-14A)	</= 30 % RSD with 2 compounds allowed out to </= 40 % RSD.
IS Recoveries	Within 40% of mean over ICAL for blanks, and within 40 % of daily CCV for samples. (TO-15)	Within 40% of CCV recoveries for blank and samples.

Receiving Notes

There were no receiving discrepancies.

Analytical Notes

There were no analytical discrepancies.

Definition of Data Qualifying Flags

Eight qualifiers may have been used on the data analysis sheets and indicates as follows:

B - Compound present in laboratory blank greater than reporting limit (background subtraction not performed).

J - Estimated value.

E - Exceeds instrument calibration range.

S - Saturated Peak.

Q - Exceeds quality control limits.

U - Compound analyzed for but not detected above the reporting limit.

UJ- Non-detected compound associated with low bias in the CCV

N - The identification is based on presumptive evidence.

File extensions may have been used on the data analysis sheets and indicates as follows:

a-File was requantified

b-File was quantified by a second column and detector

r1-File was requantified for the purpose of reissue

AIR TOXICS LTD.

SAMPLE NAME: SSG-18

ID#: 0403458B-20A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**i032807**	**Date of Collection:**	**3/24/04**
Dil. Factor:	**22.8**	**Date of Analysis:**	**3/28/04 03:13 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	11	Not Detected	57	Not Detected
Freon 114	11	Not Detected	81	Not Detected
Vinyl Chloride	11	Not Detected	30	Not Detected
Bromomethane	11	Not Detected	45	Not Detected
Chloroethane	11	Not Detected	30	Not Detected
Freon 11	11	Not Detected	65	Not Detected
1,1-Dichloroethene	11	Not Detected	46	Not Detected
Freon 113	11	Not Detected	89	Not Detected
Methylene Chloride	11	Not Detected	40	Not Detected
1,1-Dichloroethane	11	Not Detected	47	Not Detected
cis-1,2-Dichloroethene	11	Not Detected	46	Not Detected
Chloroform	11	Not Detected	56	Not Detected
1,1,1-Trichloroethane	11	Not Detected	63	Not Detected
Carbon Tetrachloride	11	Not Detected	73	Not Detected
Benzene	11	56	37	180
1,2-Dichloroethane	11	Not Detected	47	Not Detected
Trichloroethene	11	Not Detected	62	Not Detected
1,2-Dichloropropane	11	Not Detected	54	Not Detected
cis-1,3-Dichloropropene	11	Not Detected	52	Not Detected
Toluene	11	280	44	1100
trans-1,3-Dichloropropene	11	Not Detected	52	Not Detected
1,1,2-Trichloroethane	11	Not Detected	63	Not Detected
Tetrachloroethene	11	Not Detected	78	Not Detected
1,2-Dibromoethane (EDB)	11	Not Detected	89	Not Detected
Chlorobenzene	11	Not Detected	53	Not Detected
Ethyl Benzene	11	22	50	97
m,p-Xylene	11	72	50	320
o-Xylene	11	36	50	160
Styrene	11	Not Detected	49	Not Detected
1,1,2,2-Tetrachloroethane	11	Not Detected	80	Not Detected
1,3,5-Trimethylbenzene	11	Not Detected	57	Not Detected
1,2,4-Trimethylbenzene	11	17	57	84
1,3-Dichlorobenzene	11	Not Detected	70	Not Detected
1,4-Dichlorobenzene	11	Not Detected	70	Not Detected
alpha-Chlorotoluene	11	Not Detected	60	Not Detected
1,2-Dichlorobenzene	11	Not Detected	70	Not Detected
1,3-Butadiene	11	Not Detected	26	Not Detected
Hexane	11	29	41	100
Cyclohexane	11	72	40	250
Bromodichloromethane	11	Not Detected	78	Not Detected
Dibromochloromethane	11	Not Detected	99	Not Detected
Heptane	11	29	47	120

AIR TOXICS LTD.

SAMPLE NAME: SSG-18

ID#: 0403458B-20A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**i032807**	**Date of Collection:**	**3/24/04**
Dil. Factor:	**22.8**	**Date of Analysis:**	**3/28/04 03:13 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Cumene	11	Not Detected	57	Not Detected
Propylbenzene	11	Not Detected	57	Not Detected
Chloromethane	46	Not Detected	96	Not Detected
1,2,4-Trichlorobenzene	46	Not Detected	340	Not Detected
Hexachlorobutadiene	46	Not Detected	490	Not Detected
Acetone	46	530	110	1300
Carbon Disulfide	46	Not Detected	140	Not Detected
2-Propanol	46	Not Detected	110	Not Detected
trans-1,2-Dichloroethene	46	Not Detected	180	Not Detected
Vinyl Acetate	46	Not Detected	160	Not Detected
2-Butanone (Methyl Ethyl Ketone)	46	Not Detected	140	Not Detected
Tetrahydrofuran	46	Not Detected	140	Not Detected
1,4-Dioxane	46	Not Detected	170	Not Detected
4-Methyl-2-pentanone	46	Not Detected	190	Not Detected
2-Hexanone	46	Not Detected	190	Not Detected
Ethanol	46	Not Detected	87	Not Detected
Bromoform	46	Not Detected	480	Not Detected
4-Ethyltoluene	46	Not Detected	230	Not Detected
Methyl tert-butyl ether	46	2300	170	8600
TPH ref. to Gasoline (MW=100)	230	7500	950	31000

Container Type: 1 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	100	70-130
Toluene-d8	99	70-130
4-Bromofluorobenzene	97	70-130

AIR TOXICS LTD.

SAMPLE NAME: Profile-1

ID#: 0403458B-21A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**i032616**	**Date of Collection:**	**3/24/04**
Dil. Factor:	**1.75**	**Date of Analysis:**	**3/26/04 07:41 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	0.88	Not Detected	4.4	Not Detected
Freon 114	0.88	Not Detected	6.2	Not Detected
Vinyl Chloride	0.88	Not Detected	2.3	Not Detected
Bromomethane	0.88	Not Detected	3.4	Not Detected
Chloroethane	0.88	Not Detected	2.3	Not Detected
Freon 11	0.88	Not Detected	5.0	Not Detected
1,1-Dichloroethene	0.88	Not Detected	3.5	Not Detected
Freon 113	0.88	Not Detected	6.8	Not Detected
Methylene Chloride	0.88	Not Detected	3.1	Not Detected
1,1-Dichloroethane	0.88	Not Detected	3.6	Not Detected
cis-1,2-Dichloroethene	0.88	Not Detected	3.5	Not Detected
Chloroform	0.88	Not Detected	4.3	Not Detected
1,1,1-Trichloroethane	0.88	Not Detected	4.8	Not Detected
Carbon Tetrachloride	0.88	Not Detected	5.6	Not Detected
Benzene	0.88	1.9	2.8	6.1
1,2-Dichloroethane	0.88	Not Detected	3.6	Not Detected
Trichloroethene	0.88	Not Detected	4.8	Not Detected
1,2-Dichloropropane	0.88	Not Detected	4.1	Not Detected
cis-1,3-Dichloropropene	0.88	Not Detected	4.0	Not Detected
Toluene	0.88	4.0	3.4	15
trans-1,3-Dichloropropene	0.88	Not Detected	4.0	Not Detected
1,1,2-Trichloroethane	0.88	Not Detected	4.8	Not Detected
Tetrachloroethene	0.88	Not Detected	6.0	Not Detected
1,2-Dibromoethane (EDB)	0.88	Not Detected	6.8	Not Detected
Chlorobenzene	0.88	Not Detected	4.1	Not Detected
Ethyl Benzene	0.88	Not Detected	3.9	Not Detected
m,p-Xylene	0.88	1.7	3.9	7.4
o-Xylene	0.88	Not Detected	3.9	Not Detected
Styrene	0.88	Not Detected	3.8	Not Detected
1,1,2,2-Tetrachloroethane	0.88	Not Detected	6.1	Not Detected
1,3,5-Trimethylbenzene	0.88	1.4	4.4	7.0
1,2,4-Trimethylbenzene	0.88	2.0	4.4	10
1,3-Dichlorobenzene	0.88	Not Detected	5.3	Not Detected
1,4-Dichlorobenzene	0.88	Not Detected	5.3	Not Detected
alpha-Chlorotoluene	0.88	Not Detected	4.6	Not Detected
1,2-Dichlorobenzene	0.88	Not Detected	5.3	Not Detected
1,3-Butadiene	0.88	Not Detected	2.0	Not Detected
Hexane	0.88	1.7	3.1	6.2
Cyclohexane	0.88	Not Detected	3.1	Not Detected
Bromodichloromethane	0.88	Not Detected	6.0	Not Detected
Dibromochloromethane	0.88	Not Detected	7.6	Not Detected
Heptane	0.88	Not Detected	3.6	Not Detected

AIR TOXICS LTD.

SAMPLE NAME: Profile-1

ID#: 0403458B-21A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**i032616**	**Date of Collection: 3/24/04**	
Dil. Factor:	**1.75**	**Date of Analysis: 3/26/04 07:41 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Cumene	0.88	4.3	4.4	21
Propylbenzene	0.88	Not Detected	4.4	Not Detected
Chloromethane	3.5	Not Detected	7.3	Not Detected
1,2,4-Trichlorobenzene	3.5	Not Detected	26	Not Detected
Hexachlorobutadiene	3.5	Not Detected	38	Not Detected
Acetone	3.5	34	8.4	82
Carbon Disulfide	3.5	Not Detected	11	Not Detected
2-Propanol	3.5	Not Detected	8.7	Not Detected
trans-1,2-Dichloroethene	3.5	Not Detected	14	Not Detected
Vinyl Acetate	3.5	Not Detected	12	Not Detected
2-Butanone (Methyl Ethyl Ketone)	3.5	Not Detected	10	Not Detected
Tetrahydrofuran	3.5	Not Detected	10	Not Detected
1,4-Dioxane	3.5	Not Detected	13	Not Detected
4-Methyl-2-pentanone	3.5	Not Detected	14	Not Detected
2-Hexanone	3.5	Not Detected	14	Not Detected
Ethanol	3.5	9.2	6.7	18
Bromoform	3.5	Not Detected	37	Not Detected
4-Ethyltoluene	3.5	Not Detected	17	Not Detected
Methyl tert-butyl ether	3.5	Not Detected	13	Not Detected
TPH ref. to Gasoline (MW=100)	18	23000	73	96000

Container Type: 1 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	98	70-130
Toluene-d8	100	70-130
4-Bromofluorobenzene	96	70-130

AIR TOXICS LTD.

SAMPLE NAME: SSG-23

ID#: 0403458B-22A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**i032813**	**Date of Collection:**	**3/25/04**
Dil. Factor:	**1.75**	**Date of Analysis:**	**3/28/04 08:58 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	0.88	Not Detected	4.4	Not Detected
Freon 114	0.88	Not Detected	6.2	Not Detected
Vinyl Chloride	0.88	Not Detected	2.3	Not Detected
Bromomethane	0.88	Not Detected	3.4	Not Detected
Chloroethane	0.88	Not Detected	2.3	Not Detected
Freon 11	0.88	Not Detected	5.0	Not Detected
1,1-Dichloroethene	0.88	Not Detected	3.5	Not Detected
Freon 113	0.88	Not Detected	6.8	Not Detected
Methylene Chloride	0.88	Not Detected	3.1	Not Detected
1,1-Dichloroethane	0.88	Not Detected	3.6	Not Detected
cis-1,2-Dichloroethene	0.88	Not Detected	3.5	Not Detected
Chloroform	0.88	Not Detected	4.3	Not Detected
1,1,1-Trichloroethane	0.88	Not Detected	4.8	Not Detected
Carbon Tetrachloride	0.88	Not Detected	5.6	Not Detected
Benzene	0.88	3.8	2.8	12
1,2-Dichloroethane	0.88	Not Detected	3.6	Not Detected
Trichloroethene	0.88	Not Detected	4.8	Not Detected
1,2-Dichloropropane	0.88	Not Detected	4.1	Not Detected
cis-1,3-Dichloropropene	0.88	Not Detected	4.0	Not Detected
Toluene	0.88	40	3.4	150
trans-1,3-Dichloropropene	0.88	Not Detected	4.0	Not Detected
1,1,2-Trichloroethane	0.88	Not Detected	4.8	Not Detected
Tetrachloroethene	0.88	Not Detected	6.0	Not Detected
1,2-Dibromoethane (EDB)	0.88	Not Detected	6.8	Not Detected
Chlorobenzene	0.88	Not Detected	4.1	Not Detected
Ethyl Benzene	0.88	4.7	3.9	21
m,p-Xylene	0.88	19	3.9	85
o-Xylene	0.88	7.0	3.9	31
Styrene	0.88	Not Detected	3.8	Not Detected
1,1,2,2-Tetrachloroethane	0.88	Not Detected	6.1	Not Detected
1,3,5-Trimethylbenzene	0.88	1.4	4.4	7.0
1,2,4-Trimethylbenzene	0.88	4.8	4.4	24
1,3-Dichlorobenzene	0.88	Not Detected	5.3	Not Detected
1,4-Dichlorobenzene	0.88	Not Detected	5.3	Not Detected
alpha-Chlorotoluene	0.88	Not Detected	4.6	Not Detected
1,2-Dichlorobenzene	0.88	Not Detected	5.3	Not Detected
1,3-Butadiene	0.88	Not Detected	2.0	Not Detected
Hexane	0.88	2.1	3.1	7.6
Cyclohexane	0.88	Not Detected	3.1	Not Detected
Bromodichloromethane	0.88	Not Detected	6.0	Not Detected
Dibromochloromethane	0.88	Not Detected	7.6	Not Detected
Heptane	0.88	1.8	3.6	7.7

AIR TOXICS LTD.

SAMPLE NAME: SSG-23

ID#: 0403458B-22A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**i032813**	**Date of Collection:**	**3/25/04**
Dil. Factor:	**1.75**	**Date of Analysis:**	**3/28/04 08:58 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Cumene	0.88	Not Detected	4.4	Not Detected
Propylbenzene	0.88	Not Detected	4.4	Not Detected
Chloromethane	3.5	Not Detected	7.3	Not Detected
1,2,4-Trichlorobenzene	3.5	Not Detected	26	Not Detected
Hexachlorobutadiene	3.5	Not Detected	38	Not Detected
Acetone	3.5	140	8.4	330
Carbon Disulfide	3.5	Not Detected	11	Not Detected
2-Propanol	3.5	Not Detected	8.7	Not Detected
trans-1,2-Dichloroethene	3.5	Not Detected	14	Not Detected
Vinyl Acetate	3.5	Not Detected	12	Not Detected
2-Butanone (Methyl Ethyl Ketone)	3.5	12	10	35
Tetrahydrofuran	3.5	Not Detected	10	Not Detected
1,4-Dioxane	3.5	Not Detected	13	Not Detected
4-Methyl-2-pentanone	3.5	Not Detected	14	Not Detected
2-Hexanone	3.5	Not Detected	14	Not Detected
Ethanol	3.5	14	6.7	28
Bromoform	3.5	Not Detected	37	Not Detected
4-Ethyltoluene	3.5	5.1	17	25
Methyl tert-butyl ether	3.5	Not Detected	13	Not Detected
TPH ref. to Gasoline (MW=100)	18	560	73	2300

Container Type: 1 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	100	70-130
Toluene-d8	100	70-130
4-Bromofluorobenzene	96	70-130

AIR TOXICS LTD.

SAMPLE NAME: SSG-16

ID#: 0403458B-23A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**i032618**	**Date of Collection:**	**3/25/04**
Dil. Factor:	**1.71**	**Date of Analysis:**	**3/26/04 09:00 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	0.86	1.3	4.3	6.6
Freon 114	0.86	Not Detected	6.1	Not Detected
Vinyl Chloride	0.86	Not Detected	2.2	Not Detected
Bromomethane	0.86	Not Detected	3.4	Not Detected
Chloroethane	0.86	Not Detected	2.3	Not Detected
Freon 11	0.86	Not Detected	4.9	Not Detected
1,1-Dichloroethene	0.86	Not Detected	3.4	Not Detected
Freon 113	0.86	Not Detected	6.7	Not Detected
Methylene Chloride	0.86	Not Detected	3.0	Not Detected
1,1-Dichloroethane	0.86	Not Detected	3.5	Not Detected
cis-1,2-Dichloroethene	0.86	Not Detected	3.4	Not Detected
Chloroform	0.86	0.93	4.2	4.6
1,1,1-Trichloroethane	0.86	Not Detected	4.7	Not Detected
Carbon Tetrachloride	0.86	Not Detected	5.5	Not Detected
Benzene	0.86	6.8	2.8	22
1,2-Dichloroethane	0.86	Not Detected	3.5	Not Detected
Trichloroethene	0.86	Not Detected	4.7	Not Detected
1,2-Dichloropropane	0.86	Not Detected	4.0	Not Detected
cis-1,3-Dichloropropene	0.86	Not Detected	3.9	Not Detected
Toluene	0.86	50	3.3	190
trans-1,3-Dichloropropene	0.86	Not Detected	3.9	Not Detected
1,1,2-Trichloroethane	0.86	Not Detected	4.7	Not Detected
Tetrachloroethene	0.86	Not Detected	5.9	Not Detected
1,2-Dibromoethane (EDB)	0.86	Not Detected	6.7	Not Detected
Chlorobenzene	0.86	Not Detected	4.0	Not Detected
Ethyl Benzene	0.86	5.8	3.8	25
m,p-Xylene	0.86	22	3.8	100
o-Xylene	0.86	8.7	3.8	38
Styrene	0.86	Not Detected	3.7	Not Detected
1,1,2,2-Tetrachloroethane	0.86	Not Detected	6.0	Not Detected
1,3,5-Trimethylbenzene	0.86	1.7	4.3	8.5
1,2,4-Trimethylbenzene	0.86	5.6	4.3	28
1,3-Dichlorobenzene	0.86	Not Detected	5.2	Not Detected
1,4-Dichlorobenzene	0.86	Not Detected	5.2	Not Detected
alpha-Chlorotoluene	0.86	Not Detected	4.5	Not Detected
1,2-Dichlorobenzene	0.86	Not Detected	5.2	Not Detected
1,3-Butadiene	0.86	Not Detected	1.9	Not Detected
Hexane	0.86	7.2	3.1	26
Cyclohexane	0.86	Not Detected	3.0	Not Detected
Bromodichloromethane	0.86	Not Detected	5.8	Not Detected
Dibromochloromethane	0.86	Not Detected	7.4	Not Detected
Heptane	0.86	3.0	3.6	13

AIR TOXICS LTD.

SAMPLE NAME: SSG-16

ID#: 0403458B-23A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**i032618**	**Date of Collection:**	**3/25/04**
Dil. Factor:	**1.71**	**Date of Analysis:**	**3/26/04 09:00 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Cumene	0.86	Not Detected	4.3	Not Detected
Propylbenzene	0.86	0.98	4.3	4.9
Chloromethane	3.4	22	7.2	46
1,2,4-Trichlorobenzene	3.4	Not Detected	26	Not Detected
Hexachlorobutadiene	3.4	Not Detected	37	Not Detected
Acetone	3.4	290	8.2	710
Carbon Disulfide	3.4	5.2	11	16
2-Propanol	3.4	4.6	8.5	11
trans-1,2-Dichloroethene	3.4	Not Detected	14	Not Detected
Vinyl Acetate	3.4	Not Detected	12	Not Detected
2-Butanone (Methyl Ethyl Ketone)	3.4	24	10	71
Tetrahydrofuran	3.4	Not Detected	10	Not Detected
1,4-Dioxane	3.4	Not Detected	12	Not Detected
4-Methyl-2-pentanone	3.4	Not Detected	14	Not Detected
2-Hexanone	3.4	4.6	14	19
Ethanol	3.4	17	6.5	32
Bromoform	3.4	Not Detected	36	Not Detected
4-Ethyltoluene	3.4	5.9	17	29
Methyl tert-butyl ether	3.4	6.5	12	24
TPH ref. to Gasoline (MW=100)	17	870	71	3600

Container Type: 1 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	100	70-130
Toluene-d8	99	70-130
4-Bromofluorobenzene	95	70-130

AIR TOXICS LTD.

SAMPLE NAME: SSG-24

ID#: 0403458B-24A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**i032619**	**Date of Collection:**	**3/25/04**
Dil. Factor:	**1.61**	**Date of Analysis:**	**3/26/04 09:41 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	0.80	1.8	4.0	9.3
Freon 114	0.80	Not Detected	5.7	Not Detected
Vinyl Chloride	0.80	Not Detected	2.1	Not Detected
Bromomethane	0.80	Not Detected	3.2	Not Detected
Chloroethane	0.80	Not Detected	2.2	Not Detected
Freon 11	0.80	Not Detected	4.6	Not Detected
1,1-Dichloroethene	0.80	Not Detected	3.2	Not Detected
Freon 113	0.80	Not Detected	6.3	Not Detected
Methylene Chloride	0.80	Not Detected	2.8	Not Detected
1,1-Dichloroethane	0.80	Not Detected	3.3	Not Detected
cis-1,2-Dichloroethene	0.80	Not Detected	3.2	Not Detected
Chloroform	0.80	Not Detected	4.0	Not Detected
1,1,1-Trichloroethane	0.80	Not Detected	4.5	Not Detected
Carbon Tetrachloride	0.80	Not Detected	5.1	Not Detected
Benzene	0.80	3.2	2.6	10
1,2-Dichloroethane	0.80	Not Detected	3.3	Not Detected
Trichloroethene	0.80	Not Detected	4.4	Not Detected
1,2-Dichloropropane	0.80	Not Detected	3.8	Not Detected
cis-1,3-Dichloropropene	0.80	Not Detected	3.7	Not Detected
Toluene	0.80	46	3.1	180
trans-1,3-Dichloropropene	0.80	Not Detected	3.7	Not Detected
1,1,2-Trichloroethane	0.80	Not Detected	4.5	Not Detected
Tetrachloroethene	0.80	0.97	5.6	6.7
1,2-Dibromoethane (EDB)	0.80	Not Detected	6.3	Not Detected
Chlorobenzene	0.80	Not Detected	3.8	Not Detected
Ethyl Benzene	0.80	5.7	3.6	25
m,p-Xylene	0.80	24	3.6	110
o-Xylene	0.80	9.5	3.6	42
Styrene	0.80	Not Detected	3.5	Not Detected
1,1,2,2-Tetrachloroethane	0.80	Not Detected	5.6	Not Detected
1,3,5-Trimethylbenzene	0.80	2.1	4.0	10
1,2,4-Trimethylbenzene	0.80	7.2	4.0	36
1,3-Dichlorobenzene	0.80	Not Detected	4.9	Not Detected
1,4-Dichlorobenzene	0.80	Not Detected	4.9	Not Detected
alpha-Chlorotoluene	0.80	Not Detected	4.2	Not Detected
1,2-Dichlorobenzene	0.80	Not Detected	4.9	Not Detected
1,3-Butadiene	0.80	Not Detected	1.8	Not Detected
Hexane	0.80	3.1	2.9	11
Cyclohexane	0.80	Not Detected	2.8	Not Detected
Bromodichloromethane	0.80	Not Detected	5.5	Not Detected
Dibromochloromethane	0.80	Not Detected	7.0	Not Detected
Heptane	0.80	2.0	3.4	8.4

AIR TOXICS LTD.

SAMPLE NAME: SSG-24

ID#: 0403458B-24A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**i032619**	**Date of Collection:**	**3/25/04**
Dil. Factor:	**1.61**	**Date of Analysis:**	**3/26/04 09:41 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Cumene	0.80	Not Detected	4.0	Not Detected
Propylbenzene	0.80	1.1	4.0	5.5
Chloromethane	3.2	Not Detected	6.8	Not Detected
1,2,4-Trichlorobenzene	3.2	Not Detected	24	Not Detected
Hexachlorobutadiene	3.2	Not Detected	35	Not Detected
Acetone	3.2	320	7.8	770
Carbon Disulfide	3.2	3.9	10	12
2-Propanol	3.2	4.6	8.0	11
trans-1,2-Dichloroethene	3.2	Not Detected	13	Not Detected
Vinyl Acetate	3.2	Not Detected	12	Not Detected
2-Butanone (Methyl Ethyl Ketone)	3.2	25	9.6	74
Tetrahydrofuran	3.2	Not Detected	9.6	Not Detected
1,4-Dioxane	3.2	Not Detected	12	Not Detected
4-Methyl-2-pentanone	3.2	Not Detected	13	Not Detected
2-Hexanone	3.2	6.6	13	28
Ethanol	3.2	13	6.2	24
Bromoform	3.2	Not Detected	34	Not Detected
4-Ethyltoluene	3.2	7.3	16	36
Methyl tert-butyl ether	3.2	4.2	12	15
TPH ref. to Gasoline (MW=100)	16	840	67	3500

Container Type: 1 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	98	70-130
Toluene-d8	99	70-130
4-Bromofluorobenzene	96	70-130

AIR TOXICS LTD.

SAMPLE NAME: SSG-17

ID#: 0403458B-25A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**i032620**	**Date of Collection:**	**3/25/04**
Dil. Factor:	**1.75**	**Date of Analysis:**	**3/26/04 10:22 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	0.88	1.6	4.4	8.3
Freon 114	0.88	Not Detected	6.2	Not Detected
Vinyl Chloride	0.88	Not Detected	2.3	Not Detected
Bromomethane	0.88	Not Detected	3.4	Not Detected
Chloroethane	0.88	Not Detected	2.3	Not Detected
Freon 11	0.88	Not Detected	5.0	Not Detected
1,1-Dichloroethene	0.88	Not Detected	3.5	Not Detected
Freon 113	0.88	Not Detected	6.8	Not Detected
Methylene Chloride	0.88	Not Detected	3.1	Not Detected
1,1-Dichloroethane	0.88	Not Detected	3.6	Not Detected
cis-1,2-Dichloroethene	0.88	Not Detected	3.5	Not Detected
Chloroform	0.88	Not Detected	4.3	Not Detected
1,1,1-Trichloroethane	0.88	Not Detected	4.8	Not Detected
Carbon Tetrachloride	0.88	Not Detected	5.6	Not Detected
Benzene	0.88	8.3	2.8	27
1,2-Dichloroethane	0.88	Not Detected	3.6	Not Detected
Trichloroethene	0.88	Not Detected	4.8	Not Detected
1,2-Dichloropropane	0.88	Not Detected	4.1	Not Detected
cis-1,3-Dichloropropene	0.88	Not Detected	4.0	Not Detected
Toluene	0.88	57	3.4	220
trans-1,3-Dichloropropene	0.88	Not Detected	4.0	Not Detected
1,1,2-Trichloroethane	0.88	Not Detected	4.8	Not Detected
Tetrachloroethene	0.88	Not Detected	6.0	Not Detected
1,2-Dibromoethane (EDB)	0.88	Not Detected	6.8	Not Detected
Chlorobenzene	0.88	Not Detected	4.1	Not Detected
Ethyl Benzene	0.88	7.2	3.9	32
m,p-Xylene	0.88	29	3.9	130
o-Xylene	0.88	11	3.9	50
Styrene	0.88	Not Detected	3.8	Not Detected
1,1,2,2-Tetrachloroethane	0.88	Not Detected	6.1	Not Detected
1,3,5-Trimethylbenzene	0.88	2.7	4.4	14
1,2,4-Trimethylbenzene	0.88	9.4	4.4	47
1,3-Dichlorobenzene	0.88	Not Detected	5.3	Not Detected
1,4-Dichlorobenzene	0.88	Not Detected	5.3	Not Detected
alpha-Chlorotoluene	0.88	Not Detected	4.6	Not Detected
1,2-Dichlorobenzene	0.88	Not Detected	5.3	Not Detected
1,3-Butadiene	0.88	Not Detected	2.0	Not Detected
Hexane	0.88	9.1	3.1	32
Cyclohexane	0.88	Not Detected	3.1	Not Detected
Bromodichloromethane	0.88	Not Detected	6.0	Not Detected
Dibromochloromethane	0.88	Not Detected	7.6	Not Detected
Heptane	0.88	2.9	3.6	12

AIR TOXICS LTD.

SAMPLE NAME: SSG-17

ID#: 0403458B-25A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**i032620**	**Date of Collection:**	**3/25/04**
Dil. Factor:	**1.75**	**Date of Analysis:**	**3/26/04 10:22 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Cumene	0.88	Not Detected	4.4	Not Detected
Propylbenzene	0.88	1.3	4.4	6.7
Chloromethane	3.5	Not Detected	7.3	Not Detected
1,2,4-Trichlorobenzene	3.5	Not Detected	26	Not Detected
Hexachlorobutadiene	3.5	Not Detected	38	Not Detected
Acetone	3.5	470 E	8.4	1100 E
Carbon Disulfide	3.5	4.1	11	13
2-Propanol	3.5	7.7	8.7	19
trans-1,2-Dichloroethene	3.5	Not Detected	14	Not Detected
Vinyl Acetate	3.5	Not Detected	12	Not Detected
2-Butanone (Methyl Ethyl Ketone)	3.5	36	10	110
Tetrahydrofuran	3.5	Not Detected	10	Not Detected
1,4-Dioxane	3.5	Not Detected	13	Not Detected
4-Methyl-2-pentanone	3.5	Not Detected	14	Not Detected
2-Hexanone	3.5	7.4	14	31
Ethanol	3.5	27	6.7	51
Bromoform	3.5	Not Detected	37	Not Detected
4-Ethyltoluene	3.5	9.0	17	45
Methyl tert-butyl ether	3.5	30	13	110
TPH ref. to Gasoline (MW=100)	18	1400	73	5800

E = Exceeds instrument calibration range.

Container Type: 1 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	99	70-130
Toluene-d8	100	70-130
4-Bromofluorobenzene	100	70-130

AIR TOXICS LTD.

SAMPLE NAME: SSG-25

ID#: 0403458B-26A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**i032621**	**Date of Collection:**	**3/25/04**
Dil. Factor:	**1.79**	**Date of Analysis:**	**3/26/04 11:05 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	0.90	Not Detected	4.5	Not Detected
Freon 114	0.90	Not Detected	6.4	Not Detected
Vinyl Chloride	0.90	Not Detected	2.3	Not Detected
Bromomethane	0.90	Not Detected	3.5	Not Detected
Chloroethane	0.90	Not Detected	2.4	Not Detected
Freon 11	0.90	Not Detected	5.1	Not Detected
1,1-Dichloroethene	0.90	Not Detected	3.6	Not Detected
Freon 113	0.90	Not Detected	7.0	Not Detected
Methylene Chloride	0.90	Not Detected	3.2	Not Detected
1,1-Dichloroethane	0.90	Not Detected	3.7	Not Detected
cis-1,2-Dichloroethene	0.90	Not Detected	3.6	Not Detected
Chloroform	0.90	Not Detected	4.4	Not Detected
1,1,1-Trichloroethane	0.90	Not Detected	5.0	Not Detected
Carbon Tetrachloride	0.90	Not Detected	5.7	Not Detected
Benzene	0.90	1.9	2.9	6.2
1,2-Dichloroethane	0.90	Not Detected	3.7	Not Detected
Trichloroethene	0.90	Not Detected	4.9	Not Detected
1,2-Dichloropropane	0.90	Not Detected	4.2	Not Detected
cis-1,3-Dichloropropene	0.90	Not Detected	4.1	Not Detected
Toluene	0.90	4.7	3.4	18
trans-1,3-Dichloropropene	0.90	Not Detected	4.1	Not Detected
1,1,2-Trichloroethane	0.90	Not Detected	5.0	Not Detected
Tetrachloroethene	0.90	Not Detected	6.2	Not Detected
1,2-Dibromoethane (EDB)	0.90	Not Detected	7.0	Not Detected
Chlorobenzene	0.90	Not Detected	4.2	Not Detected
Ethyl Benzene	0.90	Not Detected	3.9	Not Detected
m,p-Xylene	0.90	2.2	4.0	9.6
o-Xylene	0.90	Not Detected	4.0	Not Detected
Styrene	0.90	Not Detected	3.9	Not Detected
1,1,2,2-Tetrachloroethane	0.90	Not Detected	6.2	Not Detected
1,3,5-Trimethylbenzene	0.90	Not Detected	4.5	Not Detected
1,2,4-Trimethylbenzene	0.90	Not Detected	4.5	Not Detected
1,3-Dichlorobenzene	0.90	Not Detected	5.5	Not Detected
1,4-Dichlorobenzene	0.90	Not Detected	5.5	Not Detected
alpha-Chlorotoluene	0.90	Not Detected	4.7	Not Detected
1,2-Dichlorobenzene	0.90	Not Detected	5.5	Not Detected
1,3-Butadiene	0.90	Not Detected	2.0	Not Detected
Hexane	0.90	1.0	3.2	3.7
Cyclohexane	0.90	Not Detected	3.1	Not Detected
Bromodichloromethane	0.90	Not Detected	6.1	Not Detected
Dibromochloromethane	0.90	Not Detected	7.7	Not Detected
Heptane	0.90	Not Detected	3.7	Not Detected

AIR TOXICS LTD.

SAMPLE NAME: SSG-25

ID#: 0403458B-26A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**i032621**	**Date of Collection:**	**3/25/04**
Dil. Factor:	**1.79**	**Date of Analysis:**	**3/26/04 11:05 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Cumene	0.90	Not Detected	4.5	Not Detected
Propylbenzene	0.90	Not Detected	4.5	Not Detected
Chloromethane	3.6	Not Detected	7.5	Not Detected
1,2,4-Trichlorobenzene	3.6	Not Detected	27	Not Detected
Hexachlorobutadiene	3.6	Not Detected	39	Not Detected
Acetone	3.6	5.6	8.6	13
Carbon Disulfide	3.6	Not Detected	11	Not Detected
2-Propanol	3.6	Not Detected	8.9	Not Detected
trans-1,2-Dichloroethene	3.6	Not Detected	14	Not Detected
Vinyl Acetate	3.6	Not Detected	13	Not Detected
2-Butanone (Methyl Ethyl Ketone)	3.6	Not Detected	11	Not Detected
Tetrahydrofuran	3.6	Not Detected	11	Not Detected
1,4-Dioxane	3.6	Not Detected	13	Not Detected
4-Methyl-2-pentanone	3.6	Not Detected	15	Not Detected
2-Hexanone	3.6	Not Detected	15	Not Detected
Ethanol	3.6	3.8	6.8	7.2
Bromoform	3.6	Not Detected	38	Not Detected
4-Ethyltoluene	3.6	Not Detected	18	Not Detected
Methyl tert-butyl ether	3.6	Not Detected	13	Not Detected
TPH ref. to Gasoline (MW=100)	18	56	74	230

Container Type: 1 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	98	70-130
Toluene-d8	99	70-130
4-Bromofluorobenzene	96	70-130

AIR TOXICS LTD.

SAMPLE NAME: SSG-26

ID#: 0403458B-27A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**i032622**	**Date of Collection:**	**3/25/04**
Dil. Factor:	**1.68**	**Date of Analysis:**	**3/26/04 11:51 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	0.84	6.9	4.2	35
Freon 114	0.84	Not Detected	6.0	Not Detected
Vinyl Chloride	0.84	Not Detected	2.2	Not Detected
Bromomethane	0.84	Not Detected	3.3	Not Detected
Chloroethane	0.84	Not Detected	2.2	Not Detected
Freon 11	0.84	1.0	4.8	5.8
1,1-Dichloroethene	0.84	Not Detected	3.4	Not Detected
Freon 113	0.84	Not Detected	6.5	Not Detected
Methylene Chloride	0.84	Not Detected	3.0	Not Detected
1,1-Dichloroethane	0.84	Not Detected	3.4	Not Detected
cis-1,2-Dichloroethene	0.84	Not Detected	3.4	Not Detected
Chloroform	0.84	Not Detected	4.2	Not Detected
1,1,1-Trichloroethane	0.84	Not Detected	4.6	Not Detected
Carbon Tetrachloride	0.84	Not Detected	5.4	Not Detected
Benzene	0.84	7.0	2.7	23
1,2-Dichloroethane	0.84	Not Detected	3.4	Not Detected
Trichloroethene	0.84	1.1	4.6	6.2
1,2-Dichloropropane	0.84	Not Detected	3.9	Not Detected
cis-1,3-Dichloropropene	0.84	Not Detected	3.9	Not Detected
Toluene	0.84	70	3.2	270
trans-1,3-Dichloropropene	0.84	Not Detected	3.9	Not Detected
1,1,2-Trichloroethane	0.84	Not Detected	4.6	Not Detected
Tetrachloroethene	0.84	Not Detected	5.8	Not Detected
1,2-Dibromoethane (EDB)	0.84	Not Detected	6.6	Not Detected
Chlorobenzene	0.84	Not Detected	3.9	Not Detected
Ethyl Benzene	0.84	8.9	3.7	39
m,p-Xylene	0.84	38	3.7	170
o-Xylene	0.84	15	3.7	65
Styrene	0.84	Not Detected	3.6	Not Detected
1,1,2,2-Tetrachloroethane	0.84	Not Detected	5.9	Not Detected
1,3,5-Trimethylbenzene	0.84	3.4	4.2	17
1,2,4-Trimethylbenzene	0.84	11	4.2	57
1,3-Dichlorobenzene	0.84	Not Detected	5.1	Not Detected
1,4-Dichlorobenzene	0.84	Not Detected	5.1	Not Detected
alpha-Chlorotoluene	0.84	Not Detected	4.4	Not Detected
1,2-Dichlorobenzene	0.84	Not Detected	5.1	Not Detected
1,3-Butadiene	0.84	3.8	1.9	8.5
Hexane	0.84	6.4	3.0	23
Cyclohexane	0.84	Not Detected	2.9	Not Detected
Bromodichloromethane	0.84	Not Detected	5.7	Not Detected
Dibromochloromethane	0.84	Not Detected	7.3	Not Detected
Heptane	0.84	3.6	3.5	15

AIR TOXICS LTD.

SAMPLE NAME: SSG-26

ID#: 0403458B-27A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**i032622**	**Date of Collection:**	**3/25/04**
Dil. Factor:	**1.68**	**Date of Analysis:**	**3/26/04 11:51 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Cumene	0.84	Not Detected	4.2	Not Detected
Propylbenzene	0.84	1.8	4.2	8.8
Chloromethane	3.4	4.2	7.0	8.8
1,2,4-Trichlorobenzene	3.4	Not Detected	25	Not Detected
Hexachlorobutadiene	3.4	Not Detected	36	Not Detected
Acetone	3.4	720 E	8.1	1700 E
Carbon Disulfide	3.4	9.3	11	30
2-Propanol	3.4	11	8.4	27
trans-1,2-Dichloroethene	3.4	Not Detected	14	Not Detected
Vinyl Acetate	3.4	Not Detected	12	Not Detected
2-Butanone (Methyl Ethyl Ketone)	3.4	39	10	120
Tetrahydrofuran	3.4	Not Detected	10	Not Detected
1,4-Dioxane	3.4	Not Detected	12	Not Detected
4-Methyl-2-pentanone	3.4	Not Detected	14	Not Detected
2-Hexanone	3.4	7.2	14	30
Ethanol	3.4	28	6.4	53
Bromoform	3.4	Not Detected	35	Not Detected
4-Ethyltoluene	3.4	11	17	57
Methyl tert-butyl ether	3.4	10	12	38
TPH ref. to Gasoline (MW=100)	17	1600	70	6600

E = Exceeds instrument calibration range.

Container Type: 1 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	101	70-130
Toluene-d8	102	70-130
4-Bromofluorobenzene	101	70-130

AIR TOXICS LTD.

SAMPLE NAME: SSG-20A

ID#: 0403458B-28A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**i032808**	**Date of Collection:**	**3/25/04**
Dil. Factor:	**1.71**	**Date of Analysis:**	**3/28/04 04:00 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	0.86	Not Detected	4.3	Not Detected
Freon 114	0.86	Not Detected	6.1	Not Detected
Vinyl Chloride	0.86	Not Detected	2.2	Not Detected
Bromomethane	0.86	Not Detected	3.4	Not Detected
Chloroethane	0.86	Not Detected	2.3	Not Detected
Freon 11	0.86	Not Detected	4.9	Not Detected
1,1-Dichloroethene	0.86	Not Detected	3.4	Not Detected
Freon 113	0.86	Not Detected	6.7	Not Detected
Methylene Chloride	0.86	Not Detected	3.0	Not Detected
1,1-Dichloroethane	0.86	Not Detected	3.5	Not Detected
cis-1,2-Dichloroethene	0.86	Not Detected	3.4	Not Detected
Chloroform	0.86	Not Detected	4.2	Not Detected
1,1,1-Trichloroethane	0.86	Not Detected	4.7	Not Detected
Carbon Tetrachloride	0.86	Not Detected	5.5	Not Detected
Benzene	0.86	Not Detected	2.8	Not Detected
1,2-Dichloroethane	0.86	Not Detected	3.5	Not Detected
Trichloroethene	0.86	Not Detected	4.7	Not Detected
1,2-Dichloropropane	0.86	Not Detected	4.0	Not Detected
cis-1,3-Dichloropropene	0.86	Not Detected	3.9	Not Detected
Toluene	0.86	Not Detected	3.3	Not Detected
trans-1,3-Dichloropropene	0.86	Not Detected	3.9	Not Detected
1,1,2-Trichloroethane	0.86	Not Detected	4.7	Not Detected
Tetrachloroethene	0.86	Not Detected	5.9	Not Detected
1,2-Dibromoethane (EDB)	0.86	Not Detected	6.7	Not Detected
Chlorobenzene	0.86	Not Detected	4.0	Not Detected
Ethyl Benzene	0.86	Not Detected	3.8	Not Detected
m,p-Xylene	0.86	Not Detected	3.8	Not Detected
o-Xylene	0.86	Not Detected	3.8	Not Detected
Styrene	0.86	Not Detected	3.7	Not Detected
1,1,2,2-Tetrachloroethane	0.86	Not Detected	6.0	Not Detected
1,3,5-Trimethylbenzene	0.86	Not Detected	4.3	Not Detected
1,2,4-Trimethylbenzene	0.86	Not Detected	4.3	Not Detected
1,3-Dichlorobenzene	0.86	Not Detected	5.2	Not Detected
1,4-Dichlorobenzene	0.86	Not Detected	5.2	Not Detected
alpha-Chlorotoluene	0.86	Not Detected	4.5	Not Detected
1,2-Dichlorobenzene	0.86	Not Detected	5.2	Not Detected
1,3-Butadiene	0.86	Not Detected	1.9	Not Detected
Hexane	0.86	Not Detected	3.1	Not Detected
Cyclohexane	0.86	Not Detected	3.0	Not Detected
Bromodichloromethane	0.86	Not Detected	5.8	Not Detected
Dibromochloromethane	0.86	Not Detected	7.4	Not Detected
Heptane	0.86	Not Detected	3.6	Not Detected

AIR TOXICS LTD.

SAMPLE NAME: SSG-20A

ID#: 0403458B-28A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**i032808**	**Date of Collection: 3/25/04**	
Dil. Factor:	**1.71**	**Date of Analysis: 3/28/04 04:00 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Cumene	0.86	Not Detected	4.3	Not Detected
Propylbenzene	0.86	Not Detected	4.3	Not Detected
Chloromethane	3.4	Not Detected	7.2	Not Detected
1,2,4-Trichlorobenzene	3.4	Not Detected	26	Not Detected
Hexachlorobutadiene	3.4	Not Detected	37	Not Detected
Acetone	3.4	3.6	8.2	8.6
Carbon Disulfide	3.4	Not Detected	11	Not Detected
2-Propanol	3.4	Not Detected	8.5	Not Detected
trans-1,2-Dichloroethene	3.4	Not Detected	14	Not Detected
Vinyl Acetate	3.4	Not Detected	12	Not Detected
2-Butanone (Methyl Ethyl Ketone)	3.4	Not Detected	10	Not Detected
Tetrahydrofuran	3.4	Not Detected	10	Not Detected
1,4-Dioxane	3.4	Not Detected	12	Not Detected
4-Methyl-2-pentanone	3.4	Not Detected	14	Not Detected
2-Hexanone	3.4	Not Detected	14	Not Detected
Ethanol	3.4	Not Detected	6.5	Not Detected
Bromoform	3.4	Not Detected	36	Not Detected
4-Ethyltoluene	3.4	Not Detected	17	Not Detected
Methyl tert-butyl ether	3.4	Not Detected	12	Not Detected
TPH ref. to Gasoline (MW=100)	17	20	71	83

Container Type: 1 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	100	70-130
Toluene-d8	98	70-130
4-Bromofluorobenzene	95	70-130

AIR TOXICS LTD.

SAMPLE NAME: SSG-20B

ID#: 0403458B-29A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**i032810**	**Date of Collection:**	**3/25/04**
Dil. Factor:	**22.4**	**Date of Analysis:**	**3/28/04 06:08 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	11	Not Detected	56	Not Detected
Freon 114	11	Not Detected	80	Not Detected
Vinyl Chloride	11	Not Detected	29	Not Detected
Bromomethane	11	Not Detected	44	Not Detected
Chloroethane	11	Not Detected	30	Not Detected
Freon 11	11	Not Detected	64	Not Detected
1,1-Dichloroethene	11	Not Detected	45	Not Detected
Freon 113	11	Not Detected	87	Not Detected
Methylene Chloride	11	Not Detected	40	Not Detected
1,1-Dichloroethane	11	Not Detected	46	Not Detected
cis-1,2-Dichloroethene	11	Not Detected	45	Not Detected
Chloroform	11	Not Detected	56	Not Detected
1,1,1-Trichloroethane	11	Not Detected	62	Not Detected
Carbon Tetrachloride	11	Not Detected	72	Not Detected
Benzene	11	Not Detected	36	Not Detected
1,2-Dichloroethane	11	Not Detected	46	Not Detected
Trichloroethene	11	Not Detected	61	Not Detected
1,2-Dichloropropane	11	Not Detected	53	Not Detected
cis-1,3-Dichloropropene	11	Not Detected	52	Not Detected
Toluene	11	12	43	47
trans-1,3-Dichloropropene	11	Not Detected	52	Not Detected
1,1,2-Trichloroethane	11	Not Detected	62	Not Detected
Tetrachloroethene	11	Not Detected	77	Not Detected
1,2-Dibromoethane (EDB)	11	Not Detected	87	Not Detected
Chlorobenzene	11	Not Detected	52	Not Detected
Ethyl Benzene	11	Not Detected	49	Not Detected
m,p-Xylene	11	Not Detected	49	Not Detected
o-Xylene	11	Not Detected	49	Not Detected
Styrene	11	Not Detected	48	Not Detected
1,1,2,2-Tetrachloroethane	11	Not Detected	78	Not Detected
1,3,5-Trimethylbenzene	11	Not Detected	56	Not Detected
1,2,4-Trimethylbenzene	11	Not Detected	56	Not Detected
1,3-Dichlorobenzene	11	Not Detected	68	Not Detected
1,4-Dichlorobenzene	11	Not Detected	68	Not Detected
alpha-Chlorotoluene	11	Not Detected	59	Not Detected
1,2-Dichlorobenzene	11	Not Detected	68	Not Detected
1,3-Butadiene	11	Not Detected	25	Not Detected
Hexane	11	Not Detected	40	Not Detected
Cyclohexane	11	Not Detected	39	Not Detected
Bromodichloromethane	11	Not Detected	76	Not Detected
Dibromochloromethane	11	Not Detected	97	Not Detected
Heptane	11	Not Detected	47	Not Detected

AIR TOXICS LTD.

SAMPLE NAME: SSG-20B

ID#: 0403458B-29A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**i032810**	**Date of Collection:**	**3/25/04**
Dil. Factor:	**22.4**	**Date of Analysis:**	**3/28/04 06:08 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Cumene	11	Not Detected	56	Not Detected
Propylbenzene	11	Not Detected	56	Not Detected
Chloromethane	45	Not Detected	94	Not Detected
1,2,4-Trichlorobenzene	45	Not Detected	340	Not Detected
Hexachlorobutadiene	45	Not Detected	480	Not Detected
Acetone	45	90	110	220
Carbon Disulfide	45	Not Detected	140	Not Detected
2-Propanol	45	Not Detected	110	Not Detected
trans-1,2-Dichloroethene	45	Not Detected	180	Not Detected
Vinyl Acetate	45	Not Detected	160	Not Detected
2-Butanone (Methyl Ethyl Ketone)	45	Not Detected	130	Not Detected
Tetrahydrofuran	45	Not Detected	130	Not Detected
1,4-Dioxane	45	Not Detected	160	Not Detected
4-Methyl-2-pentanone	45	Not Detected	190	Not Detected
2-Hexanone	45	Not Detected	190	Not Detected
Ethanol	45	Not Detected	86	Not Detected
Bromoform	45	Not Detected	470	Not Detected
4-Ethyltoluene	45	Not Detected	220	Not Detected
Methyl tert-butyl ether	45	2700	160	10000
TPH ref. to Gasoline (MW=100)	220	3300	930	14000

Container Type: 1 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	101	70-130
Toluene-d8	100	70-130
4-Bromofluorobenzene	97	70-130

AIR TOXICS LTD.

SAMPLE NAME: EB-3-25-04

ID#: 0403458B-30A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**i032811**	**Date of Collection:**	**3/25/04**
Dil. Factor:	**1.75**	**Date of Analysis:**	**3/28/04 07:23 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	0.88	Not Detected	4.4	Not Detected
Freon 114	0.88	Not Detected	6.2	Not Detected
Vinyl Chloride	0.88	Not Detected	2.3	Not Detected
Bromomethane	0.88	Not Detected	3.4	Not Detected
Chloroethane	0.88	Not Detected	2.3	Not Detected
Freon 11	0.88	Not Detected	5.0	Not Detected
1,1-Dichloroethene	0.88	Not Detected	3.5	Not Detected
Freon 113	0.88	Not Detected	6.8	Not Detected
Methylene Chloride	0.88	Not Detected	3.1	Not Detected
1,1-Dichloroethane	0.88	Not Detected	3.6	Not Detected
cis-1,2-Dichloroethene	0.88	Not Detected	3.5	Not Detected
Chloroform	0.88	Not Detected	4.3	Not Detected
1,1,1-Trichloroethane	0.88	Not Detected	4.8	Not Detected
Carbon Tetrachloride	0.88	Not Detected	5.6	Not Detected
Benzene	0.88	Not Detected	2.8	Not Detected
1,2-Dichloroethane	0.88	Not Detected	3.6	Not Detected
Trichloroethene	0.88	Not Detected	4.8	Not Detected
1,2-Dichloropropane	0.88	Not Detected	4.1	Not Detected
cis-1,3-Dichloropropene	0.88	Not Detected	4.0	Not Detected
Toluene	0.88	9.2	3.4	35
trans-1,3-Dichloropropene	0.88	Not Detected	4.0	Not Detected
1,1,2-Trichloroethane	0.88	Not Detected	4.8	Not Detected
Tetrachloroethene	0.88	Not Detected	6.0	Not Detected
1,2-Dibromoethane (EDB)	0.88	Not Detected	6.8	Not Detected
Chlorobenzene	0.88	Not Detected	4.1	Not Detected
Ethyl Benzene	0.88	1.1	3.9	4.9
m,p-Xylene	0.88	5.6	3.9	25
o-Xylene	0.88	2.1	3.9	9.3
Styrene	0.88	Not Detected	3.8	Not Detected
1,1,2,2-Tetrachloroethane	0.88	Not Detected	6.1	Not Detected
1,3,5-Trimethylbenzene	0.88	Not Detected	4.4	Not Detected
1,2,4-Trimethylbenzene	0.88	3.5	4.4	18
1,3-Dichlorobenzene	0.88	Not Detected	5.3	Not Detected
1,4-Dichlorobenzene	0.88	Not Detected	5.3	Not Detected
alpha-Chlorotoluene	0.88	Not Detected	4.6	Not Detected
1,2-Dichlorobenzene	0.88	Not Detected	5.3	Not Detected
1,3-Butadiene	0.88	Not Detected	2.0	Not Detected
Hexane	0.88	Not Detected	3.1	Not Detected
Cyclohexane	0.88	1.3	3.1	4.6
Bromodichloromethane	0.88	Not Detected	6.0	Not Detected
Dibromochloromethane	0.88	Not Detected	7.6	Not Detected
Heptane	0.88	Not Detected	3.6	Not Detected

AIR TOXICS LTD.

SAMPLE NAME: EB-3-25-04

ID#: 0403458B-30A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**i032811**	**Date of Collection:**	**3/25/04**
Dil. Factor:	**1.75**	**Date of Analysis:**	**3/28/04 07:23 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Cumene	0.88	Not Detected	4.4	Not Detected
Propylbenzene	0.88	Not Detected	4.4	Not Detected
Chloromethane	3.5	Not Detected	7.3	Not Detected
1,2,4-Trichlorobenzene	3.5	Not Detected	26	Not Detected
Hexachlorobutadiene	3.5	Not Detected	38	Not Detected
Acetone	3.5	35	8.4	85
Carbon Disulfide	3.5	Not Detected	11	Not Detected
2-Propanol	3.5	Not Detected	8.7	Not Detected
trans-1,2-Dichloroethene	3.5	Not Detected	14	Not Detected
Vinyl Acetate	3.5	Not Detected	12	Not Detected
2-Butanone (Methyl Ethyl Ketone)	3.5	Not Detected	10	Not Detected
Tetrahydrofuran	3.5	Not Detected	10	Not Detected
1,4-Dioxane	3.5	Not Detected	13	Not Detected
4-Methyl-2-pentanone	3.5	Not Detected	14	Not Detected
2-Hexanone	3.5	Not Detected	14	Not Detected
Ethanol	3.5	Not Detected	6.7	Not Detected
Bromoform	3.5	Not Detected	37	Not Detected
4-Ethyltoluene	3.5	Not Detected	17	Not Detected
Methyl tert-butyl ether	3.5	Not Detected	13	Not Detected
TPH ref. to Gasoline (MW=100)	18	120	73	500

Container Type: 6 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	99	70-130
Toluene-d8	97	70-130
4-Bromofluorobenzene	96	70-130

AIR TOXICS LTD.

SAMPLE NAME: EB-3-25-04 Duplicate

ID#: 0403458B-30AA

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**i032812**	**Date of Collection:**	**3/25/04**
Dil. Factor:	**1.75**	**Date of Analysis:**	**3/28/04 08:11 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	0.88	Not Detected	4.4	Not Detected
Freon 114	0.88	Not Detected	6.2	Not Detected
Vinyl Chloride	0.88	Not Detected	2.3	Not Detected
Bromomethane	0.88	Not Detected	3.4	Not Detected
Chloroethane	0.88	Not Detected	2.3	Not Detected
Freon 11	0.88	Not Detected	5.0	Not Detected
1,1-Dichloroethene	0.88	Not Detected	3.5	Not Detected
Freon 113	0.88	Not Detected	6.8	Not Detected
Methylene Chloride	0.88	Not Detected	3.1	Not Detected
1,1-Dichloroethane	0.88	Not Detected	3.6	Not Detected
cis-1,2-Dichloroethene	0.88	Not Detected	3.5	Not Detected
Chloroform	0.88	Not Detected	4.3	Not Detected
1,1,1-Trichloroethane	0.88	Not Detected	4.8	Not Detected
Carbon Tetrachloride	0.88	Not Detected	5.6	Not Detected
Benzene	0.88	Not Detected	2.8	Not Detected
1,2-Dichloroethane	0.88	Not Detected	3.6	Not Detected
Trichloroethene	0.88	Not Detected	4.8	Not Detected
1,2-Dichloropropane	0.88	Not Detected	4.1	Not Detected
cis-1,3-Dichloropropene	0.88	Not Detected	4.0	Not Detected
Toluene	0.88	9.6	3.4	37
trans-1,3-Dichloropropene	0.88	Not Detected	4.0	Not Detected
1,1,2-Trichloroethane	0.88	Not Detected	4.8	Not Detected
Tetrachloroethene	0.88	Not Detected	6.0	Not Detected
1,2-Dibromoethane (EDB)	0.88	Not Detected	6.8	Not Detected
Chlorobenzene	0.88	Not Detected	4.1	Not Detected
Ethyl Benzene	0.88	1.2	3.9	5.2
m,p-Xylene	0.88	5.8	3.9	26
o-Xylene	0.88	2.2	3.9	9.8
Styrene	0.88	Not Detected	3.8	Not Detected
1,1,2,2-Tetrachloroethane	0.88	Not Detected	6.1	Not Detected
1,3,5-Trimethylbenzene	0.88	0.92	4.4	4.6
1,2,4-Trimethylbenzene	0.88	3.6	4.4	18
1,3-Dichlorobenzene	0.88	Not Detected	5.3	Not Detected
1,4-Dichlorobenzene	0.88	Not Detected	5.3	Not Detected
alpha-Chlorotoluene	0.88	Not Detected	4.6	Not Detected
1,2-Dichlorobenzene	0.88	Not Detected	5.3	Not Detected
1,3-Butadiene	0.88	Not Detected	2.0	Not Detected
Hexane	0.88	Not Detected	3.1	Not Detected
Cyclohexane	0.88	1.4	3.1	4.9
Bromodichloromethane	0.88	Not Detected	6.0	Not Detected
Dibromochloromethane	0.88	Not Detected	7.6	Not Detected
Heptane	0.88	Not Detected	3.6	Not Detected

AIR TOXICS LTD.

SAMPLE NAME: EB-3-25-04 Duplicate

ID#: 0403458B-30AA

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**i032812**	**Date of Collection:**	**3/25/04**
Dil. Factor:	**1.75**	**Date of Analysis:**	**3/28/04 08:11 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Cumene	0.88	Not Detected	4.4	Not Detected
Propylbenzene	0.88	Not Detected	4.4	Not Detected
Chloromethane	3.5	Not Detected	7.3	Not Detected
1,2,4-Trichlorobenzene	3.5	Not Detected	26	Not Detected
Hexachlorobutadiene	3.5	Not Detected	38	Not Detected
Acetone	3.5	37	8.4	90
Carbon Disulfide	3.5	Not Detected	11	Not Detected
2-Propanol	3.5	Not Detected	8.7	Not Detected
trans-1,2-Dichloroethene	3.5	Not Detected	14	Not Detected
Vinyl Acetate	3.5	Not Detected	12	Not Detected
2-Butanone (Methyl Ethyl Ketone)	3.5	Not Detected	10	Not Detected
Tetrahydrofuran	3.5	Not Detected	10	Not Detected
1,4-Dioxane	3.5	Not Detected	13	Not Detected
4-Methyl-2-pentanone	3.5	Not Detected	14	Not Detected
2-Hexanone	3.5	Not Detected	14	Not Detected
Ethanol	3.5	Not Detected	6.7	Not Detected
Bromoform	3.5	Not Detected	37	Not Detected
4-Ethyltoluene	3.5	Not Detected	17	Not Detected
Methyl tert-butyl ether	3.5	Not Detected	13	Not Detected
TPH ref. to Gasoline (MW=100)	18	120	73	500

Container Type: 6 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	103	70-130
Toluene-d8	99	70-130
4-Bromofluorobenzene	94	70-130

AIR TOXICS LTD.

SAMPLE NAME: SSG-19

ID#: 0403458B-31A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**i032815**	**Date of Collection:**	**3/25/04**
Dil. Factor:	**7000**	**Date of Analysis:**	**3/28/04 11:03 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	3500	Not Detected	18000	Not Detected
Freon 114	3500	Not Detected	25000	Not Detected
Vinyl Chloride	3500	Not Detected	9100	Not Detected
Bromomethane	3500	Not Detected	14000	Not Detected
Chloroethane	3500	Not Detected	9400	Not Detected
Freon 11	3500	Not Detected	20000	Not Detected
1,1-Dichloroethene	3500	Not Detected	14000	Not Detected
Freon 113	3500	Not Detected	27000	Not Detected
Methylene Chloride	3500	Not Detected	12000	Not Detected
1,1-Dichloroethane	3500	Not Detected	14000	Not Detected
cis-1,2-Dichloroethene	3500	Not Detected	14000	Not Detected
Chloroform	3500	Not Detected	17000	Not Detected
1,1,1-Trichloroethane	3500	Not Detected	19000	Not Detected
Carbon Tetrachloride	3500	Not Detected	22000	Not Detected
Benzene	3500	47000	11000	150000
1,2-Dichloroethane	3500	Not Detected	14000	Not Detected
Trichloroethene	3500	Not Detected	19000	Not Detected
1,2-Dichloropropane	3500	Not Detected	16000	Not Detected
cis-1,3-Dichloropropene	3500	Not Detected	16000	Not Detected
Toluene	3500	79000	13000	300000
trans-1,3-Dichloropropene	3500	Not Detected	16000	Not Detected
1,1,2-Trichloroethane	3500	Not Detected	19000	Not Detected
Tetrachloroethene	3500	Not Detected	24000	Not Detected
1,2-Dibromoethane (EDB)	3500	Not Detected	27000	Not Detected
Chlorobenzene	3500	Not Detected	16000	Not Detected
Ethyl Benzene	3500	3700	15000	16000
m,p-Xylene	3500	11000	15000	50000
o-Xylene	3500	5400	15000	24000
Styrene	3500	Not Detected	15000	Not Detected
1,1,2,2-Tetrachloroethane	3500	Not Detected	24000	Not Detected
1,3,5-Trimethylbenzene	3500	Not Detected	17000	Not Detected
1,2,4-Trimethylbenzene	3500	Not Detected	17000	Not Detected
1,3-Dichlorobenzene	3500	Not Detected	21000	Not Detected
1,4-Dichlorobenzene	3500	Not Detected	21000	Not Detected
alpha-Chlorotoluene	3500	Not Detected	18000	Not Detected
1,2-Dichlorobenzene	3500	Not Detected	21000	Not Detected
1,3-Butadiene	3500	Not Detected	7900	Not Detected
Hexane	3500	110000	12000	410000
Cyclohexane	3500	200000	12000	720000
Bromodichloromethane	3500	Not Detected	24000	Not Detected
Dibromochloromethane	3500	Not Detected	30000	Not Detected
Heptane	3500	43000	14000	180000

AIR TOXICS LTD.

SAMPLE NAME: SSG-19

ID#: 0403458B-31A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**i032815**	**Date of Collection:**	**3/25/04**
Dil. Factor:	**7000**	**Date of Analysis:**	**3/28/04 11:03 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Cumene	3500	Not Detected	17000	Not Detected
Propylbenzene	3500	Not Detected	17000	Not Detected
Chloromethane	14000	Not Detected	29000	Not Detected
1,2,4-Trichlorobenzene	14000	Not Detected	100000	Not Detected
Hexachlorobutadiene	14000	Not Detected	150000	Not Detected
Acetone	14000	Not Detected	34000	Not Detected
Carbon Disulfide	14000	Not Detected	44000	Not Detected
2-Propanol	14000	22000	35000	56000
trans-1,2-Dichloroethene	14000	Not Detected	56000	Not Detected
Vinyl Acetate	14000	Not Detected	50000	Not Detected
2-Butanone (Methyl Ethyl Ketone)	14000	Not Detected	42000	Not Detected
Tetrahydrofuran	14000	Not Detected	42000	Not Detected
1,4-Dioxane	14000	Not Detected	51000	Not Detected
4-Methyl-2-pentanone	14000	Not Detected	58000	Not Detected
2-Hexanone	14000	Not Detected	58000	Not Detected
Ethanol	14000	Not Detected	27000	Not Detected
Bromoform	14000	Not Detected	150000	Not Detected
4-Ethyltoluene	14000	Not Detected	70000	Not Detected
Methyl tert-butyl ether	14000	1200000	51000	4400000
TPH ref. to Gasoline (MW=100)	70000	720000	290000	3000000

Container Type: 1 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	107	70-130
Toluene-d8	101	70-130
4-Bromofluorobenzene	95	70-130

AIR TOXICS LTD.

SAMPLE NAME: Lab Blank

ID#: 0403458B-32A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**i032607**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 3/26/04 11:50 AM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	0.50	Not Detected	2.5	Not Detected
Freon 114	0.50	Not Detected	3.6	Not Detected
Vinyl Chloride	0.50	Not Detected	1.3	Not Detected
Bromomethane	0.50	Not Detected	2.0	Not Detected
Chloroethane	0.50	Not Detected	1.3	Not Detected
Freon 11	0.50	Not Detected	2.8	Not Detected
1,1-Dichloroethene	0.50	Not Detected	2.0	Not Detected
Freon 113	0.50	Not Detected	3.9	Not Detected
Methylene Chloride	0.50	Not Detected	1.8	Not Detected
1,1-Dichloroethane	0.50	Not Detected	2.0	Not Detected
cis-1,2-Dichloroethene	0.50	Not Detected	2.0	Not Detected
Chloroform	0.50	Not Detected	2.5	Not Detected
1,1,1-Trichloroethane	0.50	Not Detected	2.8	Not Detected
Carbon Tetrachloride	0.50	Not Detected	3.2	Not Detected
Benzene	0.50	Not Detected	1.6	Not Detected
1,2-Dichloroethane	0.50	Not Detected	2.0	Not Detected
Trichloroethene	0.50	Not Detected	2.7	Not Detected
1,2-Dichloropropane	0.50	Not Detected	2.3	Not Detected
cis-1,3-Dichloropropene	0.50	Not Detected	2.3	Not Detected
Toluene	0.50	Not Detected	1.9	Not Detected
trans-1,3-Dichloropropene	0.50	Not Detected	2.3	Not Detected
1,1,2-Trichloroethane	0.50	Not Detected	2.8	Not Detected
Tetrachloroethene	0.50	Not Detected	3.4	Not Detected
1,2-Dibromoethane (EDB)	0.50	Not Detected	3.9	Not Detected
Chlorobenzene	0.50	Not Detected	2.3	Not Detected
Ethyl Benzene	0.50	Not Detected	2.2	Not Detected
m,p-Xylene	0.50	Not Detected	2.2	Not Detected
o-Xylene	0.50	Not Detected	2.2	Not Detected
Styrene	0.50	Not Detected	2.2	Not Detected
1,1,2,2-Tetrachloroethane	0.50	Not Detected	3.5	Not Detected
1,3,5-Trimethylbenzene	0.50	Not Detected	2.5	Not Detected
1,2,4-Trimethylbenzene	0.50	Not Detected	2.5	Not Detected
1,3-Dichlorobenzene	0.50	Not Detected	3.0	Not Detected
1,4-Dichlorobenzene	0.50	Not Detected	3.0	Not Detected
alpha-Chlorotoluene	0.50	Not Detected	2.6	Not Detected
1,2-Dichlorobenzene	0.50	Not Detected	3.0	Not Detected
1,3-Butadiene	0.50	Not Detected	1.1	Not Detected
Hexane	0.50	Not Detected	1.8	Not Detected
Cyclohexane	0.50	Not Detected	1.7	Not Detected
Bromodichloromethane	0.50	Not Detected	3.4	Not Detected
Dibromochloromethane	0.50	Not Detected	4.3	Not Detected
Heptane	0.50	Not Detected	2.1	Not Detected

AIR TOXICS LTD.

SAMPLE NAME: Lab Blank

ID#: 0403458B-32A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**i032607**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 3/26/04 11:50 AM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Cumene	0.50	Not Detected	2.5	Not Detected
Propylbenzene	0.50	Not Detected	2.5	Not Detected
Chloromethane	2.0	Not Detected	4.2	Not Detected
1,2,4-Trichlorobenzene	2.0	Not Detected	15	Not Detected
Hexachlorobutadiene	2.0	Not Detected	22	Not Detected
Acetone	2.0	Not Detected	4.8	Not Detected
Carbon Disulfide	2.0	Not Detected	6.3	Not Detected
2-Propanol	2.0	Not Detected	5.0	Not Detected
trans-1,2-Dichloroethene	2.0	Not Detected	8.0	Not Detected
Vinyl Acetate	2.0	Not Detected	7.2	Not Detected
2-Butanone (Methyl Ethyl Ketone)	2.0	Not Detected	6.0	Not Detected
Tetrahydrofuran	2.0	Not Detected	6.0	Not Detected
1,4-Dioxane	2.0	Not Detected	7.3	Not Detected
4-Methyl-2-pentanone	2.0	Not Detected	8.3	Not Detected
2-Hexanone	2.0	Not Detected	8.3	Not Detected
Ethanol	2.0	Not Detected	3.8	Not Detected
Bromoform	2.0	Not Detected	21	Not Detected
4-Ethyltoluene	2.0	Not Detected	10	Not Detected
Methyl tert-butyl ether	2.0	Not Detected	7.3	Not Detected
TPH ref. to Gasoline (MW=100)	10	Not Detected	42	Not Detected

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	98	70-130
Toluene-d8	97	70-130
4-Bromofluorobenzene	96	70-130

AIR TOXICS LTD.

SAMPLE NAME: Lab Blank

ID#: 0403458B-32B

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**i032805**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 3/28/04 01:05 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	0.50	Not Detected	2.5	Not Detected
Freon 114	0.50	Not Detected	3.6	Not Detected
Vinyl Chloride	0.50	Not Detected	1.3	Not Detected
Bromomethane	0.50	Not Detected	2.0	Not Detected
Chloroethane	0.50	Not Detected	1.3	Not Detected
Freon 11	0.50	Not Detected	2.8	Not Detected
1,1-Dichloroethene	0.50	Not Detected	2.0	Not Detected
Freon 113	0.50	Not Detected	3.9	Not Detected
Methylene Chloride	0.50	Not Detected	1.8	Not Detected
1,1-Dichloroethane	0.50	Not Detected	2.0	Not Detected
cis-1,2-Dichloroethene	0.50	Not Detected	2.0	Not Detected
Chloroform	0.50	Not Detected	2.5	Not Detected
1,1,1-Trichloroethane	0.50	Not Detected	2.8	Not Detected
Carbon Tetrachloride	0.50	Not Detected	3.2	Not Detected
Benzene	0.50	Not Detected	1.6	Not Detected
1,2-Dichloroethane	0.50	Not Detected	2.0	Not Detected
Trichloroethene	0.50	Not Detected	2.7	Not Detected
1,2-Dichloropropane	0.50	Not Detected	2.3	Not Detected
cis-1,3-Dichloropropene	0.50	Not Detected	2.3	Not Detected
Toluene	0.50	Not Detected	1.9	Not Detected
trans-1,3-Dichloropropene	0.50	Not Detected	2.3	Not Detected
1,1,2-Trichloroethane	0.50	Not Detected	2.8	Not Detected
Tetrachloroethene	0.50	Not Detected	3.4	Not Detected
1,2-Dibromoethane (EDB)	0.50	Not Detected	3.9	Not Detected
Chlorobenzene	0.50	Not Detected	2.3	Not Detected
Ethyl Benzene	0.50	Not Detected	2.2	Not Detected
m,p-Xylene	0.50	Not Detected	2.2	Not Detected
o-Xylene	0.50	Not Detected	2.2	Not Detected
Styrene	0.50	Not Detected	2.2	Not Detected
1,1,2,2-Tetrachloroethane	0.50	Not Detected	3.5	Not Detected
1,3,5-Trimethylbenzene	0.50	Not Detected	2.5	Not Detected
1,2,4-Trimethylbenzene	0.50	Not Detected	2.5	Not Detected
1,3-Dichlorobenzene	0.50	Not Detected	3.0	Not Detected
1,4-Dichlorobenzene	0.50	Not Detected	3.0	Not Detected
alpha-Chlorotoluene	0.50	Not Detected	2.6	Not Detected
1,2-Dichlorobenzene	0.50	Not Detected	3.0	Not Detected
1,3-Butadiene	0.50	Not Detected	1.1	Not Detected
Hexane	0.50	Not Detected	1.8	Not Detected
Cyclohexane	0.50	Not Detected	1.7	Not Detected
Bromodichloromethane	0.50	Not Detected	3.4	Not Detected
Dibromochloromethane	0.50	Not Detected	4.3	Not Detected
Heptane	0.50	Not Detected	2.1	Not Detected

AIR TOXICS LTD.

SAMPLE NAME: Lab Blank

ID#: 0403458B-32B

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**i032805**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 3/28/04 01:05 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Cumene	0.50	Not Detected	2.5	Not Detected
Propylbenzene	0.50	Not Detected	2.5	Not Detected
Chloromethane	2.0	Not Detected	4.2	Not Detected
1,2,4-Trichlorobenzene	2.0	Not Detected	15	Not Detected
Hexachlorobutadiene	2.0	Not Detected	22	Not Detected
Acetone	2.0	Not Detected	4.8	Not Detected
Carbon Disulfide	2.0	Not Detected	6.3	Not Detected
2-Propanol	2.0	Not Detected	5.0	Not Detected
trans-1,2-Dichloroethene	2.0	Not Detected	8.0	Not Detected
Vinyl Acetate	2.0	Not Detected	7.2	Not Detected
2-Butanone (Methyl Ethyl Ketone)	2.0	Not Detected	6.0	Not Detected
Tetrahydrofuran	2.0	Not Detected	6.0	Not Detected
1,4-Dioxane	2.0	Not Detected	7.3	Not Detected
4-Methyl-2-pentanone	2.0	Not Detected	8.3	Not Detected
2-Hexanone	2.0	Not Detected	8.3	Not Detected
Ethanol	2.0	Not Detected	3.8	Not Detected
Bromoform	2.0	Not Detected	21	Not Detected
4-Ethyltoluene	2.0	Not Detected	10	Not Detected
Methyl tert-butyl ether	2.0	Not Detected	7.3	Not Detected
TPH ref. to Gasoline (MW=100)	10	Not Detected	42	Not Detected

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	101	70-130
Toluene-d8	98	70-130
4-Bromofluorobenzene	96	70-130

AIR TOXICS LTD.

SAMPLE NAME: CCV

ID#: 0403458B-33A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**i032602**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 3/26/04 07:59 AM**	

Compound	%Recovery
Freon 12	105
Freon 114	98
Vinyl Chloride	98
Bromomethane	96
Chloroethane	96
Freon 11	101
1,1-Dichloroethene	98
Freon 113	100
Methylene Chloride	92
1,1-Dichloroethane	99
cis-1,2-Dichloroethene	103
Chloroform	106
1,1,1-Trichloroethane	108
Carbon Tetrachloride	111
Benzene	103
1,2-Dichloroethane	107
Trichloroethene	106
1,2-Dichloropropane	104
cis-1,3-Dichloropropene	108
Toluene	106
trans-1,3-Dichloropropene	108
1,1,2-Trichloroethane	108
Tetrachloroethene	111
1,2-Dibromoethane (EDB)	110
Chlorobenzene	107
Ethyl Benzene	108
m,p-Xylene	108
o-Xylene	107
Styrene	114
1,1,2,2-Tetrachloroethane	104
1,3,5-Trimethylbenzene	97
1,2,4-Trimethylbenzene	97
1,3-Dichlorobenzene	97
1,4-Dichlorobenzene	95
alpha-Chlorotoluene	95
1,2-Dichlorobenzene	93
1,3-Butadiene	93
Hexane	96
Cyclohexane	105
Bromodichloromethane	111
Dibromochloromethane	117
Heptane	109

AIR TOXICS LTD.

SAMPLE NAME: CCV

ID#: 0403458B-33A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**i032602**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 3/26/04 07:59 AM**	

Compound	%Recovery
Cumene	106
Propylbenzene	104
Chloromethane	99
1,2,4-Trichlorobenzene	96
Hexachlorobutadiene	100
Acetone	87
Carbon Disulfide	94
2-Propanol	92
trans-1,2-Dichloroethene	93
Vinyl Acetate	99
2-Butanone (Methyl Ethyl Ketone)	101
Tetrahydrofuran	100
1,4-Dioxane	103
4-Methyl-2-pentanone	112
2-Hexanone	101
Ethanol	92
Bromoform	117
4-Ethyltoluene	107
Methyl tert-butyl ether	103
TPH ref. to Gasoline (MW=100)	Not Spiked

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	101	70-130
Toluene-d8	102	70-130
4-Bromofluorobenzene	97	70-130

AIR TOXICS LTD.

SAMPLE NAME: CCV

ID#: 0403458B-33B

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**i032802**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 3/28/04 10:25 AM**	

Compound	%Recovery
Freon 12	105
Freon 114	101
Vinyl Chloride	97
Bromomethane	92
Chloroethane	98
Freon 11	104
1,1-Dichloroethene	100
Freon 113	102
Methylene Chloride	94
1,1-Dichloroethane	101
cis-1,2-Dichloroethene	104
Chloroform	109
1,1,1-Trichloroethane	113
Carbon Tetrachloride	115
Benzene	103
1,2-Dichloroethane	107
Trichloroethene	108
1,2-Dichloropropane	104
cis-1,3-Dichloropropene	107
Toluene	107
trans-1,3-Dichloropropene	104
1,1,2-Trichloroethane	104
Tetrachloroethene	107
1,2-Dibromoethane (EDB)	109
Chlorobenzene	105
Ethyl Benzene	106
m,p-Xylene	108
o-Xylene	106
Styrene	115
1,1,2,2-Tetrachloroethane	106
1,3,5-Trimethylbenzene	98
1,2,4-Trimethylbenzene	98
1,3-Dichlorobenzene	99
1,4-Dichlorobenzene	98
alpha-Chlorotoluene	97
1,2-Dichlorobenzene	95
1,3-Butadiene	95
Hexane	98
Cyclohexane	108
Bromodichloromethane	111
Dibromochloromethane	115
Heptane	108

AIR TOXICS LTD.

SAMPLE NAME: CCV

ID#: 0403458B-33B

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**i032802**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 3/28/04 10:25 AM**	

Compound	%Recovery
Cumene	105
Propylbenzene	105
Chloromethane	98
1,2,4-Trichlorobenzene	97
Hexachlorobutadiene	99
Acetone	88
Carbon Disulfide	97
2-Propanol	93
trans-1,2-Dichloroethene	95
Vinyl Acetate	102
2-Butanone (Methyl Ethyl Ketone)	105
Tetrahydrofuran	101
1,4-Dioxane	102
4-Methyl-2-pentanone	111
2-Hexanone	98
Ethanol	96
Bromoform	118
4-Ethyltoluene	109
Methyl tert-butyl ether	99
TPH ref. to Gasoline (MW=100)	Not Spiked

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	102	70-130
Toluene-d8	101	70-130
4-Bromofluorobenzene	102	70-130

AIR TOXICS LTD.

SAMPLE NAME: LCS

ID#: 0403458B-34A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**i032603**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 3/26/04 08:46 AM**	

Compound	%Recovery
Freon 12	118
Freon 114	106
Vinyl Chloride	119
Bromomethane	112
Chloroethane	118
Freon 11	109
1,1-Dichloroethene	104
Freon 113	102
Methylene Chloride	92
1,1-Dichloroethane	106
cis-1,2-Dichloroethene	107
Chloroform	114
1,1,1-Trichloroethane	127
Carbon Tetrachloride	126
Benzene	118
1,2-Dichloroethane	121
Trichloroethene	122
1,2-Dichloropropane	122
cis-1,3-Dichloropropene	121
Toluene	111
trans-1,3-Dichloropropene	122
1,1,2-Trichloroethane	116
Tetrachloroethene	116
1,2-Dibromoethane (EDB)	110
Chlorobenzene	112
Ethyl Benzene	111
m,p-Xylene	109
o-Xylene	106
Styrene	117
1,1,2,2-Tetrachloroethane	112
1,3,5-Trimethylbenzene	94
1,2,4-Trimethylbenzene	88
1,3-Dichlorobenzene	102
1,4-Dichlorobenzene	95
alpha-Chlorotoluene	124
1,2-Dichlorobenzene	97
1,3-Butadiene	98
Hexane	91
Cyclohexane	98
Bromodichloromethane	95
Dibromochloromethane	104
Heptane	101

AIR TOXICS LTD.

SAMPLE NAME: LCS

ID#: 0403458B-34A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**i032603**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 3/26/04 08:46 AM**	

Compound	%Recovery
Cumene	97
Propylbenzene	71
Chloromethane	110
1,2,4-Trichlorobenzene	83
Hexachlorobutadiene	83
Acetone	82
Carbon Disulfide	88
2-Propanol	101
trans-1,2-Dichloroethene	87
Vinyl Acetate	102
2-Butanone (Methyl Ethyl Ketone)	96
Tetrahydrofuran	98
1,4-Dioxane	96
4-Methyl-2-pentanone	105
2-Hexanone	100
Ethanol	113
Bromoform	102
4-Ethyltoluene	118
Methyl tert-butyl ether	104
TPH ref. to Gasoline (MW=100)	Not Spiked

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	98	70-130
Toluene-d8	100	70-130
4-Bromofluorobenzene	101	70-130

AIR TOXICS LTD.

SAMPLE NAME: LCS

ID#: 0403458B-34B

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**i032803**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 3/28/04 11:12 AM**	

Compound	%Recovery
Freon 12	113
Freon 114	109
Vinyl Chloride	112
Bromomethane	106
Chloroethane	121
Freon 11	113
1,1-Dichloroethene	105
Freon 113	105
Methylene Chloride	92
1,1-Dichloroethane	107
cis-1,2-Dichloroethene	108
Chloroform	118
1,1,1-Trichloroethane	131 Q
Carbon Tetrachloride	129
Benzene	121
1,2-Dichloroethane	124
Trichloroethene	126
1,2-Dichloropropane	124
cis-1,3-Dichloropropene	125
Toluene	115
trans-1,3-Dichloropropene	122
1,1,2-Trichloroethane	117
Tetrachloroethene	116
1,2-Dibromoethane (EDB)	111
Chlorobenzene	114
Ethyl Benzene	111
m,p-Xylene	110
o-Xylene	108
Styrene	120
1,1,2,2-Tetrachloroethane	115
1,3,5-Trimethylbenzene	95
1,2,4-Trimethylbenzene	90
1,3-Dichlorobenzene	103
1,4-Dichlorobenzene	95
alpha-Chlorotoluene	126
1,2-Dichlorobenzene	98
1,3-Butadiene	99
Hexane	92
Cyclohexane	102
Bromodichloromethane	100
Dibromochloromethane	105
Heptane	105

AIR TOXICS LTD.

SAMPLE NAME: LCS

ID#: 0403458B-34B

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**i032803**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 3/28/04 11:12 AM**	

Compound	**%Recovery**
Cumene	98
Propylbenzene	72
Chloromethane	105
1,2,4-Trichlorobenzene	76
Hexachlorobutadiene	76
Acetone	84
Carbon Disulfide	90
2-Propanol	102
trans-1,2-Dichloroethene	89
Vinyl Acetate	106
2-Butanone (Methyl Ethyl Ketone)	98
Tetrahydrofuran	98
1,4-Dioxane	100
4-Methyl-2-pentanone	110
2-Hexanone	101
Ethanol	113
Bromoform	104
4-Ethyltoluene	120
Methyl tert-butyl ether	102
TPH ref. to Gasoline (MW=100)	Not Spiked

Q = Exceeds Quality Control limits.

Container Type: NA - Not Applicable

Surrogates	**%Recovery**	**Method Limits**
1,2-Dichloroethane-d4	98	70-130
Toluene-d8	102	70-130
4-Bromofluorobenzene	100	70-130

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CHAIN-OF-CUSTODY RECORD

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180 BLUE RAVINE ROAD, SUITE B
FOLSOM, CA 95630-4719
(916) 985-1000 FAX: (916) 985-1020

Page ___ of ___

Contact Person: Michael Nesky
Company: LFR
Address: 13880 N Northsight 115 City: Scottsdale State: AZ Zip: 85260
Phone: 480-905-9311 FAX:
Collected By: Signature: Dayton Tate

Project info:
P.O. #:
Project #: 0114-100 82-01
Project Name: KMED Silvercroft Wash

Turn Around Time:
☐ Normal
☒ Rush 24 Hr
Specify
Press. + Grab
mw 3/26/04

Lab I.D.	Field Sample I.D.	Date & Time	Analyses Requested	Canister Pressure / Vacuum Initial	Final	Receipt
20A	SSC-18	3-24-04/15:02	TO-15 + TPH	20.5"Hg	2.5"Hg	6.5"Hg
21A	Profile-1	3-24-04/15:06	↓	22.0"Hg	2.5"Hg	7.0"Hg

Relinquished By: (Signature) Date/Time	Received By: (Signature) Date/Time
Dayton Tate 3-25-04 15:32	
Relinquished By: (Signature) Date/Time	Received By: (Signature) Date/Time
Relinquished By: (Signature) Date/Time	Received By: (Signature) Date/Time
	3/26/04 945

Notes:

Lab Use Only	Shipper Name	Air Bill #	Opened By	Temp. (°C)	Condition	Custody Seals Intact?	Work Order #
	F.EX	8432 6705 1593	CA	—	Good	Yes No (None)	0403458B

Form 1283 rev. 09

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180 BLUE RAVINE ROAD, SUITE B
FOLSOM, CA 95630-4719
(916) 985-1000 FAX: (916) 985-1020

Page ___ of ___

Contact Person: Michael Nesky
Company: LFR Inc
Address: 8880 N Northsight #115 City: Scottsdale State: AZ Zip: 85260
Phone: 480-905-9311 FAX: 480-905-9353
Collected By: Signature: Douglas Fisher

Project info:
P.O. #:
Project #: 014-10022-04
Project Name: HMEP silver creek wash

Turn Around Time:
☐ Normal
☒ Rush: 24 Hr (Specify)
Press. to 5psi and 3 hr [illegible]

Lab I.D.	Field Sample I.D.	Date & Time	Analyses Requested	Canister Pressure / Vacuum Initial	Final	Receipt
22A	SSG-23	3-25-04/0734	TO-15 + TPH	25.5"Hg	3.5"Hg	7.0"Hg
23A	SSG-16	3-25-04/0816		26.0"Hg	3.0"Hg	6.5"Hg
24A	SSG-29	3-25-04/0858		28.0"Hg	3.5"Hg	5.0"Hg
25A	SSG-17	3-25-04/09:43		26.5"Hg	3.5"Hg	7.0"Hg
26A	SSG-25	3-25-04/10:17		25.0"Hg	2.5"Hg	7.5"Hg
27A	SSG-26	3-25-04/10:48		29.0"Hg	3.5"Hg	6.0"Hg
28A	SSG-20A	3-25-04/11:38		28.5"Hg	3.0"Hg	6.5"Hg
29A	SSG-20B	3-25-04/11:48		26.0"Hg	2.5"Hg	6.0"Hg
30A	EB-3-25-04	3-25-04 1535		26.5"Hg	3.5"Hg	7.0"Hg
31A	SSG-19	3-25-04/14:22		26.0"Hg	2.5"Hg	7.0"Hg

CH 3/26/04

Relinquished By: (Signature) Date/Time	Received By: (Signature) Date/Time
Douglas Fisher 3-25-04 15:37	
Relinquished By: (Signature) Date/Time	Received By: (Signature) Date/Time
Relinquished By: (Signature) Date/Time	Received By: (Signature) Date/Time
	Trailwanado ATL 3/26/04 945

Notes:

Lab Use Only	Shipper Name	Air Bill #	Opened By	Temp. (°C)	Condition	Custody Seals Intact?	Work Order #
	F-Ex	843267051593	CH	—	Good	Yes No (None)	0403458 B

Form 1263 rev. 08

APPENDIX B

EQUATIONS USED IN VAPOR TRANSPORT MODELING

Indoor Air Concentration

The soil-vapor concentration protective of indoor air can be estimated using the method presented by Johnson and Ettinger (1991):

$$C_g = \frac{C_i V_b (ER) L_s \left\{ \exp\left(\frac{Q_s L_f}{D_f \eta A} \right) + \frac{D_T A}{V_b (ER) L_s} + \frac{D_T A}{Q_s L_s} \left(\exp\left[\frac{Q_s L_f}{D_f \eta A} \right] - 1 \right) \right\}}{D_T A \exp\left(\frac{Q_s L_f}{D_f \eta A} \right)} \quad (1)$$

where:

C_i = calculated protective indoor ambient air chemical concentration (mg/m^3)

A = area of foundation in contact with soil (m^2)

V_b = building volume (m^3)

ER = indoor air exchange rate in inverse seconds (s^{-1})

L_s = distance from source vapor to bottom of the foundation (m)

D_T = overall effective chemical diffusion coefficient in pore space in vadose zone for all soil layers and capillary fringe (m^2/s)

L_f = foundation thickness (m)

D_f = effective chemical diffusion coefficient through cracks of foundation (m^2/s)

η = fraction of open foundation area (m^2-cracks/m^2-total area)

Q_s = soil-vapor flow rate into building through foundation (m^3/s)

Effective Diffusion Coefficients

The effective diffusion coefficients for chemicals in the capillary fringe, D_c (Open Space groundwater only), unsaturated soil, D_{s1} and D_{s2}, and building foundations, D_f, were estimated by (ASTM 1995):

$$D = \frac{D_a \theta_a^{\frac{10}{3}}}{\theta_t^2} + \frac{D_w \theta_w^{\frac{10}{3}}}{H \theta_t^2} \quad (2)$$

where:

D = effective chemical diffusion coefficient (m^2/s)

D_a = chemical diffusion coefficient in air (m^2/s)

D_w = chemical diffusion coefficient in water (m^2/s)

θ_t = total soil porosity (dimensionless)

$$\theta_{w,c} = \theta_{r,c} + \frac{\theta_{t,c} - \theta_{r,c}}{\left(1 + (1)^N\right)^M} \tag{3}$$

where:

$\theta_{w,c}$ = water-filled soil porosity, capillary fringe (dimensionless)

$\theta_{r,c}$ = residual soil porosity, capillary fringe (dimensionless)

$\theta_{t,c}$ = total soil porosity, capillary fringe (dimensionless)

N = van Genuchten curve shape parameter (dimensionless)

M = van Genuchten curve shape parameter (dimensionless)

The overall effective diffusion coefficient for chemicals through the vadose zone and capillary fringe, D_T, can be calculated by combining the effective diffusion coefficients for the capillary fringe and the one or more soil layers:

$$D_T = \frac{L_c + L_{s1} + L_{s2}}{\frac{L_c}{D_c} + \frac{L_{s1}}{D_{s1}} + \frac{L_{s2}}{D_{s2}}} \tag{4}$$

where:

L_c = thickness of capillary zone (m)

L_{s1} = thickness of soil layer 1 (m)

L_{s2} = thickness of soil layer 2 (WRC only) (m)

D_c = effective diffusion coefficient for capillary zone (m^2/s)

D_{s1} = effective diffusion coefficient for soil layer 1 (m^2/s)

Default layer thicknesses were used in equation 7 for vadose zone soil and foundation cracks.

$$L_c = \frac{0.15}{R} \tag{5}$$

where:

R = mean interparticle pore radius (m)

Soil-Vapor Flow Rate

The soil-vapor flow rate in equation 1, Q_s, was estimated using the method described by Johnson and Ettinger (1991):

$$Q_s = \frac{2\pi \Delta P k X_{crack}}{\mu \ln\left(2Z_{crack} / r_{crack}\right)} \tag{6}$$

where:

π = 3.1416

ΔP = pressure differential between inside and outside building (kg/m-s^2)

X_{crack} = length of crack (modeled as a cylinder) through which vapor advection from soil occurs (m), equal to length of foundation perimeter

$$X_{crack} = 2L_b + 2W_b \tag{7}$$

where:

L_b = width of the building (m)

W_b = width of the building (m)

Z_{crack} = depth of modeled cylinder through which vapor advection from soil occurs (m)

r_{crack} = radius of modeled cylinder through which vapor advection from soil occurs (m), calculated using the method suggested by Johnson and Ettinger (1991):

$$r_{crack} = \eta A / X_{crack} \tag{8}$$

where:

μ_a = dynamic viscosity of air (kg/m-s)

k = effective permeability of soil (m^2)

Effective Permeability

The effective permeability of soil to vapor flow, k, was estimated using the method suggested by U.S. EPA (1997):

$$k = \frac{K\mu_w \left(1 - S_{te}\right)^{1/2} \left(1 - S_{te}^{1/M}\right)^{2M}}{\rho_w g} \tag{9}$$

where:

μ_w = dynamic viscosity of water (kg/m-s)

K = saturated hydraulic conductivity (m/s)

ρ_w = density of water (kg/m^3)

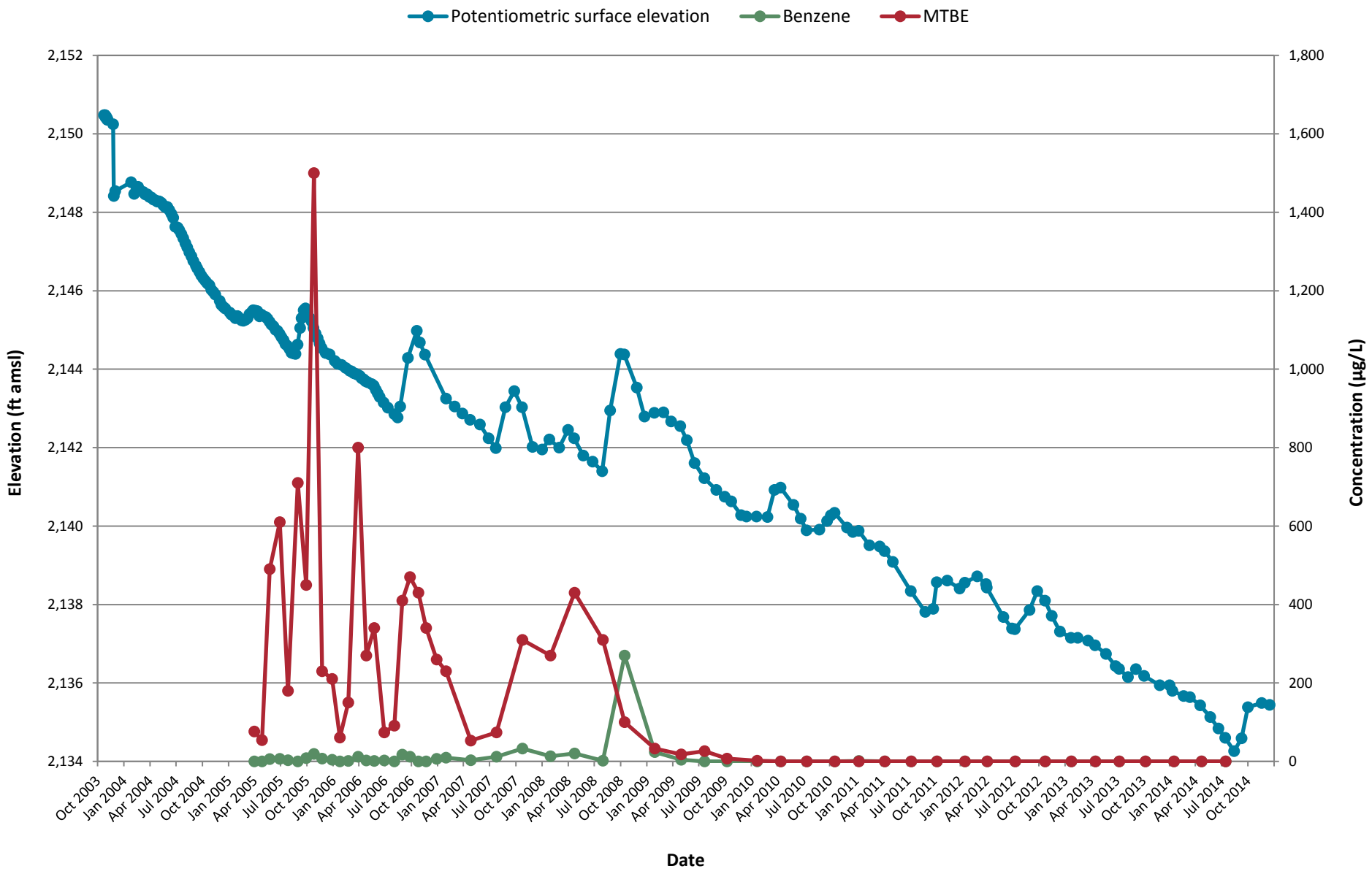
g = acceleration of gravity (m/s^2)

S_{te} = effective total fluid saturation (dimensionless), calculated using the method suggested by U.S. EPA (1997):

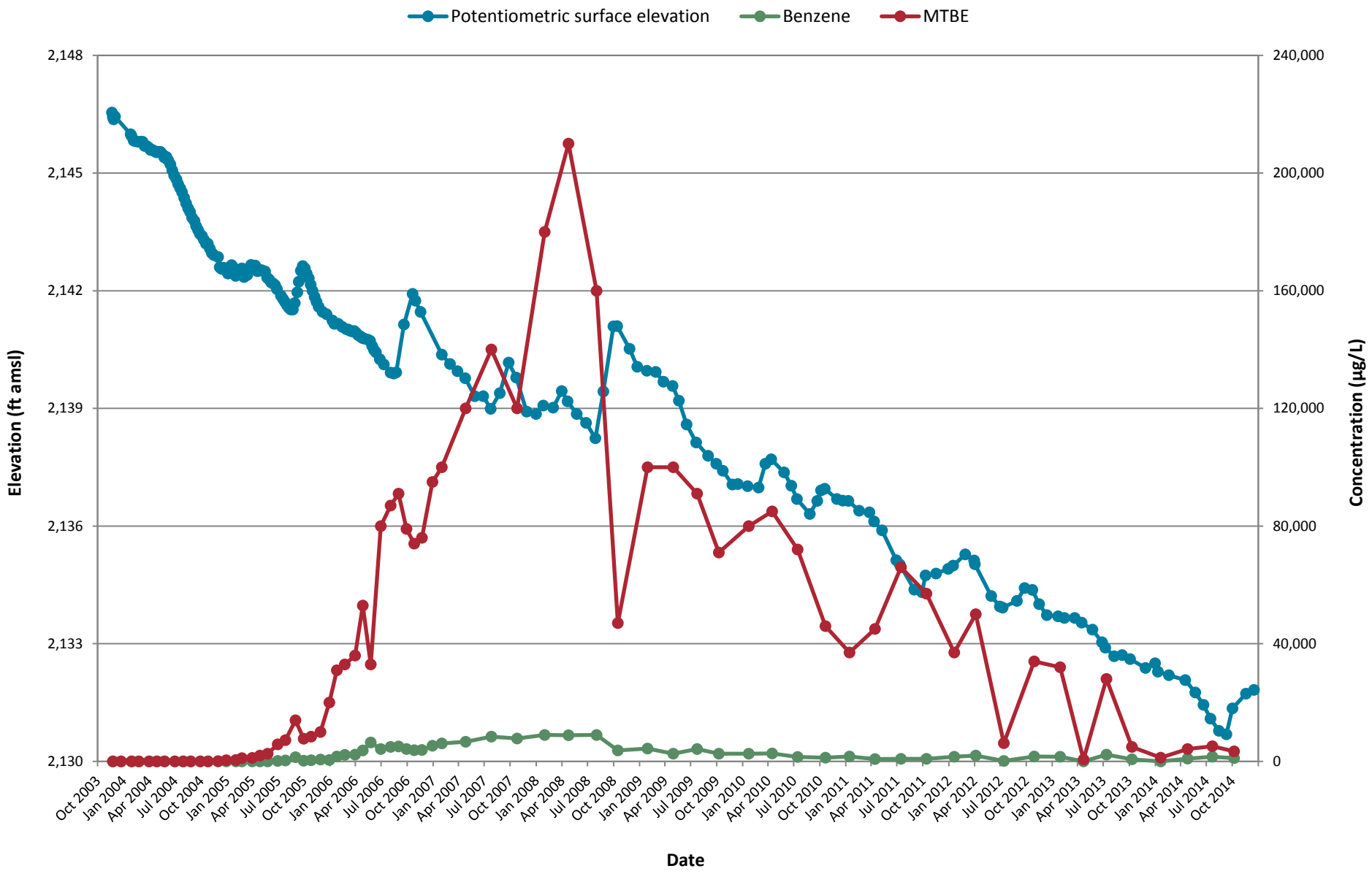
$$S_{te} = \frac{\theta_w - \theta_r}{\theta_t - \theta_r} \tag{10}$$

Input parameters used in the vapor transport modeling are presented in Tables 4, 5, and 6.

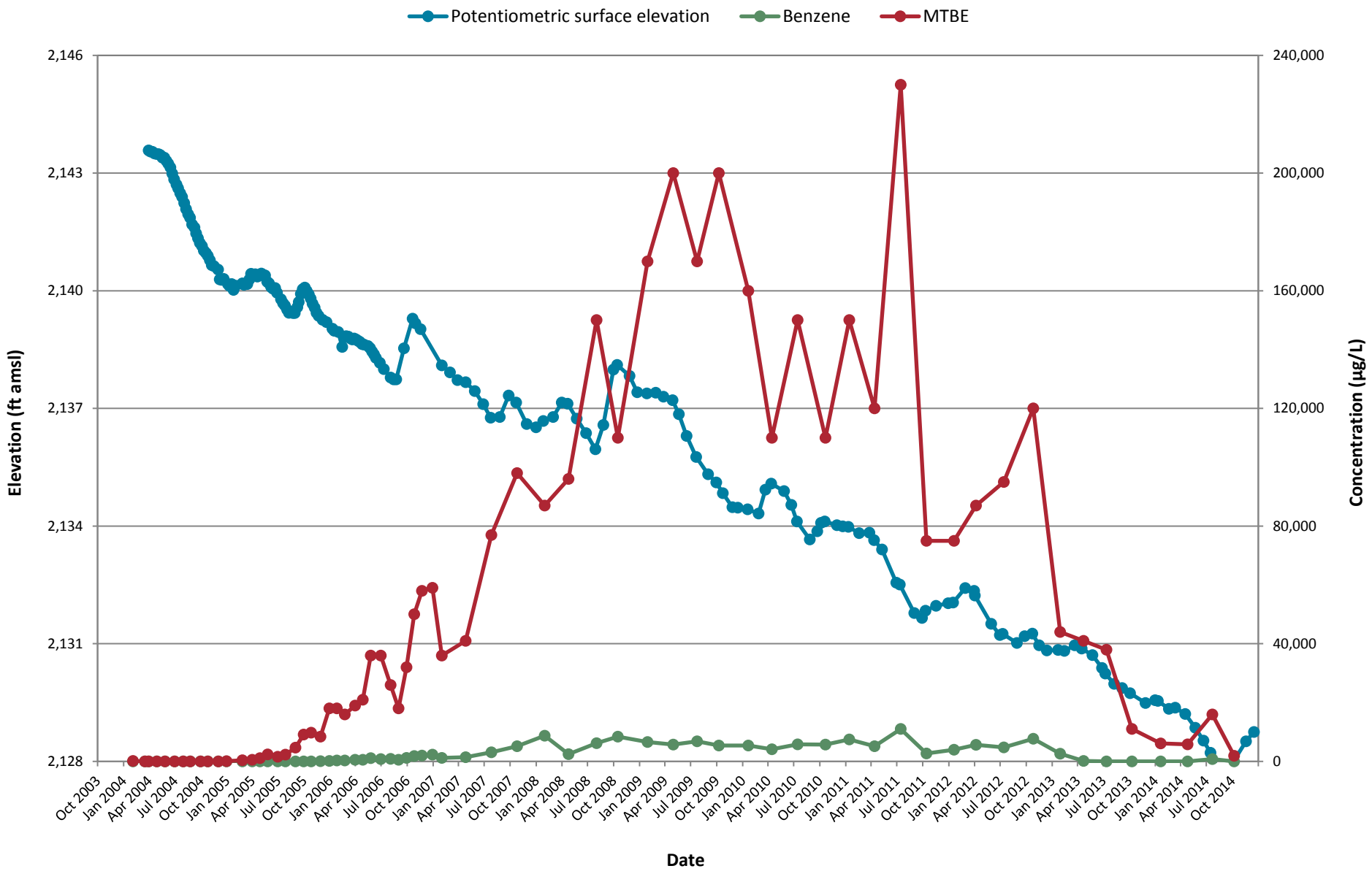
Appendix L
Groundwater Elevation, Benzene, and MTBE Concentrations vs. Time in MW-03
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona



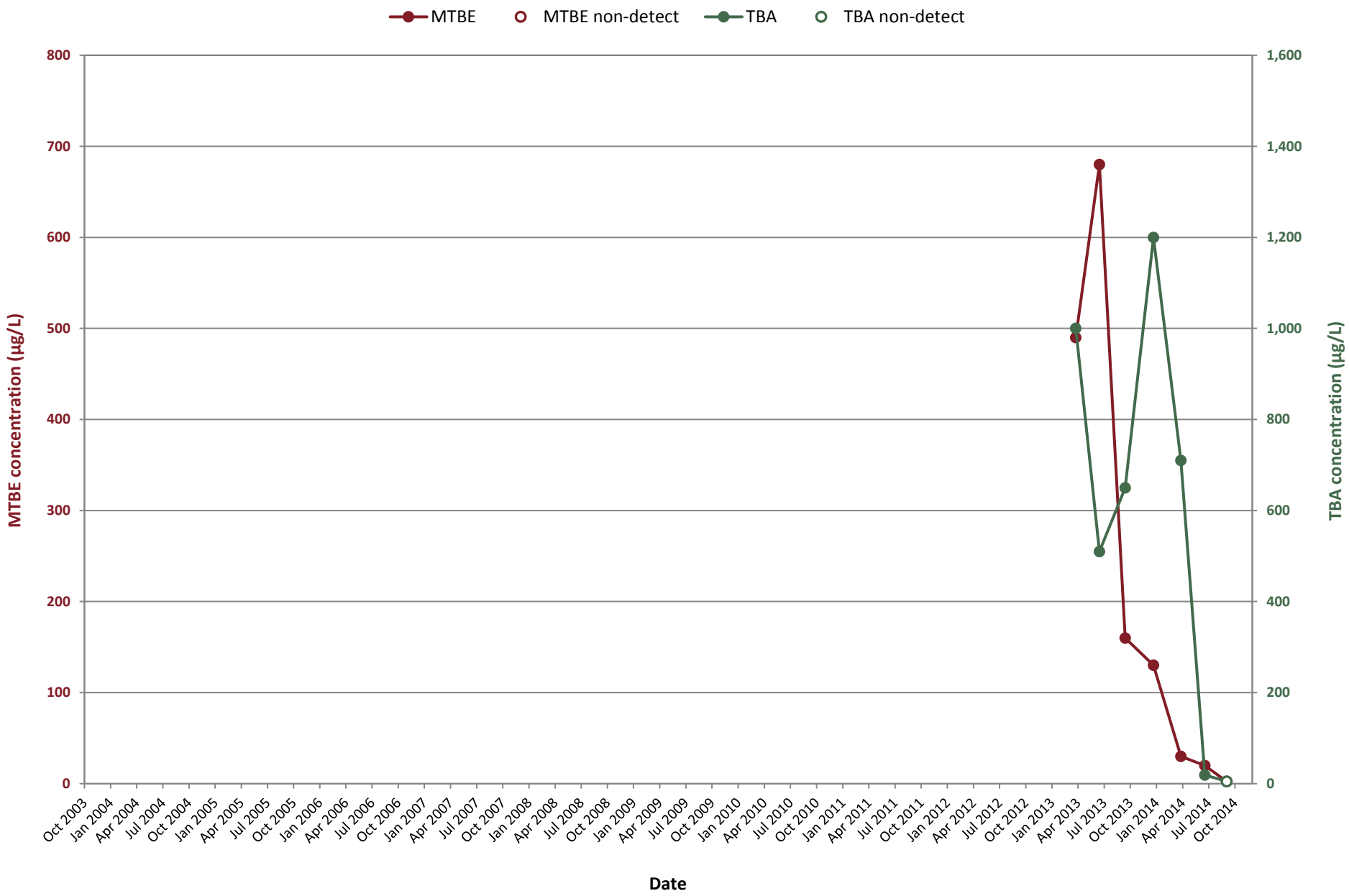
Appendix L
Groundwater Elevation, Benzene, and MTBE Concentrations vs. Time in MW-16
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona



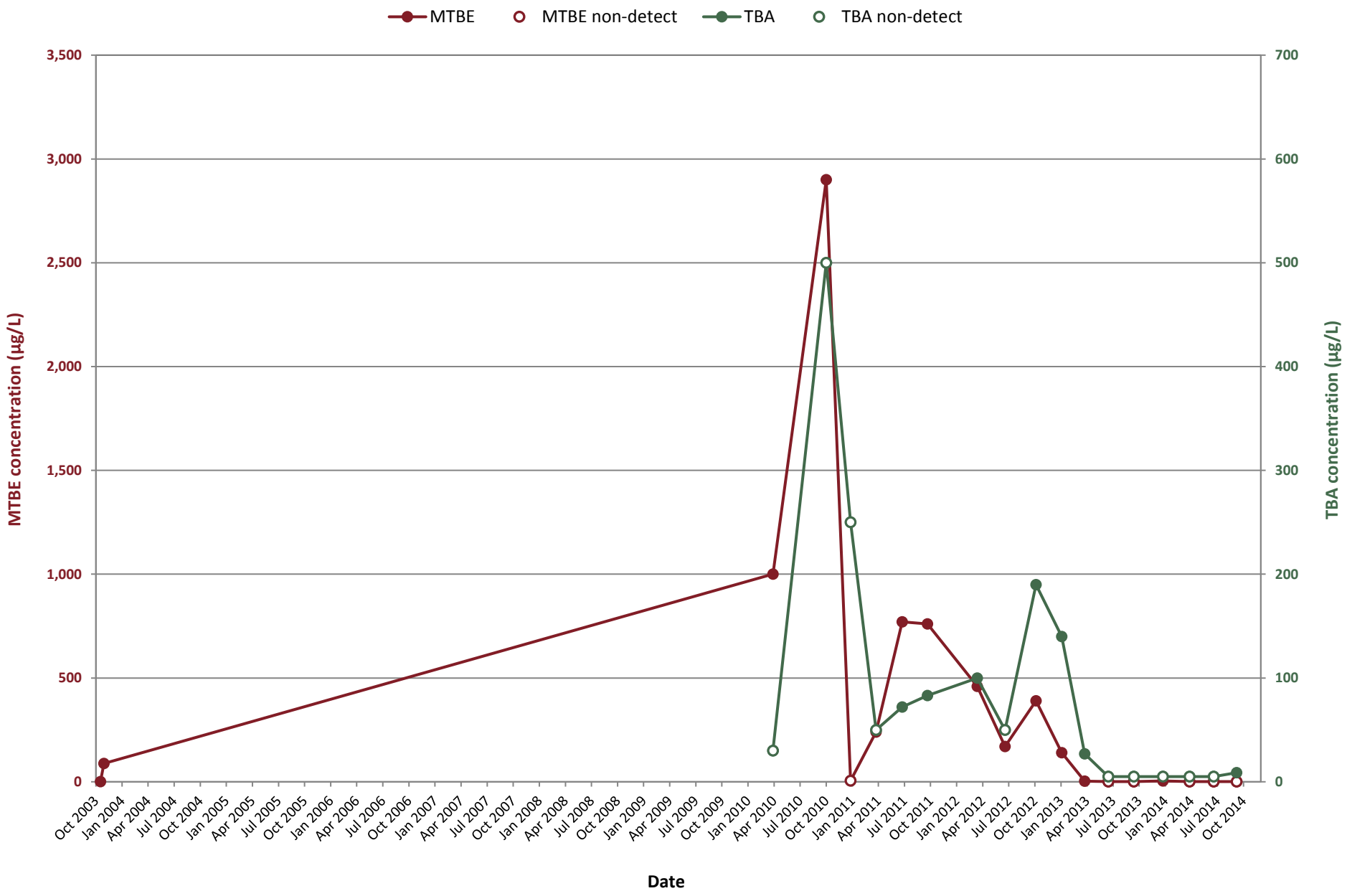
Appendix L
Groundwater Elevation, Benzene, and MTBE Concentrations vs. Time in MW-26
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona



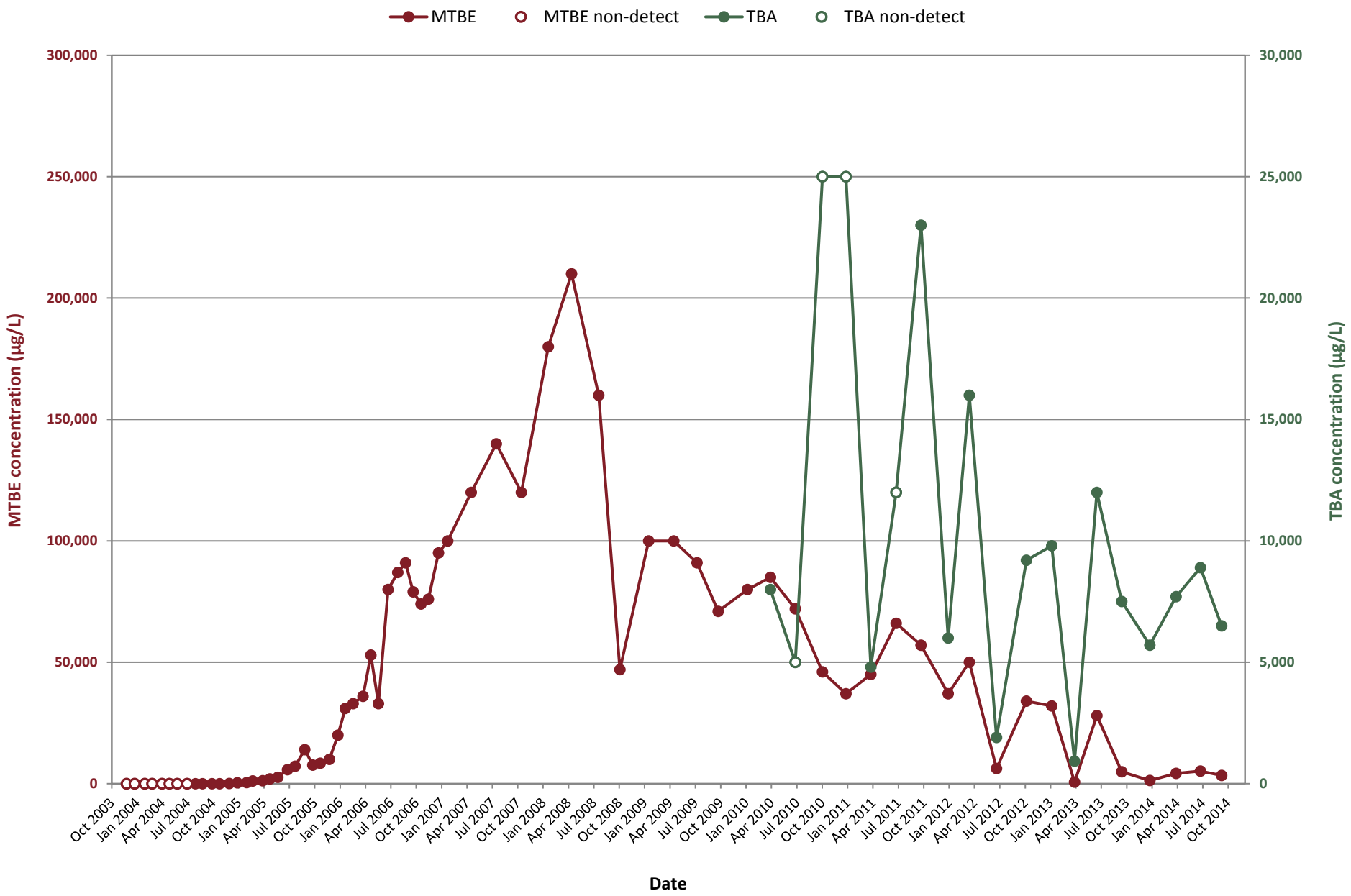
Appendix M
MTBE and TBA Concentrations vs. Time in MW-02
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona



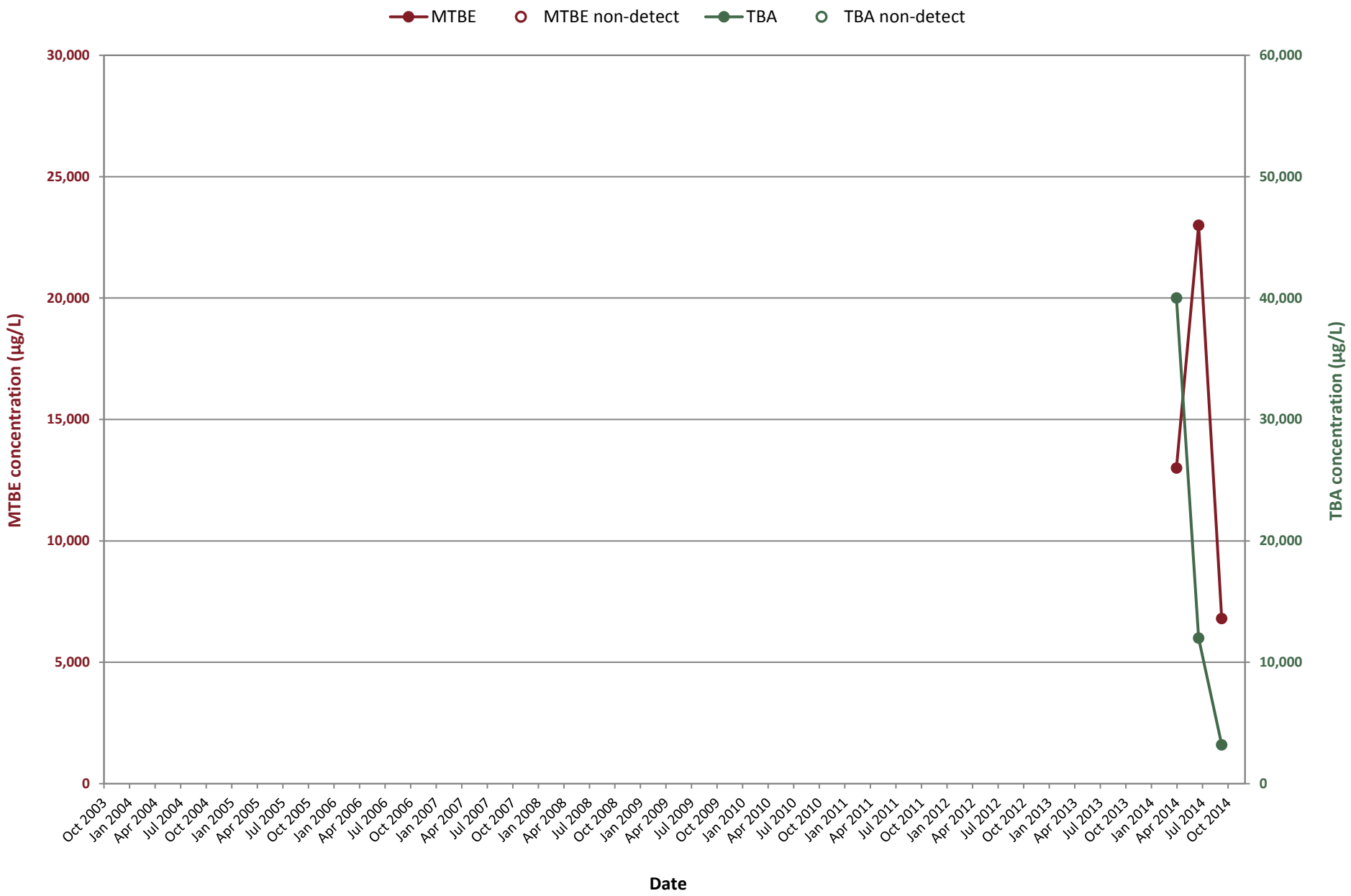
Appendix M
MTBE and TBA Concentrations vs. Time in MW-06
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona



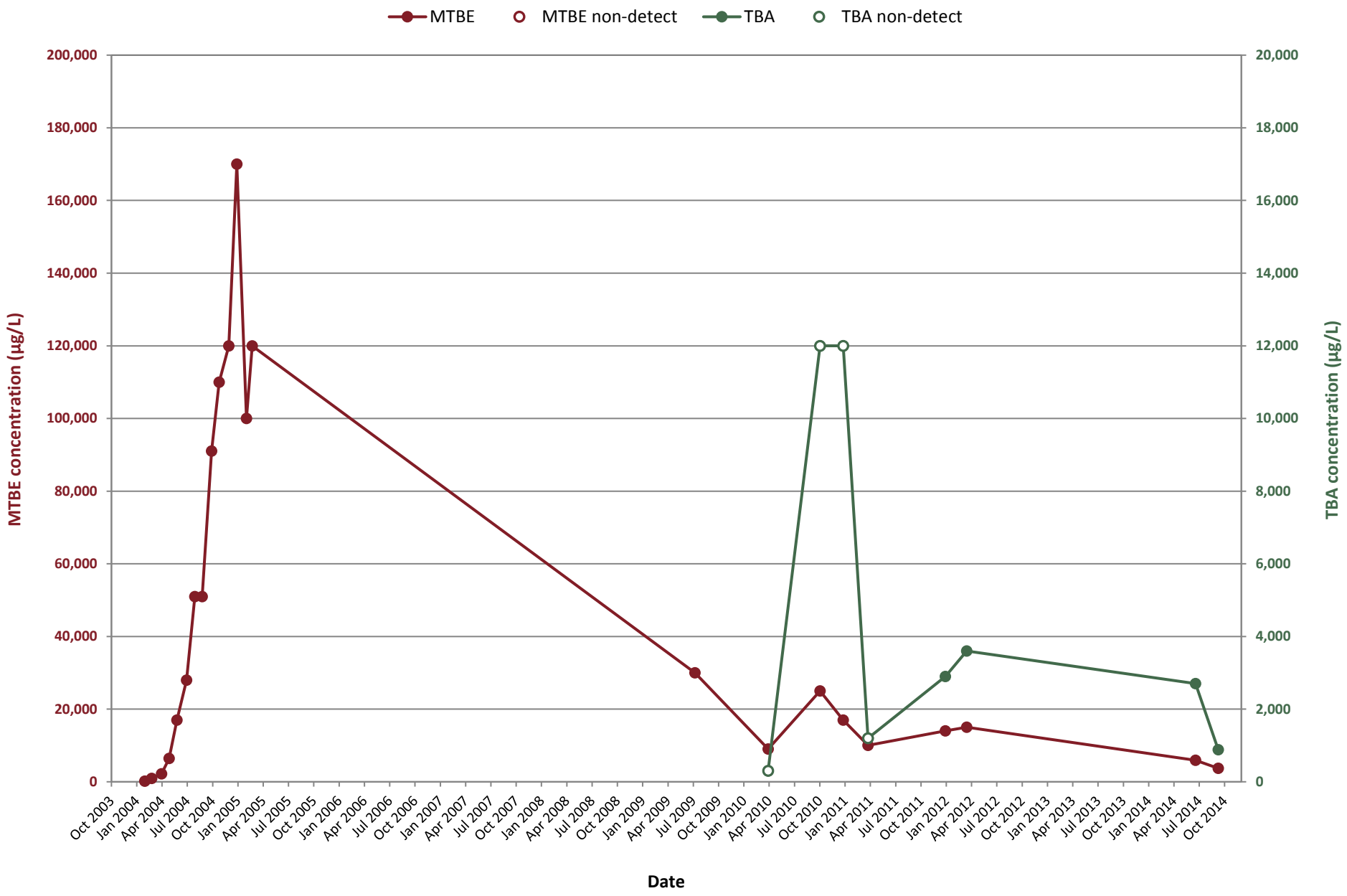
Appendix M
MTBE and TBA Concentrations vs. Time in MW-16
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona



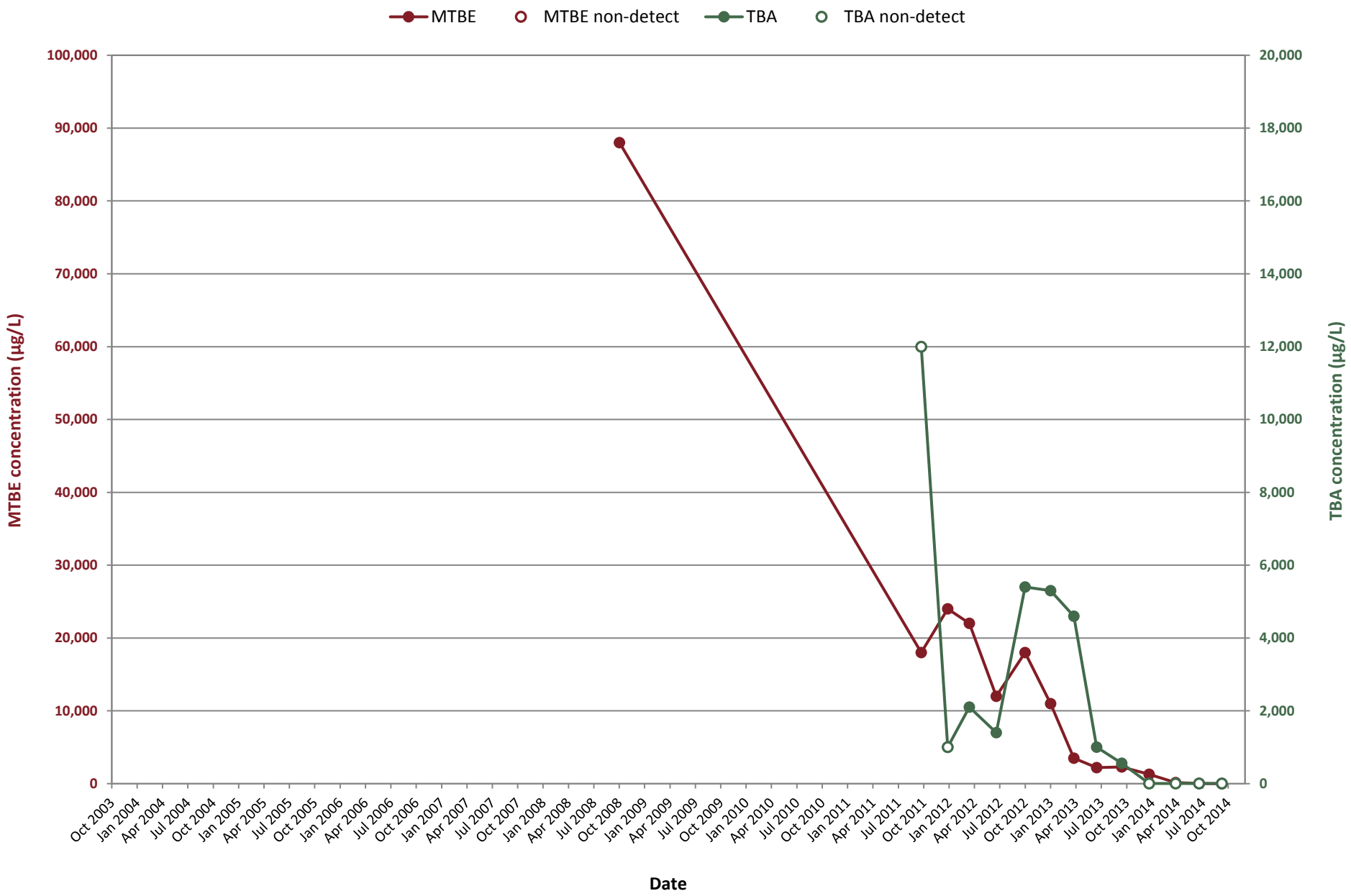
Appendix M
MTBE and TBA Concentrations vs. Time in MW-17
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona



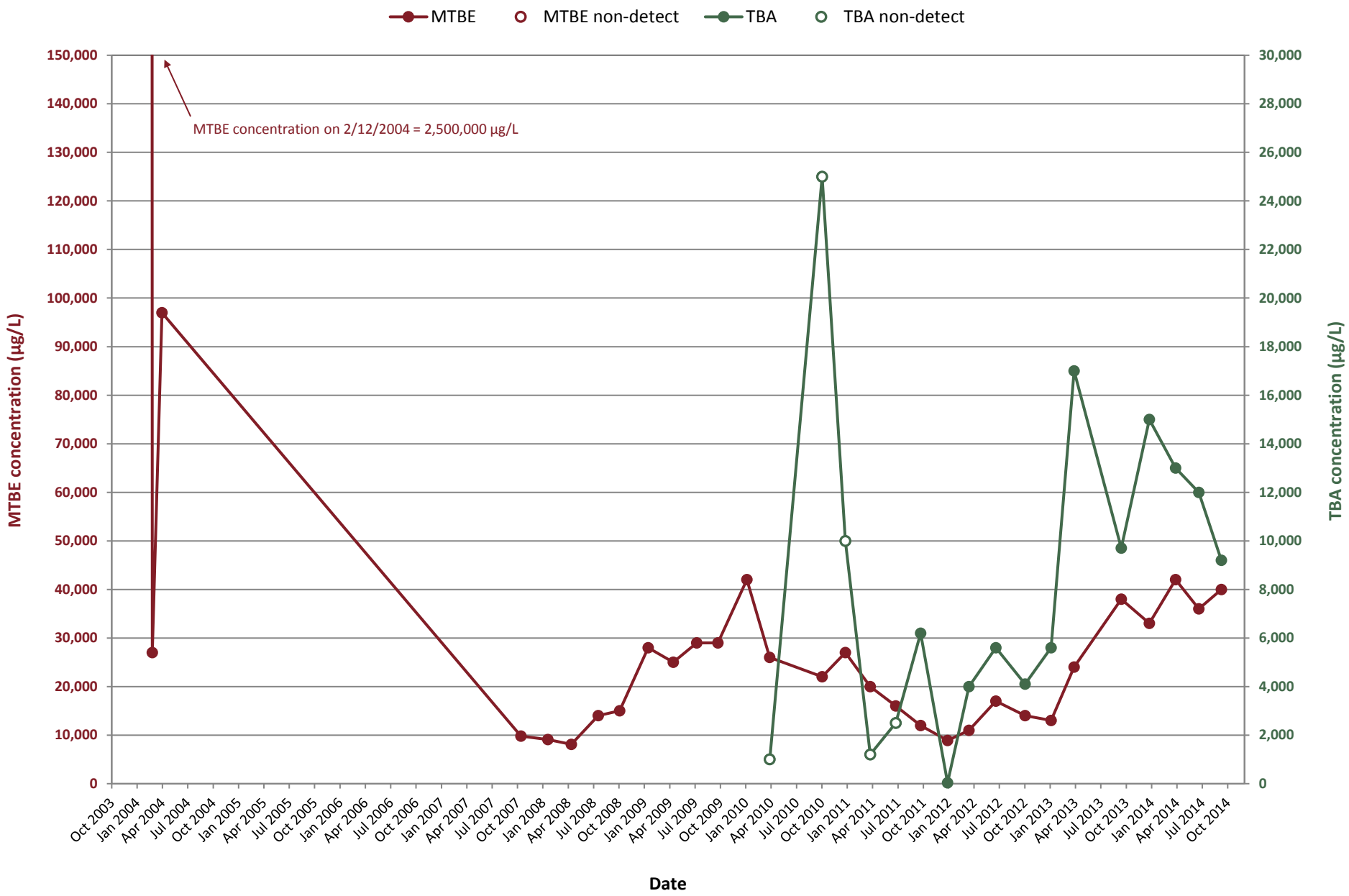
Appendix M
MTBE and TBA Concentrations vs. Time in MW-18
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona



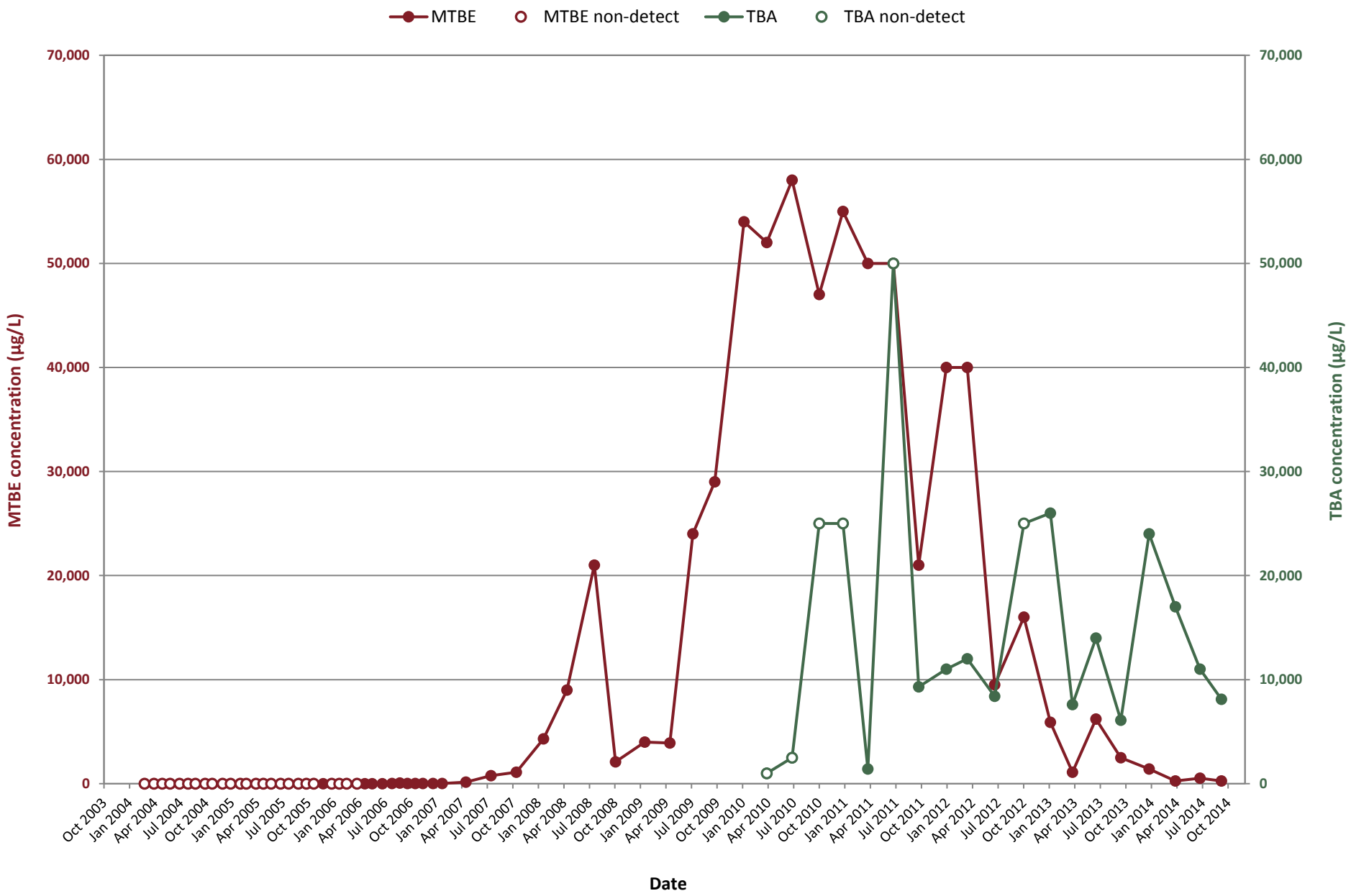
Appendix M
MTBE and TBA Concentrations vs. Time in MW-19
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona



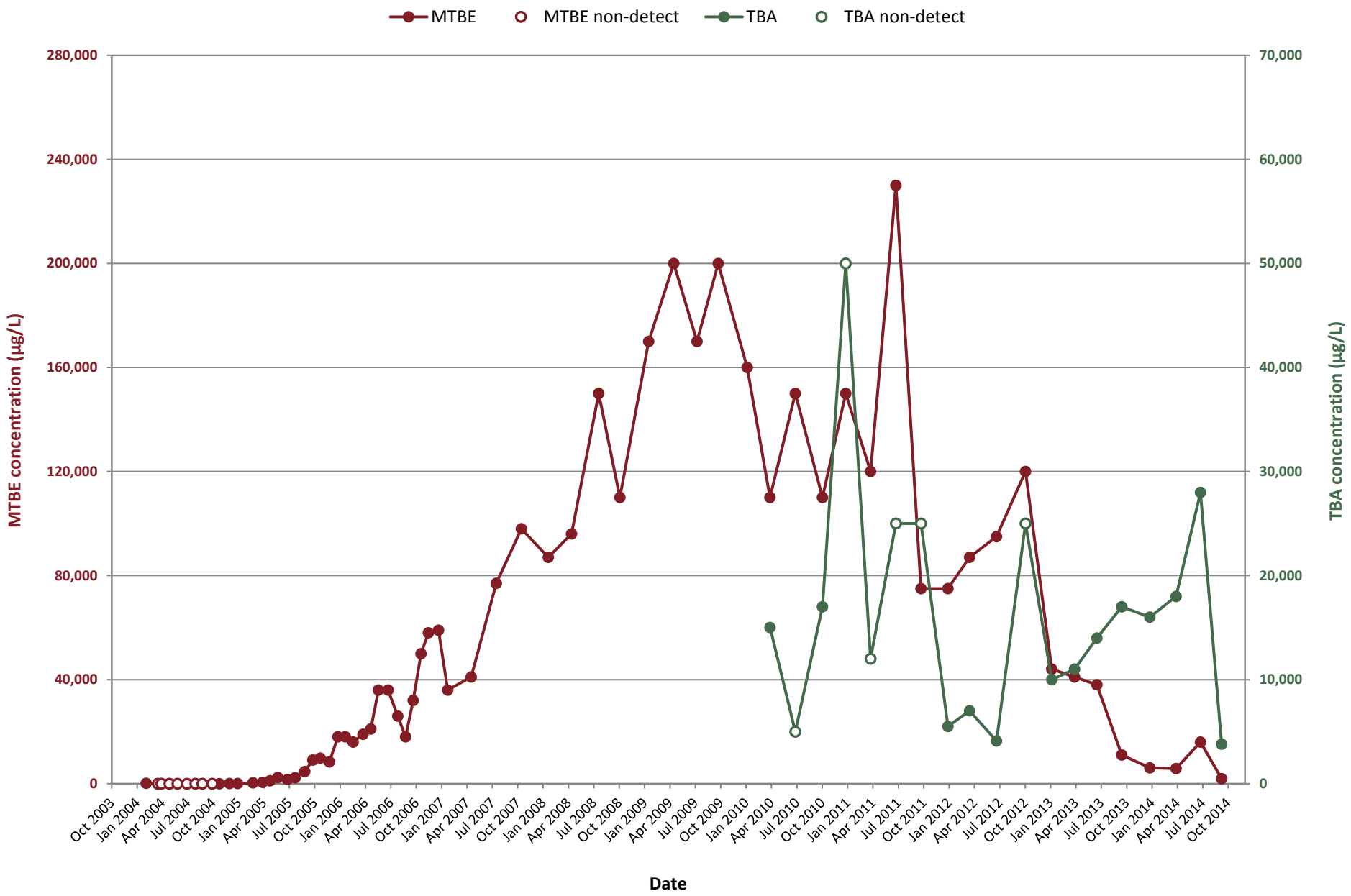
Appendix M
MTBE and TBA Concentrations vs. Time in MW-21
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona



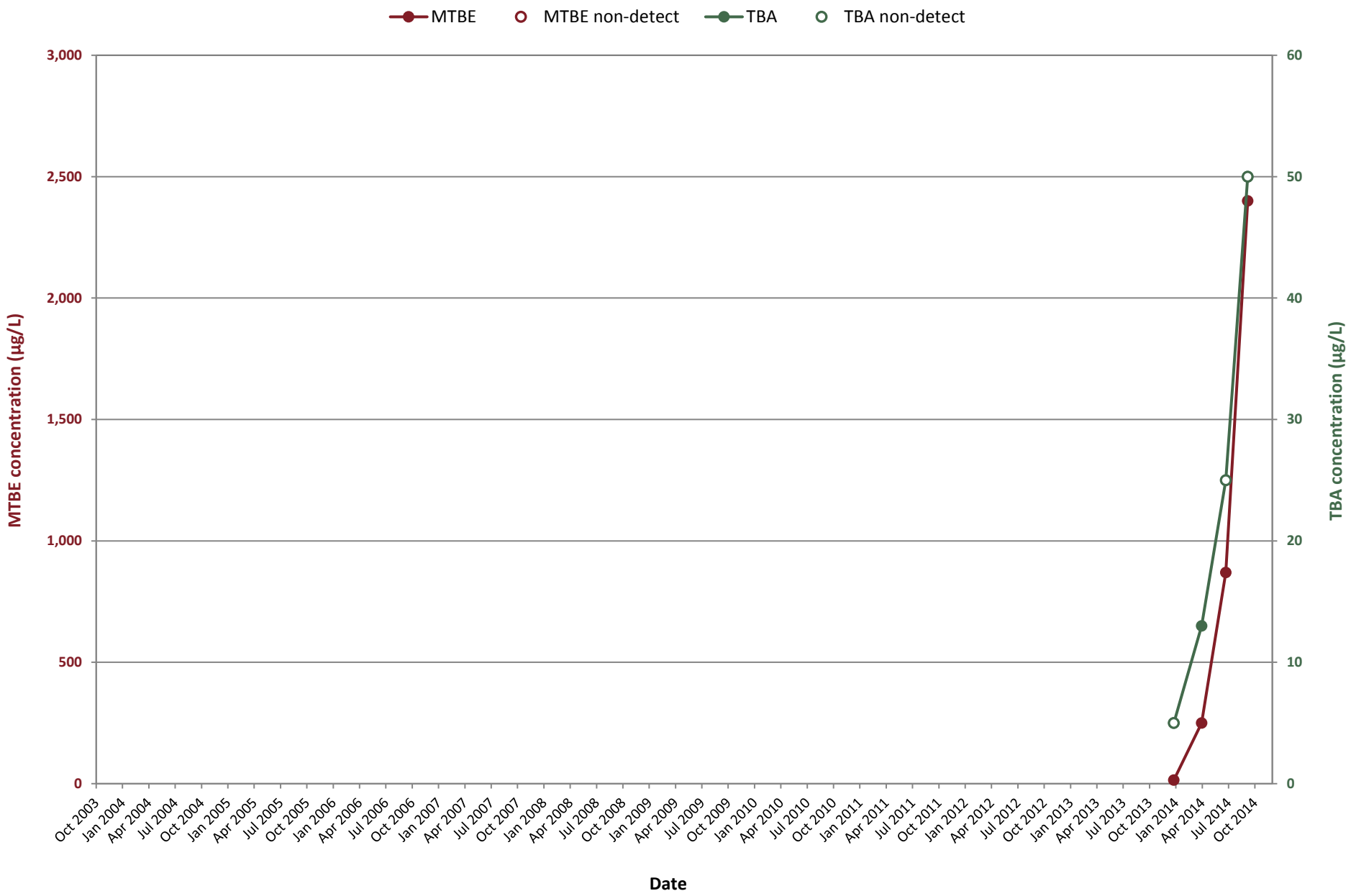
Appendix M
MTBE and TBA Concentrations vs. Time in MW-24
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona



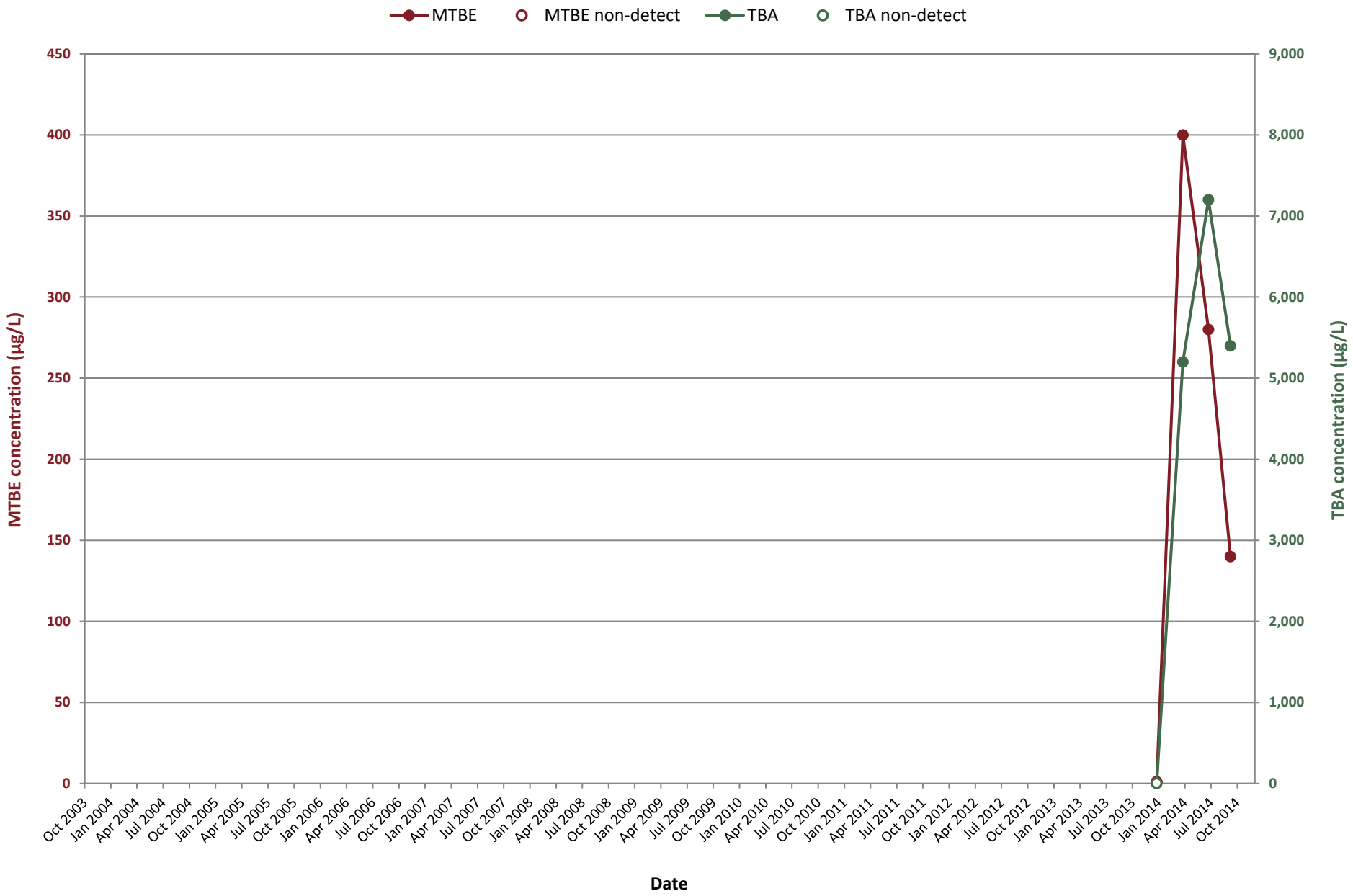
Appendix M
MTBE and TBA Concentrations vs. Time in MW-26
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona



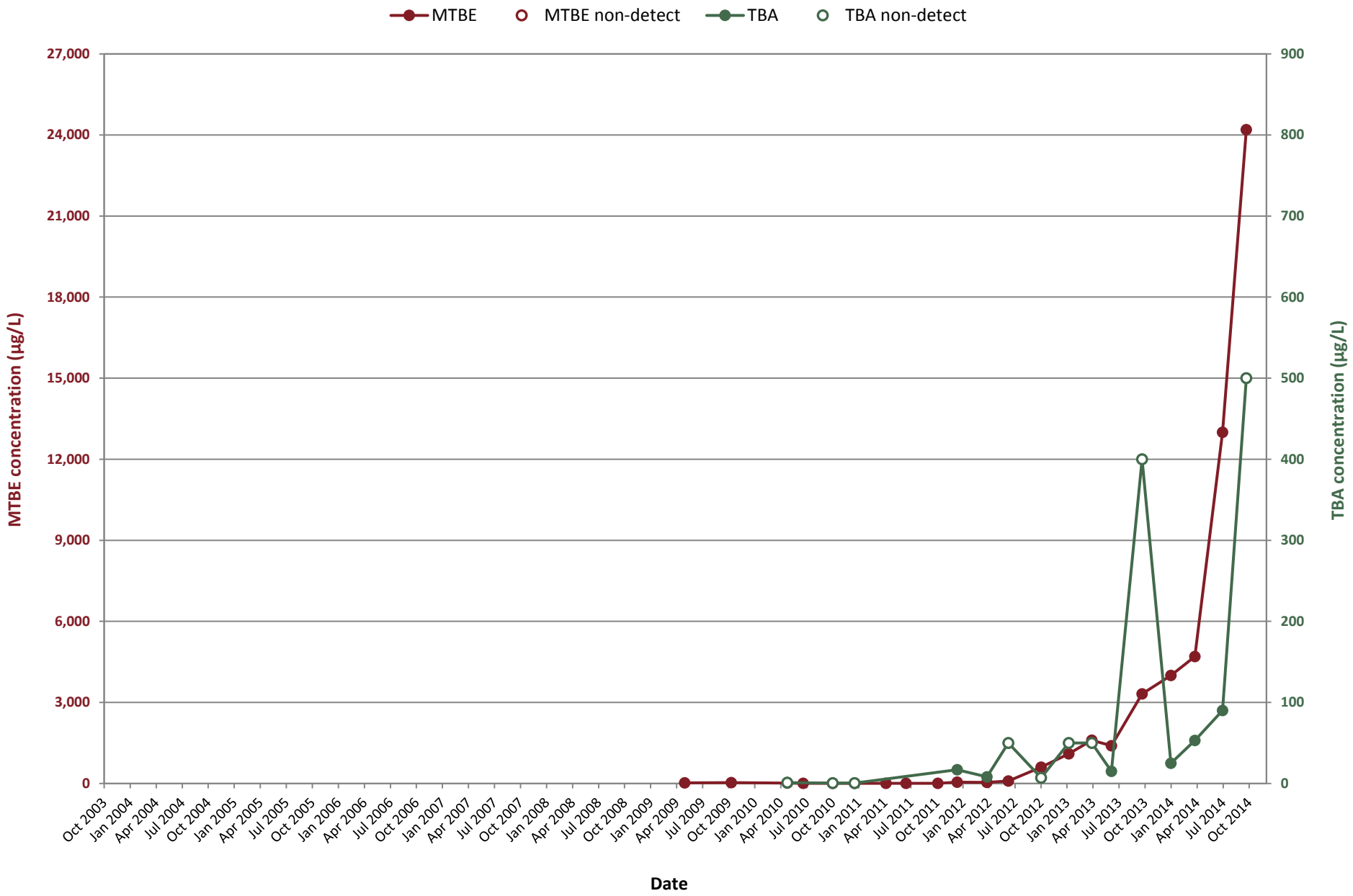
Appendix M
MTBE and TBA Concentrations vs. Time in MW-29S
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona



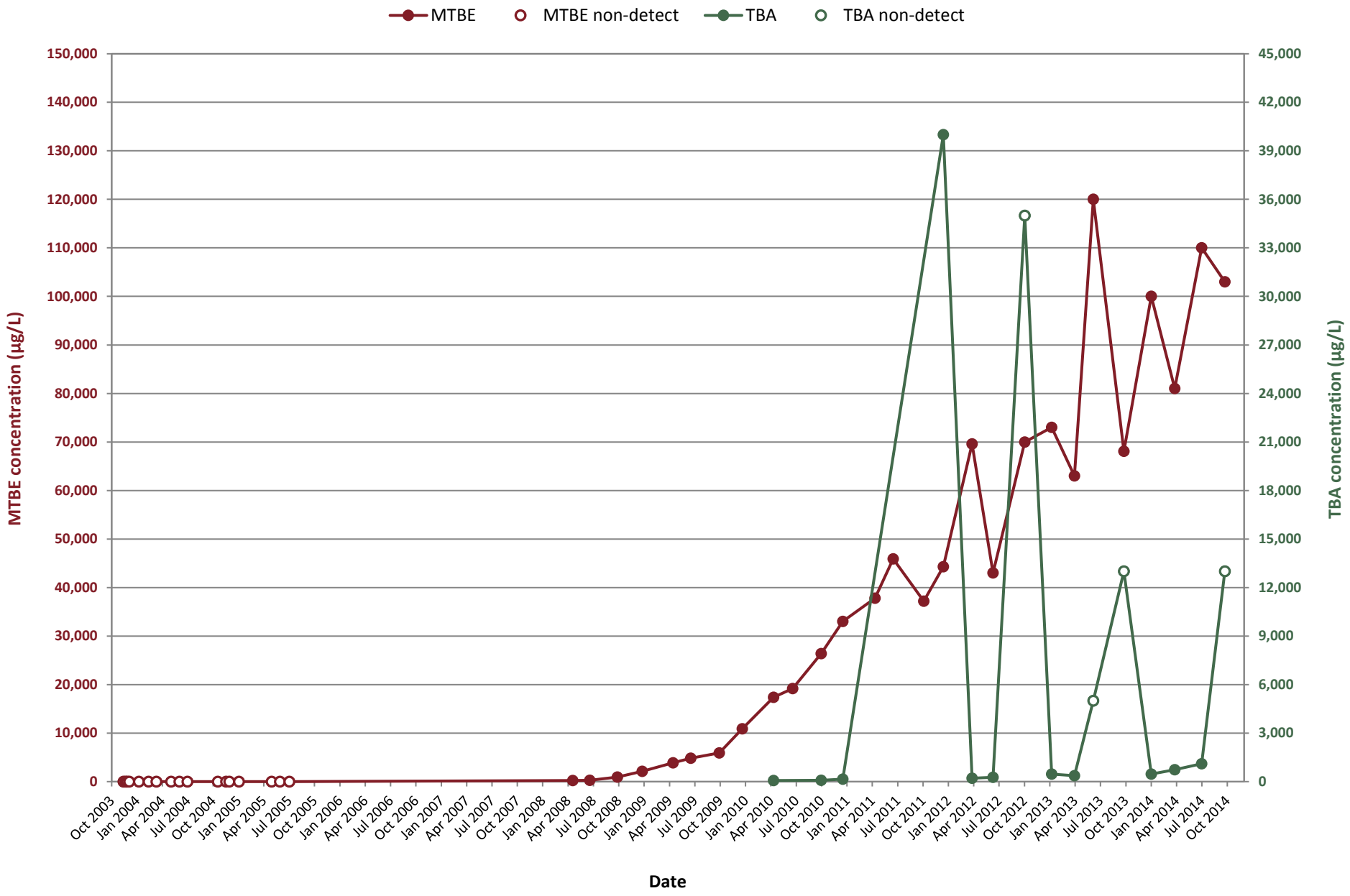
Appendix M
MTBE and TBA Concentrations vs. Time in MW-30
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona



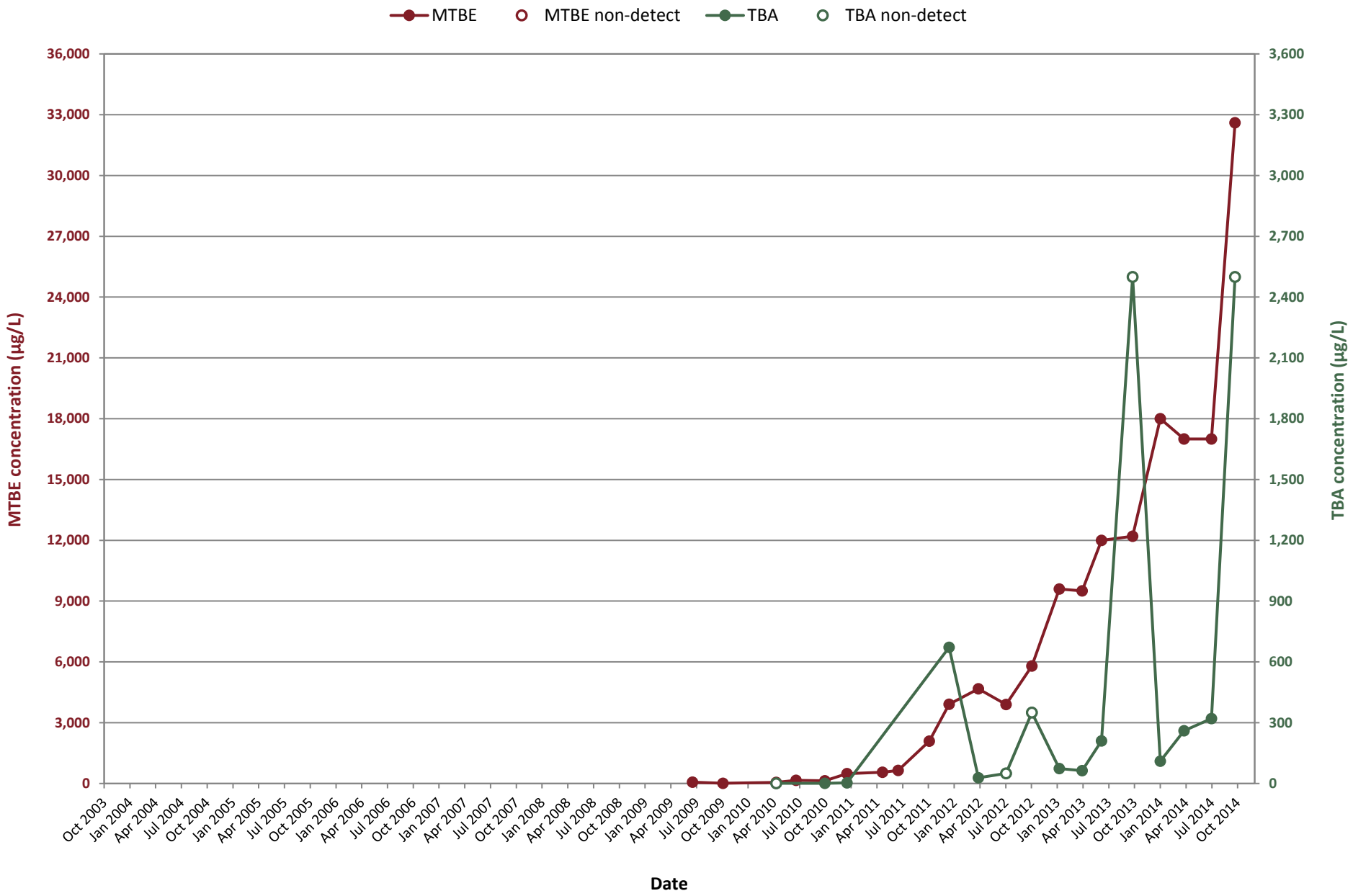
Appendix M
MTBE and TBA Concentrations vs. Time in R-067A
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona



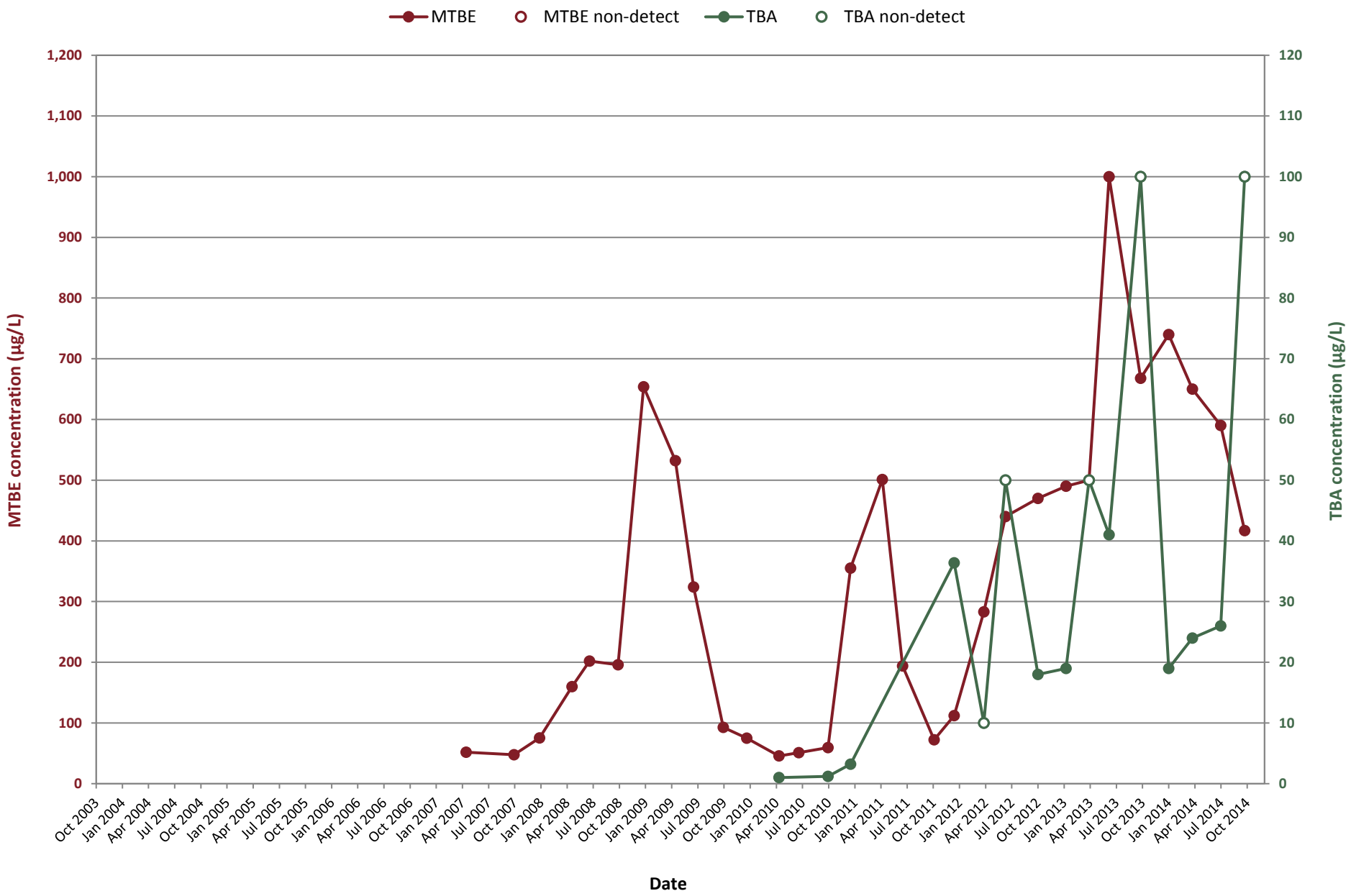
Appendix M
MTBE and TBA Concentrations vs. Time in WR-359A
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona



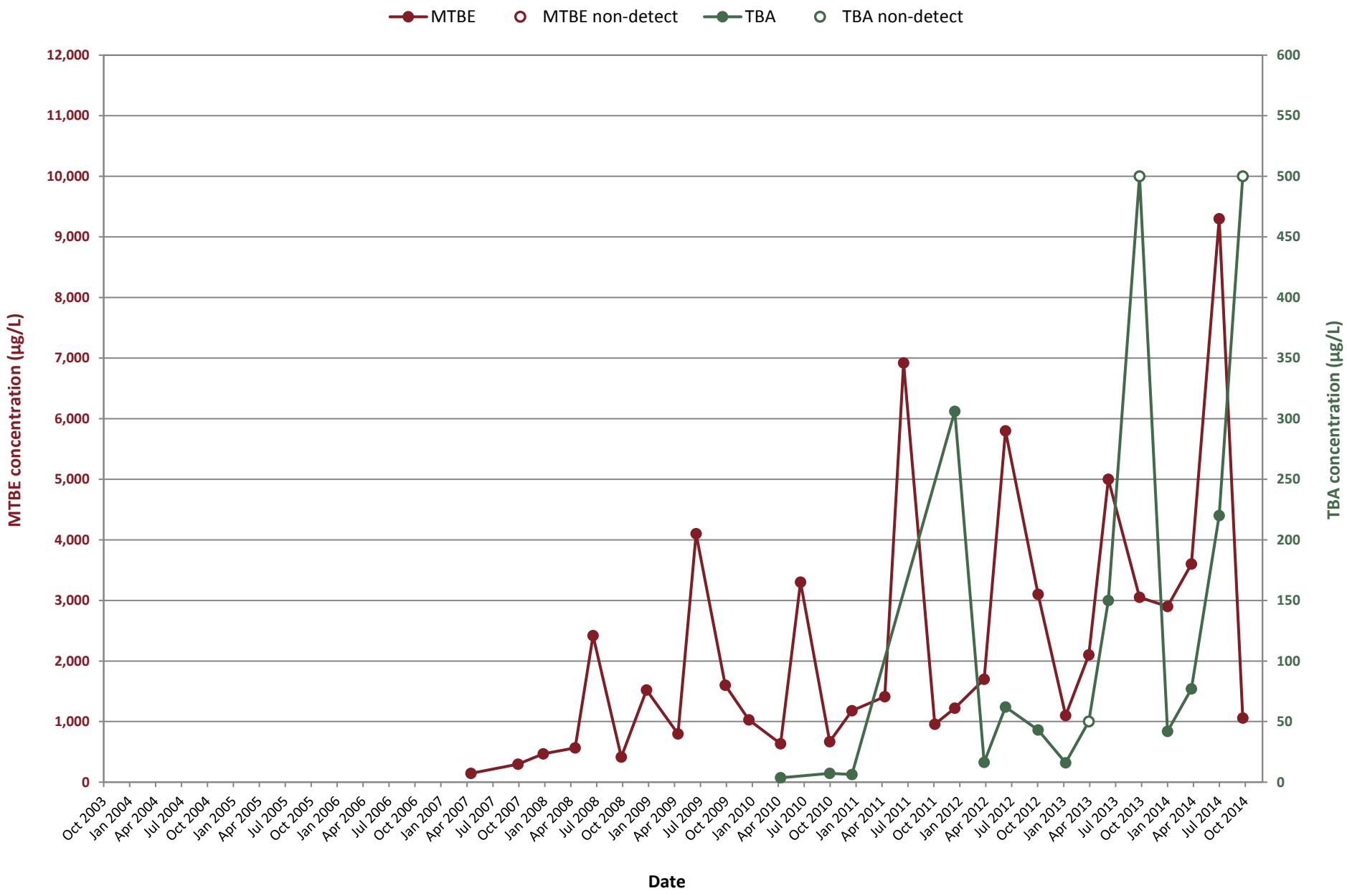
Appendix M
MTBE and TBA Concentrations vs. Time in WR-430A
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona



Appendix M
MTBE and TBA Concentrations vs. Time in WR-464A
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona



Appendix M
MTBE and TBA Concentrations vs. Time in WR-467A
SFPP, L.P.
Silvercroft Wash Release Site, Tucson, Arizona



From:	Molly Collins
To:	Vespalec, Thomas
Subject:	Re: Silverbell Landfill - future land use
Date:	Tuesday, January 31, 2012 11:19:20 AM

For the landfill itself, I believe the only development planned would be a solar farm. It is only in the possibly someday planning stages though. For the parcels to the west of both the north and south cells of the landfill (and west of the golf course), they have already been sold to private developers for housing developments. I have heard talk of bringing Ft. Lowell Rd across the river and between the two landfill cells to service the houses, but that was a long time ago.

>>> "Vespalec, Thomas" <Thomas.Vespalec@arcadis-us.com> 1/31/2012 8:12 AM >>>

Good Morning Molly,

I have been referred to you by Mr. John Kmiec in regards to my question about the future development plans for the Silverbell Landfill. I am currently working on the Remedial Investigation Report for the Silvercroft Wash Release Site (for KMEP) and need to include a section for land use. Is there any future development plans for the landfill? It is zoned as R-1 (low density Residential). Any assistance with this is greatly appreciated. Thank you.

Sincerely,

Thomas J. Vespalec, P.G. | Project Geologist | Thomas.vespalec@arcadis-us.com

ARCADIS U.S., Inc. | 14201 North 87th Street, Suite 135 | Scottsdale, Arizona 85260
T: 480.905.9311 | M: 562.833.2477 | F: 480.905.9353
www.arcadis-us.com

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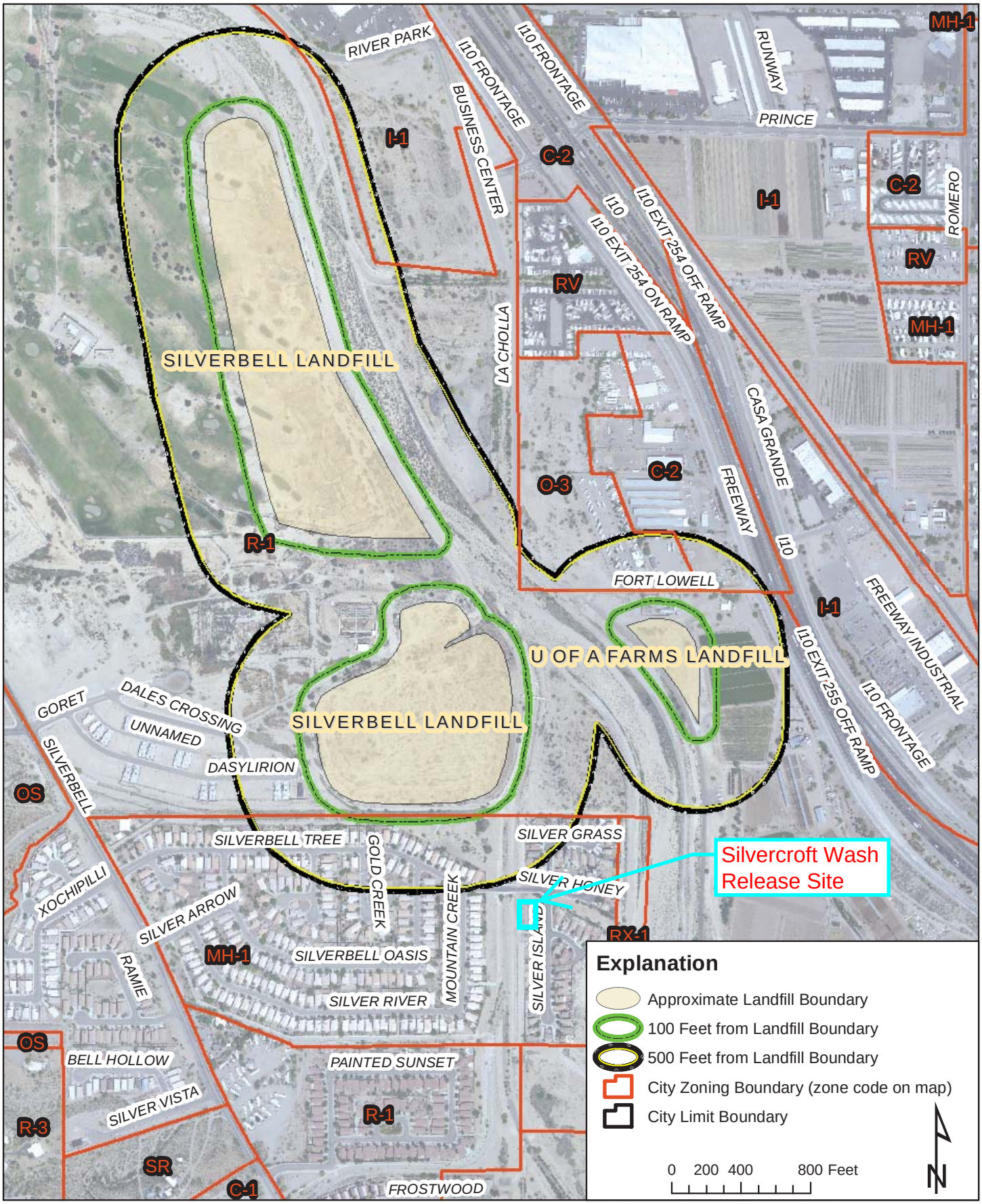
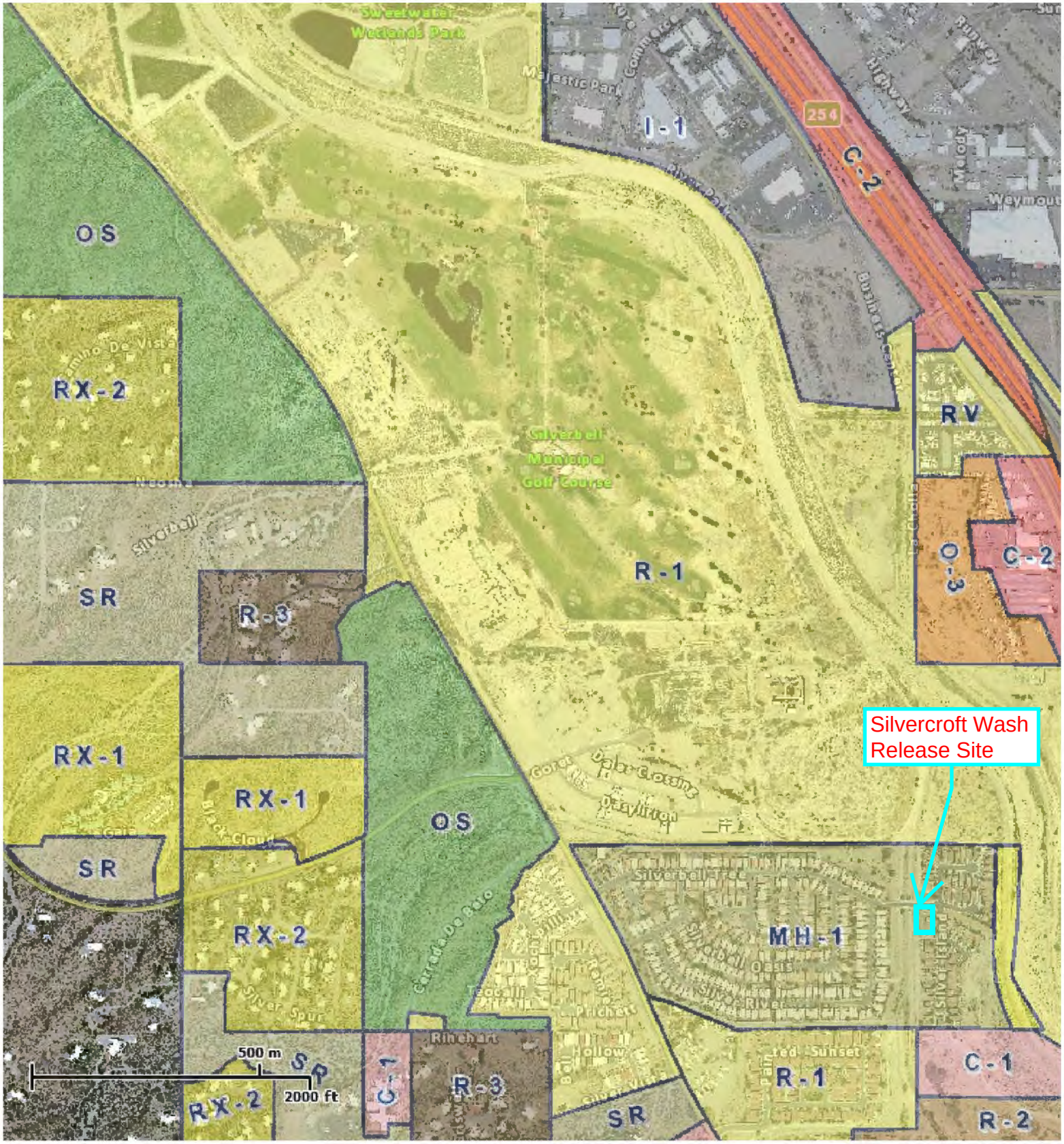


CITY OF TUCSON
ENVIRONMENTAL SERVICES

Silverbell and UofA Farm Landfills
100 & 500 Foot Buffer Boundaries
Tucson, Arizona

Drawn By:	LE
Checked:	JD
Approved:	NP
Date:	3/28/2011
File:	See Below

J:GIS\ClosedLandfills\2011\silver.mxd



Zoning

Scale: 1:12,000

Printed:Apr 13, 2012

CITY OF TUCSON
SUMMARY OF ZONING CLASSIFICATIONS AND DEVELOPMENT DESIGNATORS

The *Land Use Code (LUC)* applies development criteria on individual uses within each zone, and the criteria do not necessarily apply to all uses permitted in the zone. The development criteria listed in the table below are provided for only the most common use allowed in each zone. The *LUC* should be consulted to verify the applicable Development Designator for a specific use.

Zone (Code Section)	Development Designator[1]	Minimum Lot or Site Area (Sq. Ft.)[1]	Units Per Lot[2]	Density Per Acre[2]	Maximum Lot Coverage (Percent)[3]	Floor Area Ratio[4]	Maximum Building Height (Ft.)[5]	Perimeter Yard (Same Zone)[6]
OS (2.9.1)	4	4,000			10	0.03	12	25’
IR (2.2.1)	21	1,568,160	1				30	25’
RH (2.2.2)	25	180,000	1				30	25’
SR (2.2.4)	C	144,000	1				30	25’
SH (2.2.6)	E	36,000	2				30	20’
RX-1 (2.3.2)	D	36,000	1				30	20’
RX-2 (2.3.3)	F	16,000	1				25	20’
R-1 (2.3.4)	G	7,000	1		70		25	6’ or 2/3(H)
R-1 (2.3.4)	H	10,000	2		70		25	6’ or 2/3(H)
R-2 (2.3.5)	I	5,000	1		70		25	6’ or 2/3(H)
R-2 (2.3.5)	K	5,000		15	75		25	10’ or 3/4(H)
R-3 (2.3.6)	P			36	70		40	10’ or 3/4(H)
MH-1 (2.3.7)	G	7,000	1				25	6’ or 2/3(H)
MH-1 (2.3.7)	M	7,000		8	70		16	10’ or 3/4(H)
MH-2 (2.3.8)	I	5,000	1		70		25	6’ or 2/3(H)
MH-2 (2.3.8)	K	5,000		15	75		25	10’ or 3/4(H)
O-1 (2.4.1)	26	10,000				0.25	16	10’ or 3/4(H)
O-2 (2.4.2)	27					0.50	26	(H)
O-3 (2.4.3)	30					0.75	40	0
RVC (2.5.1)	29					0.50	30	0
NC (2.5.2)	26	10,000				0.25	16	(H)
C-1 (2.5.3)	28					0.35	30	0
C-2 (2.5.4)	30					0.75	40	0
C-2 (2.5.4)	31					0.90	40	0
C-3 (2.5.5)	33					1.50	50	0
C-3 (2.5.5)	34					2.00	75	0
P (2.5.6)	40	5,000				0.90	16	(H)
RV (2.5.7)	M	7,000		8	70		16	(H)
OCR-1 (2.6.1)	35					6.00	140	0
OCR-2 (2.6.2)	36					10.50	300	0
MU (2.6.4)	G	7,000	1		70		25	6’ or 2/3(H)
MU (2.6.4)	K	5,000		15	75		25	10’ or 3/4(H)
MU (2.6.4)	29					0.50	30	1 1/2(H)
P-I (2.7.1)	33					1.50	50	0
I-1 (2.7.2)	34					2.00	75	0
I-2 (2.7.3)	35					6.00	140	0

[1]Section 3.2.3
[2]Section 3.2.10
[3]Section 3.2.9
[4]Section 3.2.11
[5]Section 3.2.7
[6]Refer to the specific use and zone, then Section 3.2.6 to determine the Perimeter Yard applicable. The Perimeter Yards shown on the table are the interior yard setback requirements which are based on the adjacent property having the same zoning as the property in question. Perimeter yards are based on the height of the proposed building and the zoning of adjacent property. **If the zoning is not the same, the perimeter yard shown on the table may not be applicable.** Street Perimeter Yards, which are setbacks from the streets, are not shown on the table but are applied as two types, established area and developing area. See definition of established area setback in Sec. 6.2.5. Established area--greater of 20’ or 1 1/2 (H) for front yard and 10’ for street side yard. Developing area (includes all streets on *MS&R*)--Section 3.2.6.5.

Mailing Address: Development Services Department
Zoning Administration
P. O. Box 27210
Tucson, Arizona 85726-7210

Location: Public Works Building
201 North Stone
Second Floor
Phone: 520-791-5550
FAX: 520-791-4475

ZONING DISTRICT NARRATIVE SUMMARIES

(For a complete description refer to *Land Use Code*, Chapter 23, *Tucson Code*)

OS	***OPEN SPACE*** – Used for protection of permanent open space.
IR*	***INSTITUTIONAL RESERVE*** – Federal, State, City, County, and other properties under public ownership which are natural reserves or wildlife refuge reserves.
RH*	***RURAL HOMESTEAD*** – Primarily low density residential property, with limited commercial and industrial uses to service residential development.
SR, RX-1, RX-2	***LOW DENSITY RESIDENTIAL*** – Primarily low density residential property, with recreational/tourist related enterprises permitted subject to lot size.
SH*	***SUBURBAN HOMESITE*** – Primarily low density (2 units per lot) residential property, with uses as permitted in the SR zone.
R-1	***RESIDENTIAL - SINGLE-FAMILY*** – Primarily for the use of single-family residences. Schools, churches, and public buildings permitted.
R-2	***MEDIUM DENSITY RESIDENTIAL*** – Multifamily and single-family residences permitted.
R-3	***HIGH DENSITY RESIDENTIAL*** – Primarily for apartment houses; single-family development permitted.
MH-1	***MOBILE HOME*** – Mobile homes permitted, along with site-built structures. Medium density mobile home parks permitted.
MH-2	***MOBILE HOME PARK*** – Mobile home parks or mobile home subdivisions, along with social, commercial, and recreation facilities permitted as secondary uses.
O-1, O-2	***LOW INTENSITY OFFICE*** – Allows for conversion of residential to office use, primarily for properties located on arterial and/or collector streets.
O-3	***OFFICE*** – Professional and semiprofessional office, high density residential developments, and limited research and development uses permitted.
RVC*	***RURAL VILLAGE CENTER*** – Retail shopping facilities, planned and designed for the convenience and necessity of a suburban or rural neighborhood.
NC	***NEIGHBORHOOD COMMERCIAL*** – Low-intensity, small-scale commercial and office uses that are compatible in size and design with adjacent residential uses.
C-1	***LOCAL COMMERCIAL*** – A restrictive commercial zone, limited to retail sales with no outside display/storage. Office and residential development permitted. Restaurants permitted.
C-2, C-3	***GENERAL AND INTENSIVE COMMERCIAL*** – Retail commercial with wholesale; nightclubs, bars, amusement enterprises permitted. Full range of automotive activities; sales, repair, leasing, etc. Limited manufacturing permitted. Residential uses permitted.
P	***PARKING*** – Off-street parking at or below grade.
RV	***RECREATIONAL VEHICLE PARK*** – Travel trailer park only permitted use. Residences and social and recreational secondary uses allowed.
OCR-1, OCR-2	***OFFICE/COMMERCIAL/RESIDENTIAL*** – High-rise mixed office, commercial, and residential uses located in major activity centers.
PAD	***PLANNED AREA DEVELOPMENT (PAD) ZONE*** – A zoning classification which provides for the establishment of zoning districts with distinct regulations as adopted by Mayor and Council.
MU*	***MULTIPLE USE*** – A mixed use zone permitting low to medium density residential development and various commercial activities commonly from the O-3 to C-2 zones.
P-I	***PARK INDUSTRIAL*** – The most restrictive of industrial zones. Administrative, manufacturing, and wholesale activities carried on entirely within an enclosed structure. Limited retail sales permitted when incidental to an industrial use.
I-1, I-2	***LIGHT AND HEAVY INDUSTRIAL*** – Commercial, industrial, and manufacturing uses; residential restricted to caretakers residence, except for Resident Artisans in the Downtown Warehouse District.

The following table lists the overlay zones, as provided in the *LUC*, which may have requirements which supersede requirements of the zone.

OVERLAY ZONES

HDZ	Hillside Development Zone	2.8.1
SCZ	Scenic Corridor Zone	2.8.2
MS&R	Major Streets and Routes Setback Zone	2.8.3
	Gateway Corridor Zone	2.8.4
AEZ	Airport Environs Zone	2.8.5
ERZ	Environmental Resource Zone	2.8.6
	Reserved	2.8.7
HPZ	Historic Preservation Zone	2.8.8
DSO	Drachman School Overlay Zone	2.8.9
RND	Rio Nuevo and Downtown (RND) Zone	2.8.10

See also Chapter 25 (Floodplain) and Chapter 29 (WASH) of the *Tucson Code*.

GENERAL NOTES

*Zoning for newly annexed areas only.
For a complete description of all zones, refer to the *Land Use Code*, Chapter 23 of the *Tucson Code*.
Home Occupations are permitted as secondary uses to all residential uses.
For specific off-street parking requirements by land use, refer to Section 3.3.4.
Screening and landscaping requirements are found in Section 3.7 and *Development Standards* 2-06 and 2-07.
For additional information on rezoning requirements, call (520) 791-4541.

[Revised: December 1, 2005]

CITY OF TUCSON
UNIFIED DEVELOPMENT CODE

PRELIMINARY FINAL PUBLIC DRAFT – OCTOBER 2011

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ARTICLE 4: ZONES

4.1. PURPOSE

The Zones described in this article are established to regulate and separate the locations of land uses as appropriate.

4.2. ESTABLISHMENT OF BOUNDARIES

The boundaries of each zone shall be determined and defined in accordance with the provisions of the Unified Development Code (UDC).

4.3. CATEGORIES OF LAND USES

Each zone allows for three categories of land uses: permitted land uses, special exception land uses, and accessory land uses.

4.3.1. PERMITTED LAND USES

The permitted land uses for each zone are identified in Tables 4.8-1 through 4.8-6. These permitted land uses are subject to Article 6: Dimensional Standards and Measurements, Article 7: Development Standards and any additional conditions listed for each use in this code.

4.3.2. SPECIAL EXCEPTION LAND USES

Special exception land uses for each zone are identified in Tables 4.8-1 through 4.8-6. Special exception land uses shall be approved through a Special Exception Land Use procedure if the use complies with all applicable requirements of Article 6: Dimensional Standards and Measurements, Article 7: Development Standards and any additional conditions listed for the use in this code.

4.3.3. ACCESSORY LAND USES

The general standards applicable to accessory uses and buildings are contained in Sec. 4.10. Uses permitted as accessory land uses shall be those that are incidental to, subordinate to, or necessary for the operation of the principal permitted land use. Accessory uses shall be developed according to the same development requirements as the Principal Use, except as modified by applicable use-specific standards in Sec. 4.9 and the provisions of Sec. 4.10. All proposed applications for accessory uses shall be submitted for zoning compliance review and approval. Examples of accessory uses include: residences with guest houses, restaurants with bars, and churches with columbarium.

4.4. ORGANIZATION OF LAND USES

The permitted and special exception land use categories are organized by Land Use Group, Land Use Class, and Land Use Type. The Land Use Group identifies the primary activity for informational referencing. The Land Use Class and Land Use Type (if any), listed under the Land Use Group, identify permitted uses within each zone. Land Use Groups are defined in Article 11 of the UDC.

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4.5. MORE RESTRICTIVE ZONING

Within the UDC, reference is made to "more restrictive zoning" in applying development standards. For the purpose of application, this phrase shall apply in the following order, which lists the zones from the most restrictive (OS) to the least restrictive (I-2).

"OS" Open Space Zone

"IR" Institutional Reserve Zone

"RH" Rural Homestead Zone

"SR" Suburban Ranch Zone

"SH" Suburban Homestead Zone

"RX-1" Residence Zone

"RX-2" Residence Zone

"R-1" Residence Zone

"R-2" Residence Zone

"MH-1" Mobile Home Zone

"MH-2" Mobile Home Zone

"R-3" Residence Zone

"O-1" Office Zone

"O-2" Office Zone

"O-3" Office Zone

"P" Parking Zone

"RV" Recreational Vehicle Zone

"NC" Neighborhood Commercial Zone

"RVC" Rural Village Center Zone

"C-1" Commercial Zone

"C-2" Commercial Zone

"C-3" Commercial Zone

"MU" Mixed Use Zone

"OCR-1" Office/Commercial/Residential Zone

"OCR-2" Office/Commercial/Residential Zone

"P-I" Park Industrial Zone

"I-1" Light Industrial Zone

"I-2" Heavy Industrial Zone

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4.6. ZONING OF LAND ANNEXED INTO THE CITY[1]

The applicable zoning standards on land annexed into the city, unless otherwise stipulated in the annexation ordinance, shall continue to be the county zoning standards applicable to the property prior to annexation until such time they are replaced by city standards. City zoning standards shall be placed on annexed land within six months of the date of annexation. Zoning standards, zones, overlay zones, and City Zoning Maps are extended to the annexed land through a Mayor and Council Special Exception Procedure, Sec. 3.xxx.

4.7. BASE ZONES

The following base zones and specific standards are established in the city.

4.7.1. INSTITUTIONAL RESERVE (IR)

A. Purpose

The purpose of this zone is to identify lands in federal, state, city, county, and other public ownership that are natural reserves or wildlife refuge reserves. It is expected that these lands will remain reserves. However, should these lands be proposed for development with other land uses, the following standards apply. This zone is solely to provide comparable zoning for annexed areas and is not intended for rezoning.

B. Exceptions

Parcels of less than 36 acres, recorded prior to December 1, 1985, conforming to the minimum lot size requirements in effect on the date of recording, shall be deemed non-conforming.

4.7.2. RURAL HOMESTEAD ZONE (RH)

A. Purpose

This zone is intended to preserve the character and encourage the orderly growth of rural areas. It is intended to encourage rural development in areas lacking facilities for urban development and to provide for commercial and industrial development only where appropriate and necessary to serve the needs of the rural area. This zone is solely to provide comparable zoning for annexed areas and is not intended for rezoning.

B. Exceptions

Parcels of less than 180,000 square feet, recorded prior to December 1, 1985, conforming to the minimum parcel size requirements at the date of recording, shall be deemed non-conforming.

[1] Text from LUC Sec. 1.2.9.
[3] Text from LUC Sec. 2.2.4.1.

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4.7.3. SUBURBAN RANCH ZONE (SR) [3]

A. Purpose

This zone provides for very low density, large lot, single-family, residential development and suburban ranch uses. Uses that would adversely affect the open space, agricultural, or natural characteristics of this zone shall not be permitted.

4.7.4. SUBURBAN HOMESTEAD ZONE (SH) [4]

A. Purpose

This zone provides for low density, large lot, single-family, residential development and suburban ranch uses. This zone is solely to provide comparable zoning for annexed areas and is not intended for rezoning.

B. General Restrictions

Buildings and structures used for the Motion Picture Industry Use must be setback at least 100 feet from the boundary of the site.

4.7.5. RESIDENCE ZONE (RX-1)[5]

A. Purpose

This zone provides for suburban, low density, single-family, residential development and other compatible neighborhood uses.

4.7.6. RESIDENCE ZONE (RX-2)[6]

A. Purpose

This zone provides for suburban, low density, single-family, residential development and other compatible neighborhood uses.

4.7.7. RESIDENCE ZONE (R-1)[7]

A. Purpose

This zone provides for urban, low density, single-family, residential development, together with schools, parks, and other public services necessary for a satisfactory urban residential environment.

4.7.8. RESIDENCE ZONE (R-2) [8]

A. Purpose

This zone provides for medium density, single-family and multifamily, residential development, together with schools, parks, and other public services necessary for an urban residential environment.

[4] Text from LUC Sec. 2.2.6.1.
[5] Text from LUC Sec. 2.3.2.1.
[6] Text from LUC Sec. 2.3.3.1.
[7] Text from LUC Sec. 2.3.4.1.
[8] Text from LUC Sec. 2.3.5.1.

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4.7.9. RESIDENCE ZONE (R-3) [9]

A. Purpose

This zone provides for high density, residential development and compatible uses.

4.7.10. MOBILE HOME ZONE (MH-1) [10]

A. Purpose

This zone provides for low to medium density, residential development primarily in mobile home buildings on individual lots and within mobile home parks. Civic, educational, recreational, and religious uses shall also be permitted to provide for an urban residential environment.

4.7.11. MOBILE HOME ZONE (MH-2) [11]

A. Purpose

This zone provides for medium density, residential development in mobile home buildings on individual lots and within mobile home parks. Civic, educational, recreational, and religious uses shall also be permitted to provide for an urban residential environment.

4.7.12. OFFICE ZONE (O-1)[12]

A. Purpose

This zone provides for administrative and professional office uses that will complement the residential environment. Development within this zone typically consists of office conversions from existing residential uses fronting on major streets and new construction of small-scale office projects. Consolidation of lots is encouraged in order to reduce curb cuts on arterial streets and to assure compliance with the design and development standards of this zone.

B. General Restrictions[13]

The following restrictions shall apply to all uses and development in this zone.

1. Drive-through services shall not be permitted.

2. All land use activities, except vehicular use areas, shall be conducted entirely within an enclosed building unless specifically provided otherwise.

3. All **nonresidential** land use activities shall:

a. Restrict hours of operation from 7:00 a.m. to 10:00 p.m.

b. Comply with the requirements of the Tucson Code, Chapter 6, Section 6-101, Outdoor Lighting Code. Outdoor lighting utilized in conjunction with the use shall be located and directed so as to eliminate glare toward streets and adjoining R-3 or more restrictive zoning.

[9] Text from LUC Sec. 2.3.6.1.
[10] Text from LUC Sec. 2.3.7.1.
[11] Text from LUC Sec. 2.3.8.1.
[12] Text from LUC Sec. 2.4.1.1.
[13] Text from LUC Sec. 2.4.1.6.

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c. Comply with the requirements of the Tucson Code, Chapter 16, Section 16-31, Noise, and be located within an enclosed building. There shall be no openings on the side of the building adjacent to R-3 or more restrictive zoning.

4.7.13. OFFICE ZONE (O-2) [14]

A. Purpose

This zone provides for office, medical, civic, and other land uses that provide reasonable compatibility with adjoining residential uses. Typical development within this zone is two-story office or medical projects.

B. General Restrictions

The following restrictions shall apply to all uses and development in this zone.

1. Drive-through services shall not be permitted.

2. All land use activities, except vehicular use areas, shall be conducted entirely within an enclosed building unless specifically provided otherwise.

3. All **nonresidential** land uses shall:

a. Provide access from a paved public street on the Major Streets and Routes (MS&R) Plan.

b. Restrict hours of operation from 7:00 a.m. to 10:00 p.m.

c. Comply with the requirements of the Tucson Code, Chapter 6, Section 6-101, Outdoor Lighting Code. Any outdoor lighting utilized in conjunction with the use shall be located and directed so as to eliminate glare toward streets and adjoining R-3 or more restrictive zoning.

d. Comply with the requirements of the Tucson Code, Chapter 16, Section 16-31, Noise, and be located within an enclosed building with no openings on the side of the building adjacent to R-3 or more restrictive zoning.

4.7.14. OFFICE ZONE (O-3) [15]

A. Purpose

This zone provides for mid-rise office development and other land uses that provide reasonable compatibility with adjoining residential uses.

[14] Text from LUC Sec. 2.4.2.1.
[15] Text from LUC Sec. 2.4.3.1.

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B. General Restrictions[16]

The following restrictions shall apply to all uses and development in this zone.

1. Drive-through services shall not be permitted.
2. All land use activities, except vehicular use areas, shall be conducted entirely within an enclosed building unless specifically provided otherwise.

4.7.15. RURAL VILLAGE CENTER ZONE (RVC)[17]

A. Purpose

The purpose of this zone is to provide retail shopping facilities, planned and designed for the convenience and necessity of a suburban or rural neighborhood. Rural village centers shall be developed according to an approved site plan and located in accordance with adopted neighborhood, community, or area plans. The standards are designed to maintain the suburban character of duly designated commercial areas located along designated Scenic Routes and to provide safe ingress and egress to and from the village center. This zone is solely to provide for comparable zoning for areas annexed into the City limits and is not intended for rezoning.

B. General Restrictions

The following restrictions shall apply to all uses and development in this zone.

1. Drive-through or drive-in services shall not be permitted unless specifically provided for the land use.
2. All land use activities except vehicular use areas shall be conducted entirely within an enclosed building unless specifically provided otherwise.
3. The maximum area of each RVC zone shall not exceed 20 acres.

[16] Text from LUC Sec. 2.4.3.6.
[17] Text from LUC Sec. 2.5.1.1.

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4.7.16. NEIGHBORHOOD COMMERCIAL ZONE (NC)[18]

A. Purpose

This zone provides for low-intensity, small-scale, commercial and office uses that are compatible in size and design with adjacent residential uses. Residential and other related uses shall be permitted.

B. General Restrictions[19]

The following standards shall apply to all uses and development in this zone.

1. Drive-through or drive-in services shall not be permitted.

2. All land use activities, except the Residential Use Group, shall be conducted entirely within an enclosed building unless specifically provided otherwise in the Use Specific Standards. Vehicular use areas are not required to be located within enclosed buildings.

3. All land use activities, except the Residential Use Group, shall be restricted to hours of operation of 7:00 a.m. to 10:00 p.m.

4. All nonresidential development and nonresidential exterior remodeling that require a building permit shall be reviewed and approved by the Design Review Board (DRB) for architectural and site design compatibility with the surrounding residential area. Refer to Sec. 4.9.4.R.7 for DRB review standards.

5. All land uses shall be limited to 2,000 square feet of GFA, except Family Dwelling and Educational Uses. Mixed use or multi-tenant developments are limited to 10,000 square feet of GFA. A tenant within a mixed use development is limited to 2,000 square feet of GFA. Outdoor activity areas permitted in this zone shall be included in the GFA limitations.

C. Exception

On authorization of rezoning of property to the NC zone, Mayor and Council may approve land uses that will be located in existing buildings or portions thereof that exceed the limitation of 2,000 square feet of gross floor area per use or the limitations restricting mixed use or multi-tenant development to 10,000 square feet of gross floor area. The gross floor area for any such exception shall neither be increased nor enlarged following initial authorization, and the right to exceed the gross floor area restrictions shall be terminated if discontinued or abandoned.

4.7.17. COMMERCIAL ZONE (C-1)

A. Purpose

This zone provides for low-intensity, commercial and other uses that are compatible with adjacent residential uses. Residential and other related uses shall be permitted.

B. General Restrictions

The following restrictions shall apply to all uses and development in this zone.

[18] Text from LUC Sec. 2.5.2.1.
[19] Text from LUC Sec. 2.5.2.6.

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1. Drive-through services shall be prohibited except as listed below:
   a. Commercial Services and Retail Trade Uses may provide one drive-through lane.
   b. Financial Services Use may provide two drive-through lanes and one Automated Teller Machine (ATM) service lane.

2. All land use activities shall be conducted entirely within an enclosed building, except as listed below:
   a. Civic Use Group: Cemetery, Education Elementary & Secondary Schools;
   b. Commercial Use Group: Medical Services Extended Health Care;
   c. Recreation Use Group: Golf Course, Parks and Recreation; and
   d. Vehicular Use Area.

4.7.18. COMMERCIAL ZONE (C-2)

A. Purpose

This zone provides for general commercial uses that serve the community and region. Residential and other related uses shall also be permitted.

B. General Restrictions

The Land uses in the Commercial Services, Industrial, Restricted Adult Activities, and Wholesaling Use Groups shall be conducted entirely within an enclosed building unless modified by Use Specific Standards.

4.7.19. COMMERCIAL ZONE (C-3) [22]

A. Purpose

This zone provides for mid-rise development of general commercial uses that serve the community and region, located downtown or in other major activity center areas. Residential and other related uses shall also be permitted.

4.7.20. PARKING ZONE (P) [23]

A. Purpose

This zone provides for off-street motor vehicle parking within residential areas to serve land uses in another zone.

4.7.21. RECREATIONAL VEHICLE ZONE (RV)[24]

A. Purpose

[22] Text from LUC Sec. 2.5.5.1.
[23] Text from LUC Sec. 2.5.6.1.
[24] Text from LUC Sec. 2.5.7.1.

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The purpose of this zone is to provide for development of short-term occupancy recreational vehicle parks and campsites while ensuring reasonable compatibility with adjoining properties by establishing special requirements.

B. General Restrictions[25]

Storage buildings shall not be permitted in this zone as accessory to each individual unit space; however, they shall be permitted as part of the common use facility.

4.7.22. OFFICE/COMMERCIAL/RESIDENTIAL ZONE (OCR-1) [26]

A. Purpose

The purpose of this zone is to provide for high-rise development that serves the community and region and is located in major activity centers or at transit centers. A mixture of development types is encouraged, including office, commercial, and high-density residential uses.

4.7.23. OFFICE/COMMERCIAL/RESIDENTIAL ZONE (OCR-2) [27]

A. Purpose

The purpose of this zone is to provide for high-rise development that serves the community and region and is located in major activity centers. A mixture of development types is encouraged, including office, commercial, and high-density residential uses.

4.7.24. MIXED USE ZONE (MU)

A. Purpose

This zone is solely to provide for comparable zoning for areas annexed into the City limits and is not intended for rezoning.

4.7.25. PARK INDUSTRIAL ZONE (P-1) [29]

A. Purpose

This zone provides for corporate business centers and for wholesaling and manufacturing activities that can be carried on in an unobtrusive, controlled manner.

B. General Restrictions[30]

The following restrictions shall apply to land uses and development in this zone.

1. Radioactive Material Restrictions, see Sec. 4.9.5.F.

2. On land uses in the Industrial Use Group, traffic circulation shall be designed so that access to the site is from a major street or from a local street that is not

[25] Text from LUC Sec. 2.5.7.4.
[26] Text from LUC Section 2.6.1.1.
[27] Text from LUC Section 2.6.2.1.
[29] Text from LUC Section 2.7.1.1.
[30] Text from LUC Section 2.7.1.6.

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an internal residential neighborhood street and that does not provide access to residentially zoned areas unless no alternative exists.

3. Buildings and structures in the Motion Picture Industry Use must be setback at least 100 feet from the boundary of the site.

4. Accessory Retail trade use is limited to products that are wholesaled, manufactured, or stored on the premises and limited to 25 percent of the total floor area but not to exceed 2,500 square feet in the use groups below:

a. Industrial

b. Storage

c. Wholesaling

4.7.26. LIGHT INDUSTRIAL ZONE (I-1) [31]

A. Purpose

This zone provides for industrial uses that do not have offensive characteristics in addition to land uses permitted in more restrictive nonresidential zones.

B. General Restrictions[32]

The following restrictions shall apply to all land uses and development in this zone.

1. Radioactive Material Restrictions, see Sec. 4.9.5.F.

2. On land uses in the Industrial Use Group, traffic circulation shall be designed so that access to the site is from a major street or from a local street that is not an internal residential neighborhood street and that does not provide access to residentially zoned areas unless no alternative exists.

3. Buildings and structures in the Motion Picture Industry Use must be setback at least 100 feet from the boundary of the site.

4.7.27. HEAVY INDUSTRIAL ZONE (I-2) [33]

A. Purpose

This zone provides for industrial uses that are generally nuisances, making them incompatible with most other land use. These nuisances may be in the form of air pollutants; excessive noise, traffic, glare, or vibration; noxious odors; the use of hazardous materials; or unsightly appearance.

B. General Restrictions[34]

The following restrictions shall apply to all land uses and development in this zone.

1. Radioactive Material Restrictions, see Sec. 4.9.5.F.

2. On land uses in the Industrial Use Group, traffic circulation shall be designed so that access to the site is from a major street or from a local street that is not

[31] Text from LUC Section 2.7.2.1.
[32] Text from LUC Section 2.7.2.6.
[33] Text from LUC Section 2.7.3.1.
[34] Text from LUC Section 2.7.3.6.

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an internal residential neighborhood street and that does not provide access to residentially zoned areas unless no alternative exists.

3. The uses listed below must be at least 300 feet from any non-industrial zone, except where the use of the non-industrially zoned property is railroad or freeway right-of-way:

a. Extraction

b. Hazardous Material Manufacturing

c. Perishable Good Manufacturing

d. Primary Manufacturing

e. Refining

f. Salvaging and Recycling

4.7.28. OPEN SPACE ZONE (OS)

A. Purpose[35]

The purpose of the Open Space (OS) zone is to designate both public and private open space resources in order to:

1. Preserve significant natural resources and open spaces, such as areas of undisturbed native vegetation, major rock outcrops, major ridges and peaks, riparian habitats, and valuable vegetated wash segments.

2. Promote restoration of open space to provide visual, recreational, and habitat amenities.

3. Preserve vestiges of the natural desert landscape and provide opportunities for hiking, horseback riding, bicycling, and more passive recreation in a natural setting.

4. Contribute to the preservation of wildlife habitat, especially interconnected areas that foster the free movement of wildlife within the city.

5. Promote a continued economic benefit to the region by protecting open space areas for the visual and recreational enjoyment of residents and visitors alike.

6. Provide a mechanism for recognizing and protecting public and private lands that have been designated for preservation by the property owner.

B. Applicability[36]

The OS zone may be applied to both public and private lands that warrant protection as open space. The OS zone may be applied to land only with the express written consent of the property owner(s).

[35] Text from LUC Section 2.9.1.1.
[36] Text from LUC Section 2.9.1.2.

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1. Dedications and Donations

The OS zone may be applied by the City to land that is preserved by acquisition, an easement, or dedication, and/or donation to the City or other entity, for the purpose of keeping the land as permanent natural open space.

2. Fee Waiver

Fees for a rezoning application to the OS zone shall be waived.

C. General Restrictions[37]

The following restrictions shall apply to all land uses and development in this zone.

1. Unpaved or paved trails or paths shall be permitted for use only by pedestrians, non-motorized bicycles, and horses. Limited access is permitted for maintenance vehicles only. Use by all-terrain vehicles is prohibited.
2. Picnic areas, sitting areas, equestrian trail nodes, scenic lookouts, shade structures, and rest rooms shall be permitted, subject to minimal disturbance of the natural open space. Grills in the picnic areas and overnight camping are not permitted, unless located in an area that fire vehicles can access without impact on the natural open space.
3. Access driveways and parking areas shall be permitted in conjunction with the Open Space Requirements in Sec. 4.7.28.D.1 and 2, subject to minimal disturbance of the natural open space.
4. Drainage-way facilities and utility easements shall be re-vegetated to be consistent with the surrounding natural vegetation.
5. All new utilities shall be underground.

D. Open Space Requirements[38]

1. The disturbed area shall be clearly identified and the balance of the property protected during construction. All impervious surfaces, buildings, utility or drainage corridors, and structures shall be contained within the disturbed area identified on the approved site plan.
2. Whenever a portion of the property is disturbed by the construction of a permitted use or has been cleared of vegetation, the disturbed area shall be re-vegetated in conformance with an approved re-vegetation plan using plants native to the site and the immediately surrounding area. Re-vegetation shall be at a similar density to the natural surroundings.
3. The minimum width of property zoned OS shall be 40 feet, and the minimum contiguous area for OS is 4,000 square feet, unless the OS property connects to another perpetual, dedicated open space or trails resource.

[37] Text from LUC Section 2.9.1.4.
[38] Text from LUC Section 2.9.1.5.

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4.8. USE TABLE

The following use tables, Tables 4.8-1 through 4.8-6, establishes permitted and special exceptions uses in the City of Tucson. Use-specific standards that apply to uses in certain zones are included in the far right column of each table.

Land Use Groups are further defined to include Land Use Classes and Land Use Types. For example, the "Civic Land Use Group" may contain multiple "Correctional Use" Land Use Classes. The "Correctional Use" Class may contain "Supervision Facilities" or "Custodial Facilities" Land Use Types. The differentiation of types allows for increased use-specific standards and dimensional standards.

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4.8.1. PERMITTED USES: RURAL AND SUBURBAN RESIDENTIAL ZONES

TABLE 4.8-1: PERMITTED USES– RURAL AND SUBURBAN RESIDENTIAL ZONES

P = Permitted Use *S = Permitted as Special Exception Use* *G = Permitted Use if Governmentally Owned and Operated*

[1] Mayor and Council Special Exception Procedure, Sec. 3.xxx
[2] Zoning Examiner Special Exception Procedure, Sec. 3.xxx
[3] Administrative Special Exception Procedure, Sec. 3.xxx

LAND USE	RH	SR	SH	RX-1	RX-2	USE SPECIFIC STANDARDS
Agricultural Land Use Group With Land Use Class/Type:						
Animal Production (Excludes Stockyard)	P	P	P	P		**RH:** 4.9.2.A.1.a, 2.b,3.b **SR:** 4.9.2.A.1.a, 2.b,3.a **SH:** 4.9.2.A.1.b, 2.b, 2.c, 3.b **RX-1:** 4.9.2.A.1.a, 2.a, 2.b., 3.a
Animal Production Commercial Stables Only		P	P			**SR:** 4.9.2.A.1.b, 2.b **SH:** 4.9.2.A.1.b, 2.c
Animal Production Hog Ranch Only	S [1]					**RH:** 4.9.2.A.3.d
Animal Production Feedlot for Stockyard Only	S [1]					**RH:** 4.9.2..C.1
Animal Production Stable or Riding School Only	P					**RH:** 4.9.2.A.1.b, 2.b, 4.b
Crop Production	P	P	P	P	P	**RH, SR, SH, RX-1, RX-2:** 4.9.2.B.1
Crop Production with accessory Food & Beverage Sales	P	P	P			**4.9.2.B.1 and** **RH:** 4.9.9.A.2..a, 3-8 **SR, SH:** 4.9.9.A.1, 2.c, 3, 4, 7
General Farming	P	P	P	P		**4.9.2.B.1 and:** **RH:** 4.9.2.A.1.a, 2.b, 3.b **SR:** 4.9.2.A.1.a, 2.b, 3.a **SH:** 4.9.2.A.1.b, 2.b, 2.c, 3.b **RX-1:** 4.9.2.A.1.b, 2.a, 2.b, 3.a
Civic Land Use Group With Land Use Class/Type:						
Cemetery	S [1]		S [1]			**RH:** 4.9.3.A.3 **SH:** 4.9.3.A.2
Correctional Supervision Facility		S [1]				4.9.3.B.1.b, 2.a, 3.a, 4.a, 8 & 9
Correctional Custodial Facility		S [1]				4.9.3.B.1.c, 2.a, 3.a, 4.b, 8 & 9
Correctional Supervision & Custodial		S [1]				4.9.3.B.1.d, 2.c, 3.b, 4.b, 7, 8, & 9
Cultural	P	G	G	G	G	**RH:** Limited to Nature Reserve
Cultural (excludes Nature Reserve & Wildlife Refuge)	S [1]					**RH:** 4.9.3.C
Educational Elementary & Secondary School		P	P	P	P	**SR, SH, RX-1, RX-2:** 4.9.3.D
Educational Elementary & Secondary School	S [2]	S [2]	S [2]	S [2]	S [2]	
Educational Elementary & Secondary School with accessory Salvaging and Recycling		P	P	P	P	**SR, SH, RX-1, RX-2:** 4.9.3.D. & 4.9.5.G.1 & 3
Protective Service	G	G	G	G	G	**RH, SR, SH, RX-1, RX-2:** 4.9.13.F

TABLE 4.8-1: PERMITTED USES– RURAL AND SUBURBAN RESIDENTIAL ZONES

P = Permitted Use ***S = Permitted as Special Exception Use*** ***G = Permitted Use if Governmentally Owned and Operated***

[1] Mayor and Council Special Exception Procedure, Sec. 3.xxx
[2] Zoning Examiner Special Exception Procedure, Sec. 3.xxx
[3] Administrative Special Exception Procedure, Sec. 3.xxx

LAND USE	RH	SR	SH	RX-1	RX-2	USE SPECIFIC STANDARDS
Religious	P	P	P	P	P	**RH:** Use shall be 80' from any property line.
Religious with accessory Columbarium	P	P	P		P	**RH:** Use shall be 80' from any property line.
Religious with accessory Salvaging and Recycling	P	P	P		P	**RH:** Use shall be 80' from any property line and 4.9.5.G.1 & 3 **SR, SH, RX-2:** 4.9.5.G.1 & 3
Commercial Services Land Use Group With Land Use Class/Type:						
Administrative and Professional Office	S [1]					**RH:** Maximum floor area of 2,000 square feet.
Alcoholic Beverage Service	S [1]					**RH:** Maximum floor area of 2,000 square feet.
Animal Service		P	P			**SR, SH:** Use shall be setback 100' from any residentially zoned property.
Animal Service Commercial Kennel Only	S [1]					**RH:** Use shall be setback 100' from any property line.
Animal Service Veterinary Hospital Only	P					**RH:** No outdoor activity and use shall be setback 100' from any residentially zoned property.
Automotive Service Repair Excludes bodywork & paint-booths	S [1]					**RH:** 4.9.4.F.1, 6 and must have access from a paved public street on MS&R
Child Care With Extended Hours (before 6:00 am or after 7:00 pm)	S [2]	S[2]	S[2]	S[2]	S[2]	**RH, SR, SH:** 4.9.4.H.1-2 & H.9 **RX-1, RX-2:** 4.9.4.H. 1-2, H.8-9
Communications						Being Updated by Staff
Day Care Adult Maximum 10 Persons	P	P	P	P	P	Maximum includes permitted Adult Care Residents.
Day Care Child Maximum of 30 Children	P	P				**RH & SR:** 4.9.4.H. 1-5 Minimum Site 6.6 Acres
Day Care Child Maximum of 30 Children			P	P	P	**SH & RX1:** 4.9.4.H. 1-5 & Minimum site 72,000 sf **RX-2:** 4.9.4.H. 1-5 & Minimum site of 32,000 sf
Day Care Child Unlimited Number of Children	S [2]	S[2]	S[2]	S[2]	S[2]	**RH, SR, SH, RX-1, RX-2:** 4.9.4.H. 1-5, 7.f. & 8
Entertainment: Fairground, Carnival, Racetrack for Animals	S [2]					**RH:** 4.9.4.K
Financial Service	S [1]					**RH:** Excludes non-chartered financial institutions
Funeral Service Crematorium Only	S [1]		S [1]			**RH, SH:** 500' setback from any residentially zoned property.
Medical Service - Outpatient	P					**RH:** 4.9.4.O.2; 4.9.4.P.2.b, .3, &.4 and must have access from a paved public street on MS&R
Personal Service	S [1]					**RH:** Maximum floor area

TABLE 4.8-1: PERMITTED USES– RURAL AND SUBURBAN RESIDENTIAL ZONES

P = Permitted Use ***S = Permitted as Special Exception Use*** ***G = Permitted Use if Governmentally Owned and Operated***

[1] Mayor and Council Special Exception Procedure, Sec. 3.xxx
[2] Zoning Examiner Special Exception Procedure, Sec. 3.xxx
[3] Administrative Special Exception Procedure, Sec. 3.xxx

LAND USE	RH	SR	SH	RX-1	RX-2	USE SPECIFIC STANDARDS
						2,000 square feet.
Trade Service and Repair Minor	S[1]					
Transportation Service Airport Facilities	S [1]					**RH:** 4.9.4.Y.1 & 2.
Transportation Service General Aviation Airstrip	S [1]					**RH:** 4.9.4.Y.1 - 4
Traveler's Accommodation Lodging		P	P	P		**SR, SH, RX-1:** Minimum 50' side and rear yard setbacks Minimum lot size 10 Acres
Traveler's Accommodation Lodging	S [1]					
Industrial Land Use Group With Land Use Class/Type:						
Extraction	S [1]					**RH:** 4.9.5.B
Motion Picture Industry			S [1]			**SH:** 4.9.13.C
Perishable Goods Manufacturing	S [1]					**RH:** 4.9.5.E.2, .3
Primary Manufacturing Asphalt and Cement Plants Only	S [1]					**RH:** 4.9.5.B
Recreation Land Use Group With Land Use Class/Type:						
Commercial Recreation	S [1]					**RH:** Minimum setback shall be 100' from property line. Must have access from a paved public street on MS&R
Golf Course		P	P	P	P	Minimum lot size 30 acres **SR, SH, RX-1, RX-2:** 4.9.6.A.
Parks and Recreation		P	P	P	P	**SR, SH, RX-1, RX-2:** 4.9.13.C and must have access from a paved public street on MS&R
Residential Land Use Group With Land Use Class/Type:						
Adult Care or Physical Behavioral Health Services For Maximum 10 Residents	P	P	P	P	P	**RH, SR, SH, RX-1, RX-2:** 4.9.7.I.2.a, 3.a, & 4
Adult Care or Physical Behavioral Health Services For Maximum 15 Residents	S [2]	S [2]	S [2]	S [2]	S [2]	**RH, SR, SH, RX-1, RX-2:** 4.9.7.I.2.a, 3.b, & 4
Adult Care or Physical Behavioral Health Services For Unlimited Residents	S [2]	S [2]	S [2]	S [2]	S [2]	**RH, SR, SH, RX-1, RX-2:** 4.9.7.I.2.a, 3.d, 4, & 7 and Minimum 3 acre lot
Family Dwelling	P	P	P	P	P	**SR, RX-1, RX-2:** 4.9.7.B.6
Family Dwelling with accessory Home Occupations	P	P	P	P	P	**RH, SH:** 4.9.7.E **SR, RX-1, RX-2:** 4.9.7.B.6 and 4.9.7.E
Family Dwelling with accessory Group Dwelling	P	P	P	P	P	**RH, SR, SH, RX-1, RX-2:** 4.9.7.B.6 and 4.9.7.F
Family Dwelling with accessory Traveler's Accommodation		P	P	P	P	**SR, SH, RX-1, RX-2:** 4.9.7.B.6 and

TABLE 4.8-1: PERMITTED USES– RURAL AND SUBURBAN RESIDENTIAL ZONES *P = Permitted Use* *S = Permitted as Special Exception Use* *G = Permitted Use if Governmentally Owned and Operated* *[1] Mayor and Council Special Exception Procedure, Sec. 3.xxx* *[2] Zoning Examiner Special Exception Procedure, Sec. 3.xxx* *[3] Administrative Special Exception Procedure, Sec. 3.xxx*						
LAND USE	**RH**	**SR**	**SH**	**RX-1**	**RX-2**	**USE SPECIFIC STANDARDS**
Lodging for Maximum 4 Guests DRB review required						4.9.7.G.1, & G.5-11
Family Dwelling with accessory Traveler's Accommodation Lodging for Maximum 8 guests DRB review required		S [2]	S[2]	S[2]	S[2]	**SR, SH, RX-1, RX-2:** 4.9.7.B.6 and 4.9.7.G.2, G.5-12, & G.14
Mobile Home Dwelling	P		P			
Mobile Home Dwelling with accessory Home Occupations	P		P			**RH, SH:** 4.9.7.E
Mobile Home Dwelling with accessory Group Dwelling	P		P			**RH, SH:** 4.9.7.F
Retail Trade Land Use Group With Land Use Class/Type:						
Artists/Artisans Workshop/Studio	S [2]					**RH:** Maximum floor area is 2,000 square feet.
Feed store	S [1]					**RH: M**ust have access from a paved public street on MS&R
Food and Beverage Sales	S [1]					**RH:** Maximum floor area is 4,000 square feet.
Fuel dispensing	S [1]					**RH: M**ust have access from a paved public street on MS&R
General Merchandise Sales	S [1]					
Storage Land Use Group With Land Use Class/Type:						
Any Permitted Land Use with accessory Hazardous Material Storage	P	P	P	P	P	**RH:** 4.9.10.B.1, and 2.a.
Utilities Land Use Group With Land Use Class/Type:						
Distribution System		S [2]	S [2]	S [2]	S [2]	**SR, SH, RX-1, RX-2:** 4.9.11.A. 1, .2, .5, .8, .9, .11
Distribution System Limited to: Power Substation with Input Voltage of 115 Kilovolts or Greater	S [2]					**RH:** 4.9.11.A.3, .6, .7, .10
Distribution System Limited to: Telephone, Telegraph, or Power Substations with Input Voltage Less than 115 Kilovolts	S [2]					**RH:** 4.9.11.A.2, 8
Distribution System Limited to: Water Pumping and Storage Facilities Serving Two or More Properties as Public, Private, or Community Utility	S [2]					**RH:** 4.9.11.A.4
Renewable Energy Generation	S [2]	S [2]	S[2]	S[2]	S [2]	**RH, SR, SH, RX-1, RX-2:** 4.9.11.B.2, .3, .4, .5

4.8.2. PERMITTED USES: URBAN RESIDENTIAL ZONES

TABLE 4.8-2: PERMITTED USES– URBAN RESIDENTIAL ZONES

P = Permitted Use *S = Permitted as Special Exception Use* *G = Permitted Use if Governmentally Owned and Operated*

[1] Mayor and Council Special Exception Procedure, Sec. 3.xxx
[2] Zoning Examiner Special Exception Procedure, Sec. 3.xxx
[3] Administrative Special Exception Procedure, Sec. 3.xxx

LAND USE	R-1	R-2	R-3	MH-1	MH-2	USE SPECIFIC STANDARDS
Agricultural Land Use Group With Land Use Class/Type:						
Crop Production	P	P	P	P	P	**All zones:** Any greenhouse heating plant or cooling fan shall be setback a minimum of 200' from any property line.
Civic Land Use Group With Land Use Class/Type:						
Cemetery		P	P			**R-2, R-3:** Use shall be adjacent to or an extension of an existing cemetery.
Civic Assembly			G			
Cultural Use	G	G	G	G	G	**R-1 R-2, MH-1, MH-2:** 20,000 sf minimum lot size.
Cultural Use	S [1]	S [1]	S [1]			**R-1, R-2, R-3:** 4.9.3.C.2 –.8
Cultural Use with Food Service	G	G	G			**R-1, R-2, R-3:** 4.9.4.M.1, .3 & 20,000 sf minimum lot size
Cultural Use with Alcoholic Beverage Service	G	G	G			**R-1, R-2, R-3:** 4.9.4.C.3 & 4.9.4.V.4, .9 and 20,000 sf minimum lot size
Cultural Use with Entertainment	G	G	G			**R-1. R-2, R-3:** 4.9.4.K.6 and 20,000 sf minimum lot size
Cultural Use with General Merchandise Sales	G	G	G			**R-1, R-2, R-3:** 4.9.9.B.1, .2 **and** 20,000 sf minimum lot size
Educational Use Elementary and Secondary School	P	P	P	P	P	**R-1, R-2, R-3, MH-1, MH-2:** 4.9.3.D.1-7
Educational Use Elementary and Secondary School	S [2]	S [2]	S [2]	S [2]	S [2]	
Educational Use with Salvaging and Recycling	P	P	P	P	P	**R-1, R-2, R-3, MH-1, MH-2:** 4.9.3.D.1-7 & 4.9.5.G.1 & 3
Postal Service		G	G			**R-2, R-3:** 20,000 sf minimum lot size
Protective Service	G	G	G	G	G	**R-1, R-2, R-3, MH-1, MH-2:** 4.9.13.F
Religious Use	P	P	P	P	P	**R-1, R-2, MH-1, MH-2:** 20,000 sf minimum lot size
Religious Use with accessory Columbarium	P	P	P	P	P	**R-1, R-2, MH-1, MH-2:** 20,000 sf minimum lot size
Religious Use with accessory Salvaging and Recycling	P	P	P	P	P	**R-1, R-2, MH-1, MH-2:** 20,000 sf minimum lot size and 4.9.5.G.1 & 3
Commercial Services Land Use Group						
Administrative and Professional Office		G	G		G	**R-2, MH-2:** One acre minimum lot size **R-3:** 72,000 sf minimum lot size
Communications						Being Updated by Staff
Day Care, Adult	P	P	P	P		**R-1, R-2, MH-1:** 4.9.4.B.1 **R-3:** 4.9.4.B.2

TABLE 4.8-2: PERMITTED USES– URBAN RESIDENTIAL ZONES *P = Permitted Use* *S = Permitted as Special Exception Use* *G = Permitted Use if Governmentally Owned and Operated* *[1] Mayor and Council Special Exception Procedure, Sec. 3.xxx* *[2] Zoning Examiner Special Exception Procedure, Sec. 3.xxx* *[3] Administrative Special Exception Procedure, Sec. 3.xxx*						
LAND USE	**R-1**	**R-2**	**R-3**	**MH-1**	**MH-2**	**USE SPECIFIC STANDARDS**
Day Care, Child Maximum 30 Children	P	P				**R-1, R-2:** 4.9.4.H.1-5, 6.a and 7.d. 14,000 sf minimum lot size
Day Care, Child Unlimited number of children			P			**R-3:** 4.9.4.H.1-5, 6.C and 7.e 10,000 sf minimum lot size
Medical Services		S [2]	S [2]			**R-2& R-3**: 4.9.4.O.2,4 and 4.9.4.P.1,2.a,3, &.4
Recreation Land Use Group With Land Use Class/Type:						
Parks and Recreation	P	P	P	P	P	**R-1, R-2, R-3, MH-1, MH-2:** 4.9.13.B & C
Residential Land Use Group With Land Use Class/Type:						
Adult Care or Physical and Behavioral Health Services for Maximum **10** Residents	P	P	P	P	P	**R-1, R-2**: 4.9.7.I.2.a, .3.a, .4 **R-3, MH-1, MH-2**: 4.9.7.I.3.a, .4
Adult Care or Physical and Behavioral Health Services for **Unlimited** Number Residents		P	P			**R-2:** 4.9.7.I.2.a, .3.d, .4, .7 **R-3:** 4.9.7.I.3.d, .4, .8 (no minimum lot size)
Adult Care or Physical and Behavioral Health Services for Maximum **15** Residents	S [2]	S [2]		S[2]		**R-1, R-2**: 4.9.7.I.2.a, .3.b, .4 **MH-1**: 4.9.7.I.3.b, .4
Adult Care or Physical and Behavioral Health Services for **Unlimited** Number Residents	S [2]			S[2]		**R-1**: 4.9.7.I.2.a, 3.d, .4, .8 **MH-1**: 4.9.7.I.3.d, .4, .8
Adult Rehabilitation Service or Shelter Care for Maximum **10** Residents		S [2]				**R-2**: 4.9.7.I.1, .2.b, .3.a, .4, 9
Adult Rehabilitation Service or Shelter Care for Maximum **20** Residents			S [2]			**R-3**: 4.9.7.I.1, .2.b, .3.c, .4, 9
Adult Rehabilitation Service or Shelter Care for **Unlimited** Number Residents		S[2]	S [2]			**R-2**: 4.9.7.I.1, 2.a, .3.d, .4, 8 ?
Child Rehabilitation Service for Maximum 10 Residents		P	P			**R-2, R-3**: 4.9.7.I.1, .2.a, .3.a, .4
Family Dwelling	P	P	P	P	P	**R-1**: 4.9.7.B.5, .6, .7, .8 (single family) or 4.9.7.B (two dwellings) **R-2, R-3**: 4.9.7.B.6
Family Dwelling with accessoryTravelers' Accommodation Lodging with Maximum of **4** guests	P			P		**R-1, MH-1:** 4.9.7.G.1 and G.5-11
Family Dwelling with accessoryTravelers' Accommodation Lodging with Maximum of **8** guests		P			P	**R-2, MH-2:** 4.9.7.G.2 and G.5-11
Family Dwelling with accessoryTravelers' Accommodation Lodging with Maximum of **20** guests			P			**R-3:** 4.9.7.G.4 and G.5-11

TABLE 4.8-2: PERMITTED USES– URBAN RESIDENTIAL ZONES *P = Permitted Use* *S = Permitted as Special Exception Use* *G = Permitted Use if Governmentally Owned and Operated* *[1] Mayor and Council Special Exception Procedure, Sec. 3.xxx* *[2] Zoning Examiner Special Exception Procedure, Sec. 3.xxx* *[3] Administrative Special Exception Procedure, Sec. 3.xxx*						
LAND USE	**R-1**	**R-2**	**R-3**	**MH-1**	**MH-2**	**USE SPECIFIC STANDARDS**
Family or Mobile Home Dwelling with accessory General Home Occupation	P	P	P	P	P	**R-1, R-2, R-3, MH-1, MH-2:** 4.9.7.E.
Group Dwelling			P			**R-3:** 4.9.7.B.6
Mobile Home Dwelling				P	P	
Mobile Home Park (100 spaces or more) with Accessory Use					P	**MH-2:** 4.9.7.H
Mobile Home Park with Travelers Accommodation, Campsite				P	P	**MH-1, MH-2:** 4.9.4.Z
Shelter Care for Victims of Domestic Violence for Maximum 10 Residents		P	P			**R-2:** 4.9.7.I.1, .2.a, .3.a, .4, 9 **R-3:** 4.9.7.I.1, .2.b, .3.a, .4, 9
Storage Land Use Group With Land Use Class/Type:						
Hazardous Material Storage as Accessory use to a Permitted Land Use	P	P	P	P	P	**R-1, R-2, R-3, MH-1, MH-2:** 4.9.10.B.1, .2.a
Utilities Land Use Group With Land Use Class/Type:						
Distribution System	S [2]	S [2]	S [2]	S [2]	S [2]	**R-1, R-2, R-3, MH-1, MH-2:** 4.9.11.A.1, .2, .5, .8, .10, .11
Renewable Energy Generation	S [2]	S [2]	S [2]	S [2]	S [2]	**R-1, R-2, R-3 MH-1, MH-2:** 4.9.11.B.2, .3, .4, .5

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4.8.3. PERMITTED USES: SPECIAL PURPOSE ZONES

TABLE 4.8-3: Permitted Uses – SPECIAL PURPOSE ZONES

P = Permitted Use ***S = Permitted as Special Exception Use*** ***G= Government Owned & Operated***

[1] Mayor and Council Special Exception Procedure, Sec. 3.xxx
[2] Zoning Examiner Special Exception Procedure, Sec. 3.xxx
[3] Administrative Special Exception Procedure, Sec. 3.xxx

LAND USE	IR	OS	P	RV	USE SPECIFIC STANDARDS
Agricultural Land Use Group With Land Use Class/Type:					
Animal Production (Excludes Stockyard)	P				**IR:** 4.9.2.A.1.a, 2.b, 3.b, 3.c
Animal Production Hog Ranch Only	S [1]				**IR:** 4.9.2.A.3.d
Animal Production Stable or Riding School Only	P				**IR:** 4.9.2.A.2.b, 4
Crop Production	P				**IR:** 4.9.2.B
Crop Production with accessory Food and Beverage Sales	P				**IR:** 4.9.9.A.2.a, 3-9.
General Farming	P				**IR:** 4.9.2.A.1.a, 2.b, 3.b, 3.c; 4.9.2.B
Stockyard Operation Feedlot for Stockyard Only	S [1]				**IR:** 4.9.2..C.1
Stockyard Operation Livestock Auction Yard	S [1]				**IR:** 4.9.2..C.2
Civic Land Use Group With Land Use Class/Type:					
Cultural Use: Limited to Nature Reserve	P				
Cultural Use: Other than Nature Reserve or Wildlife Refuge	S [2]				**IR:** 4.9.3.C.1
Educational Use: Elementary and Secondary Schools	S [2]				
Educational Use with Salvaging and Recycling	S [2]				**IR:** 4.9.5.G.1, .3
Protective Services	G				**IR:** 4.9.13.F
Religious Uses	P				
Religious Use with Columbarium	P				
Religious Use with Salvaging and Recycling	P				**IR:** 4.9.5.G.1, .3
Commercial Services Land Use Group With Land Use Class/Type:					
Administrative and Professional Office	S [2]				**IR:** 4.9.4.A.1
Animal Services: Limited to Veterinary Hospital	P				**IR:** 4.9.4.D.5
Communications, General					Being Updated by Staff
Construction Service	S [1]				**IR:** 4.9.4.J; 4.9.13.A.2
Entertainment Carnival	S [1]				**IR:** 4.9.4.K.5
Entertainment Racetrack (Animals)	S [1]				**IR:** 4.9.4.K.5
Medical Services: Outpatient	P				**IR: 4.9.4.O.3**; 4.9.4.P.2.b, .3, .4; 4.9.13.A.2
Parking			P		**P:** 4.9.4.S

TABLE 4.8-3: Permitted Uses – SPECIAL PURPOSE ZONES

P = Permitted Use ***S = Permitted as Special Exception Use*** ***G= Government Owned & Operated***

[1] Mayor and Council Special Exception Procedure, Sec. 3.xxx
[2] Zoning Examiner Special Exception Procedure, Sec. 3.xxx
[3] Administrative Special Exception Procedure, Sec. 3.xxx

LAND USE	IR	OS	P	RV	USE SPECIFIC STANDARDS
Transportation Service Air Carrier, Airport Facilities	S [1]				**IR:** 4.9.4.Y.1 & 2
Transportation Service Air Carrier, General Aviation Strip	S [1]				**IR:** 4.9.4.Y.1 - 4
Transportation Service Air Carrier, Ultra-light Airstrip	S [1]				
Transportation Service Air Carrier, Ultra-light Flight Park	S [1]				**IR:** 4.9.4.Y.2 & 3
Travelers Accommodation: Campsite				P	
Travelers Accommodation: Campsite **(200 spaces or more)** with accessory Day Care, Personal Service, Food and Beverage Sales, General Merchandise Sales, Recreation, Family Dwelling, Mobile Home Dwelling, or Adult Care Services				P	**RV:** 4.9.7.H.1, .2
Travelers Accommodation: Lodging	S [1]				
Industrial Land Use Group With Land Use Class/Type:					
Extraction	S [1]				**IR:** 4.9.5.B.1, .2
Perishable Goods Manufacturing	S [1]				**IR:** 4.9.5.E.2, .3
Recreational Land Use Group With Land Use Class/Type:					
Open Space		P			**OS:** 4.7.28.C, .D
Residential Land Use Group With Land Use Class/Type:					
Family Dwelling	P				
Family or Mobile Home Dwelling with accessory Home Occupation	P				**IR:** 4.9.7.E
Family or Mobile Home Dwelling with accessory Home Occupation Group Dwelling	P				**IR:** 4.9.7.F.1-3.
Mobile Home Dwelling	P				
Retail Trade Use Group With Land Use Class/Type:					
General Merchandise Sales: Artists or Artisan Workshop or Studio	S [2]				**IR:** 4.9.9.B.2
General Merchandise Sales: Feed Store	S [2]				**IR:** 4.9.13.A.2
Storage Use Group With Land Use Class/Type:					
Hazardous Material Storage as Use to any Permitted Land Use	P			P	**IR, RV:** 4.9.10.B.1, .2.a
Utilities Land Use Group With Land Use Class/Type:					
Distribution System limited to: Power Substations with an Input 115 Kilovolts or Greater	S [2]				**IR:** 4.9.11.A.3, .6, .7, .10
Distribution System limited to: Telephone, Telegraph, or Power Substations with an Input of 115	S [2]				**IR:** 4.9.11.A.2, .8

TABLE 4.8-3: Permitted Uses – SPECIAL PURPOSE ZONES *P = Permitted Use* *S = Permitted as Special Exception Use* *G= Government Owned & Operated* *[1] Mayor and Council Special Exception Procedure, Sec. 3.xxx* *[2] Zoning Examiner Special Exception Procedure, Sec. 3.xxx* *[3] Administrative Special Exception Procedure, Sec. 3.xxx*					
LAND USE	**IR**	**OS**	**P**	**RV**	**USE SPECIFIC STANDARDS**
Kilovolts					
Distribution System limited to: Water pumping and storage facilities operated as part of a system serving 2 or more properties as a private, public, or community utility	S [2]				**IR:** 4.9.11.A.4
Renewable Energy Generation	S [2]				**IR :** 4.9.11.B.2, .3, .4, .5

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4.8.4. PERMITTED USES: COMMERCIAL ZONES

TABLE 4.8-4: PERMITTED USES – COMMERCIAL ZONES

P = Permitted Use *S = Permitted as Special Exception Use* *G = Permitted Use if Governmentally Owned and Operated*
[1] Mayor and Council Special Exception Procedure, Sec. 3.xxx
[2] Zoning Examiner Special Exception Procedure, Sec. 3.xxx
[3] Administrative Special Exception Procedure, Sec. 3.xxx

LAND USE	NC	RVC	C-1	C-2	C-3	USE SPECIFIC STANDARDS
Civic Land Use Group With Land Use Class/Type:						
Cemetery			P			**C-1:** 4.9.3.A.1, .5, .6 Minimum 10 acre lot size
Civic Assembly			P	P	P	
Correctional Use Custodial Facility				S [1]	S[1]	**C-2 & C-3:** 4.9.3.B.1.a, 2.b, 3.b, 6, 7 & 8
Correctional Use Supervision Facility				P	P	**C-2 & C-3:** 4.9.3.B.1.a, 2.b,3.a, 4.d, 6 & 8
Cultural Use	G	G	G	P	P	
Educational Use Elementary and Secondary Schools	S [2]		S [2]	S [2]	S [2]	
Educational Use Elementary and Secondary Schools	P		P	P	P	**NC , C-1, C-2, C-3:** 4.9.3.D.1 – 7
Educational Use Instructional School			P	P	P	
Educational Use Postsecondary Institution			P	P	P	**C-1, C-2, C-3**: 4.9.3.E
Educational Use with accessory Salvaging and Recycling	P		P	P	P	**NC, C-1, C-2, C-3:** 4.9.3.D.1-7 **&** 4.9.5.G.1, .3
Membership Organization			P	P	P	
Postal Service	G	G	G	P	P	
Protective Service	G	G	G	P	P	
Religious Use		P	P	P	P	
Religious Use with accessory Columbarium		P	P	P	P	
Religious Use with accessory Salvaging and Recycling		P	P	P	P	**RVC, C-1, C-2, C-3:** 4.9.5.G.1, .3
Commercial Services Land Use Group With Land Use Class/Type:*						
Administrative and Professional Office	P	P	P	P	P	
Alcoholic Beverage Service, Excludes Large Bars				P	P	
Alcoholic Beverage Service, Large Bar				S [1]	S [1]	**C-2, C-3**: 4.9.4.C.2
Alcoholic Beverage Service Excludes Large Bars, with accessory Perishable Goods Manufacturing				P	P	**C-2, C-3:** 4.9.5.E.6, 7, 8
Animal Service			P	P	P	**C-1, C-2:** 4.9.4.D.1, .2, .3, .4 **C-3:** 4.9.4.D.1, .2, .3, .4 or 4.9.4.D.7
Artisan Residence	P		P	P	P	**NC, C-1, C-2, C-3:** 4.9.4.E.1, .2, .3, .4, .5

TABLE 4.8-4: PERMITTED USES – COMMERCIAL ZONES

P = Permitted Use *S = Permitted as Special Exception Use* *G = Permitted Use if Governmentally Owned and Operated*

[1] Mayor and Council Special Exception Procedure, Sec. 3.xxx
[2] Zoning Examiner Special Exception Procedure, Sec. 3.xxx
[3] Administrative Special Exception Procedure, Sec. 3.xxx

LAND USE	NC	RVC	C-1	C-2	C-3	USE SPECIFIC STANDARDS
Automotive Service and Repair (Excludes bodywork and paint-booths)				P	P	
Automotive Service and Repair: Minor Service and Repair		S [1]	S [2]			**RVC:** 4.9.4.F.5 **C-1:** 4.9.4.F.2, .3, .4, .5
Billboard				P	P	**C-2, C-3:** 4.9.4.G. & Standards of Ch. 3 of the Tucson Code
Buildings and Ground Maintenance				P	P	
Communications						Being Updated by Staff
Construction Service				P	P	
Day Care	P	P	P	P	P	
Entertainment, General			P	P	P	**C-1:** 4.9.4.C.3 **C-2 & C-3:** 4.9.4.K.1, .2, .3, .4 & 4.9.4.C.3
Entertainment: Dance Hall				S[1]	S [1]	**C-2, C-3**: 4.9.4.C.2
Financial Service	P	P	P	P	P	**NC, RVC, C-3:** 4.9.4.L.3 **C-1:** 4.9.4.L.1, .3 **C-2:** 4.9.4.L.3
Financial Service: Non-chartered Financial Institution				S[2]	S[2]	**C-2, C-3:** 4.9.4.L.4
Food Service Excludes Soup Kitchens	P	P	P	P	P	**RVC:** 4.9.4.M.2 & 4.9.4.V.3 **C-1, NC:** 4.9.4.M.1 &5 **C-2:** 4.9.4.M.1
Food Service Soup Kitchens				S [1]	S [1]	**C-2, C-3**: 4.9.4.M.4
Food Service with accessory Alcoholic Beverage Service		S [1]	P			**RVC:** 4.9.4.V.2, .3, .4 & 4.9.4.C.3 **C-1:** 4.9.4.V.1, 5-9 & 4.9.4.C.3
Food Service with accessory Microbrewery			S [2]			**C-1:** 4.9.4.M.1 & 4.9.5.E.6, .7, .8
Funeral Service				P	P	
General Merchandise Sales, (automotive fuel) with accessory Auto Minor Service and Repair			P			**C-1:** 4.9.4.F.7
Medical Service: Extended Healthcare			P	P	P	
Medical Service: Major			P	P	P	
Medical Service: Outpatient		P	P	P	P	**RVC, C-1, C-2, C-3**: 4.9.4.O.2
Medical Service: Outpatient, Limited to a Blood Donor Center			S [1]	S [1]	S [1]	**C-1, C-2, C-3**: 4.9.4.O.3
Parking			P	P	P	
Personal Service	P	P	P	P	P	**RVC:** 4.9.4.T.2, .3 **C-1, NC:** 4.9.4.T.1
Research and Product Development			P	P	P	
Technical Service			P	P	P	**C-1:** 4.9.4.W.1 **C-2, C-3:** 4.9.4.W.2

TABLE 4.8-4: PERMITTED USES – COMMERCIAL ZONES

P = Permitted Use *S = Permitted as Special Exception Use* *G = Permitted Use if Governmentally Owned and Operated*

[1] Mayor and Council Special Exception Procedure, Sec. 3.xxx
[2] Zoning Examiner Special Exception Procedure, Sec. 3.xxx
[3] Administrative Special Exception Procedure, Sec. 3.xxx

LAND USE	NC	RVC	C-1	C-2	C-3	USE SPECIFIC STANDARDS
Trade Service and Repair: Major (includes automotive bodywork and paint-booths)					P	**C-3:** No openings within 30 feet of adjacent residentially zoned property.
Trade Service and Repair: Minor	P		P	P	P	**NC:** Excludes upholstery shops **C-1:** Excludes upholstery, burglar alarm repair, and motor vehicle stereo repair.
Transportation Services: Land Carrier				P	P	
Travelers Accommodation: Lodging			P	P	P	
Travelers Accommodation: Lodging with accessory Alcoholic Beverage Service			S [2]			**C-1:** 4.9.4.BB. 2, 4, 7, 8, 9, 11 Excludes large bars and dance halls.
All Permitted Commercial Services Uses with accessory: General Manufacturing; Heavy Equipment Manufacturing; Perishable Goods Manufacturing*; Precision Manufacturing; Primary Manufacturing				P	P	**C-2, C-3:** * Perishable Goods Manufacturing is limited to baked goods and confectionary products
All Permitted Commercial Services with accessory Perishable Goods Manufacturing			P			**C-1:** 4.9.5.E.4, .5, .8
All Permitted Commercial Services with accessory Salvaging and Recycling	P	P	P	P	P	**NC, RVC, C-1, C-2, C-3:** 4.9.5.G.1, .3
Industrial Land Use Group With Land Use Class/Type:						
Craftwork				P	P	
Processing and Cleaning				P	P	
Salvaging and Recycling				P	P	**C-2, C-3:** 4.9.5.G.2, .3, .5
Salvaging and Recycling: Limited to Household Goods Donation Center			S [2]	S [3]	P	**C-1, C-2:** 4.9.5.G.2, .6 –12; 4.9.13.A.2, .B-D **C-3:** 4.9.5.G.2, .3, .6 -11; 4.9.13.C & .D
Recreation Land Use Group With Land Use Class/Type:						
Commercial Recreation			P	P	P	
Golf Course			P	P	P	**C-1, C-3:** 4.9.6.A.1.a – f **C-2:** 4.9.6.A.1.a – f, h
Parks and Recreation	P		P	P	P	

TABLE 4.8-4: PERMITTED USES – COMMERCIAL ZONES

P = Permitted Use *S = Permitted as Special Exception Use* *G = Permitted Use if Governmentally Owned and Operated*

[1] Mayor and Council Special Exception Procedure, Sec. 3.xxx
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[3] Administrative Special Exception Procedure, Sec. 3.xxx

LAND USE	NC	RVC	C-1	C-2	C-3	USE SPECIFIC STANDARDS
Residential Land Use Group With Land Use Class/Type:						
Adult Care or Physical and Behavioral Health Services Maximum 10 Residents	P					**NC:** 4.9.7.I.3.a, .4
Adult Care or Physical and Behavioral Health Services Unlimited Number Residents			P	P	P	**C-1, C-2:** 4.9.7.I.3.d, .4, .8 **C-3:** 4.9.7.I.3.d, .4
Adult Rehabilitation or Shelter Care Maximum 10 Residents			P	P	P	**C-1, C-2, C-3:** 4.9.7.I.1, 3.a, .4, .6, .8
Adult Rehabilitation or Shelter Care Unlimited Number Residents			S [2]	S [2]	S [2]	**C-1, C-2, C-3:** 4.9.7.I.1, 3.d, .4, .6, .8
Child Rehabilitation Service Maximum 10 Residents	P		P	P	P	**NC, C-1, C-2, C-3:** 4.9.7.I.1, 3.a, .4
Family Dwelling	P		P	P	P	
Family Dwelling with Home Occupations	P		P	P	P	Being updated by staff.
Family Dwelling with General Farming				P	P	**C-2, C-3:** 4.9.2.A.1.a, 3.a & 4.9.2.B.1
Family Dwelling with Traveler's Accommodation Lodging	P					**NC:** 4.9.7.G. 1, 5, 6, 7, 8, 9, 10, 11, 12
Family Dwelling within the Rio Nuevo and Downtown Zone	P					
Group Dwelling			P	P	P	
Shelter Care for Victims of Domestic Violence for Maximum **15** Residents			P			**C-1:** 4.9.7.I.1, 3.b, .4
Shelter Care for Victims of Domestic Violence for Maximum **20** Residents				P	P	**C-2, C-3:** 4.9.7.I.1, 3.c, .4
Restricted Adult Activities Use Group With Land Use Class/Type:						
Adult Commercial Services, Recreation, or Retail Trade				P	P	**C-2, C-3**: 4.9.8
Retail Trade Use Group With Land Use Class/Type:						
Construction Material Sales				P	P	
Food and Beverage Sales, General	P	P	P	P	P	**NC:** Excludes alcoholic beverage sales

TABLE 4.8-4: PERMITTED USES – COMMERCIAL ZONES

P = Permitted Use *S = Permitted as Special Exception Use* *G = Permitted Use if Governmentally Owned and Operated*

[1] Mayor and Council Special Exception Procedure, Sec. 3.xxx
[2] Zoning Examiner Special Exception Procedure, Sec. 3.xxx
[3] Administrative Special Exception Procedure, Sec. 3.xxx

LAND USE	NC	RVC	C-1	C-2	C-3	USE SPECIFIC STANDARDS
Food and Beverage Sales: Large Retail Establishment		S [1]	S [1]	S [1]	S [1]	**RVC, C-1, C-2, C-3:** 4.9.9.D
Medical Marijuana Designated Caregiver Cultivation Location					P	**C-3:** 4.9.9.E.2 & 3
Medical Marijuana Dispensary				P	P	**C-2, C-3:** 4.9.9.E.1
Medical Marijuana Dispensary Off-site Cultivation Location				P	P	**C-2, C-3:** 4.9.9.E.2
Medical Marijuana Qualifying Patient Cultivation Location				P	P	**C-2, C-3:** 4.9.9.E.4
Merchandise Sales, General	P	P	P	P	P	**C-1:** Maximum of 12 fuel dispensing locations. **C-2, C-3:** Outdoor display of odorous material shall be minimum 30 feet from interior lot line.
Merchandise Sales: Large Retail Establishment		S [1]	S [1]	S [1]	S [1]	**RVC, C-1, C-2, C-3:** 4.9.9.D
Swap Meets and Auctions				P	P	**C-2, C-3:** 4.9.9.F
Vehicle Rental and Sales				P	P	**C-2, C-3:** 4.9.9.G.1-2
All Permitted Retail Trade Uses with accessory Craftwork			P			**C-1:** 4.9.5.A
All Permitted Retail Trade Uses with accessory: General Manufacturing; Heavy Equipment Manufacturing; Precision Manufacturing; Perishable Good Manufacturing*; Primary Manufacturing				P	P	**C-2, C-3:** *Perishable Good Manufacturing is limited to baked goods and confectionary products.
All Permitted Retail Trade Uses with accessory Perishable Goods Manufacturing			P			**C-1:** 4.9.5.E.4, .5, .8
All Permitted Retail Trade Uses with accessory Salvaging and Recycling	P	P	P	P	P	**NC, RVC, C-1, C-2, C-3:** 4.9.5.G.1, .3
Storage Use Group With Land Use Class/Type:						
Commercial Storage				P	P	**C-2, C-3:** 4.9.10.A
Hazardous Material Storage with a Permitted Land Use			P	P	P	**C-1, C-2:** 4.9.10.B.1, 2.a **C-3:** 4.9.10.B.1, 2.c
Personal Storage			P	P	P	**C-1:** 4.9.10.C **C-2, C-3:** 4.9.10.C.3, .6

TABLE 4.8-4: PERMITTED USES – COMMERCIAL ZONES *P = Permitted Use* *S = Permitted as Special Exception Use* *G = Permitted Use if Governmentally Owned and Operated* *[1] Mayor and Council Special Exception Procedure, Sec. 3.xxx* *[2] Zoning Examiner Special Exception Procedure, Sec. 3.xxx* *[3] Administrative Special Exception Procedure, Sec. 3.xxx*						
LAND USE	**NC**	**RVC**	**C-1**	**C-2**	**C-3**	**USE SPECIFIC STANDARDS**
Utilities Use Group With Land Use Class/Type:						
Distribution System	S [2]	S [2]	S [2]	P	P	**NC, RVC, C-1 C-2,C-3:** 4.9.11.A.1, .5, .9
Renewable Energy Generation			S [3]	S [3]	S [3]	**C-1:** 4.9.11.B.1-5 **C-2, C-3:** 4.9.11.B.1-3 & .5
Renewable Energy Generation			S [2]	S [2]	S [2]	
Wholesaling Use Group With Land Use Class/Type:						
Business Supply and Equipment Wholesaling				P	P	
Construction/Heavy Equipment Wholesaling				P	P	
Food and Beverage Wholesaling				P	P	
All Permitted Wholesaling Uses with accessory: General Manufacturing; Heavy Equipment Manufacturing; Precision Manufacturing; Primary Manufacturing.				P	P	
All Permitted Wholesaling Uses with accessory Perishable Goods Manufacturing, limited to baked goods and confectionary products				P	P	
* All Commercial Services in the C-1 Zone may provide one drive-through service lane unless otherwise provided.						

4.8.5. PERMITTED USES: OFFICE AND MIXED USE ZONES

TABLE 4.8-5: PERMITTED USES – OFFICE AND MIXED USE ZONES

P = Permitted Use *S = Permitted as Special Exception Use* *G= Permitted if Governmentally Owned and Operated*

[1] Mayor and Council Special Exception Procedure, Sec. 3.xxx
[2] Zoning Examiner Special Exception Procedure, Sec. 3.xxx
[3] Administrative Special Exception Procedure, Sec. 3.xxx

LAND USE	O-1	O-2	O-3	MU	OCR-1	OCR-2	USE SPECIFIC STANDARDS
Agricultural Land Use Group With Land Use Class/Type:							
Animal Production, General				P			**MU**: 4.9.2.A.1.a, 1.c, 2.a, 2.b, & 3.a
Animal Production Commercial Stables Only				S [2]			**MU**: 4.9.2.A.1.b, 2.b, & 4.c
Civic Land Use Group With Land Use Class/Type:							
Cemetery			P	S [2]			**O-3:** Use must be adjacent to or extension of existing cemetery.
Civic Assembly		P	P	P	P	P	
Correctional Use Custodial Facility				S [1]	S [1]	S [1]	**MU, OCR-1, OCR-2:** 4.9.3.B.1.a, 2.b, 3.b, 6, 7 & 8
Correctional Use Supervision Facility				P	P	P	**MU, OCR-1, OCR-2:** 4.9.3.B.1.a, 2.b, 3.a, 6 & 8
Cultural Use		G	G	P	P	P	
Cultural Use	S [1]	S [1]	S [1]				**O-1, O-2, O-3:** 4.9.3.C.2 - 8
Cultural Use with accessory Food Service	S [1]	S [1]	S [1]				**O-1, O-2, O-3:** 4.9.3.C.2- 8 & 4.9.4.M.1, .3
Cultural Use with accessory Alcoholic Beverage Service	S [1]	S [1]	S [1]				**O-1, O-2, O-3:** 4.9.3.C.2- 8 **&** 4.9.4.C.3 & 4.9.4.V.4, .10
Cultural Use with accessory Entertainment	S [1]	S [1]	S [1]				**O-1, O-2, O-3:** 4.9.3.C. 2- 8 **&** 4.9.4.K.6
Cultural Use with accessory General Merchandise Sales	P	P	P				**O-1, O-2, O-3:** 4.9.3.C. 2- 8 **&** 4.9.9.B1, .2
Educational Use: Elementary and Secondary Schools		P	P		P	P	**O-2, O-3, OCR-1, OCR-2:** 4.9.3.D
Educational Use: Elementary and Secondary Schools		S [2]	S [2]		S [2]	S [2]	
Educational Use: Postsecondary Institution		P	P				**O-2, O-3:** 4.9.3.E
Educational Use: Postsecondary Institution and Instructional School				P	P	P	
Educational Use with accessory Salvaging and Recycling		P	P				**O-2, O-3:** 4.9.3.E & 4.9.5.G.1&3
Membership Organization					P	P	
Postal Service		G	G	P	P	P	
Protective Service		G	G		P	P	
Religious Use		P	P	P	P	P	
Religious Use with accessory Columbarium		P	P	P	P	P	
Religious Use with accessory Salvaging and Recycling		P	P	P	P	P	**O-2, O-3, MU, OCR-1, OCR-2:** 4.9.5.G.1, .3

TABLE 4.8-5: PERMITTED USES – OFFICE AND MIXED USE ZONES

P = Permitted Use ***S = Permitted as Special Exception Use*** ***G= Permitted if Governmentally Owned and Operated***

[1] Mayor and Council Special Exception Procedure, Sec. 3.xxx
[2] Zoning Examiner Special Exception Procedure, Sec. 3.xxx
[3] Administrative Special Exception Procedure, Sec. 3.xxx

LAND USE	O-1	O-2	O-3	MU	OCR-1	OCR-2	USE SPECIFIC STANDARDS
Commercial Services Land Use Group With Land Use Class/Type:							
Administrative and Professional Office	P	P	P	S [2]	P	P	**O-1:** 4.9.4.R
Alcoholic Beverage Service, General				S [2]	P	P	**OCR-1, OCR-2:** Prohibits bars and dance halls over 18,000 square feet.
Alcoholic Beverage Service: Bar over 18,000 sq feet					S [1]	S [1]	**OCR-1, OCR-2:** 4.9.4.C.2
Alcoholic Beverage Service with accessory Microbrewery				P	P	P	**MU, OCR-1, OCR-2:** Products manufactured shall be sold at retail on site.
Animal Services				S [2]			
Automotive Service and Repair, excludes bodywork and paint-booths				S [2]			
Billboard				S [2]			**MU:** 4.9.4.G & Tucson Code, Ch. 3 Standards
Buildings and Ground Maintenance				S [2]			
Commercial Recreation				P	P	P	
Communications							Being Updated by Staff
Construction Service				S [2]			
Day Care, General				S [2]	P	P	
Day Care, Adult		P					
Day Care, Child		P	P				**O-2:** 4.9.4.H.1-5, 6.a and 7.d **O-3:** 4.9.4.H.1-5, 6.a and 7.e OR 4.9.4.H. 1-5, 6.b and 7.f
Day Care, Child		S [2]	S [2]				**O-2:** 4.9.4.H.1-5, 6.a, 7.d & 8 OR 4.9.4.H.1, 2, and 9 **O-3:** 4.9.4.H.1-5, 6.c, and 7.g OR 4.9.4.H. 1, 2, and 0
Entertainment General				S [2]	P	P	**MU, OCR-1, OCR-2:** 4.9.4.K.1, .2, .3, .4; 4.9.4.C.3
Entertainment Dance Hall					S [1]	S [1]	**OCR-1, OCR-2:** 4.9.4.C.2
Financial Service Excludes Non-chartered Financial Institutions				S [2]	P	P	
Financial Service limited to Non-chartered Financial Institutions				S [2]	S [2]	S [2]	**MU, OCR-1, OCR-2:** 4.9.4.L.4
Food Service Excludes Soup Kitchens				S [2]	P	P	**OCR-1, OCR-2:** 4.9.4.M.1
Food Service Soup Kitchen					S [1]	S [1]	**OCR-1, OCR-2:** 4.9.4.M.4
Funeral Service				S [2]			
Medical Service Extended Healthcare		P	P	P	P	P	**MU:** 4.9.4.O.5
Medical Service Major		P	P	P	P	P	**O-2, O-3:** 4.9.4.P.1 **MU:** 4.9.4.O.5

TABLE 4.8-5: PERMITTED USES – OFFICE AND MIXED USE ZONES

P = Permitted Use ***S = Permitted as Special Exception Use*** ***G= Permitted if Governmentally Owned and Operated***

[1] Mayor and Council Special Exception Procedure, Sec. 3.xxx
[2] Zoning Examiner Special Exception Procedure, Sec. 3.xxx
[3] Administrative Special Exception Procedure, Sec. 3.xxx

LAND USE	O-1	O-2	O-3	MU	OCR-1	OCR-2	USE SPECIFIC STANDARDS
Medical Service, Major with accessory: Food Service; General Merchandise Sales; or Personal Service		P	P				**O-2, O-3:** 4.9.4.P.1 & 4.9.4.Q
Medical Service: Outpatient (excludes Blood Donor Center)	P	P	P	P	P	P	**O-1:** 4.9.4.O.1 & 4.9.4.P.1; 4.9.4.R **O-2:** 4.9.4.O.1 & 4.9.4.P.1 **MU:** 4.9.4.O.6 & 4.9.4.P.2.b, .3, .4; 4.9.13.A.2
Medical Service: Blood Donor Center					S [1]	S [1]	**OCR-1, OCR-2:** 4.9.4.O.3
Parking				S [2]	P	P	**MU:** 4.9.4.S.2
Personal Service				S [2]	P	P	
Research and Product Development			P	S [2]			**O-3:** 4.9.4.U
Technical Service				S [2]	P	P	**MU:** 4.9.4.W.2
Trade Service and Repair Major or Minor				S [2]			
Transportation Service: Land Carrier				S [2]	P	P	
Travelers Accommodation: Lodging				S [2]	P	P	
All Permitted Commercial Uses with accessory Salvaging/Recycling				P	P	P	**MU, OCR-1, OCR-2:** 4.9.5.G.1, .3
Industrial Land Use Group With Land Use Class/Type:							
Craftwork				S [2]			
General Manufacturing				S [2]			
Perishable Goods Manufacturing				S [2]			
Precision Manufacturing				S [2]			
Processing and Cleaning				S [2]			
Salvaging and Recycling: Limited to Household Goods Donation Center					P	P	**OCR-1, OCR-2:** 4.9.5.G.2, .6 - 11; 4.9.13.C; 4.9.13.D
Recreation Land Use Group With Land Use Class/Type:							
Parks and Recreation		P	P	P			
Residential Land Use Group With Land Use Class/Type:							
Family Dwelling	P	P	P	P	P	P	
Family Dwelling within the Rio Nuevo and Downtown Zone			P				
Family Dwelling with Home							Being updated by staff

TABLE 4.8-5: PERMITTED USES – OFFICE AND MIXED USE ZONES

P = Permitted Use ***S = Permitted as Special Exception Use*** ***G= Permitted if Governmentally Owned and Operated***

[1] Mayor and Council Special Exception Procedure, Sec. 3.xxx
[2] Zoning Examiner Special Exception Procedure, Sec. 3.xxx
[3] Administrative Special Exception Procedure, Sec. 3.xxx

LAND USE	O-1	O-2	O-3	MU	OCR-1	OCR-2	USE SPECIFIC STANDARDS
Occupations							
Family Dwelling with Travelers' Accommodation, Lodging Home	P	P	P				**O-1, O-2:** 4.9.7.G.1, 5 –12 **O-3:** 4.9.7.G. 4 –12
Group Dwelling				P	P	P	
Mobile Home Dwelling				P			
Adult Care or Physical and Behavioral Health Services Maximum 10 Residents	P	P	P				**O-1, O-2, O-3:** 4.9.7.I.3.a, .4
Adult Care or Physical and Behavioral Health Services Maximum 15 Residents	S [2]						**O-1:** 4.9.7.I.3.b, .4
Adult Care or Physical and Behavioral Health Services Unlimited Number Residents	S [2]		P		P	P	**(S) O-1:** 4.9.7.I.3.d, .4, .8 **O-3:** 4.9.7.I.3.d, .4, .8 **OCR-1, OCR-2:** 4.9.7.I.3.d, .4
Child Rehabilitation Services Maximum 10 Residents		P	P		P	P	**O-2:** 4.9.7.I.1, 2.b, 3.a, .4 **O-3, OCR-1, OCR-2:** 4.9.7.I.1, 3.a, .4
Adult Rehabilitation Service or Shelter Care for Maximum15 Residents		S [2]	P				**(S) O-2:** 4.9.7.I.1, .2.b, 3.b, .4, .9 **O-3:** 4.9.7.I.1, .3.b, .4, .6, .9
Adult Rehabilitation Service or Shelter Care for Unlimited Number Residents		S [2]	S [2]		P S[2]	S [2]	**O-3:** 4.9.7.I.1, 3.d, .4, 8 **OCR-1:** 4.9.7.I.1, 3.d, 4, 6, 8, **(S)OCR-1, OCR-2:** 4.9.7.I.1, 3.d, .4, 8
Shelter Care for Victims of Domestic Violence		P	P		P	P	**O-2:** 4.9.7.I.1, 2.b, 3.b, .4, .7 **O-3, OCR-1, OCR-2:** 4.9.7.I.1, 3.c, .4
Restricted Adult Activities Land Use Group With Land Use Class/Type:							
Adult Commercial Services, Recreation, Retail Trade					P	P	**OCR-1, OCR-2:** 4.9.8
Retail Trade Land Use Group With Land Use Class/Type:							
Construction Material Sales				S [2]			
Food and Beverage Sales, General				S [2]	P	P	
Food and Beverage Sales: Large Retail Establishment					S [1]	S [1]	**OCR-1, OCR-2:** 4.9.9.D
General Merchandise Sales				S [2]	P	P	**OCR-1, OCR-2:** 4.9.9.B
General Merchandise Sales: Large Retail Establishment					S [1]	S [1]	**OCR-1, OCR-2:** 4.9.9.D
Heavy Equipment Sales				S [2]			**MU:** 4.9.9.C
Swap Meets and Auctions					S [1]	S [1]	**OCR-1, OCR-2:** 4.9.9.F
Vehicle Rental and Sales				S[2]	P	P	**MU, OCR-1, OCR-2:** 4.9.9.G.1, .2

TABLE 4.8-5: PERMITTED USES – OFFICE AND MIXED USE ZONES

P = Permitted Use ***S = Permitted as Special Exception Use*** ***G= Permitted if Governmentally Owned and Operated***

[1] Mayor and Council Special Exception Procedure, Sec. 3.xxx
[2] Zoning Examiner Special Exception Procedure, Sec. 3.xxx
[3] Administrative Special Exception Procedure, Sec. 3.xxx

LAND USE	O-1	O-2	O-3	MU	OCR-1	OCR-2	USE SPECIFIC STANDARDS
All permitted Retail Uses with: Accessory General Manufacturing					P	P	**OCR-1, OCR-2:** Accessory use limited to 50% of the gross floor area.
All permitted Retail Uses with: Accessory Heavy Equipment Manufacturing					P	P	**OCR-1, OCR-2:** Accessory use limited to 50% of the gross floor area.
All permitted Retail Uses with: Accessory Perishable Goods limited to baked goods/confectionary products					P	P	**OCR-1, OCR-2:** Accessory use limited to 50% of the gross floor area.
All permitted Retail Uses with: Accessory Precision Manufacturing					P	P	**OCR-1, OCR-2:** Accessory use limited to 50% of the gross floor area.
All permitted Retail Uses with: Accessory Primary Manufacturing					P	P	**OCR-1, OCR-2:** Accessory use limited to 50% of the gross floor area.
All permitted Retail Uses with accessory Salvaging and Recycling				P	P	P	**MU, OCR-1, OCR-2:** 4.9.5.G.1, .3
Storage Land Use Group With Land Use Class/Type:							
Commercial Storage				S [2]	P	P	**MU, OCR-1, OCR-2:** 4.9.10.A
Hazardous Material Storage with a Permitted Land Use			P	P	P	P	**O-3, MU:** 4.9.10.B.1, 2.a **OCR-1, OCR-2:** 4.9.10.B.1, 2.c
Personal Storage				S [2]	P	P	**MU, OCR-1, OCR-2:** 4.9.10.C.3, .6
Utilities Land Use Group With Land Use Class/Type:							
Distribution System	S [2]	S [2]	S [2]	S [2]	P	P	**O-1, O-2, O-3, OCR-1, OCR-2:** 4.9.11.A.1, 5, 9 **MU:** 4.9.11.A.1, 2, 5, 8, 9, 11
Renewable Energy Generation	S [2]	S [2]	S [2]	S [2] S [3]	S [2] S [3]	S [2] S [3]	**O-1, O-2, O-3:** 4.9.11.B. 2-5 S[2] **OCR-1, OCR-2:** 4.9.11.B S[2] **MU:** 4.9.11.B.1,2,3,&5
Wholesaling Land Use Group With Land Use Class/Type:							
Business Supply and Equipment Wholesaling				S [2]			
Construction/ Heavy Equipment Wholesaling				S [2]			
Food and Beverage Wholesaling				S [2]			
All permitted Wholesaling uses with accessory: General Manufacturing; Heavy Equipment Manufacturing; Precision Manufacturing;					P	P	**OCR-1, OCR-2:** Accessory use limited to 50% of the gross floor area.

TABLE 4.8-5: PERMITTED USES – OFFICE AND MIXED USE ZONES *P = Permitted Use* *S = Permitted as Special Exception Use* *G= Permitted if Governmentally Owned and Operated* *[1] Mayor and Council Special Exception Procedure, Sec. 3.xxx* *[2] Zoning Examiner Special Exception Procedure, Sec. 3.xxx* *[3] Administrative Special Exception Procedure, Sec. 3.xxx*							
LAND USE	**O-1**	**O-2**	**O-3**	**MU**	**OCR-1**	**OCR-2**	**USE SPECIFIC STANDARDS**
Primary Manufacturing							
All permitted Wholesaling uses with accessory Perishable Goods Manufacturing limited to baked goods/confectionary products					P	P	**OCR-1, OCR-2:** Accessory use limited to 50% of the gross floor area.

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4.8.6. PERMITTED USES: INDUSTRIAL ZONES

TABLE 4.8-6: Permitted Uses – INDUSTRIAL ZONES

P = Permitted Use ***S = Permitted as Special Exception Use***

[1] Mayor and Council Special Exception Procedure, Sec. 3.xxx
[2] Zoning Examiner Special Exception Procedure, Sec. 3.xxx
[3] Administrative Special Exception Procedure, Sec. 3.xxx

LAND USE*	P-I	I-1	I-2	USE SPECIFIC STANDARDS
Agricultural Land Use Group With Land Use Class/Type:				
Stockyard Operation			S [1]	
Civic Land Use Group With Land Use Class/Type:				
Civic Assembly		P		
Correctional Use: Custodial Facility		S [1]	S [1]	**I-1, I-2:** 4.9.3.B.1.a, 2.b, 3.b, 6, 7 & 8 Minimum 1 acre site
Correctional Use: Jail or Prison		S [1]	S [1]	**I-1 & I-2:** 4.9.3.B.1.e, 2.d, 3.c, 4.c, 5, 6, 7 & 8 Minimum 30 acre site
Correctional Use: Jail or Prison			S [1]	**I-2:** 4.9.3 B.4.b, 5, 6, 7, 8 & 10 Minimum 150 acre site
Cultural Use		P		
Educational Use: Elementary and Secondary Schools, Limited to Grades 9 -12	S [2]	S [2]		**P-I:** 4.9.3.D.9
Educational Use: Instructional School or Postsecondary Institution		P		
Educational Use with accessory Salvaging and Recycling	S [2]	S[2]		**P-I, I-1:** 4.9.5.G.1, .3
Membership Organization		P		
Postal Service		P		
Religious Use		P		
Religious Use with accessory Salvaging and Recycling		P		**I-1:** 4.9.5.G.1, .3
Commercial Services Land Use Group With Land Use Class/Type:				
Administrative and Professional Office	P	P	P	
Alcoholic Beverage Service General		P		**I-1:** 4.9.4.C.3
Alcoholic Beverage Service Large Bar		S [1]	S [1]	**I-1, I-2:** 4.9.4.C.2, .4
Alcoholic Beverage Service with accessory Perishable Goods Manufacturing		P		**I-1:** 4.9.5.E.6, .7, .8
Animal Service		P		
Automotive – Service and Repair Excludes bodywork & paint-booths		P	P	

TABLE 4.8-6: Permitted Uses – INDUSTRIAL ZONES
P = Permitted Use ***S = Permitted as Special Exception Use***

[1] Mayor and Council Special Exception Procedure, Sec. 3.xxx
[2] Zoning Examiner Special Exception Procedure, Sec. 3.xxx
[3] Administrative Special Exception Procedure, Sec. 3.xxx

LAND USE*	P-I	I-1	I-2	USE SPECIFIC STANDARDS
Billboard		P	P	**I-1, I-2:** 4.9.4.G & Tucson Code, Ch. 3 Standards
Buildings and Ground Maintenance		P	P	
Commercial Recreation		P		
Communications				Being Updated by Staff
Construction Service		P		
Day Care	P	P	P	
Entertainment General		P		**I-1:** 4.9.4.K.1, .2, .3, .4 & 4.9.4.C.3
Entertainment Dance Hall		S [1]	S [1]	**I-1, I-2:** 4.9.4.C.2, .4
Financial Service General		P	P	**I-1, I-2:** 4.9.4.L.3
Financial Service Drive-through Permitted	P		P	**P-I, I-2:** 4.9.4.L.3
Food Service Excludes Soup Kitchen	P	P	P	**P-I:** 4.9.4.M.1
Food Service Soup Kitchen		S [1]		**I-1:** 4.9.4.M.4
Food Service with accessory: Alcoholic Beverage Service	P			**P-I:** 4.9.4.M.1 & 4.9.4.V.1-2 & 4.9.4.C.3
Funeral Service		P		
Medical Service: Extended Healthcare		P		
Medical Service: Major		P		
Medical Service: Outpatient Excludes Blood Donor Center	P	P		
Medical Service Blood Donor Center		S [1]	S [1]	**I-1 & I-2:** 4.9.4.O.3
Parking	P	P	P	
Personal Service	P	P		
Research and Product Development	P	P	P	**P-I:** 4.9.5.C.5, .6, .8
Technical Service	P	P	P	
Trade Service and Repair Major (includes auto body shops/paint-booths) or Minor		P	P	**I-1, I-2:** 4.9.4.X.1
Transportation Service Air Carrier			S [1]	
Transportation Service Land Carrier		P	P	
Travelers Accommodation: Lodging	P	P	P	**P-1, I-1, I-2:** 4.9.4.BB & 4.9.4.V
All Commercial Services Permitted Uses with accessory Salvaging and Recycling	P	P	P	**P-1, I-1, I-2**: 4.9.5.G.1, .3
Industrial Land Use Group With Land Use Class/Type:				
Craftwork	P	P	P	**P-I, I-1, I-2:** 4.9.5.C
Extraction			S [1]	**I-2:** 4.9.5.B
General Manufacturing	P	P	P	**P-I, I-1, I-2:** 4.9.5.C
Manufacturing, Hazardous Material			S [1]	**I-2:** 4.9.5.C
Manufacturing, Heavy Equipment			P	**I-2:** 4.9.5.C.
Motion Picture Industry	P	P	P	**Minimum lot size 36 acres and:** **P-I, I-1, I-2:** 4.9.5.C.
Perishable Goods Manufacturing	P	P	P	**P-I, I-1, I-2:** 4.9.5.E.1, .2 & 4.9.5.C.

TABLE 4.8-6: Permitted Uses – INDUSTRIAL ZONES
P = Permitted Use ***S = Permitted as Special Exception Use***

[1] Mayor and Council Special Exception Procedure, Sec. 3.xxx
[2] Zoning Examiner Special Exception Procedure, Sec. 3.xxx
[3] Administrative Special Exception Procedure, Sec. 3.xxx

LAND USE*	P-I	I-1	I-2	USE SPECIFIC STANDARDS
Perishable Goods Manufacturing		S [2]	S [1]	**I-1, I-2:** 4.9.5.C
Precision Manufacturing	P	P	P	**P-I, I-1, I-2:** 4.9.5.C
Precision Manufacturing with accessory: Construction Material Sales; Food and Beverage Sales; General Merchandise Sales; Heavy Equipment Sales.	P			**P-1:** 4.9.5.C.8
Precision Manufacturing with accessory: Salvaging and Recycling	P	P	P	**P-1, I-1, I-2:** 4.9.5.G.1, .3
Primary Manufacturing			S [1]	**I-2:** 4.9.5.C
Processing and Cleaning	P	P	P	**P-I, I-1, I-2:** 4.9.5.C
Processing and Cleaning with accessory: Construction Material Sales; Food and Beverage Sales; General Merchandise Sales; Heavy Equipment Sales.	P			**P-1:** 4.9.5.C.8
Processing and Cleaning with accessory: Salvaging and Recycling	P	P	P	**P-1, I-1, I-2:** 4.9.5.G.1, .3
Refining			S [1]	**I-2:** 4.9.5.C
Salvaging and Recycling	P	P	P S [1]	**(P) P-I:** 4.9.5.C.2 & 4.9.5.G.2, .4, .5 **(P) I-1:** 4.9.5.G.2, .4 **(P) I-2:** 4.9.5.G.2, .4, .13 **(S) I-2:** 4.9.5.C.1 - 8
Salvaging and Recycling with accessory: Construction Material Sales; Food and Beverage Sales; General Merchandise Sales; Heavy Equipment Sales.	P			**P-1:** 4.9.5.C.8
Salvaging and Recycling: Limited to Household Goods Donation Center			P	**I-2:** 4.9.5.G.2, .6, & 4.9.13.C; 4.9.13.D
Recreation Land Use Group With Land Use Class/Type:				
Golf Course		P		**I-1:** 4.9.6.A.1.f, .g, .i
Residential Land Use Group With Land Use Class/Type:				
Family Dwelling		S [3]		**I-1:** 4.9.7.A
Family Dwelling with Permitted Land Use	P	P	P	**P-I, I-1, I-2:** 4.9.7.C
Residential Care Services: Rehabilitation Service or Shelter Care (permitted and special exception)	P S [2]	P	S [2]	**(P) P-I:** 4.9.7.I.1, 3.d, .4, .5 **(P) I-1:** 4.9.7.I.1, 3.d, .4, .5, .6, .11 **(S) P-I, I-2:** 4.9.7.I.1, 3.d, .4, .5
Residential Care Services: Shelter Care, Victims of Domestic Violence	P	P		**P-I:** 4.9.7.I.1, 3.c, .4, **I-1:** 4.9.7.I.1, 3.c, .4, .11
Restricted Adult Activities Land Use Class With Land Use Type:				
Adult: Commercial Services, Industrial, Recreation, or Retail Trade		P		**I-1:** 4.9.8.A
Retail Trade Land Use Group With Land Use Class/Type:				
Auctions		P		**I-1:** 4.9.9.F
Construction Material Sales		P	P	
Food and Beverage Sales, General		P		

TABLE 4.8-6: Permitted Uses – INDUSTRIAL ZONES

P = Permitted Use ***S = Permitted as Special Exception Use***

[1] Mayor and Council Special Exception Procedure, Sec. 3.xxx
[2] Zoning Examiner Special Exception Procedure, Sec. 3.xxx
[3] Administrative Special Exception Procedure, Sec. 3.xxx

LAND USE*	P-I	I-1	I-2	USE SPECIFIC STANDARDS
Food and Beverage Sales: Large Retail Establishment		S [1]		**I-1:** 4.9.9.D
Permitted Retail uses with accessory Food and Beverage Sales			P	**I-2:** 4.9.9.A
General Merchandise Sales, General		P	P	
General Merchandise Sales Large Retail Establishment		S [1]	S [1]	**I-1:** 4.9.9.D
Heavy Equipment Sales		P	P	**I-1, I-2:** 4.9.9.C
Medical Marijuana (Designated Caregiver or Off-Site) Cultivation Location		P	P	**I-1, I-2:** 4.9.9.E.2
Medical Marijuana Qualifying Patient Cultivation Location		P	P	**I-1, I-2:** 4.9.9.E.4
Permitted Retail uses with accessory Salvaging and Recycling		P		**I-1:** 4.9.5.G.1, .3
Swap Meets and Auctions	S [3]	S [3]	P	**P-1, I-1, I-2:** 4.9.9.F
Vehicle Rental and Sales	P	P	P	**P-I:** 4.9.9.G.2, .3 **I-1, I-2:** 4.9.9.G.1
Storage Land Use Group With Land Use Class/Type:				
Commercial Storage	P	P	P	**P-I:** 4.9.10.A & 4.9.5.C.8 **I-1, 1-2:** 4.9.10.A
Commercial Storage with accessory: Construction Material Sales; Food and Beverage Sales; Heavy Equipment Sales; General Merchandise Sales	P			**P-1:** 4.9.10.A & 4.9.5.C.8
Commercial Storage with accessory: Hazardous Material Storage	P	P	P	**P-I:** 4.9.10.B.1, 2.a **I-1, I-2:** 4.9.10.B.1, 2.d
Hazardous Material Storage			S [1]	
Personal Storage		P	P	**I-1, I-2:** 4.9.10.C.3, .6
Personal Storage Uses with accessory: Construction Material Sales; Food and Beverage Sales; Heavy Equipment Sales; General Merchandise Sales	P			**P-1:** 4.9.10.A & 4.9.5.C.8
Personal Storage with accessory: Hazardous Material Storage	P	P	P	**P-I:** 4.9.10.B.1, 2.a **I-1, I-2:** 4.9.10.B.1, 2.d
Utilities Land Use Group With Land Use Class/Type:				
Distribution System	P	P	P	**P-I, I-1, I-2:** 4.9.11.A.1, .2, .4
Renewable Energy Generation	P	P	P	**P-I, I-1, I-2:** 4.9.11.B.2, .3, .5
Sanitation System			S [1]	**I-2:** 4.9.11.C
Wholesaling Land Use Group With Land Use Class/Type:				
Business Supply & Equipment Wholesaling	P	P	P	**P-I:** 4.9.5.C.8
Business Supply & Equipment with accessory: Construction Material Sales; Food and Beverage Sales; Heavy Equipment Sales; General Merchandise Sales	P			**P-1:** 4.9.5.C.8
Construction/Heavy Equipment Wholesaling	P	P	P	**P-I:** 4.9.5.C.8

TABLE 4.8-6: Permitted Uses – INDUSTRIAL ZONES *P = Permitted Use* *S = Permitted as Special Exception Use* *[1] Mayor and Council Special Exception Procedure, Sec. 3.xxx* *[2] Zoning Examiner Special Exception Procedure, Sec. 3.xxx* *[3] Administrative Special Exception Procedure, Sec. 3.xxx*				
LAND USE*	**P-I**	**I-1**	**I-2**	**USE SPECIFIC STANDARDS**
Construction/Heavy Equipment w/ accessory: Construction Material Sales; Food and Beverage Sales; Heavy Equipment Sales; General Merchandise Sales	P			**P-1:** 4.9.5.C.8
Food and Beverage Wholesaling	P	P	P	**P-I:** 4.9.5.C.8
Food and Beverage with accessory: Construction Material Sales; Food and Beverage Sales; Heavy Equipment Sales; General Merchandise Sales	P			**P-1:** 4.9.5.C.8
Hazardous Material Wholesaling			S [1]	
*Any Land Use Class not permitted or a Special Exception Use in any other zone, or permitted in the I-2 zone, may be permitted in the I-2 zone and shall comply with the dimensional standards determined to be most similar to the proposed use.				

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4.9. USE-SPECIFIC STANDARDS[41]

4.9.1. GENERAL

A. Purpose

The use-specific standards in this section are intended to provide additional standards for certain permitted and special exception land uses in order to mitigate any adverse impacts on adjacent land uses, on the immediate neighborhood, and on the community.

B. Applicability

These requirements are in addition to those required of principal buildings in Article 6: Dimensional Standards of the UDC and are applied only when required in a zone for a particular land use. Use specific standards shall apply where the standards in Article 6 and use-specific standards differ (e.g., lot coverage).

4.9.2. AGRICULTURAL USE GROUP

A. Animal Production

1. Provisions Relating to Animals in General

a. All buildings for animals shall be setback at least 50 feet from all property lines, except corrals that shall be setback ten feet from all property lines.

b. All stables, barns, and animal sheds or shelters shall be setback at least 100 feet from any property line.

c. Minimum lot size shall be 36,000 square feet.

2. Provisions Relating to Livestock

a. No more than two horses or two head of cattle are permitted per each 36,000 square feet of lot area.

b. A stock-tight fence and necessary cattle guards shall be erected and maintained along the boundaries of any area where livestock is kept or grazed. This provision shall not apply to interior lot lines where the adjacent property is zoned IR or to open range as determined under Arizona Revised Statutes (ARS).

c. All horses, cattle, sheep, goats, or similar animals shall be confined within a stock-tight fence in an area of no less than 400 square feet per animal. Such fenced-in area shall be setback ten feet from the rear property line where it abuts an IR, RH, SR, SH, RX-1, or RX-2 zone; 40 feet from the rear where it abuts any other zone; and 40 feet from a side property line. A setback of ten feet shall be permitted on the side yard where the adjacent property owners have a written recorded agreement to this effect, but in no event shall a corral be closer than 50 feet to any residence or living quarters on an abutting property.

3. Provisions Relating Specifically to Hogs

a. No hogs shall be permitted.

[41] Text from LUC Section 3.5.

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b. No more than one hog weighing more than 50 pounds shall be permitted per each 36,000 square feet of lot area.

c. Hog-raising projects that exceed the permitted number of hogs in Sec. 4.9.2.3.b shall be permitted if sponsored by the 4-H Club, Future Farmers of America, or other similar nonprofit organization, provided that a letter of authorization from the sponsoring organization is submitted confirming that the project is sponsored by the organization, describing the project and stating its length of time.

d. Hogs shall be penned at least 500 feet from any property line.

4. Riding Stables or Riding Schools

a. All stables, barns, and animal sheds or shelters shall be setback at least 200 feet from any interior property line with residential zoning, except that the distance may be measured to the boundary of the site or subdivision to be served as a common use facility.

b. Outside audio amplification shall be prohibited.

c. Minimum lot size shall be limited to 10 acres.

B. Crop Production

1. Any greenhouse heating plant or cooling fan shall be located a minimum of 200 feet distant from every lot line.

2. Maximum lot coverage shall be 50 percent.

C. Stockyard Operation

1. A commercial feedlot use shall be setback at least 500 feet from any property line.

2. Livestock auction yard.

a. All buildings, holding pens and areas, and show areas shall be setback at least 300 feet from any property line.

b. Generation of dust shall be minimized.

c. Outdoor audio amplification that would create a nuisance to adjacent properties shall be prohibited.

4.9.3. CIVIC USE GROUP

A. Cemetery

1. The use shall be adjacent to, or an extension of, an existing cemetery.

2. The minimum site area shall be one acre for a pet cemetery and five acres for a human cemetery.

3. All buildings shall be setback at least 100 feet from any property line.

4. The use shall be limited to the storage of cremated remains in a columbarium.

5. Minimum lot size shall be 10 acres.

6. The side setback shall be 25 feet and the rear setback shall be 50 feet.

B. Correctional Use

1. Minimum Required Site Size

a. One acre.

b. Five acres.

c. Ten acres.

d. 15 acres.

e. 30 acres.

2. Maximum Number of Beds

a. The maximum number of beds permitted shall be 40.

b. The number of beds permitted shall be calculated by dividing the area of the site by 2,200 square feet, with a maximum permitted capacity of 40.

c. The maximum number of beds permitted shall be 60, with no more than 40 offenders in the Custodial Facility and no more than 20 offenders in the Supervision Facility.

d. The maximum number of beds permitted shall be 1,250.

3. Separation: A Correctional Use shall be separated from other public or private Correctional Uses, Rehabilitation Service Uses, and Shelter Care Uses, as determined by the zone in which the Correctional Use is located. The applicant for a Correctional Use shall provide documentation of compliance with the required separation distances.

a. 1,200 feet.

b. 1,200 feet from a Supervision Facility, Rehabilitation Service, or Shelter Care and four miles from a Custodial Facility or a Jail or Prison.

c. 1,200 feet from a Supervision Facility, Rehabilitation Service, or Shelter Care; four miles from a Custodial Facility; and five miles from a Jail or Prison.

4. Minimum Interior Yard Setbacks: Minimum interior yard setbacks shall be required for any structure, including a fenced enclosure, and shall be measured to the property line.

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a. 50 feet.

b. 100 feet.

c. 500 feet.

d. Zero setback if adjacent to nonresidential zone or development and 80 foot setback if adjacent to residential zone or development.

5. Building Height

a. The maximum building height permitted shall be 50 feet, except for guard towers that may be up to 60 feet in height.

b. The maximum height permitted shall be 25 feet.

6. Site Location: The site shall be located at least 300 feet from the property line to a zone boundary line of R-3 or more restrictive zoning, or for sites where Sec. 4.9.3.C.10 is applicable, the 300 foot setback does not apply to residentially zoned property used for a prison or jail or to residentially zoned property used as a public right-of-way or railroad right-of-way.

7. Management Plan: The applicant shall submit to the Zoning Administrator and the Police Department a management plan. See Administrative Manual for management plan submittal requirements.

8. Licensure: If licensing is required for the use, proof of such licensure shall be provided prior to the issuance of a certificate of occupancy for the use. If licensure is not required, the applicant shall provide documentation to that effect.

9. Loudspeakers: The use of outdoor speakers shall be prohibited.

10. Prison Clustering Provisions

a. The site area shall be a minimum of 150 acres.

b. The site shall be located within one-half mile of at least one jail or prison facility owned and operated by the federal or state government, and the jail or prison has a minimum design capacity of 500 beds.

c. The project shall not adversely affect adjacent land uses or surrounding neighborhoods. Adverse effects can be substantially mitigated through the application of additional conditions.

C. Cultural Use

Cultural Uses shall be subject to the following use specific standards that are not subject to variance, however, if one or more of the standards cannot be met, the Mayor and Council can modify the standards for a specific site where there is substantial conformance with the intent of the use specific standards.

1. The use shall be setback at least 100 feet from any property line.

2. The use shall provide a visual buffer where the site is adjacent to a residential use or zone. This can be accomplished by providing, for example, a landscape buffer, setbacks of buildings or uses, or masonry screen walls.

3. Storage of fertilizer, manure, or other odorous material located in an enclosed building shall be setback a minimum of 20 feet or if located outdoors shall be

setback a minimum of 40 feet from any property line that is adjacent to a residential use or zone.

4. Public access to the site shall be from a Major Streets and Routes (MS&R) street or from a local street that is not an internal residential neighborhood street.

5. The impacts of noise on adjacent residential uses shall be mitigated to comply with the noise standards in the Tucson Code, Chapter 16, Sec. 16-31.

6. Hours of operation for the cultural use, as well as any accessory use, should be detailed in the application and should be limited, in order to assure compatibility with adjacent residential uses.

7. Outdoor lighting shall be limited in height and shielded from adjacent residential uses.

8. Trip generation and traffic impacts on the surrounding streets shall be analyzed, and mitigation measures shall be provided.

D. Educational Uses

Educational Uses shall be subject to the following use specific standards. No variances shall be permitted; however, if the standards cannot be met, the applicant can request approval through a special exception procedure if permitted within the zone.

1. Licensing

a. If licensing, certification, or similar type of approval is required by the State of Arizona for the use, proof of such licensure, certification, or approval shall be provided. Such information shall include the number of students for which the school is approved.

b. If the number of students approved by the State exceeds the number approved on the site in accordance with zoning requirements, the number of students shall be limited to the number that meet zoning requirements.

2. Site Area

a. Except as provided below for charter schools, the minimum required site area for educational uses in residential zones is five acres, unless a greater site area is required in Art. 6: Dimensional Standards, or the ratio of 1,452 square feet of site area for each student proposed for the school, whichever is greater, up to a maximum of ten acres for elementary schools (Grades K-6), 20 acres for middle schools (Grades 7 and 8), and 40 acres for high schools (Grades 9-12). For the purposes of this requirement, the number of students applied in this calculation is the number for which the school has been approved by the authorizing agency. If a maximum number of students is not stipulated as part of the approval from the authorizing agency, then the number used in the calculation shall be the amount proposed by the applicant.

b. A single family residence on less than one acre shall not be occupied as or converted into a charter school.

c. In nonresidential zones, the minimum site area shall be in accordance with the requirements in Art. 6: Dimensional Standards for the use.

3. Hours and Days of Operation

Educational Uses within Neighborhood Commercial (NC) or more restrictive zoning shall be limited in hours of operation to 6:00 a.m. to 7:00 p.m., Monday through Friday only.

4. Outdoor Activity

All outdoor activity shall be held more than 50 feet away from the property line where adjacent to R-3 or more restrictive zoning. The use of loudspeakers, amplifiers, or similar type equipment outdoors shall not be permitted on the school site within 100 feet of the property line where adjacent to R-3 or more restrictive zoning.

5. Vehicular and Pedestrian Access

Vehicular and pedestrian access to the Educational Use site shall be from a street designated as a major street by the Major Streets and Routes (MS&R) Plan or from a local street other than an internal residential neighborhood street for sites zoned C-1 or more restrictive zoning.

6. Building Setback

Building setbacks may be reduced on the side of the building adjacent to R-3 or more restrictive zoning if windows are non-operable and doors are limited to alarmed emergency exit doors. (Figure 4.9-A IS BEING UPDATED)

7. Passenger Drop-Off Areas

Passenger drop-off parking areas shall be provided at a ratio of one motor vehicle parking space (parallel) for every 20 students for which the school is authorized, up to a total of eight spaces. These spaces shall be in addition to the required off-street parking spaces.

8. Lot Coverage

The maximum lot coverage shall be 20 percent.

9. Height

The maximum height shall be 75 feet.

E. Postsecondary Institutions

Teaching of only those operations or occupations that are permitted in the zoning classification of the property as permitted uses is permitted.

F. Religious Use

1. The use shall be setback at least 80 feet from any property line.

2. Minimum lot size shall be 20,000 square feet.

4.9.4. COMMERCIAL SERVICES USE GROUP

A. Administrative and Professional Office

1. Maximum floor area shall be 2,000 square feet.

2. Minimum site area shall be 43,460 square feet.

3. Maximum lot coverage shall be 20 percent.

B. Adult Day Care

1. The use shall be for a maximum of ten persons, or if operated in conjunction with an Adult Care Service, the number of clients together with the number of residents shall be exceed the total permitted for the Adult Care Service.

2. The use shall comply with one of the following.

a. For a maximum of 15 persons;

b. For an unlimited number of persons with a minimum lot size of 20,000 square feet; or

c. If operated in conjunction with an Adult Care Service, the total number of clients and residents shall not exceed the total permitted for the Adult Care Service.

C. Alcoholic Beverage Service and Entertainment

1. Maximum floor area shall be 2,000 square feet.

2. Large bar or dance hall.

a. Minimum Setbacks

Setbacks for the following use areas shall be measured from the use area to a zone boundary line of R-3 or more restrictive zoning.

(1) Outdoor Use Area: 500 feet.

(2) Parking Area: 200 feet.

(3) Loudspeakers: 500 feet.

(4) The Zoning Examiner may authorize a reduction to the required setbacks if special physical circumstances exist that will still mitigate any negative impacts.

b. Security Management Plan

The applicant shall submit to the Zoning Administrator and the Police Chief a security management plan describing the method and operation of security within and outside the building, including the parking area. Any changes or amendments to the plan shall be filed with, and approved by, the Zoning Administrator and the Police Chief.

c. Access

Access shall be either from a street shown on the Major Streets and Routes (MS&R) Map with no vehicular access to the site from a local street or from a local street within a nonresidential development.

DRAFT

3. Large bars and dance halls shall be prohibited.

4. Height shall be limited to 300'

D. Animal Service

1. Overnight confinement for clinic treatment shall be permitted for a maximum of five animals.

2. No boarding of animals shall be permitted.

3. The activity shall be within a completely enclosed building.

4. An outpatient clinic shall be permitted for small animals only.

5. Buildings, shelters, animal runs, and fenced areas shall be setback at least 100 feet from any property line abutting residentially zoned property.

6. Buildings, shelters, animal runs, and fenced areas shall be setback at least 100 feet from any property line.

7. The use shall be setback at least 200 feet from any residential zone.

8. Minimum lot size shall be 144,000 square feet.

E. Artisan Residence

1. **Purpose**

To provide an artisan residence use in the NC, C-1, C-2, and C-3 commercial zones designed to be used as both a dwelling and work space by an artist, artisan, or craftsperson, including persons engaged in the application, teaching, or performance of fine arts such as, but not limited to drawing, vocal or instrumental music, painting, sculpture, and writing; and the accessory sale of art objects produced on the premises. Buildings or spaces within buildings shall be used jointly for commercial and residential purposes. Nothing in this subsection shall limit principal uses as otherwise permitted by the applicable zoning.

2. **Combined Uses**

A building or a tenant space in a commercial zone may be used as an artisan workshop with a residential dwelling. The workshop and workshop activities shall be located indoors unless outdoor activity is permitted by the applicable zoning.

3. **On-site Sales**

The on-site sale of the artist's products, including occasional shows of the artist's works, shall be permitted accessory uses.

4. **Separation and Access**

Access to the residential use shall be only through the same access that is provided for the artisan use.

5. **Operational Requirements**

The operation of the artisan residence shall not create noise, vibrations, smoke, fumes, dust, odors, vapors, other noxious emissions, or any other similar nuisances that are discernible beyond the boundaries of the building enclosing the artisan residence.

6. Parking

Each artisan residence unit shall provide two on-site motor vehicle parking spaces for each residential component and one on-site parking space for each 500 square feet of gross floor area (GFA) of the work space area. The GFA of the residential component shall not be included in the parking calculation.

F. Automotive - Service and Repair

1. No auto washing shall be permitted.

2. The service building shall be limited in design to accommodate no more than two vehicles at any time. Vehicle space size shall be a maximum of ten by 25 feet.

3. The use shall occur within an enclosed building with one access per bay, not on the side toward any residential zone.

4. The building walls shall have no openings, other than non-opening windows, within 30 feet of the adjacent residential zone boundary line.

5. Auto washing, limited to a self-service, coin-operated car wash, shall be permitted on the premises. No more than six bays using hand-operated, wand-type equipment or more than one bay using non-conveyor, automatic equipment are permitted, and vacuum equipment shall be located at least 100 feet from any residential zone.

6. The maximum floor area shall be 2,000 square feet.

7. Limited to one automatic in-bay car wash that shall not include conveyors or motorized air-drying. It shall be enclosed within a building except at points of ingress and egress, have a maximum floor area of 600 square feet, and not exceed 12 feet in height.

8. Height shall be limited to 75 feet.

G. Billboards

1. Pedestrian Access

Pedestrian access shall not be located under, or within five feet of, a vertical line intersecting the ground and any structural element extending from a billboard, including, but not limited to, overhangs, cantilevered beams, and elevated walkways. Refer to Sec. XXX for requirements.

2. Parking

Parking area access lanes shall not be located under, or within five feet of, a vertical line intersecting the ground and any structural element extending from a billboard, including, but not limited to, overhangs, cantilevered beams, and elevated walkways. Refer to Sec. 7.4.6.B for location requirements of parking spaces.

3. Loading

Refer to Sec. 7.5 for loading (servicing) space requirements and Sec. 7.5.4 for location requirements for such loading spaces.

4. Landscaping and Screening

Refer to Table 7.6.4-1 for landscaping and screening requirements for billboards.

5. Height

Maximum height shall be 30 feet.

H. Child Care in Residential and Office Zones

1. Dispersal

A 600 foot separation between child care centers in residential zones shall be required. Child care centers that provide only before- and after-school programs at elementary and secondary school sites are not considered for the purposes of this separation. The separation distance shall be measured from property lines, except in the case of a child care center on a mixed use development site where the separation is measured from that portion of the site devoted to the child care use.

2. Licensing

If licensing is required by the State of Arizona for the use, proof of such licensure shall be provided prior to issuance of a certificate of occupancy.

3. Hours and Days of Operation

Child care centers adjacent to R-3 or more restrictive zoning shall be limited in hours of operation to 6:00 a.m. to 7:00 p.m. and to operation Monday through Friday only, except as provided in Sec. 4.9.4.H.9.

4. Building Setbacks

Building setbacks may be reduced on the side of the building adjacent to R-3 or more restrictive zoning if windows are non-operable and doors are limited to alarmed emergency exit doors. (Figure 4.9-B. IS BEING UPDATED)

5. Recreational Areas

Minimum distance of outdoor recreational areas, including, but not limited to, swimming and wading pools, ball fields, and playground equipment, to any adjacent property in R-3 or more restrictive zoning shall be 25 feet. Where abutting a street or alley, the setback shall be measured to the centerline of a right-of-way. A wall shall be required between a recreation area provided on site and adjacent to R-3 or more restrictive zoning.

6. Number of Children

The maximum number of children cared for shall be as follows.

a. 30 children.

b. 100 children.

c. Unlimited number of children.

7. Site Size

The minimum required site size shall be as follows. In no case will a site larger than ten acres be required.

a. Six and six-tenths (6.6) acres in RH and SR.

b. 72,000 square feet in SH and RX-1.

c. 32,000 square feet in RX-2.

d. 14,000 square feet in R-1, R-2, and O-2.

e. 10,000 square feet in R-3 and O-3.

f. The minimum required site size shall be equal to the minimum site size required for the zone in Sec. 4.9.4.H.7.a, .b, .c, or .d for the zoning district, divided by 30 and multiplied by the maximum enrollment for which the center is licensed.

g. The minimum required site size shall be equal to 200 square feet per child, multiplied by the maximum enrollment for which the center is licensed, plus 4,000 square feet.

8. Street Frontage

The center shall front on a Major Streets and Routes (MS&R) street with no vehicular access to the site from a local street or on a local street within a nonresidential development. The street frontage requirements shall be apply to a child care center located on an elementary school site if the child care center is in conformance with the dispersal, licensing, recreational area and building setbacks, hours and days of operation limitations, and site coverage standards.

9. Extended Hours for Any Number of Children

In addition to the requirements of Sec. 4.9.4.H.1, .2, .3, and 8, a child care use that operates before 6:00 a.m. or after 7:00 p.m. or on Saturday or Sunday where the site is adjacent to R-3 or more restrictive zoning shall comply with the following.

a. Site Size

The minimum site size for a child care center with extended hours of operation or weekend operation shall be two and one half acres, except in RH and SR where the minimum site shall be ten acres.

b. Building Setback

The minimum building setback shall be 75 feet from a property line adjacent to R-3 or more restrictive zoning.

c. Recreational Areas

Outdoor recreational areas, including, but not limited to, swimming and wading pools, ball fields, and playground equipment, shall be screened and setback from any property line adjacent to R-3 or more restrictive zoning as follows.

(1) A wall, as defined in screening materials, shall be required between a recreational area and the adjacent property line.

(2) The minimum setback from the adjacent property in R-3 or more restrictive zoning shall be 100 feet. Where abutting a street, alley, drainage-way, or other right-of-way, the setback shall be measured to the centerline of a right-of-way.

(3) A reduction to the required recreational area setback may be requested in accordance with Sec. 3.xxx Variances, if the reduction meets the requirements set forth for special exception land uses.

d. Vehicular Use Areas
Vehicular use areas shall be designed so that no more than 50 percent of the parking spaces provided are within 50 feet of an interior property line adjacent to R-3 or more restrictive zoning.

I. Communications (This section being updated by Staff)

J. Construction Service

1. The use shall be setback at least 100 feet from any property line.

2. The yard shall be completely enclosed by screening a minimum of six feet in height.

K. Entertainment

1. A circus, carnival, or tent show shall be permitted for no longer than 15 days.

2. Circuses, carnivals, and tent shows shall be subject to zoning compliance review and approval through Zoning Compliance Review, Sec. 3.xxx.

3. A circus, carnival, or tent show shall be setback 100 feet from the activity to the lot line of any residential use or zone.

4. Motor vehicle parking areas and bicycle facilities for a circus, carnival, or tent show shall be dust-proofed, and access to the vehicular use areas shall be identified and controlled to minimize vehicular and pedestrian conflicts.

5. The use shall be setback at least 200 feet from any property line.

6. Concerts, dances, and other similar high-noise activities shall be conducted entirely within an enclosed building or setback a minimum of 600 feet from adjacent residentially zoned property. Modification of this criterion may be permitted by the Mayor and Council through the special exception process provided:

a. All speakers and similar sound projecting devices are oriented away from adjacent residentially zoned properties;

b. The applicant will develop a noise mitigation plan for the use based on the specific activities proposed and the proximity of such activities to the residential property line;

c. Noise levels are continuously monitored during the performance, and noise emission standards are enforced by a cultural use employee (or designee); and

d. The performance ends no later than 10:00 p.m.

L. Financial Service

1. Limited to a maximum of three drive-through service lanes, with one restricted to drive-through automated teller machine (ATM) service only.

2. The use shall be setback at least 100 feet from any property line.

3. No non-chartered financial institution facilities, such as payday loan facilities, except where permitted as a special exception under Sec.4.9.4.L.4.

4. Non-Chartered financial institutions shall require approval as a special exception by the Zoning Examiner in accordance with procedures set forth in Sec. 3.xxx and provided that:

a. A non-chartered financial institution site shall be separated from other non-chartered financial institution sites by a distance of 320 feet.

b. A non-chartered financial institution site shall be located at least 500 feet, measured in a straight line, from the property line to a zone boundary line of R-3 or more restrictive zoning.

M. Food Service

1. Activities may be conducted outdoors. Loudspeakers or music, live or recorded, shall not be permitted within 600 feet of a residentially zoned property.

2. Dancing shall not be permitted. Drive-in or drive-through restaurants shall not be permitted.

3. Soup kitchens shall not be permitted.

4. Soup kitchens shall comply with the following standards.

a. The use shall be conducted within a completely enclosed building.

b. Seating shall be provided at 100 percent of the meal service capacity.

c. A waiting area shall be provided within the building for a minimum of one-half of the total number of persons to be served.

d. Public rest rooms shall be provided.

e. No other soup kitchen use shall be located within one mile.

5. To differentiate between a restaurant that serves alcoholic beverages and a bar that serves food, a restaurant meets the following standards.

a. The full kitchen remains open and meals are available to patrons during all hours of operation, except as follows. Restaurants open later than 10:00 PM must keep the full kitchen open until at least 10:00 PM to maintain their classification as a Restaurant

b. Management cannot ask for age verification (carding) for admittance to the establishment.

c. Management cannot restrict patronage by age or sex (i.e., Ladies Night, Over 21, etc.) except for limited special services or events within certain limited areas of the establishment.

d. A cover charge cannot be required for general admittance, except for special services or events offered within certain areas of the establishment.

e. Management shall maintain a minimum amount of table seating at all times and not have tables removed to create a dance floor or set aside major sections of the establishment for special events.

f. The gross revenue sale of food complies with A.R.S. § 4-205.02(G)(2)

N. Funeral Service

1. A crematorium shall be setback a minimum of 200 feet from any property line.

2. A crematorium shall be setback a minimum of 500 feet from any boundary of the site that adjoins property in a residential zone.

O. Medical Service

1. The use shall provide a minimum of one off-street loading space or the number of spaces required per Sec. 7.4, whichever is greater.

2. Blood donor centers shall not be permitted.

3. Blood donor centers shall comply with the following standards.

a. The site is not located in the same block as a residential zone or any elementary or secondary school or Day Care use.

b. The site is located at least 300 feet, measured in a straight line, from the property line to a residential zone boundary line or the property line of an elementary or secondary school.

c. A waiting area equal to ten percent of the gross floor area is provided.

d. No other blood donor center is located within 1,200 feet.

4. Minimum site area shall be 1.5 acres.

5. Minimum site area shall be 144,000 square feet.

6. Minimum site area shall be 180,000 square feet.

7. Height shall be limited to 75 feet.

P. Medical Service in Residential and Office Zones Standards

1. The facility shall front on a street on the Major Streets and Routes (MS&R) Plan or on a residential street, provided:

a. The residential street shall intersect a street on the MS&R Plan, and

b. The property shall be within 150 feet of a street on the MS&R Plan, measured along the residential street.

2. Minimum Setbacks.

a. A minimum building setback of 20 feet from any interior lot line adjoining residential zoning shall be required.

b. A minimum building setback of 100 feet from any property line shall be required.

3. Requests to vary the provisions of this section, including setbacks for existing or new buildings, are processed in accordance with Sec. 3.xxx Variances.

4. If licensing is required by the State of Arizona for the use, proof of such licensure shall be provided.

Q. Major Medical Service and Outpatient Medical Service, Accessory Uses

1. The use shall be located within a principal building.

2. Access to the use shall be from within the principal building or from the interior of the development.

3. No outside display or storage of merchandise or supplies.

4. No sign associated with accessory uses shall be visible from any public street.

5. Sale of items shall be restricted to those associated with medical services.

R. Office Zone Compatibility Standards

1. Chain link fencing shall not be used to meet screening requirements.

2. Refuse areas shall be setback at least 20 feet from street property lines and interior property lines abutting a residential use or zone, except when alley pickup is approved by the Environmental Services Department.

3. Refuse areas shall be screened from the street with materials similar to those of the principal building.

4. Noise-generating equipment shall be located in an area away from adjacent residential uses or vacant residentially zoned property.

5. Vehicular access shall be from other than internal residential neighborhood streets.

6. Consolidation of parking areas and access points shall be required for sites with multiple buildings. Consolidation of parking areas and access points is encouraged for adjoining sites.

7. New construction shall be reviewed by the Design Review Board (DRB) for architectural and site design compatibility with the surrounding residential area. See the Administrative Manual for DRB submittal requirements.

S. "P" Parking Zone Standards

1. Parking shall be restricted to at or below grade. Buildings to cover at-grade parking shall be permitted.

2. Height shall be limited to 16 feet.

T. Personal Service

1. Laundry facilities shall not exceed 3,000 square feet of floor area.

2. An attendant shall be on the premises during all open hours.

3. No more than 24 dry cleaning units shall be permitted.

4. The maximum floor area shall be 2,000 square feet.

U. Research and Product Development

1. All land use operations, including storage, shall be housed within a completely enclosed building. Vehicular use areas do not have to be located within enclosed buildings.

2. The minimum lot size requirement shall be 10,000 square feet.

3. Every building shall be setback from property lines adjacent to residential uses or zones a distance equal to three times the height of the building.

V. Sale of Spirituous Liquor in Conjunction with Food Service Use

1. The Food Service establishment shall provide regular meal service at regularly available tables during all hours of operation or until 10:00 PM to guests for compensation. The establishment shall have kitchen facilities for keeping, cooking, and preparing foods for meals.

2. The Food Service establishment shall have 75 seats or more for the serving of meals at regularly available tables for all hours of operation. Seating at counters, in private banquet rooms, and outdoor seating shall not count toward the minimum 75 seat requirement.

3. The Food Service establishment may serve alcoholic beverages with meals; however, an area separate from the Food Service use shall not be provided with tables, counter areas, and/or booths for persons to sit at primarily for service of alcoholic beverages operating as an Alcoholic Beverage Service establishment, unless:

a. The Food Service establishment has 75 seats or more for the serving of meals at tables (seating at counters, in banquet rooms, and outdoor seating shall not count toward the 75 seat requirement) that are available at all hours of operation; and

b. The Alcoholic Beverage Service area does not exceed, in size, 25 percent of the Food Service floor area, including any Food Service outdoor area; and

c. The Alcoholic Beverage Service area does not have an outside public entrance separate from the main entrance to the Food Service use.

4. The Food Service establishment may serve, in addition to beer and wine, other alcoholic beverages.

5. A Food Service use with more than 75 seats for the serving of meals at tables that are available at all hours of operation may have a dance floor, provided such dance floor shall not be larger than 200 square feet. Seating at counters, in banquet rooms, and outdoor seating shall not count toward the 75 seat requirement.

6. Signs shall not be permitted in or on a window or on the exterior of any building or structure within the project that is visible from a public street or adjacent residentially zoned property identifying or advertising the Alcoholic Beverage Service use or the sale of spirituous liquors.

7. Alcoholic beverages shall not be provided with drive-in or drive-through services.

8. Alcoholic Beverage Service may be provided outdoors if the outdoor area is a minimum of 100 feet from residentially zoned property excluding public right-of-way, or is separated by a building from adjacent residentially zoned property. If the use is within 600 feet of a residential zone, no loudspeakers or music, live or recorded, shall be permitted.

9. A Food Service establishment that is located within 300 feet of a residential zone, excluding public right-of-way, measured in a straight line from the licensed premises to the zone boundary line of R-3 or more restrictive zoning may serve alcoholic beverages upon conformance with the following conditions:

a. The applicant is required to submit a mitigation plan to the PDSD Director that will be reviewed in accordance with Zoning Compliance 300' Notice Sec. 3.xxx. The mitigation plan shall specifically address noise from the use, including parking lot noise, screening of lighting from vehicle headlights and light standards on site, parking, and access to adjacent neighborhoods, but shall not address issues that are the purview of the Arizona Department of Liquor Licenses and Control, such as the number of liquor licenses in the area or the hours of liquor sales.

b. If the use is operated in a manner that violates the mitigation plan or conditions for permitting the use or causes adverse land use impacts, the use may be suspended or terminated in accordance with Sec. 10.5.

W. Technical Service

1. Gross floor area shall be limited to a maximum of 1,500 square feet.

2. Gross floor area shall be limited to a maximum of 3,500 square feet.

X. Trade Service and Repair

1. Major

If located within 30 feet of a residential use or zone, the building walls shall have no openings, other than non-opening windows, within 30 feet of the adjacent residential use or zone boundary line.

2. Minor

Use shall exclude the repair and replacement of upholstery and the repair of burglar alarms and motor vehicle stereos.

Y. Transportation Service, Air Carrier

1. The minimum site area shall be as required by the Federal Aviation Agency (FAA) for the airport facility. The site area shall not be less than permitted by the underlying zoning.

2. The Mayor and Council may restrict the number of flights and hours of operation due to the proximity and intensity of noise-sensitive land uses.

3. The runway length required for safe operation shall be as shown in the flight manual of the largest aircraft to use the site and an additional 240 feet at each end of the runway.

4. The runway width shall be 240 feet centered on the runway.

Z. Travelers' Accommodation, Campsite

1. The use shall be in conjunction with, and within, a mobile home park.

2. The overall number of mobile home spaces and campsites shall not exceed the overall density permitted for the mobile home park.

3. The campsite area shall not be located adjacent to a non-mobile home residential zone.

4. Access to the area shall be through the mobile home park.

5. The area shall comply with the mobile home park development standards.

6. No more than 25 percent of the total spaces in the mobile home park can be used for the campsite use.

AA. Travelers' Accommodations, Lodging

1. Minimum lot size shall be ten acres.

2. The side and rear setbacks shall be 50 feet.

BB. Travelers' Accommodation, Lodging and Accessory Uses

1. The minimum distance to any public street shall be one 100 feet.

2. Outside entrances shall not face any public street.

3. The use shall be operated for the convenience of the guests.

4. When the Alcoholic Beverage Service use is provided in an area set aside from the Food Service area, such as a bar or cocktail lounge, that area of the Alcoholic Beverage Service use shall not have an outside public entrance separate from the entrance to the principal use.

5. The total area of retail and service establishments shall not exceed five percent of the total floor area.

6. Animal-Related Uses.

a. No more than one animal for each 10,000 square feet of site area.

b. No stable or corral shall be located within 100 feet of any property line or within 300 feet of any existing buildings on an adjacent property at the time of the improvement.

c. No stable or corral shall be located or maintained closer than 50 feet to any property line or closer than 100 feet to any school, park, public street (excepting an alley), or dwelling on adjoining properties.

7. Travelers' Accommodation, Lodging, shall have at least 50 rooms for transient lodging.

8. Alcoholic Beverage Service may be provided outdoors if the outdoor area is a minimum of 100 feet from residentially zoned property or is separated by a building from adjacent residentially zoned property. If the use is within 600

feet of a residential zone, no loudspeakers or music, live or recorded, shall be permitted.

9. Alcoholic beverages shall not be provided with drive-in or drive-through services.

10. No alcoholic beverages, except beer and wine, shall be served.

11. Signs shall not be permitted in or on a window or on the exterior of any building or structure visible from a public street or from adjacent residentially zoned property identifying or advertising the Alcoholic Beverage Service use or the sale of spirituous liquors.

12. No Large Bars.

13. No Soup Kitchens

4.9.5. INDUSTRIAL USE GROUP

A. Craftwork Manufacturing

1. The area devoted to the use shall not exceed 25 percent of the gross floor area or 1,000 square feet, whichever is less.
2. The products manufactured on site shall be sold at retail on the premises.
3. The products manufactured on site shall be limited to leather-craft, jewelry, and clothing.

B. Extraction

1. The use shall be setback at least 300 feet from any property line, except that the use may be closer than 300 feet to an abutting I-2 zoned parcel with the written consent of the owner of the abutting property.
2. The generation of dust shall be minimized.

C. Manufacturing and Industrial (Includes General, Heavy Equipment, Precision, and Primary Manufacturing Land Uses)

1. The manufacturing activity shall be located on the same lot or site with the permitted use.
2. Access shall be from a street. Access from an alley shall also be permitted, provided the alley is at least 20 feet wide; it is paved for its entire block length; and zoning on both sides of the alley for its entire length within the block is not residential or office.
3. Reserved.
4. Manufacturing uses shall be conducted wholly within completely enclosed buildings.
5. All work and activity in connection with, and accessory to, a manufacturing use, such as loading and unloading areas, docks, and platforms, shall be located entirely within a building or an area on the lot that shall be enclosed on all sides by a solid wall or fence six feet in height. Such loading and unloading areas, docks, and platforms shall be located as far from any surrounding residential uses or zones as is reasonably possible.
6. The manufacturing and allied uses and activities shall be conducted in conformance with the following use specific standards:
   a. Noise: The sound level of any individual operation shall not exceed the levels permitted in Chapter 16, Section 16-31, Noise Ordinance, of the Tucson Code.
   b. Smoke: Smoke emission from any source shall not exceed a density greater than that described as No. 1 on the Ringleman Chart. However, smoke may be emitted that is equal to, but not darker than, No. 2 on the Ringleman Chart for not more than four minutes in any 30 minute period. For the purpose of grading the density of smoke, the Ringleman Chart, as published by the U.S. Bureau of Mines, shall be the standard.

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c. Glare or Heat: Any activity producing intense glare or heat shall not be performed in such a manner as to create a nuisance or hazard beyond the property lines.

d. Odors: Emission of odorous gases or other odorous matter shall not be permitted in such quantities as to be offensive to owners or occupants of adjoining property or in such a manner as to create a nuisance or hazard beyond the property lines.

e. Vibration: No vibration shall be permitted that is discernible beyond the property lines to the human sense of feeling for a duration of three minutes or more in any one hour of the day between the hours of 7:00 a.m. and 7:00 p.m. or of a duration of 30 seconds or more in any one hour between the hours of 7:00 p.m. and 7:00 a.m.

f. Fly Ash, Dust, Fumes, Vapors, Gases, and Other Forms of Air Pollution: No emission shall be permitted that can cause damage to health, animals, vegetation, or other forms of property or that can cause any excessive soiling of the air.

g. Liquids and Solid Waste: No waste shall be discharged into the streets, drainage-ways, or on property possibly creating a danger to the public health and safety, and no waste shall be discharged in the public sewage system that might endanger the normal operation of the public sewage system.

h. Illumination: Illumination of buildings and open areas shall be located and directed so as to eliminate glare toward streets and adjoining properties and shall comply with the requirements of the Tucson Code, Chapter 6, (Outdoor Lighting Code).

7. Soap manufacturing shall be limited to cold process only.

8. Outdoor storage, when permitted, shall not be located in a street perimeter yard. Outdoor storage areas shall be screened in accordance with Sec. 7.6, Landscaping and Screening. No materials or products shall be stacked or stored to exceed the height of the screen within 50 feet of an adjoining residential zone or street. Outdoor display of finished products shall be permitted within a street perimeter yard in an area limited to ten percent of the site area or 10,000 square feet, whichever is less. Such display area shall not encroach into required landscape buffer areas. Outdoor storage in the P-I zone shall be limited to 25 percent of the site area.

9. Accessory Manufacturing uses to Commercial Services, Retail Trade, or Wholesaling Use Groups, are permitted in the:

a. C-2 Zone, limited to 25% of the gross floor area.

b. C-3 Zone, limited to 33% of the gross floor area.

D. Motion Picture Industry

1. Buildings and structures shall be setback at least 100 feet from the boundary of the site.

2. The minimum lot size shall be 36 acres.

E. Perishable Goods Manufacturing

1. The manufacturing of fish or meat products, sauerkraut, sugar beets, vinegar, and yeast and the rendering or refining of fats and oils shall not be permitted.
2. Slaughterhouses, meat packing plants, fertilizer yards, and plants for the reduction of animal matter shall not be permitted.
3. The building setback shall be at least 300 feet from any property line.
4. The area devoted to the accessory land use is limited to a maximum of 33 percent of the gross floor area.
5. The accessory land use shall be limited to baked goods and confectionery products.
6. The accessory land use shall be limited to the manufacturing of beer, "microbrewery."
7. The area devoted to the accessory land use shall not exceed 25 percent of the gross floor area or 1,000 square feet, whichever is less.
8. The products manufactured on site shall be sold at retail on the premises.
9. Maximum height shall be 50 feet.
10. Accessory Manufacturing uses to Commercial Services, Retail Trade, or Wholesaling Use Groups, are permitted in the:
    a. C-2 Zone, limited to 25% of the gross floor area.
    b. C-3 Zone, limited to 33% of the gross floor area.

F. Radioactive Materials Restrictions

1. Manufacturing activities involving the use, storage, or disposal of radioactive material shall be prohibited, except as permitted below.
2. Radioactive material that does not become an integral part of the manufactured product or is exempt from the licensing requirements of, or is permitted under, a general license issued by the Arizona Atomic Energy Commission or its legally established successor, may be used, stored, or disposed of as part of a manufacturing activity.
3. Radioactive material may be used in medical diagnosis and therapy or in medical, educational, or industrial research and development.

G. Salvaging and Recycling

1. Salvaging and Recycling shall be limited to recycling collection bins only.
2. All salvaging and recycling activities and storage shall occur within an enclosed building.
3. Salvaging and Recycling shall be limited to empty household product containers, such as, but not limited to, aluminum cans, glass and plastic bottles, and newspaper.

4. Junkyards, salvaging of motorized vehicles, such as cars, trucks, airplanes, and similar vehicles; salvaging of hazardous materials; and landfills shall not be permitted.

5. Salvaging and Recycling shall be restricted to collection of recycling materials.

6. In addition to the requirements of Sec. 7.6, Landscaping and Screening, there shall be a screen wall at least six feet in height between this use and any residential zone.

7. The household goods donation center shall be located in a permanent building staffed by an attendant who remains on the premises during the center's hours of operation.

8. Security procedures or physical barriers shall be provided to prevent after-hours drop-off of donated items and to prohibit nighttime access to these items.

9. The applicant shall submit a security management plan that describes the operation of the center, to the Zoning Administrator for review and approval. The plan shall include: the days and hours of operation for the center; descriptions of the planned security procedures and/or physical barriers planned to prohibit both vehicular access when the center is closed and outside storage when the center is closed; the outdoor lighting schematic; and the operational procedures planned to implement the security management plan. Any changes or amendments to the security management plan shall be filed with and approved by the Zoning Administrator. If the use is operated in a manner that violates the security plan or conditions for permitting the use, the use may be suspended in accordance with Sec. 10.5.

10. Signs shall be posted on the site providing the days and hours of operation and stating that donations are not to be left after the center has closed.

11. One drive-through service lane may be provided for customer drop-off of donated items.

12. The household goods donation center shall be located on, and have access from, either a street designated as an arterial street in the Major Streets and Routes Plan (MS&R) or a local street in a commercial or industrial park that has direct access to an arterial street.

4.9.6. RECREATION USE GROUP

A. Golf Course

1. Standards for Permitted and Special Exception Land Uses

a. Minimum number of holes: Nine.

b. Minimum distance between a tee and its hole: 75 feet.

c. Minimum distance of tees and cups to any property line: 100 feet.

d. Driving range shall be placed so that flying balls are directed toward the interior of the site.

e. Subject to lighting requirements, Sec. 4.9.13.C.

f. Minimum lot size shall be 30 acres.

g. Side yard setback shall be 25 feet and rear yard setback shall be 50 feet.

h. There shall be no side or rear yard setback when located adjacent to nonresidential zoning district or development but there shall be 80' side and rear setback when located next to residential zoning district or development.

i. Height shall be limited to 25 feet.

2. Standards for Accessory Uses to Golf Courses

a. Alcoholic Beverage Service

(1) Permitted only as part of, and in conjunction with, a Food Service use,. All requirements for dispensing alcoholic beverages listed for Food Service, Sec. 4.9.6.A.2.b, are apply.

(2) The Alcoholic Beverage Service area may not have a separate outside entrance. Access shall be through the Food Service use area.

b. Food Service

(1) The Food Service establishment shall have kitchen facilities for keeping, cooking, and preparing foods for meals.

(2) Food Service establishments with at least 75 seats for dining at regularly available tables may operate a cocktail lounge or bar to sell all spirituous liquors for on-premises consumption.

c. Personal Service and General Merchandise Sales

(1) Personal Service and General Merchandise Sales shall be integrated into the main building associated with the principal use, such as a clubhouse or registration office. Access shall be from within such main building.

(2) No sign associated with the Personal Service or General Merchandise Sales shall be visible from the exterior of the building.

(3) General Merchandise Sales shall be limited to the sale of items related to the principal use only.

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d. In Addition to Sec. 4.9.6.A.1, .2, and .3, the Following Requirements Apply

(1) The minimum distance to any public street shall be 100 feet.

(2) Outside entrances shall not face any public street.

(3) The use is operated for the convenience of the users of the Golf Course.

B. Commercial Recreation

1. The minimum setback shall be 100 feet.

2. The minimum lot size shall be 20,000 square feet.

4.9.7. RESIDENTIAL USE GROUP

A. Artist Studio/Residence in I-1

1. The use shall be limited to buildings in existence on February 25, 1991, within the designated artist studio/residence area as defined in Sec. 11.4.
2. The use shall not displace existing industrial uses.
3. The appearance and structural integrity of the building shall be preserved or enhanced.
4. Residential use of the property shall be incidental and accessory to the artist studio use, with no greater than 50 percent of the floor area devoted to the accessory residential use.
5. The accessory residential use shall be occupied by an artist who is also the occupant of the primary artist studio use.
6. Adequate measures shall be provided to assure the health, safety, and welfare of the occupants in relation to any industrial process, use, or storage carried out in the artist studio/residence or on adjacent properties.
7. The use shall not impair or interfere with the continued industrial use of adjacent properties or with the purposes of the industrial zone.

B. Family Dwelling

1. Both dwellings shall be under the same ownership and on the same parcel.
2. Both dwellings shall comply with the development standards listed in Art. 6.
3. One dwelling shall be at least 25 percent smaller than the other dwelling.
4. The dwellings may be attached or detached.
5. A manufactured housing unit shall not be considered a dwelling for the purposes of this section, unless it is located in a subdivision recorded after January 1, 1982, and not located in a re-subdivision of any subdivision recorded prior to January 1, 1982.
6. A manufactured housing unit shall not be considered a dwelling for the purposes of this section, unless the following standards are met or a subdivision plat that has been clearly identified for manufactured housing has been approved and permits for manufactured homes have been issued for 25 percent or more of the lots prior to November 27, 2000.
   a. It is placed on an excavated and backfilled foundation (ground set). If the home is located in a floodplain, the bottom of the lowest floor joist shall be a minimum of one foot above the 100 year/base flood elevation, and the foundation of the home shall be placed on the fill.
   b. No more than eight inches of perimeter skirting wall shall be visible from the street frontage of the property. The perimeter skirting wall shall match the exterior color of the home.
   c. The exterior siding materials shall be either hardboard, vinyl, or stucco.

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d. Concrete or masonry steps shall be provided for the entry on the street side of the dwelling.

e. All entry doors on the street side of the dwelling shall be inward-swinging doors.

f. The roofing style and materials shall be either flat roof (Pueblo), steel rib roof, or shingle or tile roof with a 3:12 roof pitch or greater. All pitched roofs, except those that are disguised by a parapet, shall have a minimum six inch eave on all sides of the dwelling.

7. For any new single family dwelling in the R-1 zone with five bedrooms, three parking spaces are required. For every bedroom over five, one additional space is required for each bedroom.

8. For all single family dwellings in the R-1 zone with five or more bedrooms, and for all lots containing two or more single family dwellings, with the second dwelling having more than one bedroom, all parking and maneuvering shall be located on-site, either in a side or rear yard. The vehicular use area shall be improved, which includes surfacing, striping, and provision of barriers, in conformance with the Technical Manual. Parking spaces shall not be located in a vehicular use area in any front street perimeter yard.

C. Family Dwelling or Mobile Home Dwelling as Accessory Use in Industrial Zones

1. The dwelling is permitted as an accessory use to an Industrial, Wholesaling, or Storage Use.

2. Restricted to one single-family or mobile home dwelling for a caretaker of the principal use.

3. The dwelling shall conform to the development standards for the principal use.

D. Home Occupation, Day Care: Permitted in Office, Residential, NC and C-1 zones:

1. A home occupation shall be clearly secondary to the residential use of the dwelling.

2. A home occupation shall be conducted in such a manner that it is compatible with the residential character of the neighborhood in which it is located.

3. Goods related to the home occupation shall not be visible from the street.

4. Goods shall not be sold on the premises.

5. Except for permitted signage, the home occupation use shall not substantially alter the exterior appearance or character of the residence in which it is conducted, either by exterior construction, lighting, graphics, or other means.

6. No more than one sign shall be visible from the exterior of the property used as a home occupation. The sign shall not exceed one square foot in size. Signs shall also conform to Chapter 3 of the Tucson Code.

7. A home occupation shall not create any nuisance, hazard, or other offensive condition, such as that resulting from noise, smoke, fumes, dust, odors, or other noxious emissions. Electrical or mechanical equipment that causes fluctuations

in line voltage, creates any interference in either audio or video reception, or causes any perceivable vibration on adjacent properties is not permitted.

8. No more than five clients per day, and only one client at a time, shall be permitted on site.

9. No more than one full-time equivalent person not residing on the premises shall be employed in the day care use.

10. During the hours of activity of the day care use, there is no limit on the amount of floor area devoted to this use.

11. Outdoor activities and equipment associated with the use shall be permitted and shall be screened by a five foot fence, wall, or hedge where adjoining R-3 or more restrictive zoning.

12. Hours of operation shall be noted on the application, and those hours of operation shall not create an adverse impact on adjoining residences.

13. Any vehicle used in conjunction with the day care use shall be limited to a passenger car, van, or pickup truck.

14. The day care use shall be approved and licensed by the Arizona Department of Health Services prior to final approval.

E. Home Occupation (General) accessory to any Mobile Home or Family Dwelling:

1. A home occupation shall be clearly secondary to the residential use of the dwelling.

2. A home occupation shall be conducted in such a manner that it is compatible with the residential character of the neighborhood in which it is located.

3. No more than 25 percent of all buildings on the lot may be devoted to the home occupation. A detached accessory building of not more than 200 square feet in area may be used for such home occupation.

4. Persons other than those residing in the dwelling shall not be employed in the home occupation, except that one nonresident of the premises may be employed in the IR, RH, SR, SH, O-2, O-3, NC, C-1, C-2, C-3, OCR-1, and OCR-2 zones.

5. Goods related to the home occupation shall not be visible from the street.

6. Goods shall not be sold on the premises.

7. Outdoor storage of materials or equipment related to the home occupation activity shall be not permitted on the premises.

8. Except for permitted signage, the home occupation use shall not substantially alter the exterior appearance or character of the residence in which it is conducted, either by exterior construction, lighting, graphics, or other means.

9. No more than one sign shall be visible from the exterior of the property used as a home occupation. The sign shall not exceed one square foot in size. Signs shall also conform to Chapter 3 of the Tucson Code.

10. A home occupation shall not create any nuisance, hazard, or other offensive condition, such as that resulting from noise, smoke, fumes, dust, odors, or other

noxious emissions. Electrical or mechanical equipment that causes fluctuations in line voltage, creates any interference in either audio or video reception, or causes any perceivable vibration on adjacent properties is not permitted.

11. No more than five clients per day, and only one client at a time, shall be permitted on site.

12. Motor vehicle and bicycle parking shall not be required for home occupation - general application. The home occupation may involve the use of no more than one commercial vehicle for the transportation of goods or materials to and from the premises. The commercial vehicle shall be limited to a passenger car, van, or pickup truck. This vehicle shall not be more than 20 feet in overall length and not more than seven feet in overall height and shall be parked on private property in a carport or garage or shielded from view from adjoining properties by landscaping, fencing, or screening material. Motor vehicle and bicycle parking necessitated by the conduct of such home occupation shall be provided on site.

13. Automotive - Service and Repair, hair salon, and Medical Service uses shall be prohibited as home occupations.

14. Home occupations shall require approval through a Zoning Compliance Review, Sec. 3.xxx.

F. Home Occupation, Group Dwellings:

1. Room and board shall be provided to not more than two persons in the Family Dwelling who are not members of the family or household in the IR, RH, SR, SH, RX-1, RX-2, MH-1 Zones. Room and board shall be provided to not more than four persons in the Family Dwelling who are not members of the family or household in the R-2 or MH-2 zones.

2. Meals shall be served only to roomers or boarders residing in the Family Dwelling. Separate cooking facilities in guest rooms shall be prohibited.

3. Parking requirements shall be as required for Group Dwellings, Sec. 7.4.4.

G. Home Occupation, Travelers' Accommodation, Lodging:

1. Accommodations shall be permitted for up to four guests for a maximum stay of 14 days. No more than two sleeping rooms shall be used to accommodate guests.

2. Accommodations shall be permitted for up to eight guests for a maximum of 14 days. No more than four sleeping rooms shall be used to accommodate guests.

3. Accommodations shall be permitted for up to 12 guests for a maximum stay of 14 days. No more than six sleeping rooms shall be used to accommodate guests.

4. Accommodations shall be permitted for up to 20 guests for a maximum stay of 14 days. No more than 10 sleeping rooms shall be used to accommodate guests.

5. Meals shall be served only to guests staying in the facility. Separate cooking facilities in guest rooms shall be prohibited.

6. The PDSD Director shall determine that the building and site improvements are compatible with the surrounding residential area. The Design Review Board (DRB) shall review all applications, except those involving properties within the Historic Preservation Zone (HPZ), for compatibility and make recommendations to the PDSD Director. The DRB shall review architectural style, building elevations, materials on exterior facades, color schemes, new mechanical equipment locations, lighting of outdoor areas, window locations and types, screening, landscaping, vehicular use areas, and other contributing design features. If the application is within the HPZ, see Sec. 5.8.5 for the review procedure for compatibility.

7. No more than one full-time equivalent person not residing on the premises may be employed in the home occupation use.

8. No more than one sign shall be visible from the exterior of the property used as a home occupation. The sign shall not exceed one square foot in size. Signs shall also conform to Chapter 3 of the Tucson Code.

9. Outdoor activities and equipment associated with the use shall be permitted and shall be screened by a five foot fence, wall, or hedge where adjoining R-3 or more restrictive zoning.

10. A home occupation shall not create any nuisance, hazard, or other offensive condition, such as that resulting from noise, smoke, fumes, dust, odors, or other noxious emissions. Electrical or mechanical equipment that causes fluctuations in line voltage, creates any interference in either audio or video reception, or causes any perceivable vibration on adjacent properties shall not be permitted.

11. This use may involve the use of no more than one commercial vehicle for the transportation of persons or materials to and from the premises. The commercial vehicle shall be limited to a passenger car, van, or pickup truck. This vehicle shall be parked on private property in a carport or garage or shielded from view from adjoining properties by landscaping, fencing, or screening material. Motor vehicle and bicycle parking as required for Travelers' Accommodation, Lodging, shall be in addition to that required for the residential use.

12. If Home Occupation, Group Dwelling and Home Occupation, and/or Travelers' Accommodation, Lodging, occur on the same site, the total number of guests, roomers, and boarders shall not exceed the number of guests permitted for that zone.

13. The minimum lot size shall be 10,000 square feet.

14. Motor vehicle and bicycle parking shall be provided per Sec. 7.7.4, for Travelers' Accommodation, Lodging. Variances shall not be granted from the number of required parking spaces.

H. Accessory Uses in Mobile Home Parks with 100 Spaces or More

1. Child Day Care (subject to 4.9.7.D. 1-5), Food and Beverage Sales (limited to a delicatessen or snack bar), General Merchandise Sales, and Personal Services (limited to a coin-operated laundry or pick-up station for dry cleaning) are permitted as accessory uses subject to the following:

a. The use is located in the social or recreation center of the park.

b. The social or recreation center is located 50 feet or more from any interior lot line of the mobile home park and 100 feet or more from any street lot line bounding the mobile home park.

c. The accessory use does not occupy more than 25 percent of the floor area of the social or recreation center.

d. No merchandise or supplies shall be stored or displayed outside the building.

e. No exterior signs or public advertising are permitted.

2. Vehicle rental and sales of model units in the mobile home park are permitted as accessory uses subject to the following:

a. Each model home shall have the same setback and spacing requirements as other units.

b. The number of spaces allotted for model homes shall be no more than five percent of the total spaces in the mobile home park.

c. Exterior display or advertising is limited to one sign. The sign may not exceed six square feet at each model, be over six feet in height nor be illuminated.

3. Recreational vehicles may occupy no more than 25% of the existing spaces designed for mobile homes provided:

a. The mobile home park is in an MH-2 zone, or the mobile home park was built prior to July 1, 1995.

b. The rental lease is for no less than one month duration.

I. Residential Care Services

1. A Rehabilitation Service or Shelter Care use shall not be located within 1,200 feet, in any direction, from another Rehabilitation Service or Shelter Care use. The applicant for such use shall provide an inventory of such uses within 1,200 feet of the site prior to the establishment of the use.

2. Other Services.

a. Accessory treatment, including counseling or other types of meetings, shall not be permitted for nonresidents of the facility.

b. Accessory treatment, including counseling or other types of meetings, shall be permitted for nonresidents of the facility, if limited to 25 percent of the gross floor area of the facility.

3. Maximum Number of Residents.

a. Care shall be permitted for a maximum of ten residents.

b. Care shall be permitted for a maximum of 15 residents.

c. Care shall be permitted for a maximum of 20 residents.

d. Care shall be permitted for an unlimited number of residents.

4. If licensing shall be required by the State of Arizona for the use, proof of such licensure shall be provided.

5. Prior to establishment of a Rehabilitation Service or Shelter Care in an industrial zone, applicants for the use shall provide to the PDSD a report and site environs analysis for the facility indicating that adequate measures are provided to assure the health, safety, and welfare of the residents of the facility in respect to any industrial process, use, or storage carried out on the site or on adjacent properties.

6. The site shall be located at least 500 feet, measured in a straight line, from the property line to a zone boundary line of R-3 or more restrictive zoning.

7. Minimum lot size shall be three acres. Lot coverage shall be limited to 50 percent. Minimum setback from all interior lot lines adjoining residential zoning shall be 25 feet.

8. Minimum lot size shall be one and one-half acres. Lot coverage shall be limited to 60 percent. Minimum setback from all interior lot lines adjoining residential zoning shall be 20 feet.

9. Minimum lot size shall be 20,000 square feet.

10. Maximum height shall be 40 feet.

11. Maximum height shall be 140 feet.

4.9.8. RESTRICTED ADULT ACTIVITIES USE GROUP

A. Restricted Adult Activities

1. The adult establishment shall not be less than 1,000 feet from any church, school, public playground, park, or neighborhood recreation property line.
2. The adult establishment shall not be less than 1,000 feet from any residential use property line or residential zone boundary line.
3. The adult establishment shall not be less than 1,000 feet from the premises of any other adult entertainment enterprise.
4. The adult establishment requires approval through Zoning Compliance Review, Sec. 3.xxx.
5. The land use activity shall occur within an enclosed building.
6. In the I-1 zone, all activity, including the display of any retail items, shall occur within a completely enclosed building and shall not be visible from the exterior.[44]

4.9.9. RETAIL TRADE USE GROUP

A. Food and Beverage Sales

1. One building shall be permitted.
2. Maximum area of stand.
   a. 3,000 square feet.
   b. 750 square feet.
   c. 200 square feet.
3. Only the sale of farm products grown or produced on the premises shall be permitted.
4. The building shall not be located closer than 20 feet to any property line.
5. The minimum setback from any street intersection shall be 150 feet.
6. The parking area shall be setback a minimum of 45 feet from the property line.
7. The minimum parking area shall be 800 square feet.
8. The maximum width of the entry to the parking area shall be 30 feet.
9. The vehicular use area is to be surfaced as is required in Sec. 7.4.6.I if the stand is open more than six months per calendar year. If open a shorter time, these areas shall be maintained to minimize dust.
10. The maximum floor area shall be 4,000 square feet.
11. The following standards shall apply to retail establishment (store).

[44] From 2.7.2.2.F – first sentence.

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a. A retail establishment (store) shall be limited to a maximum of 100,000 square feet of floor area. The 100,000 square feet of floor area includes gross floor area, outdoor storage areas, and any outside area that provides associated services to the public, such as, but not limited to, outdoor merchandise display, snack bars, etc. The floor area does not include motor vehicle parking or loading areas. For the purposes of determining the applicability of the 100,000 square foot floor area maximum, the aggregate square footage of all adjacent stores, which share cashiers, management, a controlling ownership interest, and storage areas, shall be considered one establishment, e.g., a plant nursery associated with a general merchandise store, such as a home improvement store.

b. Establishments greater than 100,000 square feet of floor area (Large Retail Establishments) shall be considered through a special exception land use process as provided in the applicable zone.

B. General Merchandise Sales

1. Outdoor display or storage of fertilizer, manure, or other odorous material shall be located at least 30 feet from any interior lot line.

2. The maximum floor area shall be 2,000 square feet.

3. Fuel dispensing locations shall be limited to a maximum of 12.

4. The following standards shall apply to retail establishment (store).

a. A retail establishment (store) shall be limited to a maximum of 100,000 square feet of floor area. The 100,000 square feet of floor area includes gross floor area, outdoor storage areas, and any outside area that provides associated services to the public, such as, but not limited to, outdoor merchandise display, snack bars, etc. The floor area shall not include motor vehicle parking or loading areas.

b. For the purposes of determining the applicability of the 100,000 square foot floor area maximum, the aggregate square footage of all adjacent stores that share checkstands, management, a controlling ownership interest, and storage areas shall be considered one establishment, e.g., a plant nursery associated with a general merchandise store, such as a home improvement store.

c. Establishments greater than 100,000 square feet of floor area (Large Retail Establishments) shall be considered through a special exception land use process as provided in the applicable zone.

C. Heavy Equipment Sales

1. Any area used for the display or storage of heavy equipment shall be surfaced with a hard, durable, dustproof material.

2. Any lights used to illuminate outdoor activity shall be arranged so as to reflect the light away from adjacent residential uses or zones.

D. Large Retail Establishment Design Standards

Large Retail Establishments shall be subject to the following use specific standards. Variances from the standards shall not be permitted; however, if one or more of the

standards cannot be met, the applicant may request approval through the special exception land use process where there is substantial compliance with this section.

1. Site Design and Relationship to Surrounding Community

a. Vehicular Access

The project shall provide safety and protection to adjacent residential uses by having motor vehicle access from a major street as designated by the adopted Major Streets and Routes (MS&R) Plan. Access can also be provided from a street that is not designated by the MS&R Plan, provided it can be shown that any negative impacts on residential uses or residentially zoned properties can be mitigated.

b. Buffers

The project shall provide visual and noise buffers where the site is adjacent to a residential use or residentially zoned property. This can be accomplished by providing a minimum building setback of at least 200 feet from a residential use or residentially zoned property that is adjacent to the site. An eight foot high, or higher, masonry screen wall and at least a 20 foot wide landscape buffer shall be provided adjacent to the site property line where it adjoins a residential use or residentially zoned property. The landscape buffer shall be placed on the inside of the screen wall and shall include, in addition to shrubs and groundcover, canopy trees at 20 to 30 foot intervals depending on the separation needed for the tree canopies to touch at maturity to form a noise, light, and visual screen above the screen wall. No other uses, such as, but not limited to, parking or storage, shall be permitted within the landscape buffer area.

c. Outdoor Storage Areas

The project shall mitigate visual and noise impacts on residential uses, residentially zoned properties, and streets that may be adjacent to the site from outdoor storage areas (when permitted by the zone district requirements). The mitigation can be accomplished by locating these areas on-site and at least 200 feet from any residential use or residentially zoned property that is adjacent to the site. The areas should be screened or enclosed so that they are not visible from public streets, public sidewalks, internal pedestrian walkways, or adjacent residential properties. The screen shall be at least 8 feet high and of masonry construction to assure the highest level of noise abatement and to confine any loose papers, cartons, and other trash. Storage materials shall not be visible above the screen wall. It is preferred that these outdoor storage areas be placed between buildings in a manner that would allow the buildings to act as screens.

d. Trash Collection Areas

The project shall mitigate visual and noise impacts on adjoining residential neighborhoods and streets from trash collection areas by locating these areas on-site and at least 200 feet from any residential use, residentially zoned property, and street that is adjacent to the site. The areas shall be screened or enclosed so that they are not visible from public streets,

public sidewalks, internal pedestrian walkways, or adjacent residential properties. Screening and landscaping of these areas shall conform to the predominant materials used on the site. The screen shall be at least eight feet high and of masonry construction to assure the highest level of noise abatement and to confine any loose papers, cartons, and other trash. It is preferred that these trash collection areas be placed between buildings to allow the buildings to act as screens. No trash shall be removed between 4:00 p.m. and 9:00 a.m. as part of scheduled trash collection.

e. Pedestrian Flow

The project shall provide pedestrian accessibility, safety, and convenience to reduce traffic impacts and enable the development to project a friendly, inviting image. Sidewalks shall be at least eight feet wide and unobstructed and shall connect the public street sidewalks, the main entrances to the stores, transit stops on- or off-site, and other buildings on the site, in addition to providing convenient access to adjacent residential neighborhoods. Sidewalks shall be provided along the full length of any building where it adjoins a parking lot. Sidewalks shall have an associated three foot wide landscape strip for their entire length, except at intersections with parking area access lanes (PAALs). The landscaping shall include canopy trees or other shading devices to shade at least 65 to 75 percent of the sidewalks during the major part of the day (shadow pattern needs to be taken into consideration).

f. Central Features and Community Spaces

The project shall provide attractive and inviting pedestrian scale features, spaces, and amenities. Entrances and parking lot locations shall be functional and inviting with walkways conveniently tied to logical destinations. Bus stops should be considered integral parts of the configuration whether they are located on-site or along the street. Customer drop-off/pick-up points that may be provided should also be integrated into the design (shall not conflict with traffic lanes or pedestrian paths). Pedestrian ways shall be anchored by special design features, such as towers, arcades, porticos, light fixtures, planter walls, seating areas, and other architectural features that define circulation paths and outdoor spaces. Examples are outdoor plazas, patios, courtyards, and window shopping areas. Each development shall have at least two of these features.

g. Delivery and Loading Spaces

(1) Delivery and loading operations shall be designed and located to mitigate visual and noise impacts to adjoining residential neighborhoods. If there is a residential use or residentially zoned property adjacent to the site, such operations shall not be permitted between 10:00 p.m. and 7:00 a.m. Delivery and loading spaces shall be setback at least 200 feet from a residential use or residentially zoned property that is adjacent to the site, unless such operations are located entirely within an enclosed building, provided it is no closer than the allowable building setback.

(2) Delivery trucks shall not be parked in close proximity to or within a designated delivery or loading area during non-delivery hours with motors and/or refrigeration/generators running, unless the area where the trucks are parked is setback at least 300 feet from residential property to mitigate the truck noise. The setback shall not apply if the main building is located between the truck parking and the residential use or residentially zoned property to act as the screen.

(3) The delivery and loading areas shall be screened or enclosed so that they are not visible from public streets, public sidewalks, internal pedestrian walkways, or adjacent properties. The screen shall be of masonry construction and at least ten feet high, measured from the loading dock floor elevation, to screen the noise and activity at the loading dock. The masonry screen assures the highest level of noise abatement. It is preferred that the delivery and loading spaces be enclosed within a building or placed between buildings in a manner that would allow the buildings to act as screens.

h. Traffic Impacts

The applicant shall have a professional entity perform a Traffic Impact Analysis (TIA) report for the development using the Institute of Transportation Engineers' Trip Generation publication as the standard for trip generation calculation, as well as a parking generation report proposing the number of motor vehicle parking spaces required for the project, if different from shopping center calculations. The scope and standards for the TIA report shall be approved by the Department of Transportation, prior to submittal of the TIA report. The parking generation report shall be accepted by the Department of Transportation and PDSD, prior to the first public hearing. The TIA report shall identify traffic flow impacts on the public streets, recommend mitigation measures to address those conditions that fall below the standards established by the adopted regional Mobility Management Plan, and show how the applicant will provide the recommended improvements. The Mayor and Council may approve a parking requirement that supersedes the number required by Sec. 7.4, Motor Vehicle and Bicycle Parking, as part of their review process. The TIA and parking generation reports are applicable to a specific application. Any change to the specific proposed use of the site and buildings requires resubmittal, review, and approval of a revised TIA report and revised parking generation report.

i. Outdoor Lighting

A photometric plan and outdoor lighting report shall be required that provides information on how outdoor lighting is addressed to mitigate negative impacts on adjacent residential uses or residentially zoned properties. The report shall also address the negative impacts of outdoor lighting between the hours of 10:00 p.m. and 7:00 a.m. on adjacent residential properties or zones and how they will be mitigated. Outdoor lighting between 10:00 p.m. and 7:00 a.m. shall be limited to low-pressure sodium lighting.

j. Outdoor Sales Display/Ancillary Uses

Measures to mitigate any negative impacts to a residential use or residentially zoned property that is adjacent to the site from the location of any outdoor activity associated with services to the public, such as, but not limited to, outdoor merchandise display and sales, outdoor storage, and outdoor snack bar and eating areas shall be required. The outside activity shall be setback at least 250 feet and oriented to face away from any residential use or residentially zoned property that is adjacent to the site, unless a building is located between the activity and the residential property.

k. Hazardous Materials

The project shall provide a Hazardous Materials Management Plan and Hazardous Materials Inventory Statement as provided in the Fire Code to assure that the building site and design will protect public health and safety from accidental exposure to hazardous materials as provided in the Tucson Fire Code.

l. Noise Abatement

The project shall provide a noise mitigation plan indicating how the noise initiated by the land use will be mitigated to comply with noise standards in Chapter 16, Section 16-31, of the Tucson Code. Trucks shall not be left idling between the hours of 6:00 p.m. and 7:00 a.m.

m. Combination of Retail with Food and Beverage Sales

General Merchandise Sales and retail sales shall not be combined with Food and Beverage Sales except where one of the Land Use Classes consists of less than ten percent of the gross floor area.

2. Aesthetic Character of Buildings

a. Facades and Exterior Walls Including Sides and Back

The building shall be designed in a way that will reduce the massive scale and uniform and impersonal appearance and will provide visual interest consistent with the community's identity, character, and scale. Long building walls shall be broken up with projections or recessions with depths of at least three percent of the façade length along all sides of the building. Along any public street frontage, the building design should include windows, arcades, or awnings along at least 60 percent of the building length. Architectural treatment, similar to that provided to the front façade, shall be provided to the sides and rear of the building to mitigate any negative view from adjacent properties and/or streets.

b. Detail Features

The project shall provide architectural features that contribute to visual interest at the pedestrian scale and reduce the massive aesthetic effect by breaking up the building wall, front, side, or rear, with color, texture change, wall offsets, reveals, or projecting ribs.

c. Roofs

The roof design shall provide variations in roof lines to add interest to, and reduce the massive scale of, large buildings. Roof features shall complement the architectural and visual character of adjoining neighborhoods. Roofs shall include two or more roof planes. Parapet walls shall be architecturally treated to avoid a plain, monotonous look, unless it is in keeping with the architectural style of the building, e.g., Santa Fe style with smooth walls.

d. Materials and Color

The buildings shall have exterior building materials and colors that are aesthetically pleasing and compatible with materials and colors that are used in adjoining neighborhoods. This includes the use of high-quality materials and colors that are low reflective, subtle, neutral, or earth tone. Certain types of colors shall be avoided, e.g., fluorescent or metallic. Construction materials, such as tilt-up concrete, smooth-faced concrete block, prefabricated steel panels, and other similar material shall be avoided, unless the exterior surface is covered with an acceptable architectural treatment.

e. Entryways

The building design shall provide design elements that give customers orientation on accessibility and that add aesthetically pleasing character to buildings by providing clearly-defined, highly-visible customer entrances.

f. Screening of Mechanical Equipment

(1) Roof- or ground-mounted mechanical equipment shall be screened to mitigate noise and views in all directions. If roof mounted, the screen shall be designed to conform architecturally with the design of the building, whether it is with varying roof planes or with parapet walls. A wood fence or similar treatment is not acceptable.

(2) Ground-mounted mechanical equipment shall be screened. The screen shall be of masonry construction and be of sufficient height to block the view and noise of the equipment.

3. Design Review Board (DRB)

All proposed Large Retail Establishments shall be reviewed by the Design Review Board (DRB) for recommendation to the PDSD Director, who will make a recommendation on whether the project complies with the use specific standards. The DRB will base its recommendation on whether or not the project complies with the use specific standards related to compatibility, architecture, and site design, as provided in Sec. 4.9.9.D where specific requirements are not provided. The applicant shall be responsible for providing all documentation and information necessary to show compliance, such as, but not limited to, site plans, building elevations, landscaping plans, floor plans, and outdoor lighting photometry plan.

E. Medical Marijuana

1. Medical Marijuana Dispensary

a. The total maximum floor area of a medical marijuana dispensary shall not exceed 2,500 square feet.

b. The secure storage area for the medical marijuana stored at the medical marijuana dispensary shall not exceed 500 square feet of the total 2,500 square foot maximum floor area of a medical marijuana dispensary.

c. A medical marijuana dispensary shall be located in a permanent building and shall not be located in a trailer, cargo container, mobile or modular unit, mobile home, recreational vehicle, or other motor vehicle. "Building" shall have the same meaning provided in Section 11.4.

d. The permitted hours of operation of a medical marijuana dispensary shall be from 9:00 a.m. to 7:00 p.m.

e. A medical marijuana dispensary shall have an interior customer waiting area equal to a minimum of 25 percent of the gross floor area.

f. A medical marijuana dispensary shall not have a drive-through service.

g. A medical marijuana dispensary shall not have outdoor seating areas.

h. A medical marijuana dispensary shall not offer a service that provides off-site delivery of the medical marijuana.

i. A medical marijuana dispensary shall be setback a minimum of 2,000 feet from any other medical marijuana dispensaries, measured in a straight and direct horizontal line between the two closest exterior walls of medical marijuana dispensaries.

j. A medical marijuana dispensary shall be setback a minimum of 1,000 feet from a public, private or charter school or a licensed childcare center, measured in a straight and direct horizontal line from the closest exterior wall of the medical marijuana dispensary to the closest property line of a school or childcare center.

k. A medical marijuana dispensary shall be setback a minimum of 1,000 feet from a church, library, or public park and a minimum of 2,000 feet from a licensed residential substance abuse diagnostic and treatment facility or other licensed drug or alcohol rehabilitation facility, measured in a straight and direct horizontal line from the closest wall of the medical marijuana dispensary to the closest property line of a church, library, public park, licensed residential substance abuse diagnostic and treatment facility, or other licensed drug or alcohol rehabilitation facility. A "church" means a building that is erected or converted for use as a church, where services are regularly convened that is used primarily for religious worship and schooling and that a reasonable person would conclude is a church by reason of design, signs, or other architectural features.

l. A medical marijuana dispensary shall comply with all lawful, applicable health regulations, including those promulgated by the Arizona

Department of Health Services and any other authorized regulatory agency.

2. Medical Marijuana Dispensary Off-site Cultivation Location

a. The total maximum floor area of a medical marijuana dispensary off-site cultivation location shall not exceed 3,000 square feet.

b. The secure storage area for the medical marijuana stored at the medical marijuana dispensary off-site cultivation location shall not exceed 1,000 square feet of the 3,000 square foot total maximum floor area of a medical marijuana dispensary off-site cultivation location.

c. A medical marijuana dispensary off-site cultivation location shall be located in a permanent building and shall not be located in a trailer, cargo container, mobile or modular unit, mobile home, recreational vehicle, or other motor vehicle. "Building" shall have the meaning provided in Section 11.4.

d. A medical marijuana dispensary off-site cultivation location shall be setback a minimum of 2,000 feet from any other medical marijuana dispensaries or medical marijuana dispensary off-site cultivation locations measured in a straight and direct horizontal line between the two closest exterior walls of medical marijuana dispensaries' cultivation locations.

e. A medical marijuana dispensary off-site cultivation location shall be setback a minimum of 1,000 feet from a public, private or charter school or a licensed childcare center measured in a straight and direct horizontal line from the closest exterior wall of the medical marijuana off-site cultivation location to the nearest property line of a school or childcare center.

f. A medical marijuana dispensary off-site cultivation location shall be setback a minimum of 1,000 feet from a church, library, or public park and a minimum of 2,000 feet from a licensed residential substance abuse diagnostic and treatment facility or other licensed drug or alcohol rehabilitation facility measured in a straight and direct horizontal line from the closest wall of the medical marijuana dispensary off-site cultivation location to the closes property line of a church, library, public park, licensed residential substance abuse diagnostic and treatment facility, or other licensed drug or alcohol rehabilitation facility. A "church" means a building that is erected or converted for use as a church, where services are regularly convened that is used primarily for religious worship and schooling and that a reasonable person would conclude is a church by reason of design, signs, or other architectural features.

g. A medical marijuana off-site cultivation location shall comply with all lawful, applicable health regulations, including those promulgated by the Arizona Department of Health Services and any other authorized regulatory agency.

3. Medical Marijuana Designated Caregiver Cultivation Location

a. All conditions and restrictions for medical marijuana dispensary off-site cultivation locations apply except that the designated caregiver

cultivation location cultivation area is limited to a total 250 square feet maximum, including any storage areas.

b. A designated caregiver may cultivate at their residence for a single qualifying patient subject to compliance with § A.R.S. 36-2806.01.

c. More than one designated caregiver may co-locate cultivation locations as long as the total cultivation area does not exceed 250 square feet maximum, including storage areas.

d. A designated caregiver shall comply with all lawful, applicable health regulations, including those promulgated by the Arizona Department of Health Services and any other authorized regulatory agency.

4. Medical Marijuana Qualifying Patient Cultivation Location

a. A qualifying patient may cultivate at their place of residence subject to compliance with A.R.S. § 36-2806.01.

b. A qualifying patient, cultivating marijuana, shall comply with all lawful, applicable health regulations, including those promulgated by the Arizona Department of Health Services and any other authorized regulatory agency.

F. Swap Meets and Auctions

1. No large animals shall be sold.

2. Area lighting shall be low-pressure sodium and shielded on top.

3. The retail area shall be dust-proofed.

4. The following additional requirements apply if the use is located within 400 feet of a residential use or zone.

a. The use shall not operate later than 11:00 p.m.

b. Any high noise activity, such as amplified auctioneering, entertainment, or woodworking, shall occur within an enclosed building.

G. Vehicle Rental and Sales

1. Outdoor lights shall not operate later than 10:00 p.m., except for security lighting provided it does not exceed ten percent of all outdoor lighting.

2. Any lights used to illuminate outdoor activity shall be arranged so as to reflect the light away from adjacent property and comply with the Tucson Code, Chapter 6, Outdoor Lighting Code.

3. Limited to rental only; no retail sales.

4.9.10. STORAGE USE GROUP

A. Commercial Storage

1. Adjacent to a residential use or zone, outdoor storage shall comply with the following.

a. Storage material shall not be visible from outside the screen.

b. Outdoor lighting shall be directed away from adjacent residential uses and zones.

2. Outdoor storage, when permitted, shall not be located in the street perimeter yard.

B. Hazardous Material Storage

1. Aboveground storage tanks for the storage of hazardous materials, such as, but not limited to, hydrogen, gasoline, diesel fuel, automotive fluids, oil, or waste-oil, shall be permitted as accessory uses in conjunction with and for the purpose of a principal Permitted Land Use.

a. Exceptions

(1) A tank used for storing propane, water, or heating oil for consumptive use on the premises shall not be regulated by this section.

(2) Aboveground storage tanks that are not located within an enclosed building shall not be permitted within the Scenic Corridor Zone (SCZ).

b. No person shall install an accessory aboveground storage tank unless the tank meets the following requirements.

(1) The tank shall be used only for the purpose of servicing the vehicles used or serviced in connection with a permitted principal use. The tanks shall not be open for use by the public.

(2) Except as specified in this section, the setback standards of the zoning district in which the tanks shall be located apply to all accessory storage tanks.

(a) If the Fire Chief approves the location of a tank within an enclosed building, the minimum setbacks shall be determined by the Fire Chief, provided that the setbacks shall not be less than those required by the zoning.

(b) A tank that is not located within an enclosed building shall be setback as follows.

(i) A minimum of 50 feet from any property line adjacent to any area where, in the opinion of the Fire Chief, the tank could present a hazard or danger to person or property.

(ii) A minimum of 200 feet from any property line adjacent to R-3 or more restrictive zoning, or the tank location shall be approved as a special exception through a Zoning Examiner Special Exception Procedure, Sec. 3.xxx.

(3) The tank shall be screened by a wall equal to the height of the tank.

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(4) The maximum permitted diameter of a tank is 95 inches, except that, on 10,000 gallon storage tanks, the maximum diameter may be increased to ten feet.

(5) The maximum permitted height of a tank, excepting venting, manways, and filler caps, is ten feet above grade, except that, on 10,000 gallon storage tanks, the maximum height may be increased to 12 feet above grade.

(6) An aboveground storage tank shall have a secondary containment tank.

(7) A concrete pad shall be provided under all tanks.

(8) The construction, installation, and location of the aboveground storage tanks and the types of materials to be stored in the tanks shall be approved by the Fire Chief.

c. These standards shall not supersede or replace any other applicable city, county, state, or federal standards and requirements for aboveground storage tanks.

2. The maximum capacity of each aboveground storage tank shall be as follows.

a. Capacity of 1,000 gallons shall be permitted.

b. Capacity of 2,000 gallons shall be permitted.

c. Capacity of 4,000 gallons shall be permitted.

d. Capacity of 10,000 gallons shall be permitted.

C. Personal Storage

1. All storage shall be within enclosed buildings.

2. Access shall be from a collector or arterial street.

3. All walls or doors visible from adjacent streets and residential properties shall be surfaced with a non-reflective material.

4. Maximum individual unit size: 200 square feet of floor area.

5. Razor or barbed wire shall not be used.

6. The facility's exterior façade visible from adjoining residential properties or street frontage shall be earth tone in color and of masonry, stucco, or similar materials.

7. Maximum site area: Three acres.

4.9.11. UTILITIES USE GROUP

A. Distribution System

1. The setback of the facility, including walls or equipment, shall be 20 feet from any adjacent residential zone.
2. Where a facility is not enclosed within a building, the surrounding screen shall be used as the building wall for the purposes of setbacks.
3. The setback of the facility, including walls or equipment, shall be 200 feet from any existing adjacent residential zone. This setback may be varied as provided in Sec. 3.xxx Variances.
4. Where a water tower more than 20 feet in height is used in conjunction with such facilities, its center shall be located a distance from any lot line equal to not less than one-half its height.
5. The use shall not have any service or storage yards.
6. Noise emission at the property line shall be equivalent to the residential requirements of the noise ordinance.
7. No TVI (television interference) or RIV (radio interference) on a continuous basis shall be permitted.
8. Any building housing such facility shall be in keeping with the character of the zone in which it is located. The Design Review Board (DRB) shall review all applications and make recommendations to the Zoning Examiner. The DRB shall review architectural style, building elevations, materials on exterior facades, color schemes, new mechanical equipment locations, lighting of outdoor areas, window locations and types, screening, landscaping, vehicular use areas, and other contributing design features.
9. The use shall be located wholly within an enclosed building or within an area enclosed on all sides with a masonry wall or compact evergreen hedge, not less than six feet, nor more than ten feet, in height.
10. The use shall include a ten foot high wall in an earth tone and vegetative landscaping where contiguous to a residential zone.
11. The use shall be limited to water pumping and storage facilities, telephone exchanges, and power substations with an input voltage of no greater than 138 kilovolts.

B. Renewable Energy Generation

1. Requires approval through an Administrative Special Exception procedure, Sec. 3.xxx.
2. The setback of the facility, including walls or equipment, shall be 20 feet from any adjacent residential zone.
3. All activities shall be conducted in conformance with the following use specific standards:

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a. Noise

The sound level of any individual operation shall not exceed the levels permitted in the Tucson Code, Chapter 16, Section 16-31, Noise Ordinance.

b. Smoke

Smoke emission from any source is not permitted to exceed a density greater than that described as No. 1 on the Ringleman Chart. However, smoke may be emitted which is equal to, but not darker than, No. 2 on the Ringleman Chart for not more than four minutes in any 30 minute period. For the purpose of grading the density of smoke, the Ringleman Chart, as published by the U.S. Bureau of Mines, is the standard.

c. Glare or Heat

Any activity producing intense glare or heat shall not be performed in such a manner as to create a nuisance or hazard beyond the property lines of the project site.

d. Odors

Emission of odorous gases or other odorous matter is not permitted in such quantities as to be offensive to owners or occupants of adjoining property or in such a manner as to create a nuisance or hazard beyond the property lines of the project site.

e. Vibration

No vibration is permitted that is discernible beyond the property lines of the project site.

f. Fly Ash, Dust, Fumes, Vapors, Gases, and Other Forms of Air Pollution

No emission is permitted that can cause damage to health, animals, vegetation or other forms of property or that can cause any excessive soiling of the air per State or County guidelines.

g. Liquids and Solid Waste

No waste shall be discharged into the streets, drainage ways, or on property possibly creating a danger to the public health and safety, and no waste shall be discharged in the public sewage system that might endanger the normal operation of the public sewage system.

h. Illumination

Illumination of buildings and open areas shall be located and directed so as to eliminate glare toward streets and adjoining properties and shall comply with the requirements of the Outdoor Lighting Code in Chapter 6 of the Tucson Code.

i. Interference

No TVI (television interference) or RIV (radio interference) is permitted to emanate from the project site.

4. The use shall not include a service or storage yard.

5. In addition to the requirements of Sec. 7.6, Landscaping and Screening, there shall be a decorative masonry wall at least six feet in height between the project site and any residential zone.

C. Sanitation System

Uses shall be at least 300 feet from any nonindustrial zone, except where the use of the non-industrially zoned property is railroad or freeway right-of-way.

4.9.12. WHOLESALING USE GROUP

Reserved.

4.9.13. GENERALLY APPLIED STANDARDS

A. Access

1. The use shall have primary vehicular access from an arterial street.

2. The use shall have access from a paved public street on the Major Streets and Routes (MS&R) Plan.

B. Hours

The principal use shall be restricted to hours of operation of 7:00 a.m. to 10:00 p.m.

C. Lighting

In addition to the requirements of Chapter 6, Section 6-101, Outdoor Lighting Code, of the Tucson Code, any outdoor lighting utilized in conjunction with the use shall be located and directed so as to eliminate glare toward streets and adjoining R-3 or more restrictive zoning.

D. Noise

In addition to the requirements of Chapter 16, Section-31, Noise, of the Tucson Code, the use shall be located within an enclosed building. There shall be no openings on the side of the building adjacent to R-3 or more restrictive zoning.

E. Outdoor Activity

Activity may occur outdoors.

F. Screening

In addition to the requirements of Sec. 7.6, there shall be a screen wall at least five feet in height between this use and any residential zone.

4.10. ACCESSORY USES AND BUILDINGS[46]

Accessory uses and buildings shall be permitted in all zoning districts.[47] Those land uses and buildings associated with and incidental to a principal building shall be accessory and subject to the provisions described below.

4.10.1. ACCESSORY USES

An accessory use shall comply with the following.

A. The use shall be incidental to the principal use and is located on the same parcel as the principal use;

B. The use shall be intended for the occupants, residents, customers, employees, or guests of the principal use; and

C. The use shall not substantially alter the exterior appearance or character of the principal use or building to which it is incidental.

D. Animals may be kept for personal use in all zones subject to Tucson Code, Chapter 4, and any applicable health regulations.

4.10.2. ACCESSORY BUILDINGS

In all zones, the buildings used for accessory uses shall comply with the following.

A. An accessory building shall be built only on a lot occupied by a principal building or use.

B. An accessory building, except for a stable or enclosure for animals, may be attached to a principal building, provided that its construction complies with the development requirements of the principal building.

C. The use of solar energy collectors for the purpose of providing energy for heating or cooling shall be permitted in all zones, whether as part of a principal building or as an accessory building. Such solar collection devices shall not be included in computing lot coverage.

D. This section is not intended to apply to buildings of five feet or less in height and ten square feet or less in area, such as doghouses or refuse container enclosures, or to play equipment.

4.10.3. SPECIFICALLY WITHIN RESIDENTIAL ZONES

The buildings used for an accessory use within a residential zone shall comply with the following.

A. An accessory building shall not be a dwelling unit but may be a building that is used as sleeping quarters by the residents of the dwelling unit in accordance with Sec. 4.10.1.A and .B. The sleeping quarters may include bedrooms, bathrooms, and a

[46] Text from LUC Section 3.2.5. The sections shown as deleted have been relocated to Art. VI Dimensional Standards.
[47] We added this language to replace the language repeated in nearly every district in Art. II, Div. 2 that states: "Land uses accessory to the Permitted Land Use and Secondary Land Use are allowed, subject to compliance with Sec. 3.2.5." We assume that accessory uses are, in fact, allowed in al zoning districts. Since this section includes all of current Sec. 3.2.5, the need to comply with this section needs to be mentioned only once.

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sitting room, provided the building complies with Sec. 4.10.1.C and is not the dominant use of the property.

B. Detached accessory buildings are not permitted in the buildable area extending the full width of the lot between the principal building and the front street lot line, except for terraces and steps not over three feet high above the natural grade, paved areas, and fences or walls.

4.10.4. SPECIFICALLY WITHIN NONRESIDENTIAL ZONES

The building used for an accessory use within a nonresidential zone shall comply with the following.

A. An accessory building shall not be occupied as a dwelling, except as a caretaker's facility.

B. The area of a site occupied by an accessory use or building shall be included as part of the lot coverage calculation.

4.11. TEMPORARY USE OR BUILDING

Certain land uses or buildings not permitted within specific zones may be permitted on a temporary basis if authorized through Zoning Compliance Review, Sec. 3.xxx, provided such request for a temporary use complies with the following.

4.11.1. QUALIFICATION FOR PERMIT

For certain land uses or buildings to be permitted on a temporary basis, the land use or building shall comply with one or more of the following special circumstances.

A. The circumstances constitute a substantial hardship, such as, but not limited to, a natural disaster, e.g., fire or flood, or a government action that has resulted in damage to an existing building on the subject property.

B. A temporary building, such as a mobile or modular unit, occupied as a caretaker's facility or a home for the eventual resident may be permitted during the construction of a permanent building. The temporary building shall be on the same site as the construction.

C. The temporary location of off-street parking facilities during the structural expansion or remodeling of an existing building. Such temporary facilities do not have to comply with requirements of a permanent parking facility but shall, at a minimum, provide the following.

1. Screening from adjacent residential development. Since this is a temporary facility, screening cannot be achieved by the use of landscaping unless mature vegetation that can act as the screen exists on the site.

2. Dust-proofing.

D. A temporary real estate office may be permitted during construction of a project, provided:

1. The temporary use shall be terminated at the end of one year from the date the approval was granted; however, additional 12 month extensions may be granted, provided sales activity for the project continues and ten percent or more of the lots or units remain unsold.

2. The temporary office building is located on a lot and complies with Unified Development Code (UDC) zoning requirements applicable to that lot.

3. The temporary office building is located in the same subdivision within which sales occur.

4. The temporary use or building complies with any additional conditions required by the approval authority.

E. A temporary construction equipment yard for public improvement projects involving street improvements or the placement of utilities within public rights-of-way, provided solutions are implemented to mitigate potential negative impacts to adjacent residential development. Such solutions include, but are not limited to, screening of equipment, setbacks, hours of operation, and limited or restricted use of residential streets.

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F. The temporary placement of a mobile telecommunications tower facility on nonresidential property may be permitted upon the demonstration by a telecommunications provider that the facility is necessary for its operations; the facility is setback from any residentially zoned property by a distance equal to the height of the proposed tower and base; and the tower and base do not exceed 65 feet from the existing grade. The temporary use authorized by this subsection shall be approved for a period not to exceed 60 days and may be approved for one extension of time not to exceed 60 days.

4.11.2. BOND REQUIRED

A cash or assurance bond in the amount of 1,000 dollars for a residential use and 5,000 dollars for a nonresidential use shall be required, unless stipulated otherwise in the qualification standards in Sec. 4.11.1, to guarantee termination of the temporary use. The cash or assurance bond shall be provided to the City before any permit for the use is issued.

4.11.3. REFUND

The bond, as required in Sec. 4.11.2, shall be refunded when the temporary use or building is removed by the applicant in accordance with Sec. 4.11.4.

4.11.4. REMOVAL

The temporary use or building shall be removed on or before the date of expiration of the approval period. Should the zoning compliance certificate be revoked, a temporary use shall be removed within 15 days notice.

A. Removal is to include all improvements installed to accommodate the temporary use or building.

B. If, after the removal, the property is left graded and vacant, the property shall be reseeded in accordance with the requirements of the grading ordinance for graded but undeveloped properties.

4.11.5. FORFEITURE

If the temporary use or building is not removed or the site does not achieve compliance, the bond required by Sec. 4.11.2 shall be forfeited.

4.11.6. TIME LIMIT

Approval for a temporary use or building may be granted for one year, with an additional one year period granted for good cause, unless otherwise stipulated in the temporary use or building qualification standards in Sec. 4.11.1.

ARCADIS

SUBJECT: SILVERCROFT SITE

PHONE CALL WITH COT

JOB NO:

BY: DATE:

CHKD: DATE: 11-2-11

PAGE 1

SHEET 1

CITY OF TUCSON : JOHN KMIEC
(520) 837-2433

ARCADIS : THOMAS VESPALEC

DISCUSS WATER USE AT SITE & SILVERBELL LANDFILL

- NO POTABLE WELL WITHIN 2 MILES
- EPA DESIGNATED TUCSON BASIN AQUIFER A "SOLE SOURCE" IN LATE 80'S - EARLY 90'S
- CITY OF TUCSON HAS WATER RIGHTS IN AREA
- SWEETWATER RECHARGE FACILITY IS PERMITTED FOR AQUIFER STORAGE OF 13,000 acre-feet
- COT SILVERBELL GOLF COURSE RECEIVES ALL LANDSCAPE (NON-POTABLE) WATER FROM THE ROGER ROAD WASTE WATER TREATMENT PLANT

City of Tucson Water Department Drought Preparedness and Response Plan

Approved by City of Tucson Mayor and Council November 28, 2006

Ordinance Approved March 20, 2007

Updated Spring 2012

CITY OF TUCSON WATER DEPARTMENT

DROUGHT PREPAREDNESS AND RESPONSE PLAN

Plan Approved: November 28, 2006

Ordinance Approved: March 20, 2007

PLAN UPDATE FEBRUARY 2012

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Cover Art: Anna Cota-Robles,
Tucson Water Graphic Artist

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or
Web sites referenced with the illustration

Drought Planning Team: Tom Arnold
Dee Korich, *Team Leader*
Karen LaMartina (retired)
Ries Lindley (retired)
Roberta Lopez-Suter
Linda Smith (retired)

Front cover: The impacts of drought, like drought itself, are varied and unpredictable. A sustained drought of many years may have wet periods, perhaps even wet periods with wetter-than-normal conditions. The photo collage here shows healthy vegetation in the background that responded to the wetter than normal summer of 2006. The ancient saguaro in the foreground, already stressed by disease, was unable to survive the additional stress of the previous decade of drier than normal conditions.

For more information, visit Tucson Water's website at www.tucsonaz.gov/water

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EXECUTIVE SUMMARY

Background

The City of Tucson Drought Preparedness and Response Plan (Plan) was adopted by Mayor and Council November 28, 2006, as required by A.R.S. §45-342. An implementation ordinance (No. 10380) was approved March 20, 2007. The Plan recognized that drought impacts do not occur suddenly or without warning, and acknowledged that with proper planning and review it is unlikely the community will find itself in an emergency situation caused solely by drought. The Plan called for annual reporting on local and regional indicators to be monitored as triggers for implementing or rescinding various stages of drought response that may be required to ensure Tucson Water's water resources and system characteristics are not compromised by drought impacts.

The Plan triggers for escalating drought response stages meet the statutory requirement for drought response indicators to be directly tied to a water provider's water resource availability and the ability to deliver those resources. For Tucson Water, water resource availability requires review of both regional (Colorado River) and local conditions that may impact supplies, whereas evaluation of infrastructure reliability primarily requires review of the potable and reclaimed water distribution systems (local system indicators).

The adopted Plan established four drought response stages, outlined an action plan for responding to potential drought-related impacts on Tucson Water's system and water supplies, and addressed the issue of emergency supplies. The Plan also demonstrated the success of the long-term financial investment the community has made in securing and implementing use of renewable water resources, which has provided a considerable ability to withstand the impacts of sustained drought on Tucson Water's supplies.

Tucson Water's regional indicators are severe or sustained drought on the Colorado River watershed, including declared shortages on the Colorado River; or a drought status "above normal" declared by the Arizona Department of Water Resources (ADWR) for the Santa Cruz Watershed, which includes the City of Tucson. Local system drought impact indicators for Tucson Water include measures of aquifer storage, potable and reclaimed water production capacity (i.e.: measures of water supplies and the ability to deliver them where needed), and gallons per capita per day (GPCD) use. While GPCD is not a "drought indicator" per se, monitoring GPCD allows the Utility to better assess whether drought response measures previously implemented are having the desired effect. Tucson Water's declining GPCD in the face of long-term drought indicates both the responsiveness and the general drought awareness of the Utility's customers.

Tucson Water's drought preparedness planning is an ongoing process closely linked with long-range water resource planning. All successful planning requires periodic updates of any written plans to incorporate new data and adjust planning scenarios to reflect real-life conditions. In addition there is a statutory requirement to update the Plan every five years.

This update meets the statutory requirement and also incorporates experience gained from five years of declared Stage 1 Response. However, over the last five years increasing data related to climate change that may impact current definitions of "drought" and the possibility that drought may become the new normal has driven the need to incorporate climate change, or variability, into long range planning efforts. This update begins to integrate Tucson Water's broader climate change planning efforts into the drought preparedness plan. Over the next five years, the goal is to have the drought preparedness and response plan become one component of an *Integrated Drought Preparedness and Response/Climate Change Adaptability Plan (Integrated Plan)* for the Utility.

Much of Tucson Water's current water resource planning efforts mitigate future supply uncertainty. Storing excess CAP water now, mitigates against future Colorado River shortages. Investment in conservation now provides a hedge against drought, similar to storing excess CAP. Developing and securing multiple supply alternatives, such as effluent and recycled water, will give Tucson Water the flexibility to respond to changing supply conditions.

<u>Drought Response Stages and Response Measures</u>

The Plan continues the drought response stages established in the original Drought Preparedness and Response Plan including the following drought response stages:

- **Stage 1**

1. *A Stage 1 drought response will be declared by the City Manager, on the advice of the Water Director, based on either one or both regional indicators. The regional indicators include a severe and sustained drought on the Colorado River or a declaration of drought within Tucson's watershed (Santa Cruz Watershed) posted on the Arizona Department of Water Resources website. During Stage 1, local system indicators will primarily be monitored for implementation of specific response actions.*
2. *The focus of Stage 1 response actions will include:*
    - *Public notification and information on drought issues;*

- *Changes in system operations (such as expedited well maintenance) and/or system modifications (such as well drilling and well maintenance and other system maintenance programs to reduce system losses such as meter replacement and leak detection) deemed necessary by the Water Director; and*
- *Self-administered water audits by City departments to identify water-saving and water efficiency measures for City buildings, City-maintained landscapes and City-owned water-cooled equipment.*
- *Possible additional measures may include voluntary self-audit programs for commercial, multi-family and industrial users.*

- **Stage 2**

1. *A Stage 2 drought response also will be declared by the City Manager, on the advice of the Water Director, primarily based on regional indicators. Specifically, if an initial shortage (i.e., a shortage affecting only excess or lower priority uses, not municipal uses) is declared on the Colorado River, the City will elevate to Stage 2 drought responses. In addition, local system indicators, in conjunction with a declaration of drought in the Santa Cruz Watershed posted on the ADWR website, could trigger elevation to Stage 2 or may trigger additional response actions.*
2. *The focus of Stage 2 response actions will include:*
   - *Continuation of all Stage 1 actions, with intensified public education and additional system or operational actions;*
   - *Mandatory implementation of water reductions or efficiencies identified during Stage 1 audits for all City uses of potable water;*
   - *All potable water users will be requested to make additional voluntary reductions;*
   - *Mandatory self-audits will be required for multi-family users, and for commercial and industrial users at/or exceeding monthly usage of 325 cubic feet (Ccf); and*
   - *Irrigation restrictions will be required for multi-family, commercial, and industrial customers, with potential exemptions/variances available for sites demonstrating that minimum efficiency criteria are met and maintained.*

- **Stage 3**

1. *A Stage 3 drought response will be declared by Mayor and Council, upon the recommendation of the City Manager, based on either one or both of the following drought indicators: reductions in CAP deliveries to the City or local*

system indicators in conjunction with a declared drought in the Santa Cruz Watershed posted on the ADWR website.

2. *The focus of Stage 3 response actions may include:*
   - *Continuation of all previous actions under Stages 1 and 2;*
   - *Prohibition on operation of fountains at multi-family, commercial, and industrial sites.*
   - *Mandatory water reductions by all potable water users (percentage to be determined by existing conditions); and*
   - *Plumbing retrofit on resale for residential, commercial, multi-family, and industrial users.*

- **Stage 4**
  1. *A Stage 4 drought response will be declared by Mayor and Council, upon the recommendation of the City Manager, based on one or both of the following drought indicators: additional reductions in CAP deliveries to the City or local system indicators in conjunction with a declared drought in the Santa Cruz Watershed posted on the ADWR website.*
  2. *The focus of response actions for Stage 4 may include:*
     - *Continuation of Stage 1, 2, and 3 response actions and implementation of appropriate provisions of the City's Emergency Water Conservation Ordinance No. 8461. These provisions include but may not be limited to:*
     - *No outdoor irrigation unless the City Manager designates a schedule of appropriate watering days;*
     - *No washing of sidewalks, driveways, parking areas, tennis courts, patios, or other impervious surface areas with water from an open hose, or a spray nozzle attached to an open hose, or under regular or system pressure, except when required to eliminate conditions that threaten public health, safety, or welfare;*
     - *No outdoor use of any water-based play apparatus connected to a pressurized source;*
     - *No operation of large commercial water-cooled space and equipment cooling systems below an operating efficiency level of two cycles of concentration (see Glossary);*
     - *No serving water to customers of restaurants and other food service establishments unless water is specifically requested by the customer;*

- *No operation of outdoor misting systems in public areas;*
- *No filling of new swimming pools, fountains, spas or other exterior water features; including no draining and refilling of exterior water features; and*
- *No washing of autos, trucks, trailers, and other types of mobile equipment, except at facilities equipped with wash water recirculation systems, and for vehicles requiring frequent washing to protect public health, safety, and welfare.*
- *In addition, staff will develop additional response actions if warranted. For example, "demand offset programs" may be developed and implemented – meaning that new commercial and residential development may not be permitted unless the projected water demand of that development is "offset" through water demand reductions elsewhere, such as through retrofitting older facilities to reduce water consumption.*

Emergency Supplies

The Plan also continues short-term reliance on groundwater resources as backup supplies for the potable system, but acknowledges that long-term, non-sustainable reliance on groundwater is not a preferred alternative. Both mandatory demand reductions and the development of alternative renewable water supplies will be strategies utilized by Tucson Water to avoid or minimize long-term reliance on groundwater. In addition, the use of potable water as a backup for the reclaimed water system will be prohibited during drought response stages 2, 3, and 4. The Plan limits existing interconnect agreements with other water utilities to emergency situations only. Requests for backup supplies from other water utilities will continue to be considered on a case-by-case basis and only at a level which will protect public health and safety (i.e., essential uses); backup supplies for non-essential uses in the service areas of other water utilities will not be considered during drought. Complimenting this response strategy is the on-going efforts to reach regional solutions for utilizing renewable water resources to reduce the need for requests from other local water providers for emergency supplies from Tucson Water.

GLOSSARY

Aquifer: A body of rock or sediments sufficiently permeable to conduct groundwater and to yield economically significant quantities of water to wells and springs.

Aquifer Storage Index: Groundwater levels in the aquifer as measured at selected wells and compared to groundwater levels in a particular (index) year.

Arizona Department of Water Resources (ADWR): A department of state government responsible for water management and administration of water-related programs within the State.

Arizona Drought Monitoring Technical Committee (ADMTC): This committee was formed by the Governor's Drought Task Force. It monitors data like climate, weather forecasts, and physical drought conditions. The committee determines drought conditions based on these data.

Arizona Water Banking Authority: An institution established in 1996 by the legislature to help secure the state's full entitlement of Colorado River water through the Central Arizona Project.

Assured Water Supply: An ADWR requirement that all new developments in "active management areas" (geographical regions of the state subject to regulation by ADWR) must demonstrate a 100-year water supply that is of adequate quality, continuously available, consistent with the management plan and management goal of the AMA, and that there is financial capability to construct the water facilities available for the proposed use.

Central Arizona Project: A federal water project designed to bring water from the Colorado River to central and southern Arizona. The Central Arizona Project includes 336 miles of canal and pipeline and 14 pump stations.

Conservation: Techniques for saving water that reduce demand.

Climate Change: Any trend or persistent change in the statistical distribution of climate variables (temperature, humidity, wind speed, etc.).

Cycles of Concentration: A principal measure of water use efficiency in a cooling tower, which are commonly used for cooling in large-scale commercial and industrial facilities. Cycles of concentration refers to the ratio of chemical constituents in cooling

tower bleed-off water to constituents on the make-up (fresh) water that is added to the tower to perform its cooling.

Demand: The amount of water being used.

Demand Offset: A program whereby a water user agrees to reduce water use in one area in order to consume water in another. (Example: A developer agrees to pay to retrofit older housing with water-efficient plumbing fixtures in order to construct new homes.)

Demand Reductions: Measures taken by a water utility to reduce the use of potable water in response to drought or supply insufficiency conditions.

Drought: A sustained natural reduction in precipitation that results in negative impacts to the environment and human activities.

Drought Impact: The effects of a drought.

Drought Preparedness: The act of planning to decrease the impacts of drought by implementing measures and or developing other water supplies to reduce water demand as drought conditions worsen.

Drought Response Stage: A level of severity of drought response required, as measured by Tucson Water's indicators. There are four stages of drought response in Tucson Water's drought response plan.

Economic Hardship: A threat to an individual's or business' primary source of income.

Effluent: Treated municipal wastewater.

Essential Uses: Water uses related to maintaining the health, welfare, safety, and public sanitation needs of the community.

Firm or Firming: The act of securing Colorado River water supplies by recharging and storing available excess supply in underground recharge basins in order to meet anticipated future declared shortages on the Colorado River.

Fountain: An ornamental water-using fixture for purely aesthetic purposes.

Gallons per Capita per Day (GPCD): As used in the Plan, GPCD is calculated by taking all potable water produced divided by the population the water system serves, and dividing the result by 365.

Groundwater: That portion of water beneath the surface of the earth that can be recovered with wells or that flows naturally to the earth's surface via seeps or springs.

Indicator: A variable that changes as drought conditions change (example--Colorado River water availability).

Long-term Drought: When sustained precipitation deficits over time periods of one to several years affect surface and subsurface water supplies.

Mitigation: Actions or programs that reduce drought risk and impacts and enhance recovery.

Ordinance: A municipal regulation.

Potable Water: Water that meets the U.S. Environmental Protection Agency and/or the State's drinking water (water-quality) standards.

Potable Water Production Capacity: The amount of potable water that can be delivered reliably by the potable system for a 30-day (peak) time period.

Public Notification: Notice of drought response stage provided to Tucson Water customers and the general public through local media sources as a result of news releases and/or Tucson Water bill inserts.

Reclaimed Water: Wastewater treated to a quality suitable for non-potable applications such as landscape irrigation, decorative water features, non-food crops, and certain industrial uses.

Reclaimed Water Production Capacity: The sustainable amount of water that can be extracted from the Sweetwater Recharge and Recovery Facility.

Recharge: Water that replenishes an aquifer by surface infiltration or by other natural or induced means.

Recovery or Recover: The practice of pumping water that has been artificially recharged to an aquifer.

Secondary effluent: Wastewater that has been treated to a higher quality.

Short-term Drought: Measured by the departure of precipitation or another drought indicator from average conditions on a time-scale from one to several seasons, an example being a dry winter with little rain for a year.

Supply Insufficiency: Supply insufficiency occurs when water available in an area is not sufficient to meet immediate unrestricted demand.

Surface Water: Water that is on the earth's surface, such as in a stream, river, or lake.

Total Demand: The volume of water a water provider is required to produce to meet the needs of all potable and nonpotable customers.

Tucson Active Management Area (Tucson AMA): The Tucson AMA is one of five AMAs in the state that were established pursuant to the 1980 Groundwater Management Act. The State's Active Management Areas were established to provide long-term management and conservation of their limited groundwater supplies.

Triggers: The value or combined value of one or more indicators that cause a change from one drought response stage to another.

Vulnerability: For purposes of this Plan, vulnerability is defined as the probable susceptibility to drought impacts (damage) related to economic, social, and environmental conditions in the community, as mitigated by system characteristics such as reliability and redundancy.

Water Resources: A source of water supply or supplies.

Watershed: The area drained by a river system.

Water Year: A timeframe often used by surface water providers to delineate one year's operation, usually October 1 to September 30, to coincide with the federal budget fiscal year timeframe.

CHAPTER ONE

INTRODUCTION

Water providers are responsible for providing reliable and safe drinking water supplies to their customers while maintaining adequate flows to meet pressure requirements in case of fire. During times of water shortage due to drought or climatic conditions, strategic planning to minimize public health and safety impacts on the community is a critical obligation of water providers.

A water provider has a responsibility to prepare for drought and adaptability to climate change by determining the potential impacts of these conditions on its water supply system and the community it serves and by developing plans to minimize those impacts. With this five-year update of the Plan, climate variability – as a planning factor – is a part of the Plan as its own scenario that must be assessed in terms of long range water resource planning and management.

The Plan is intended to help Tucson Water staff implement response and adaptive measures early to avoid the inevitable pitfalls of reactive, crisis-mode decision-making.

Historical Background

No single definition exists for drought (National Drought Mitigation Center, 2005). However, like the original Drought Preparedness and Response Plan, the Plan will adhere to the *Arizona Drought Preparedness Plan* definition of drought as a *sustained, natural reduction in precipitation that results in negative impacts to the environment and human activities.* As new information becomes available related to long-term drought and climate change the Plan will evaluate it for relevance to the Utility and address or incorporate it in future updates.

Although the entire state continues to experience some degree of drought, not all entities will react to, or be affected by drought conditions the same way. That especially holds true for water providers, each of whom must plan for its unique water supply and demand situation, delivery systems, and customer use patterns. In addition, jurisdictional issues may require consideration in drought and climate change planning. For example, Tucson Water is the largest municipal water provider in southeastern Arizona (estimated 2010 service area population: 705,000) and serves inside and outside the municipal boundaries (Figure 1.1). The Plan is enforceable outside the City limits as a condition of water service.

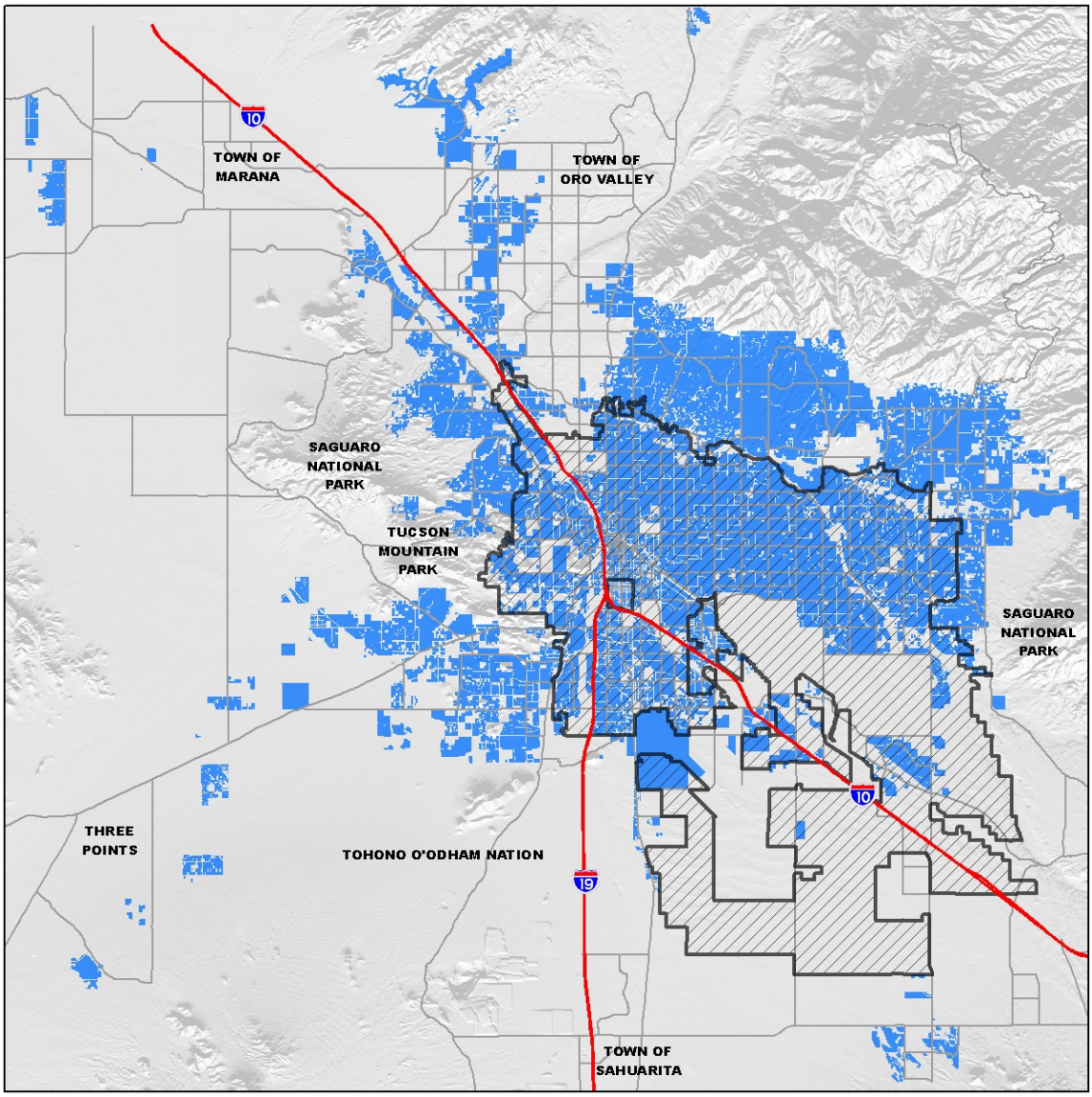

Figure 1.1: Tucson Water Service

The following chapters include the general information on water supplies available to Tucson Water, the water systems designed to deliver those supplies to customers, emergency supplies, and the process for review outlined in the original Drought Preparedness and Response Plan with any relevant updates. However, the "heart" of the Plan, Chapters Two and Four, provides the guidance and a decision-making framework for responsible water-resource management for drought response and adaptability to climate change.

CHAPTER TWO

CLIMATE CHANGE PLANNING

The U.S. Global Change Research Program in its 2009 report "Global Climate Change Impacts in the United States" writes that climate variability in the Southwest is among the most rapidly-occurring in the nation, more than the global average in some areas. One anticipated result is less spring snowpack and snowmelt to augment the Colorado River, a critical water resource of the City of Tucson. Analysis of observed and projected hydroclimatic factors suggests that climate change within the Colorado River watershed could include, but may not be limited to:

- an increase in average surface temperature
- spatial changes in annual and seasonal precipitation both in magnitude and intensity
- more frequent earlier melting of spring snow packs
- increased evaporation
- reduced surface water flows in the Colorado River

The Central Arizona Project (CAP) is currently projecting that a shortage on the Colorado River may occur within the next five years. A shortage would mean lower priority CAP water users will be curtailed as needed. CAP also predicts that high-priority CAP allocations (M&I and Indian) may be reduced beginning in the mid-2020s. In subsequent years, the annual probability of an M&I shortage could increase.

Increased regulation of greenhouse gas emissions at fossil-fueled power plants and incentives to develop alternative energy sources are actively being debated by policy makers as a response to climate change. These policies, if implemented, will result in increased energy costs, resulting in higher water rates than they would be otherwise.

In response, Tucson Water established a project team to coordinate with climate scientists, other water providers, and federal, state and local government agencies to articulate the practical resource and supply implications associated with climate change. This project team is comprised of representatives from all pertinent areas of the Utility and includes members from local government and climate science researchers at the University of Arizona.

Tucson Water staff identified a range of potential impacts on Utility-related activities and has already taken a number of steps which will make the Utility more resilient to long-term drought and climate-related shortages on the Colorado River. These and future initiatives will provide the Utility with greater flexibility to respond to climate change and its associated uncertainties.

CHAPTER THREE

WATER RESOURCES AND PRODUCTION CAPACITY

This section describes the water resources (water supplies) used by Tucson Water and the infrastructure used to deliver these water supplies to our customers. It also explains how drought may or may not impact either the water resource or the water system's ability to deliver water. General reliability comments are also included for water resources and system infrastructure.

Available Water Resources

Currently three water sources are both physically and legally available to Tucson Water for municipal supply:

- Groundwater,
- Colorado River water, and
- Effluent and Recycled Water

Having three sources of water gives the Utility a great deal of flexibility in how it responds to a drought, either on the Colorado River or locally.

Groundwater

Tucson Water pumps groundwater from a very large aquifer, well over 1,000 feet deep in many locations and hundreds of square miles in area. The estimated volume of groundwater physically available within Tucson Water's service area ranges from about 10 to 20 million acre-feet (City of Tucson Water Department, 2004). Net natural recharge in this area is estimated at 50,000 to 60,000 acre feet per year, or less than one percent of the total volume of groundwater in storage. As a result, most portions of this very large aquifer would respond very gradually to local drought conditions. Because of this, drought impacts to water supply from this aquifer may not become apparent unless local drought is sustained over decades. More shallow aquifers in some parts of this region, however, may be very responsive to a reduction in local precipitation and demonstrate impacts from relatively short-term drought.

Local drought may cause an increase in gallons per capita per day demand (GPCD). Unless additional renewable water supplies, such as Colorado River water, were available to meet that increased demand, or demand was reduced, additional groundwater would

have to be pumped. A *reduction* in the availability of Colorado River water to the City would also have to be made up with groundwater, unless demand was reduced. A combination of local drought *and* drought on the Colorado River could have a significant impact on our groundwater resources if demand was not reduced.

Finally, while the volume of physically available groundwater may be substantial, the City is limited in how much groundwater it can mine, or pump, under the Assured Water Supply (AWS) rules. Increased use of groundwater may be a viable response to drought, but could also have a detrimental impact on the City's ability to maintain its AWS designation in the future through overuse of groundwater. Minimizing the impacts of drought on our physical and legal access to groundwater is a principal focus of the Plan.

Colorado River Water

Tucson Water's current CAP allocation is just over 144,000 acre-feet per year[1]. Like any other surface water resource, the availability of Colorado River water depends on precipitation, especially snow-pack, in the Colorado River Watershed. Colorado River water, the only renewable surface water source available to Tucson, is imported to the Tucson area via the 336-mile long Central Arizona Project (CAP) canal (Figure 3.2).

Tucson Water is no longer the only water provider in the Tucson Active Management Area currently directly utilizing Colorado River water as a source of potable supply. Tucson Water has entered into Intergovernmental Agreements (IGAs) with the Pascua Yaqui Indian Nation and the Town of Oro Valley to take delivery of their CAP allocations (or a portion thereof) at one of the Clearwater Recharge and Recovery facilities and wheel the recovered water through the Tucson Water transmission system thereby increasing utilization of renewable water supplies within the Tucson Active Management Area. The Utility is in discussions with other local water providers for additional wheeling agreements as the region continues to move toward direct utilization of CAP.

As the Utility utilizes its CAP allocation to meet demand close monitoring of drought conditions on the Colorado River Watershed are needed because a severe drought on the Colorado could result in the Secretary of the Interior declaring a shortage on the river.

The Secretary annually (usually in October) determines the condition of the Colorado River for the coming "water year" as surplus, normal, or shortage. A declaration of shortage, meaning the river does not have sufficient capacity to fully meet all of the

[1] The current CAP allocation is 144,172 acre feet. This will increase by 19 AF once the Flowing Wells transfer is finalized.

allocations to states with contractual rights to the water, could impact delivery of Tucson's CAP water.

Figure 3.1: Central Arizona Project Canal

In surplus or normal water years, the Utility has reliable potable water supplies through the City of Tucson's Colorado River water allocation delivered through the Central Arizona Project, and its backup groundwater resources. However, if the Secretary declares a shortage on the Colorado River and CAP deliveries are reduced, Tucson Water's groundwater resources would likely have to be used for drought mitigation.

In anticipation of droughts on the Colorado River, the Arizona Water Banking Authority (AWBA) has been "firming" CAP allocations, or adding water supply reliability, for municipal users by storing (recharging) excess Colorado River water in underground facilities such as Tucson Water's Central Avra Valley Storage and Recovery Project (CAVSARP) and Southern Avra Valley Storage and Recovery Project (SAVSARP). If there were reductions in delivery of the City's CAP allocation due to drought on the Colorado River, this "firmed" water could be made available (pumped) to help meet demand.

Effluent and Recycled Water

Municipal wastewater effluent is a renewable water source that increases as the population increases. Effluent is generated by interior water usage such as toilets, showers, washing machines etc., and the volume generated is largely unaffected by drought, unlike groundwater and Colorado River water. In 2010, 64,500 acre-feet of effluent were produced from the metropolitan wastewater treatment plants in the Tucson area. The City of Tucson has an entitlement to about 31,536 acre-feet of this effluent. About 13,000 acre-feet of the City's current effluent entitlement was recycled in 2010 in the reclaimed water system, primarily providing irrigation water to customers with large turf facilities such as golf courses, parks, and athletic fields. An additional 500 acre feet of the City's secondary effluent was used on the Silver Bell Golf Course directly.

A prolonged drought, both locally and on the Colorado, or climate change could result in the implementation of potable water conservation measures that reduce interior demand and associated effluent volumes. However, given anticipated population growth and the amount of unused effluent, it is extremely unlikely that these conservation measures would result in an insufficient supply of effluent to satisfy the demands of the reclaimed system or other direct users of secondary effluent.

SYSTEM DELIVERY CAPACITY

This section provides an overview of how we produce our two potable water supplies, groundwater and Colorado River water, and how the City's wells are designed and constructed. Because drought affects each of these supplies differently each is discussed separately. Finally, the central distribution system and the isolated systems are discussed as these two are affected differentially by drought.

Potable Well Fields

To meet demand, Tucson Water relies on about 200 potable production wells spread over five well fields with a collective pumping capacity of about 200 million gallons per day (MGD). These wells either pump native groundwater or recover a blend of recharged Colorado River water and native groundwater. The combined production capacity of 200 MGD currently far exceeds the average daily demand of the peak 30-day period of about 140 MGD. (Figure 3.3)

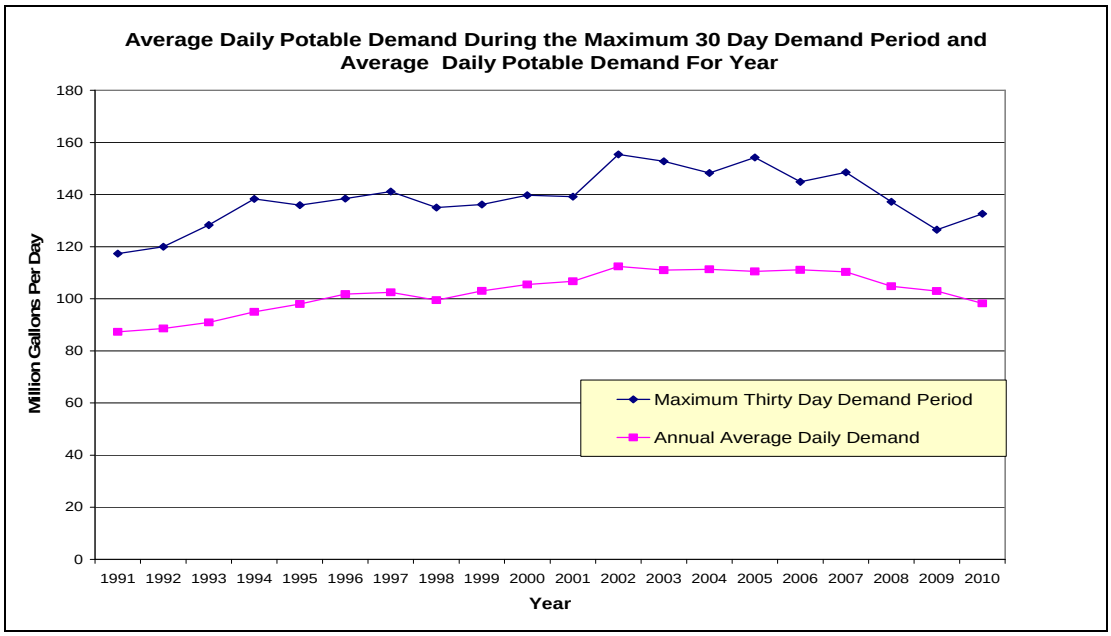

Figure 3.2: Average Daily Potable Demand and Maximum 30-Day Potable Demand

The Utility's wells are often drilled to depths which exceed 800 feet below land surface. For many of the City's wells, the perforated section begins below the water table and the perforated section is quite long. All these characteristics hold for the wells drilled at CAVSARP as well. At CAVSARP, the perforation design and depth was to capture both groundwater and "perched" recharged water to produce a mix of the two sources. In contrast, SAVSARP wells are screened somewhat higher in order to capture primarily recharged CAP water rather than groundwater. As a result, the overall production capacity of the Utility's well fields will note immediately impacted if the water table fell (Figure 3.4). For wells producing groundwater, under normal pumping conditions, it could take years of extreme local drought before the water table fell enough to negatively impact these wells. For wells located at recharge facilities it would take both a significant and sustained – six months to a year - reduction in the City's Colorado River water deliveries for these wells to begin to lose productive capacity. Given the design and deep penetration of Tucson Water's wells into the regional aquifers, they are generally not subject to sudden or dramatic

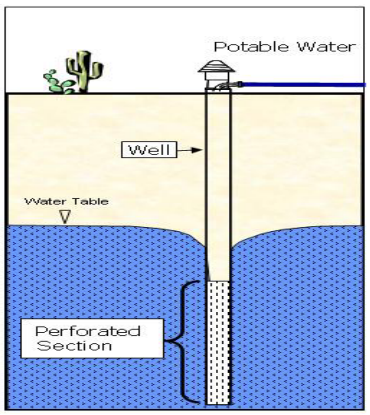

Figure 3.3: Well Diagram

declines in production if water tables fall as a result of either local or regional drought. However, aquifer-stewardship goals and subsidence issues preclude Tucson Water from solely relying on groundwater for drought preparedness.

Historically, Tucson Water relied on groundwater to supply potable demands. To that end four major well fields were developed. Since 2001, Tucson Water has been relying less on native groundwater to meet potable demands and more on renewable supply from imported Colorado River water. The Colorado River water is imported via the Central Arizona Project Canal to three recharge and recovery facilities:

- Central Avra Valley Storage and Recovery Project (CAVSARP) which went into operation in 2001;
- Pima Mine Road Recharge Project (PMRRP – jointly owned by the City of Tucson and the Central Arizona Water Conservation District) which went into full-scale operation in 2001;
- Southern Avra Valley Storage and Recovery Project (SAVSARP) which began operation in 2008.

The recharged Colorado River water is then recovered through new or existing well fields and delivered to customers. Two of the four well fields originally designed for producing groundwater are now producing a mixture of groundwater and recharged Colorado River water due to their proximity to the recharge projects. The Avra Valley Well Field which for years was used to pump groundwater, is now recovering Colorado River water recharged at SAVSARP. The Santa Cruz Well Field, located down gradient from PMRRP, now produces a blend of local groundwater and Colorado River water recharged at PMRRP.

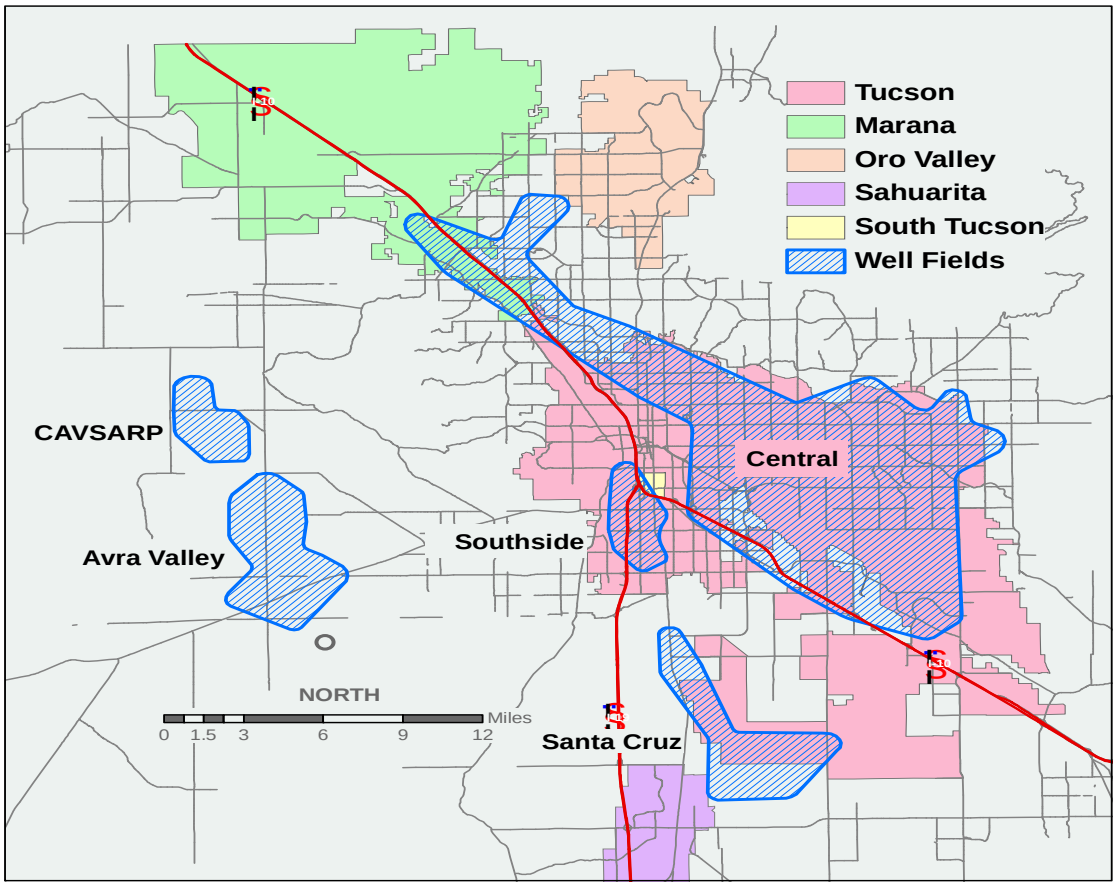

Figure 3.4: Tucson Water Well Fields

The mixture of groundwater and recharged Colorado River water recovered through the Avra Valley, CAVSARP and Santa Cruz Well Fields accounted for approximately 70% of Tucson Water's annual potable deliveries in 2010. In 2012, Tucson Water will purchase and recharge its full allocation of Colorado River water for the first time (144,172 acre-feet).

The combination of existing groundwater well fields, well fields which deliver a blend of groundwater and recharged Colorado River water, and the phased construction of the planned recovery well field at SAVSARP will result in production capacity increasing faster than potable demand. This should allow the Utility to comfortably satisfy the average daily demand of the peak 30-day period for at least the next 10 years, under normal climatic conditions within the Colorado River Watershed

The wells at CAVSARP and SAVSARP are designed to allow for continued operations for six months to a year, even in the event *no* Colorado River water was being recharged – for example, if the Central Arizona Project canal were to actually fail. Under drought conditions on the Colorado, it is possible, though very unlikely, that no Colorado River water would be delivered for recharge. The design of the recovery well system would allow these well fields to continue operating for some period of time at full capacity after a cut in CAP delivery was imposed. However, if the water table began to fall the production capacity of this well field could also fall, causing a shift in production back to the Central Well Field.

Central Distribution System and Isolated Systems

Tucson Water's potable systems are designed and operated so that the following operational and regulatory requirements are met:

- Maintain adequate system delivery pressures.
- Meet the daily peak demand.
- Meet potential fire-flow demands.
- Meet or exceed all primary drinking water standards.
- Maintain adequate system disinfection levels.
- Satisfy or exceed customer expectations.

About 99 percent of the water produced by Tucson Water's production wells enters the large, integrated central distribution system. Generally, the water produced from these wells can be moved anywhere in the central distribution system via pipelines, boosters, and reservoirs and may travel 40 to 50 miles to reach customers. Given the number of production wells and anticipated excess production capacity, the loss of a few wells to falling water tables will generally have little impact on the City's ability to meet demand.

In addition to the central distribution system, there are nine small, isolated potable systems supplied by dedicated production wells and associated supply infrastructure (Figure 3.6). These isolated systems rely entirely on native groundwater and supply infrastructure located in the immediate area. Isolated systems are more operationally

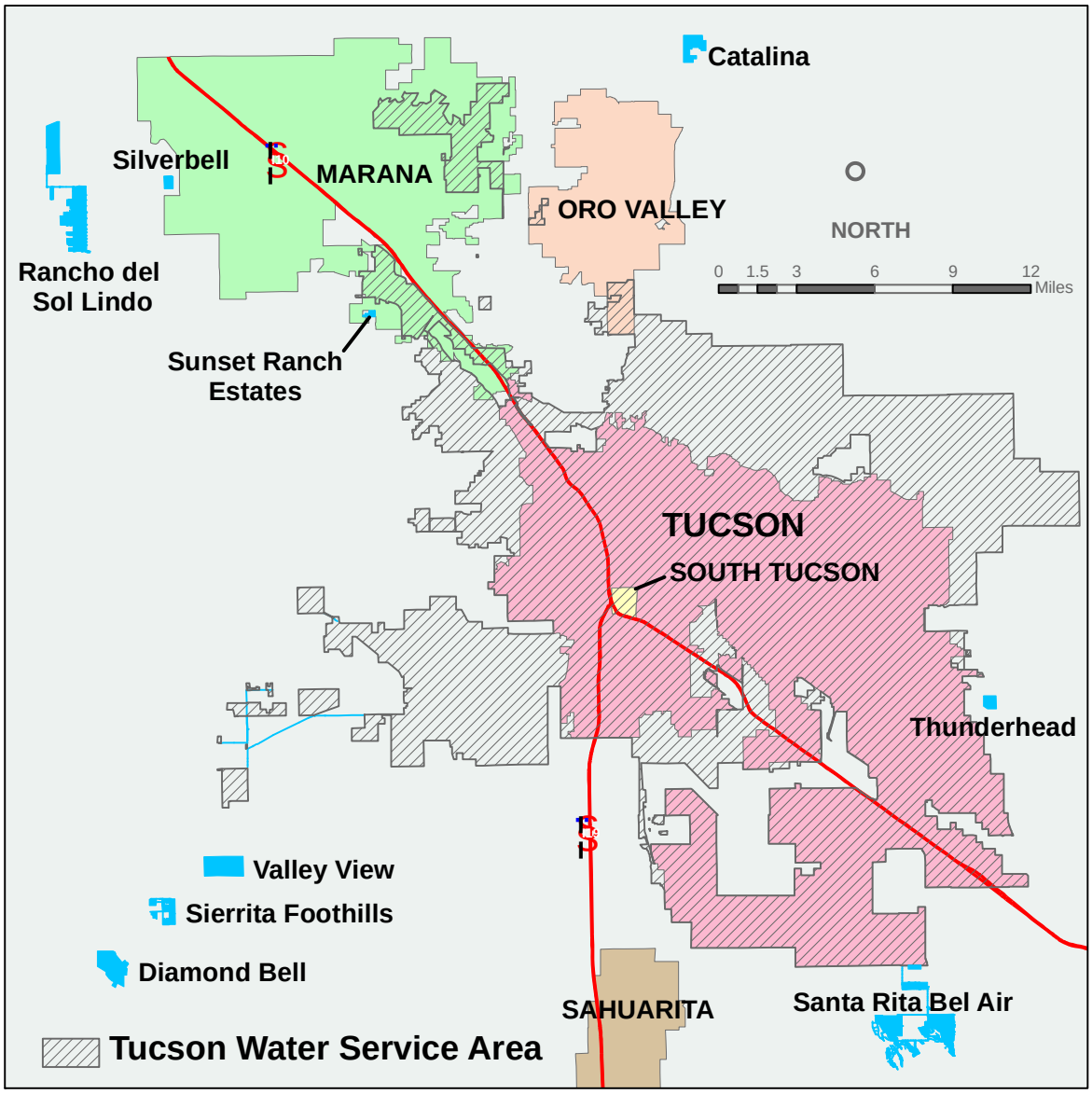

Figure 3.5: Tucson Water Isolated Systems

vulnerable, since they do not benefit from the system reliability available to the central distribution system, making them potentially more vulnerable to *local* drought impacts. Conversely, because such systems are not connected to the central distribution system, they cannot be impacted by drought conditions in the Colorado River Watershed and must be monitored separately.

Chapter Four utilizes the water supply and system information discussed above to identify specific drought indicators for the Utility and determine the factors that will trigger declaration of drought response stages for the Tucson Water service area and the response measures necessary to mitigate potential drought impacts.

Reclaimed Water System

The reclaimed system takes secondary effluent from Pima County's Roger Road Wastewater Treatment Plant and it is either filtered at the Tucson Reclaimed Water Treatment Plant for direct delivery or recharged and recovered for indirect delivery. Demand for reclaimed water is very responsive to increases in temperature and reduction in precipitation. The peak-demand period under drought could be extended, arriving earlier and lasting for a longer period of time. Though the availability of effluent will generally not be affected by drought, the demand from new and existing reclaimed customers could potentially outstrip the reclaimed system's capacity to meet demand. Under normal climatic conditions, the potable system has provided backup supply at critical times. Potable water will not provide backup supply to the reclaimed system during drought response stages 2, 3, and 4.

CHAPTER FOUR

DROUGHT RESPONSE STAGE DECLARATION, IMPLEMENTATION, AND RESPONSE MEASURES

The City of Tucson Water Department Drought Preparedness and Response Plan provides guidelines for determining the current drought response stage, higher or lower drought response stages, termination of all drought response stage declarations, and the response measures suggested for implementation at each stage. The Utility's authority to establish a system of priorities for delivery of potable and reclaimed water during times of shortage is recognized in this Plan. Authority for this plan and its enforcement is derived from Ordinance 10380 (Appendix E).

In general, the Plan provides guidelines, rather than "hard lines," to provide the Water Director (Director) with sufficient information and flexibility to consider current circumstances pertinent to the declaration of specific drought response stages and implementation of specific drought response measures. Because Tucson Water's water resources include both local groundwater and Colorado River water, this approach will better serve the community than establishing rigid criteria that may not adequately reflect water supply availability or water distribution system conditions.

Tucson Water's Plan includes four drought response levels ranging from Stage 1 to Stage 4. A Stage 1 drought response level will be declared based on either one or both of the following: monitoring of local drought conditions and an associated declaration of drought by ADWR in its monthly "Arizona Drought Monitor Report" or a severe and sustained drought on the Colorado River Watershed. These Stage 1 triggers are among the primary hard line or mandatory triggers in Tucson Water's Plan. Once a Stage 1 level has been declared for Tucson Water's service area, progression through Stages 2, 3 and 4 will be declared based on threats to Tucson Water's Colorado River supplies *and/or* local system indicators that indicate negative impacts to the Utility's groundwater supplies.

DROUGHT DECLARATION

A Stage 1 or 2 drought response in the Tucson Water service area will be declared by the City Manager on the advice of the Director (Figure 4.1). Following the City Manager's declaration of Stage 1 or 2 drought response level, Tucson Water will implement appropriate response actions, including but not limited to various conservation measures. The Director will continually monitor drought conditions and promptly recommend to the City Manager and Mayor and Council that the level increase to Stages 3 or 4 if conditions worsen. Declaration of a Stage 3 or a Stage 4 drought response level requires approval of the Mayor and Council (Tables 4-1 through 4-4). Water reduction goals will be

developed for each drought stage at the time the stage is triggered. At that time, Tucson Water will have a better understanding of the causes for the trigger, and the response measures needed to relieve drought impacts. Similarly, based on continual monitoring of drought indicators and conditions, the Director will advise the City Manager to rescind Stages 1 or 2, or recommend termination of Stages 3 or 4 to Mayor and Council as warranted by changing conditions.

DROUGHT INDICATORS

Drought indicators are measurable variables that describe drought conditions. For example, the state of Arizona uses its watersheds to describe drought conditions throughout Arizona. Tucson Water's drought indicators (Figure 4.2) include variables for both regional and local drought and are designed to measure potential drought impacts on Tucson Water's available water supplies and/or potential distribution system impacts related to drought.

Staff from the System Planning, Water Resources Management, and Operations sections selected drought indicators based on their specific applicability to Tucson Water's water resources and distribution system. Staff also assigned values or "triggers" to these indicators to assist the Director in determining drought response stages appropriate for the Tucson Water service area.

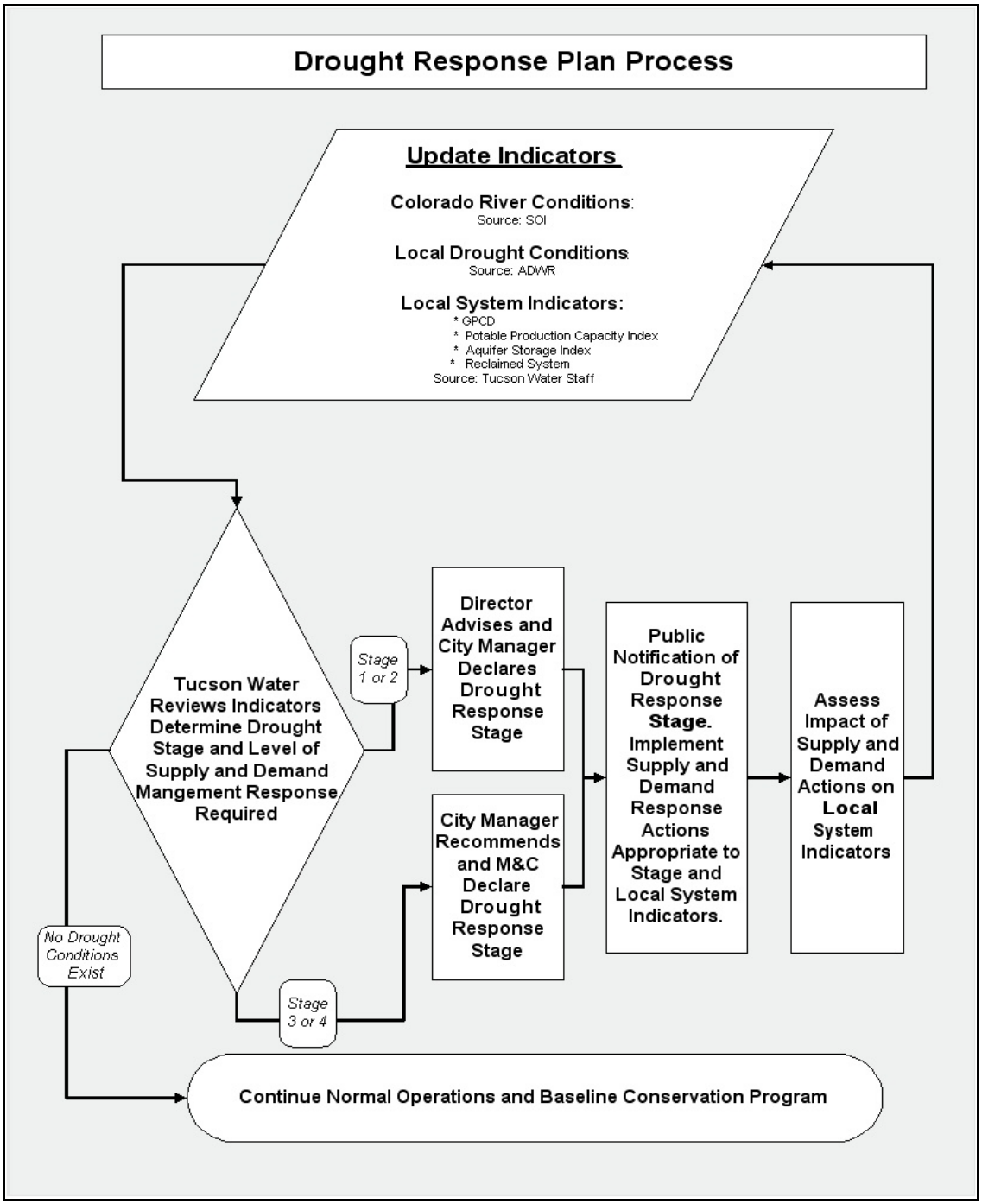

Figure 4.2. Drought Declaration Process Flow Chart

DROUGHT INDICATORS	DROUGHT RESPONSE STAGES and THEIR TRIGGERS			
REGIONAL INDICATORS	**Stage 1:** **Declared by City Manager on advice of Water Director**	**Stage 2:** **Declared by City Manager on advice of Water Director**	**Stage 3:** **Declared by M&C based on recomm of City Manager (per advice of Water Director)**	**Stage 4:** **Declared by M&C based on recomm of City Manager (per advice of Water Director)**
Colorado River - Shortages and Associated CAP Reductions **Arizona Department of Water Resources Drought Stage above "Normal"**	Either one or both of the following: Severe and sustained drought in the Colorado River watershed or ADMTC declares drought in Tucson's watershed.	Either one or both of the following: Secretary of Interior declares shortage on Colorado River with CAP deliveries to excess and Ag Users reduced **or** Local System Indicator Values*	Either one of both of the following: Continuing shortage on Colorado River with CAP deliveries to M&I users reduced; **or** Local System Indicator Values*	Either one of both of the following: Continued shortage on Colorado River with additional reductions in CAP deliveries to M&I users, **or** Local System Indicator Values*
LOCAL SYSTEM INDICATORS				
Potable Production Capacity Index: a ratio of Production Capacity (how much water can be produced reliably over a 30 day period) divided by Average Demand (the peak 30 day average) **Aquifer Storage Index:** Groundwater levels in the aquifer as measured at selected wells and compared to groundwater levels in a particular (index) year. **Reclaimed Production Capacity Index:** Can operational requirements be met?	Local System Indicators are not a trigger in this stage but may be used for determination of required response actions.	One or more index numbers that are low or trending downward, in conjunction with ADMTC declared drought, could trigger elevation of a drought response stage. **Local system indicators may also be used to determine response actions.	One or more index numbers that are low or trending downward, in conjunction with ADMTC declared drought, could trigger elevation of a drought response stage. **Local system indicators may also be used to determine response actions.	One or more index numbers that are low or trending downward, in conjunction with ADMTC declared drought, could trigger elevation of a drought response stage. **Local system indicators may also be used to determine response actions.
Response Monitoring Tool: **GPCD**	Changes in GPCD will be used as a tool for monitoring customer reaction to response actions and may be used in conjunction with other Local System Indicators to determine needed response actions.			
Tucson Water Isolated Systems	ADMTC Declaration of Drought triggers Stage 1; Shortage on Colorado River has no impact	Local System Indicator values that are low or trending downward	Same triggers are monitored for elevation to Stage 3	Same triggers are monitored for elevation to Stage 4
Focus of Responses Actions: ***See Drought Response Measures tables for specific menu of actions for each stage**	Public Education and Information Focus on Drought, Operational or System Maintenance Actions and City Depts to "lead by example" by conducting water-use self-audits.	All Stage 1 actions plus mandatory city dept water reductions and voluntary customer water reductions	All Stage 1 and 2 actions plus mandatory potable water use reductions/ restrictions	All Stage 1,2, and 3 actions plus implement Ordinance 8461 with mandatory restrictions on all non-essential water uses

*Local system indicators act as triggers only in conjunction with an ADMTC declared drought in the Tucson area.

Figure 4.2: Indicators and Triggers

Footnote for Figure 4.2:

Mandatory or hard-line triggers primarily relate to potential impacts from drought on Colorado River water availability. Sustained drought on the Colorado River will trigger Stage 1. A declaration of shortage on the River by the Secretary of the Interior will trigger Stage 2. A reduction in CAP deliveries to municipal users (including Tucson Water) will trigger Stage 3; and further reductions in deliveries will trigger Stage 4.

The Arizona Drought Monitoring Technical Committee's (ADMTC), declaration of drought in the Tucson region, as posted on ADWR's website and based on local climatic indicators, is a mandatory trigger as well and will trigger a Stage 1 regardless of conditions on the River. However, increased severity of drought status posted by ADWR will not be mandatory triggers for Tucson Water's drought response stages, but will be used to implement specific public information or education related to drought.

Advisory triggers relate to drought impacts on local system indicators. These indicators must be analyzed in conjunction with the ADMTC's declaration of drought in the Tucson region and other water conditions to determine if drought response Stages 2, 3 or 4 should be triggered. Local system indicators will not trigger a Stage 1, but may be used to implement specific response actions.

Regional Indicators

Regional indicators specific to Tucson Water's Plan are either drought and shortages on the Colorado River, or a declaration of drought by the ADMTC for the Tucson region, or both.

Shortages on the Colorado River

A regional drought on the Colorado River Watershed could lead to a declaration of shortage on the river by the Secretary of the Interior. Section 301 (b) of the Colorado River Basin Project Act of 1968 provides for Arizona to curtail use of its CAP entitlement to assure water availability to satisfying uses in California and water rights in Arizona and Nevada which are prior to the Central Arizona Project if Colorado River water supplies are below normal. This means that a declaration of shortage could potentially reduce CAP deliveries to Tucson Water, eventually impacting the water resources available to meet customer demand depending on the severity and duration of the shortage and the quantity of Arizona Water Banking Authority (AWBA) firming credits available to pump. Because of this potential impact, a severe and sustained drought in the Colorado River Watershed will trigger a Stage 1 drought response within the Tucson Water service area. A severe and sustained drought in the Colorado River Watershed will be determined by climatological data and the reservoir levels of Lake Mead and Lake Powell, as reported by ADMTC, which includes CLIMAS (Climate Assessment for the Southwest Project), a collaboration of researchers who study the effects of climate for organizations who need climate information to make informed decisions. The impact of drought conditions on the City of Tucson's Colorado River supplies will be determined by the Secretary of the Interior's designation of shortage conditions on the River.

Declaration of Drought by ADWR

ADWR publishes on its web site a monthly Drought Monitor Report (Figure 3.3) that graphically depicts the severity of drought for each of the fourteen surface watersheds in Arizona. Tucson is located in the Santa Cruz Watershed. These reports use climatological and environmental data collected by the ADMTC including precipitation, temperature, stream flows, vegetation status, and reservoir status describing state conditions in each of the watersheds.

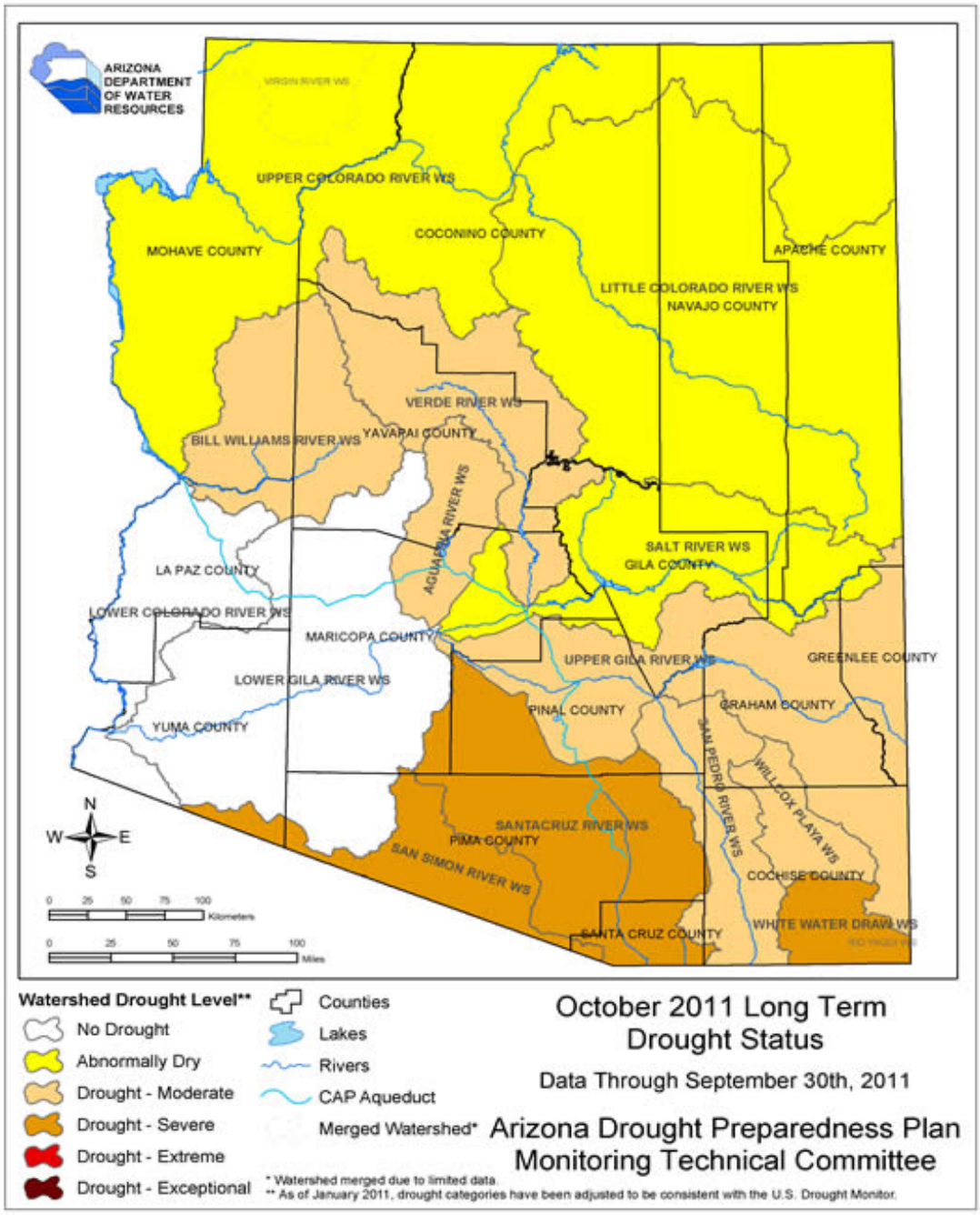

Figure 4.3: Long-Term Drought Status Graphic from Arizona Department of Water Resources October 2011 Drought Monitor Report

Tucson Water's drought indicators do not include specific climate or environmental variables because the state already monitors these indicators and announces drought conditions throughout the state. Instead, the Utility will rely on the state's declaration of drought (any stage above normal) within the Santa Cruz Watershed to trigger a Stage 1 drought response level within the Tucson Water service area.

Local System Indicators

Local system indicators are measures specific to Tucson Water's customer use patterns and water system that are not only useful in good resource management practices, but also provide a means of forecasting potential system impacts related to drought, and in assessing the implementation of drought response measures. Local system indicators include production capacity indices for both potable and reclaimed water, an aquifer storage index, and GPCD. A discussion on the selection and development of Tucson Water's local system indicators is included in Appendix A.

DROUGHT TRIGGER MECHANISMS

The System Assessment Team assigned guidelines, rather than rigid values, to the regional and local system indicators that can be used to trigger declaration of drought response stages. The triggers assigned to local system indicators will generally function in combination with another trigger, such as the ADMTC's declaration of drought in the Tucson region--these are primarily "advisory" triggers. However, certain triggers will, by themselves, initiate, elevate, or terminate drought response stages--these are "mandatory" or "hard line" triggers. For example, reductions in Colorado River water supply declared by the Secretary of the Interior or reductions in Central Arizona Project water supply declared by the State of Arizona will trigger changes in drought response stages regardless of the values of other drought indicators. The System Assessment Team will regularly monitor drought indicators and advise the Director when any indicator requires closer monitoring or when a trigger point has been reached for a specific drought response stage.

DROUGHT RESPONSE STAGES AND RESPONSE MEASURES

Tables 4.1 through 4.4 describe response actions City departments and Tucson Water customers will be asked or required to do to reduce water demand during drought response Stages 1 through 4. Drought response measures supplement rather than replace ongoing water conservation and education programs. One or more response actions may be implemented when a drought response stage is declared. Additional actions may be implemented if needed based on continual monitoring of local system indicators and other tools such as the GPCD. Specific conservation measures included in Tucson

Water's drought response actions were developed based on the following general principles:

1. Emphasize the need for visible leadership from City-maintained facilities.
2. Reduce or restrict highly visible, non-essential uses of water.
3. Avoid or minimize economic impacts to the community except under extreme conditions.
4. Work with large commercial water users to determine their own operational strategies for reducing water use well in advance of implementing advanced drought response stages.
5. Continue to proactively educate all customers on the importance of using water efficiently regardless of climatic conditions.
6. Ensure that any water restrictions do not impact community health and safety.

TABLE 4.1

STAGE 1

Trigger: Either one or both of the following: a severe and sustained drought on the Colorado River Watershed or any declaration of drought status above normal by the ADMTC will trigger a Stage 1 drought response.

Theme: Continuation of baseline conservation program (all stages--Appendix B). Public notification and education on drought issues for customers and a requirement that City Departments initiate plans to review (audit) a representative sample of water to maintain and/or increase efficiency. Self-administered water audits at all non-residential facilities are voluntary during this stage, with incentives offered during later stages for conducting and implementing conservation measures.

City of Tucson	• Require City departments to self audit a representative sample of their facility's water use to determine if there is conservation potential beyond existing water-efficient practices. • Tucson Water continues or accelerates ongoing operations such as well drilling and well maintenance and other system maintenance programs to reduce system losses (meter replacement, leak detection).
Residential Customers	• Continue baseline conservation program (Appendix B). • Public notification through local and social media and/or water bill inserts. • Implement an information program designed to specifically address the drought situation and need for voluntary water reductions (e.g., WaterSmart program).
Multi-Family Customers	• Implement Stage 1 measures for residential customers and may include: • Conduct voluntary self-audits and develop water budgets for possible exemptions from mandatory restrictions in Stage 2. For example, utilizing the WaterSmart business program and informing customers how to implement business specific voluntary measures.

Commercial Customers	• Implement Stage 1 measures for multi-family customers and may include: • Encourage customers to implement business-specific voluntary measures (Examples: encourage restaurants to serve water only upon request or ask plant nurseries to promote the sale of low-water-use vegetation).
Industrial Customers	• Implement Stage 1 measures for commercial customers.
Reclaimed Water Users	• Continue customer education on efficient-water-use especially related to drought conditions. • Voluntary self-audits and developing water budgets to potentially gain exemptions from mandatory reductions in advanced drought response stages. • Tucson Water staff prepares a methodology to monitor wastewater treatment plant flows and calculate reclaimed water customer reductions for later drought stages if approved water budgets are not implemented.

TABLE 4.2

STAGE 2

Trigger: A declaration by the Secretary of the Interior of a shortage on the Colorado River will result in a reduction in Central Arizona Project supply to excess uses, agricultural and other non-municipal users and will trigger a Stage 2 drought response level. If ADWR has declared a drought response stage above normal for the Santa Cruz Watershed, local system indicators may also trigger progression to Stage 2 drought response. In addition, local system indicators will be used to determine the level of initial or continuing response actions needed for this stage.

Theme: Continues all Stage 1 measures. Voluntary reductions by Tucson Water residential and multi-family customers. Implementation of water savings/efficiencies identified during Stage 1 for City Departments. Adds a requirement for self-audits and conservation plans for commercial/industrial customers with a volume usage at/or exceeding 325 Ccf monthly.

City of Tucson	• City Departments are required to budget for the implementation of cost effective water saving and efficiency practices identified in Stage 1 audits. • Develop a plan for managing public fountains and other non-essential uses within City operations. • Tucson Water continues system operation, maintenance, and well drilling activities initiated during Stage 1 and expedites if warranted.
Residential Customers	• Continue baseline conservation program (Appendix B). • Consider implementation of voluntary irrigation schedule based on suggested schedule. Encourage voluntary reductions of all uses of non-essentials, including decorative fountains.
Multi-Family Customers	• Continue Stage 1 measures, implement Stage 2 measures for residential customers, and may include: • Develop and initiate irrigation restrictions with exemptions for sites that have developed water budgets meeting efficiency standards established by Tucson Water.

Commercial Customers	• Continue Stage 1 measures, implement Stage 2 measures for multi-family customers, and may include: • Require commercial facilities with monthly demand at/or exceeding 325 Ccf to conduct a self-audit and develop a conservation plan.
Industrial Customers	• Continue Stage 1 measures; implement Stage 2 measures for commercial customers.
Reclaimed Water Users	• Continue Stage 1 measures. • Prepare customers for potential reductions if wastewater flow reductions occur and if an approved water budget is not implemented. • Potable water will not provide backup supplies to the reclaimed water distribution system.

TABLE 4.3
STAGE 3

Trigger: Continuing shortages on the Colorado River resulting in reductions in CAP deliveries to municipal subcontractors, including the City, will trigger a Stage 3 drought response level. Local system indicators, in combination with an ADWR declared drought in the Santa Cruz Watershed, may also trigger a Stage 3 drought response. Local system indicators will be used to determine the implementation of specific drought response actions during this stage.

Theme: Addition of mandatory customer reductions as conditions warrant. Response actions from Stages 1 and 2 will continue. In addition a drought surcharge may be implemented in Stage 3 if determined necessary to recover additional operating costs including increased public education and enforcement efforts due to drought conditions. A drought surcharge will be developed, based on an annual (October) evaluation of need, as part of Tucson Water's rate process subject to the same review and approvals as other rates and charges. In cases of severe, prolonged drought, the Mayor and Council may consider implementing a temporary moratorium on new water connections or require implementation of an "offset" program that would reduce water use in one area in order for water use to occur in another (see Glossary). Construction water use will be limited and only on approval by the Water Director.

City of Tucson	• Continue Stage 1 and 2 measures. • Restrict washing down of paved areas with exception of public/animal health and safety issues (e.g.,: Reid Park Zoo, Fire and Police, emergency vehicles).
Residential Customers	• Continue Stage 1 and 2 measures and may include: • Develop restrictions on vehicle washing except at commercial facilities with reuse features. • Intensify water waste monitoring and enforcement. The City Manager may request or direct assistance from other City staff to monitor and cite repeat violators. • Develop watering restrictions and publicize through Tucson Water website, social media and in public information materials. • Implement interior retrofit on resale of property requirements.

Multi-Family Customers	• Continue Stage 1 and 2 measures and Stage 3 residential measures and may also include: • Intensify water waste monitoring and enforcement. • Implement watering restrictions. • Prohibit operation of public fountains. • Prohibit fall overseeding of turf areas unless irrigated with reclaimed water. • Implement interior retrofit on resale of property requirements for pre-1991 construction. • Implement landscape retrofit on resale of property requirements if warranted.
Commercial Customers	• Implement all Stage 1 and 2 measures and Stage 3 multi-family measures and may include implementing conservation plan recommendations developed in Stage 2: • Implement twice a week watering restrictions. (Water use linked to some commercial customer's products, e.g. nurseries, can apply for exemption.) • Implement mandatory retrofit on resale of property requirements for interior and exterior uses. • Prohibit operation of fountains at commercial and industrial sites. • Prohibit fall overseeding of turf unless reclaimed water is used. • Restrict washing of sidewalks, driveways, parking lots or any other paved surface.
Industrial Customers	Implement all Stage 1 and 2 measures and all measures for commercial customers and may include implementing conservation plan recommendations developed in Stage 2.
Reclaimed Water Users	• Implement all Stage 1 and 2 measures and may include: • Require irrigation restrictions, with potential exemptions for sites that have conducted audits, upgraded systems to meet minimum efficiency standards, and irrigate with budget-based irrigation schedules. • Require signage for facilities that implement budgets stating they are in compliance with current drought restrictions. • Potable water will not provide backup supplies to the reclaimed water distribution system.

TABLE 4.4
STAGE 4

Trigger: Additional reductions to CAP municipal deliveries, inadequate AWBA firming credits to offset the CAP delivery reductions, deteriorating local system indicators, or a failure to significantly reduce water demand in Stage 3 could trigger a Stage 4 drought response.

Theme: Eliminate all non-essential uses. Continuation of drought surcharge if implemented in Stage 3. In cases of severe, prolonged drought, the Mayor and Council may consider implementing a temporary moratorium on new water connections or require implementation of an "offset" program that would reduce water use in one area in order for water use to occur in another (see Glossary). Construction water use will be limited and only on approval by the Water Director.

City of Tucson	• Continue all Stage 1, 2, and 3 measures and implement appropriate provisions from the City's Emergency Water Conservation Ordinance (No. 8461) including but not limited to: • No operation of large-scale water-cooled systems below 2 cycles of concentration. • No outdoor irrigation (or implementation of further reduced watering schedule at the discretion of City Manager and Mayor and Council) • No washing of paved areas with any pressurized water source except in the case of meeting health and safety issues. • No use of any water-based play apparatus connected to a pressurized water source. • No restaurants and other food service establishments will serve water to their customers unless water is specifically requested by customers. • No operation of outdoor misting systems to cool public areas. • No filling of new swimming pools, fountains, spas, or other exterior water features, including no draining and refilling of existing exterior water features. • No washing of autos, trucks, trailers, and other types of mobile equipment except at facilities equipped with wash water recirculation systems, and for vehicles requiring frequent washing to protect public health, safety, and welfare.
Residential Customers	• Continue Stage 1, 2, and 3 measures and implement appropriate provisions from the City's Emergency Water Conservation Ordinance (No. 8461) including but not limited to:

	• No outdoor irrigation, or establish an irrigation schedule (discretion of City Manager and Mayor and Council). • No washing of paved areas with any pressurized water source except in the case of meeting health and safety issues. • No use of water-based play apparatus. • No filling of new swimming pools, fountains, spas, or other exterior water features. Existing pools may be topped off to maintain water level but may not be refilled if drained. • No washing of autos, trucks, types of mobile equipment except at facilities with wash water re-circulating systems.
Multi-Family Customers	• Continue Stage 1, 2, and 3 measures and include Stage 4 measures listed for residential customers.
Commercial Customers	• Continue Stage 1, 2, and 3 measures and include Stage 4 measures for multi-family customers. • No operation of large-scale water-cooled systems below 2 cycles of concentration. • No restaurants and other food service establishments will serve water to their customers unless specifically requested by customers. • No operation of outdoor misting systems to cool public areas.
Industrial Customers	• Continue Stage 1, 2, and 3 measures in addition to appropriate provisions under Stage 4 for Commercial Customers.
Reclaimed Water Users	• Continue Stage 1, 2, and 3 measures.

Customer Notification

Upon approval by the City Manager and/or Mayor and Council, the Director shall instruct the Utility's Public Information Office to notify customers of the stage of drought response. Declaration of any drought response stage will initiate public education and information programs to advise and educate customers on potential drought impacts in the Tucson Water service area and the need for possible conservation measures. Public notification will be made through various channels including but not limited to media releases and water bill inserts.

Enforcement

Enforcement of Ordinance 10380 will be done by Tucson Water's "Water Cop" staff. Additional Tucson Water staff may be temporarily assigned to enforcement if conditions warrant. The City Manager is authorized to designate additional City employees to assist in the enforcement of the Plan as authorized through the ordinance. Enforcement assistance will be coordinated with the Water Director.

Violation

Violations of Ordinance 10380 will result in a written notice placed on the property where the violation occurred. A duplicate notice will be mailed to the person who is regularly billed for the water service where the violation occurs, and to any person known to the Department who is responsible for the violation or its correction. The notice will describe the violation and order that it be corrected, ceased, or abated immediately or within such specified time as the Department determines is reasonable under the circumstances. The notice of violation will include a description of the possible fees and associated penalties. If the order is not complied with, the Department may disconnect the service where the violation occurs and the then current disconnection charge will be applied to the customer account. Reconnection of any service disconnected for non-compliance will require payment of the then current complete new service connection charge in addition to other fees or charges imposed by this ordinance for disconnection of service.

In addition to being grounds for discontinuation of service, violation of any provision of this article shall be a civil infraction. An individual or corporation convicted of violating provisions of this ordinance will be assessed a civil penalty of not less than $250 or more than $1,000 per violation as determined by the Court upon review of the Utility's recommendation based on a description of the violation.

Essential Uses

Essential uses that are exempted from drought restrictions include but may not be limited to:

- Any use to maintain the health, welfare, and safety of Tucson Water customers, City residents, and visitors, including hospitals, other health care facilities, and fire departments;
- Any use to maintain public sanitation, including washing of sanitation trucks, trucks used to carry food or other perishables, and commercial establishments that must wash paved areas for sanitation purposes.

Variances

The Director, or designee, is authorized to review special cases within which strict application of the ordinance would result in serious hardship to a customer. A variance may be granted only for reasons involving health, safety, or economic hardship. Application for variance must be made on a form provided by the Director. The Utility will charge a fee to process a variance request (Appendix F*)*.

DROUGHT RESPONSE STAGE TERMINATION

When the conditions warranting declaration of Drought response Stage 1 or 2 no longer exist, the Director will advise the City Manager that the drought response stage should be terminated or reduced. The Manager will declare the change or termination of Stage 1 and 2. When the conditions warranting declaration of Drought Response Stage 3 or 4 no longer exist, the Director will recommend the change or termination of the drought response stage to the City Manager and the Mayor and Council. Changes in, or termination of, Drought Response Stage 3 and 4 will require the approval of the Mayor and Council. Response actions will be reduced to the appropriate level as drought response stages are terminated or reduced.

A well rig. Groundwater wells can provide backup supplies during severe drought.

CHAPTER FIVE

EMERGENCY OR BACKUP SUPPLIES FOR POTABLE WATER

Guidelines for development of drought preparedness and response plans were provided by ADWR to assist water providers in completing meaningful plans. A discussion of emergency, or backup, potable water supplies is an essential element of the drought preparedness and response plan. This section will address Tucson Water's potable backup supplies for meeting service area demands as well as address agreements with other local water providers for emergency water supplies.

Tucson Water Backup Supplies

Decades of water supply and system infrastructure planning have resulted in a water system that utilizes both CAP water and groundwater for most of the Tucson Water service area, with the exception of isolated water systems which depend solely on groundwater. The conjunctive use of groundwater and surface water supplies, particularly the operation of the Clearwater recharge and recovery system, provides a great deal of resilience to the Tucson Water supply system during water emergencies as well as during times of local drought.

Tucson Water's resource planning and system design staff acknowledge the similarity in certain operational responses to water emergencies and severe drought conditions while recognizing that drought itself is not an emergency situation. Drought does not occur suddenly and without warning. Rather, careful observation of key drought indicators will allow for implementation of responses to avoid reaching emergency conditions.

However, should a prolonged unforeseen crisis occur with delivery of surface water supplies, such as damage to the CAP canal or a long-term declared shortage on the Colorado River causing a reduction in CAP water deliveries to Tucson, groundwater supplies would serve as emergency backup for the City of Tucson. Although long-term reliance on groundwater is not a preferred alternative, and is not advisable from a Utility policy, regulatory, or environmental standpoint, short-term reliance will provide a reliable emergency supply should Tucson Water customers need it.

Emergency Supply Policy for Other Water Providers

Other water providers in the greater Tucson region may occasionally experience difficulty in meeting customer demand due to a variety of supply or infrastructure issues. The City of Tucson currently has "interconnect agreements" with some area water providers for such specific needs as fire protection capacity or other emergencies related

to water supply or infrastructure. As stated above, drought is not an emergency and *these agreements do not cover water shortages due to drought.*

However, it is possible the Utility could occasionally be asked to provide water on an emergency basis to other water providers who may have less resource or system reliability than Tucson Water during a severe drought. Such requests for drought-related, short-term emergency supplies will be reviewed on a case by case basis. The Water Director will expedite review of the request and forward a recommendation to the Mayor and Council, or if a quorum is not available the Mayor or Mayor's designee, for approval or denial of the request based on the following guidelines:

1. Short-term drought supply assistance will only be provided to alleviate a public health or safety condition. A public health or safety condition is defined as inadequate water supply to provide for fire flow capacity, essential human uses or to meet the requirements of healthcare establishments.
2. Short-term drought supply assistance will only be provided if the Utility can adequately meet the projected needs of its customers on a continuing basis.
3. Short-term drought supplies will be provided at a price equivalent to three times the Commercial Customer rate. The price is in part determined by the fact that the water supply is being provided during peak demand times and therefore is going to be more expensive for the Utility to provide than water delivered during off-peak times.
4. Recipients of short-term drought supplies are required to implement in their service area drought response measures equal to or more stringent than Tucson Water's Stage 4 drought response measures. Recipients of these short-term supplies also must make provisions for developing their own alternative water supplies.
5. The duration of short-term drought supply shall not exceed 90 days (subject to approval of the Mayor and Council*)* while alternative supplies are being developed. However, the Utility has the right to discontinue emergency service at any time.

CHAPTER SIX

PLAN REVISIONS

Even with built-in flexibility, the Utility's Plan will require occasional review and revision. Significant community investments in system reliability and use of renewable resources have enabled the Utility to maintain a robust water system that has demonstrated little impact from drought to date. Because of that, the Plan is based on best available information and judgment, rather than on actual drought impact experience.

Over time, if drought conditions persist or become more severe, the Plan will likely require adjustments. Climatological studies indicate there may be long-term changes in store for global weather patterns and there is general consensus in the scientific community that average temperatures are increasing in the Southwest. It is unclear how these changes may impact precipitation patterns over the long term. However, changes in weather patterns will make forecasting more difficult and thorough planning more important. To ensure that the Plan remains an effective management tool, Tucson Water staff will review the Plan annually and recommend any necessary revisions or updates needed to meet the challenges of new or changing conditions.

Based on the relationships between well field and distribution system health, the annual review will also be useful to system planners and operations staff from a maintenance and infrastructure development standpoint.

Minor updates to the Plan will be approved by the Water Director and be appended to the drought plan. However, if significant revisions or updates are recommended the Plan will be formally revised with revisions approved by the Mayor and Council and forwarded to the Arizona Department of Water Resources (ADWR). The plan will be formally revised no less than every five years in accordance with ADWR requirements.

APPENDIX A

DEVELOPMENT OF LOCAL SYSTEM INDICATORS

The indicators used in the Plan were developed to provide guidelines for the Water Director to:

- determine the level of drought response needed in the Tucson Water service area;
- evaluate the potential impacts drought might have on availability of water supplies or the Utility's ability to deliver water to customers; and
- implement the response actions needed to mitigate potential impacts.

To accomplish this, drought indicators must be meaningful and measure something that is:

- critical to Tucson Water's ability to deliver water (including water supply availability and potential system impacts specific to our water system);
- useful for good resource management practices; and
- not already measured by another indicator (i.e. not repetitive or a variable included in another indicator).

Because Tucson Water uses both imported surface water and groundwater for potable supply, the Plan's indicators needed to reflect potential drought impacts to either or both of these supplies. This consideration resulted in development of both regional indicators and local system indicators. Regional indicators, as described in Chapter 3, reflect potential reductions in availability of Colorado River water as well as watershed conditions for our local area monitored and reported by the Arizona Department of Water Resources (ADWR). Local system indicators reflect potential impacts specific to Tucson's water system and groundwater supplies. Tucson Water's Plan includes 3 local system indicators and one additional indicator that will be used primarily as a "response monitoring tool".

Whereas regional indicators are outside the control or influence of Tucson Water, usually reflecting watershed related conditions, the Utility can generally exercise more direct control in responding to local system indicators. Tucson Water staff routinely evaluates a number of variables to examine the performance of the potable and reclaimed systems. However, monitoring and analyzing these variables in terms of their relationship to drought will provide early warning of potential drought related system problems that can signal the need to implement mitigation measures to avoid those problems.

The local system indicators give a general view of the overall "health" of the water systems, with each one reflecting the influence of a number of possible impacts of drought. A downward trend in any of the indicators would be a signal to the Director that

a more in-depth evaluation of system components is needed or that specific response measures should be implemented.

Potable Water Production Capacity Index (PPCI)

The PPCI indicator is a ratio of potable production capacity to potable demand. In this equation, demand is the forecasted total potable water demand for the average day of the peak 30-day period for the upcoming summer. Production capacity in this equation is the expected capability to produce and deliver water to adequately meet the upcoming summer demand over the entire maximum 30-day period – this will be less than the sum of the capacity of all the individual wells. PPCI measures the Utility's overall ability to produce sufficient water to meet peak demand.

Production capacity in the PPCI ratio is largely determined based on well efficiency measures, including such factors as system pressures, static water levels, specific well capacity and so forth. Tucson Water's integrated potable system is generally designed to provide supply in excess of the average day of the peak 30-day period. Tucson Water will monitor this index both for its absolute value and for its trend in each of the potable systems. A high value trending downward or a low value that is not showing signs of improving will likely warrant operational response actions such as expedited system maintenance or well drilling programs.

Gallons Per Capita Per Day (GPCD)

"Gallons per capita per day water use", or GPCD, has been tracked by the utility for a number of years to ensure compliance with ADWR regulations. GPCD was incorporated into the Plan as a local system indicator that will be used primarily as a "response monitoring tool" when a drought response stage is declared for the Tucson Water service area. Per capita water use is simply total potable demand, including lost and unaccounted for water, divided by the population and by the number of days in the year.

Under normal climatic conditions, GPCD would be expected to remain stable. One of the anticipated effects of local drought is an increase in GPCD because customers traditionally tend to use more water when it is hotter and drier than normal. Monitoring GPCD will help determine if there is a demand response to the drought –increases due to drought conditions or decreases corresponding to water conservation or drought specific programs.

The Potable Production Capacity Index (PPCI) will capture increases in total demand or reductions in capacity during the peak demand periods. Given anticipated expansion of

production capacity, however, a local drought will likely not result in demand exceeding production capacity (as measured by the PPCI) even if GPCD were to increase.

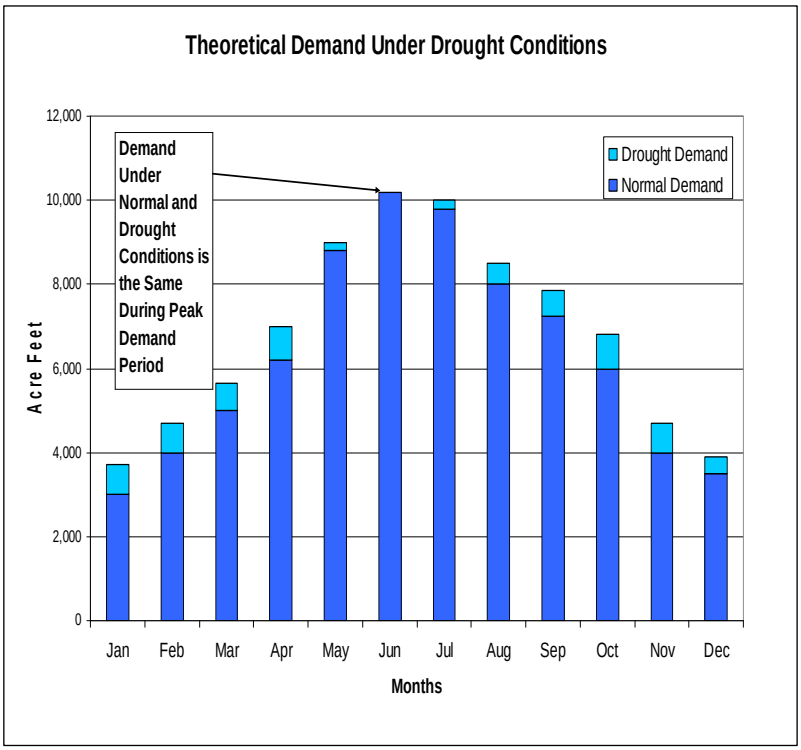

Figure A.1: Theoretical Demand under Drought Conditions

In fact, GPCD could go up as a result of increased demand during the winter and shoulder months (March, April and September, October) rather than during the maximum 30- day (peak) demand period, which can be generally characterized as "drought-like" even under normal climate conditions. Therefore, if the PPCI were the only indicator incorporating demand, the drought plan would fail to address potential drought related impacts of increased GPCD. An example of those potential impacts might include more groundwater being used than under normal climate conditions, which in turn would result in more rapid use of our Allowable Groundwater Credits and would potentially contribute to a more rapid decline in the water table. (See Figure A.1)

Aquifer Storage Index (ASI)

The "health" of the aquifers from which Tucson Water pumps groundwater can be measured in a number of ways. Aquifer health, regional water table elevations, and the number and depth of wells can all impact the overall productivity of a well field. In addition, drought conditions on the Colorado River could lead to decreased CAP deliveries to the City's recharge and recovery projects. While the design of the recharge projects allow for continued pumping with reduced or no recharge for a considerable time, doing so over sustained periods could negatively impact the productive capacity of those well fields.

When considering drought impacts, changes to the regional water table in the most productive well fields are of prime concern. Tucson Water developed the ASI to capture changes in static water level conditions to provide a measure of changes in the aquifer that could influence water supply.

The ASI is an annual measure which indicates a change in groundwater levels by comparing groundwater levels with those in a particular (index) year. The groundwater levels are taken from individual, spatially-distributed wells and summed to produce a total for the year. The water levels are weighted by the volume pumped. The total for the current year is divided by the total for the index year of 2000 to derive the ASI. (The year 2000 was selected because it represents the condition of the aquifer immediately prior to the introduction of CAP water at the CAVSARP facility, following many years of continuous groundwater pumping.) A prolonged local and/or regional drought would be expected to decrease water levels in the aquifer, which in turn could eventually affect the productivity of the well fields.

Reclaimed Production Capacity Index (RPCI)

The RPCI indicator is a ratio of reclaimed production capacity to reclaimed demand, very similar to the PPCI. Tucson Water's reclaimed system is generally designed to be 2.0 times the average day of the peak month. The design standard for the reclaimed system is different than the standard for the potable system because reclaimed demand is primarily related to irrigation needs and is, therefore, more responsive to climatic conditions and has higher "peak demand" requirements.

A probable outcome of local drought is an increase in demand for reclaimed water from existing and new customers that could negatively impact the system's ability to meet that demand unless capacity (infrastructure enhancement) keeps pace. A downward trend in the RPC will be considered along with other drought indicators to determine appropriate drought response.

APPENDIX B
TUCSON WATER BASELINE CONSERVATION PROGRAM

- General public information programs (Beat the Peak, speaker's bureau, presence at community events, distribution of bill inserts).

- Education and training programs (annual teacher internship training, water audit training for landscapers).

- Rebates and other incentive-type programs.

- Direct assistance programs (Zanjeros audit program, Water Smart irrigation workshops for homeowners, Smartscape workshops for landscapers).

- Regulatory measures (landscaping and water waste ordinances, plumbing codes).

- Increasing block water rate structure.

.

- Participate in or sponsor water conservation-related research projects.

APPENDIX C

RELATED CITY PLANS, ORDINANCES, AND POLICIES

Plans:

City of Tucson Water Department, 2004. *Water Plan: 2000-2050 (Final Draft).*

City of Tucson Water Department, 2008. *Water Plan 2000-2050, 2008 Update*

City of Tucson Water Department, 1997. *Tucson Water Emergency Response Plan.*

Ordinances:

City of Tucson, 1995. *Ordinance 8461*, Relating to Water; establishing the City of Tucson Emergency Water Conservation Response Plan; amending the Tucson Code by adding a new article VI, Emergency Conservation Response, and by adding new sections 27-90 through 27-99 to the Tucson Code.

Policies:

City of Tucson, 1998. *Mayor and Council Water Policies* (Roman Numeral 3, Policies; Section C., Water Supply Management, and Development, Number 2--Contingency Plans).

APPENDIX D

REFERENCES

American Water Works Association (AWWA), 2002. *Drought Management Handbook* AWWA Water Shortage Subcommittees, AWWA Water Conservation Committee

Arizona Department of Water Resources, 2006 *System Water Plan Guidance Document* www.water.az.gov/dwr

Arizona Department of Water Resources, 2006 *Drought Monitor Report (*various issues), Governor's Task Force Monitoring Technical Committee

Arizona Governor's Drought Task Force, Governor Janet Napolitano, 2004. *Arizona Drought Preparedness Plan, Operational Drought Plan*

Arizona Hydrological Society Symposium, 2006 *Climate Change and Drought Workshop,* Glendale Civic Center, Glendale, Arizona

City of New York, 1998 *Drought Management Plan and Rules* City of New York Department of Environmental Protection

City of Peoria, Arizona, 2003 *Drought Contingency Plan* City of Peoria Utilities Department, Water Resource and Conservation Division

City of Phoenix, Arizona, 2000 *Drought Management Plan* City of Phoenix Water Services Department

City of Scottsdale, Arizona (not dated) *Drought Management Plan* City of Scottsdale Water Department

City of Tucson Water Department, 2004 *Water Plan: 2000-2050 (Final Draft)*

City of Tucson Water Department, 2008 *Water Plan 2000-2050, 2008 Update*

Climate Assessment for the Southwest (CLIMAS) Project; University of Arizona Cooperative Extension 2006 *Southwest Climate Outlook* (various issues) CLIMAS web site www.ispe.arizona.edu/climas

National Drought Mitigation Center, U.S. Drought Monitor web site: www.drought.unl.edu/dm/monitor.html

Pima County, Arizona, 2006 *Pima County Drought Management Plan* (draft)

Southern Nevada Water Authority, 2005 *Drought Plan* (supplement to the Authority's Water Resource Plan.*)*

APPENDIX E

ORDINANCE 10380

(Editor's Note: The City of Tucson Mayor and Council unanimously approved the drought response plan November 28, 2006. The implementing ordinance was subsequently adopted March 20, 2007.)

See next page.

ADOPTED BY THE
MAYOR AND COUNCIL

March 20, 2007

ORDINANCE NO. 10380

RELATING TO WATER; AMENDING THE TUCSON CODE, CHAPTER 27, WATER, BY ADDING A NEW ARTICLE VIII, DROUGHT PREPAREDNESS AND RESPONSE PLAN; AND DECLARING AN EMERGENCY.

BE IT ORDAINED BY THE MAYOR AND COUNCIL OF THE CITY OF TUCSON, ARIZONA, AS FOLLOWS:

SECTION 1. The Tucson Code Chapter 27 is amended to add a new Article VIII, as follows:

ARTICLE VIII. DROUGHT PREPAREDNESS AND RESPONSE PLAN

Sec. 27-110. Purpose.

This article establishes a city drought preparedness and response plan.

Sec. 27-111. Declaration of policy.

It is hereby declared that, because of varying conditions related to water resource supply and distribution system capabilities during drought, it is necessary to establish and to enforce drought response stages and drought response measures to ensure that the water resources available to the city are put to the maximum beneficial use; that unreasonable use, or unreasonable method of use is prevented; and that conservation of water is accomplished in the interests of the customers of the city and for the public health, safety, and welfare.

Sec. 27-112. Application.

(a) This article applies to all departments of the city, and to all city water customers who own, occupy, or control water use on any premises as defined in section 27-10.

(b) No person shall make, cause, use, or permit the use of water received from the Department for residential, commercial, industrial, governmental or any other purpose in any manner contrary to any provision in this article.

(c) Mandatory drought response measures shall be implemented based upon the declaration of drought response stages pursuant to section 27-115.

Sec. 27-113. Declaration of drought response stages, implementation, termination.

(a) Stage 1 or Stage 2 drought response will be declared by the City Manager, or any designee, on the advice of the Director. A Stage 3 or Stage 4 drought response will be declared by the Mayor and Council, or any designee, upon the recommendation of the City Manager.

(b) The Director shall develop guidelines which set forth general criteria to assist the City Manager or Mayor and Council, or any designee, in determining drought response stages.

(c) Following the declaration of any drought response stage, the Department will implement appropriate response actions, including but not limited to public notification and various drought response measures.

(d) The Director will continually monitor drought conditions and promptly recommend that the drought stage level increase if conditions worsen. Similarly, the Director will advise the City Manager to rescind Stage 1 or 2, or to recommend termination of Stage 3 or 4, if warranted by lessened drought conditions.

Sec. 27-114. Triggers for each drought response stage.

Each drought response stage will be triggered by specific conditions related to the availability of Colorado River water and/or local water system indicators, such as well and distribution system operating capacities:

(a) Stage 1 trigger: A severe and sustained drought on the Colorado River watershed and/or any declaration of drought status above normal in the Santa Cruz Watershed by the Arizona Drought Monitoring Technical Committee.

(b) Stage 2 trigger: A declaration by the Secretary of the Interior of a shortage on the Colorado River that results in a reduction in Central Arizona Project (CAP) water deliveries to agricultural, other non-municipal users, or to excess users, OR, a deterioration in local water system

indicators in conjunction with a drought status above normal for the Santa Cruz Watershed.

(c) Stage 3 trigger: Continuing shortages on the Colorado River resulting in reductions in CAP deliveries to municipal subcontractors, including the city, OR, a further deterioration in local water system indicators in conjunction with a drought status above normal for the Santa Cruz Watershed.

(d) Stage 4 trigger: Additional reductions to CAP municipal deliveries, a further deterioration of local system indicators, and/or a failure to significantly reduce water demand in Stage 3.

Sec. 27-115. Response actions for each drought response stage.

Upon declaration of a drought response stage the Director shall be authorized to implement and enforce any or all of the drought response measures for a specific drought response stage included in the last-adopted Drought Preparedness and Response Plan on file with the City Clerk's Office.

Sec. 27-116. Variances.

The Director, or the Director's designee, is authorized to review special cases within which strict application of this chapter would result in serious hardship to a customer. A variance may be granted only for reasons involving health, safety or economic hardship. Application for variance from requirements of this article must be made on a form provided by the Director. The Department may charge a fee to process a variance request.

Sec. 27-117. Violation.

(a) Violations of this article will result in a written notice placed on the property where the violation occurred. A duplicate will be mailed to the person who is regularly billed for the service where the violation occurs and to any person known to the Department who is responsible for the violation or its correction. The notice will describe the violation and order that it be corrected, ceased or abated immediately or within such specified time as the Department determines is reasonable under the circumstances. The notice of violation will contain a description of the possible fees and penalties associated with said violation. If the order is not complied with, the Department may disconnect the service where the violation occurs and the then current disconnection charge will be applied to the customer account. Reconnection of any service disconnected for non-compliance will require payment of the then current complete new service connection charge in addition to other fees or charges imposed by this ordinance for disconnection of service.

(b) In addition to being grounds for discontinuation of service, violation of any provision of this article shall be a civil infraction. An individual or corporation convicted of violating provisions of this section shall be assessed a civil penalty of not less than two hundred fifty dollars ($250.00) or more than one thousand dollars ($1,000.00) per violation.

Sec. 27-118. Enforcement.

This article will be enforced by the Department. The City Manager, in consultation with the Director, is authorized to designate additional city employees to assist in enforcement, should conditions warrant.

Sec. 27-119. Definitions.

Department means the City of Tucson Water Department (Tucson Water).

Director means the Director of the City of Tucson Water Department.

Economic hardship means a threat to a primary source of income for an individual or business.

Notification to public means notification through local media, including interviews and issuance of news releases and/or Department bill inserts.

SECTION 2. If any Section, Subsection, Sentence, Clause, Phrase, or Portion of this Ordinance is for any reason held to be invalid or unconstitutional by the decision of any court of competent jurisdiction, such decision shall not affect the validity of the remaining portions thereof.

SECTION 3. The various City officers and employees are authorized and directed to perform all acts necessary or desirable to give effect to this ordinance.

SECTION 4. WHEREAS, it is necessary for the preservation of the peace, health, and safety of the City of Tucson that this Ordinance become

. . .

. . .

immediately effective, an emergency is hereby declared to exist and this ordinance shall be effective immediately upon its passage and adoption.

PASSED, ADOPTED AND APPROVED BY THE MAYOR AND COUNCIL OF THE CITY OF TUCSON, ARIZONA, March 20, 2007.

MAYOR

ATTEST:

CITY CLERK

APPROVED AS TO FORM:

CITY ATTORNEY

CA:dc
03/06/2007 12:55 PM

REVIEWED BY:

CITY MANAGER

APPENDIX F
VARIANCE APPLICATION
FROM
CITY OF TUCSON WATER DEPARTMENT
DROUGHT PREPAREDNESS PLAN
ORDINANCE NO. 10380 REQUIREMENTS

SECTION I. General Information

1. **Applicant Name:**_____
2. **Customer Name**
3. **(*if different from 1.)*:**_____
4. **Service Address:**_____
5. **Account Number(s)**_____
6. **Daytime Contact:**
   - **Name:**_____
   - **Address**_____
   - **Affiliation:**_____
   - **Telephone Number(s)**_____

SECTION II. Variance Request

Article VI, Section 27-96 of the Tucson Code states: "The City Manager, or the City Manager's designee, is authorized to review hardship cases and special cases within which strict application of the Chapter would result in serious hardship to a customer. A variance may be granted only for reasons involving health, safety, or economic hardship. Application for variance from requirements of the Chapter must be made on a form provided by the Director."

1. Identify the use of water for which a variance is being applied:_____
_____
_____

2. Above use is located at a (check one only): ____Residence ____Commercial Establishment

3. Identify the hardship for which a variance is requested.

_____

_____

_____

_____

VARIANCE APPLICATION
FROM
CITY OF TUCSON WATER DEPARTMENT
DROUGHT PREPAREDNESS PLAN
ORDINANCE NO. 10380 REQUIREMENTS
(Continued)

4. Cite specific health codes or safety regulations that impact your ability to comply with the Drought Preparedness and Response Plan Ordinance.

_____

_____

_____

Applicant Signature:_____

Date:_____

OFFICE USE ONLY:

1. Reviewer_____
2. Date:_____
3. Status: Approve____Reject____

COMMERCIAL OFFICE ONLY:

1.Reviewer:_____
2. Date Received:_____
3. Date Entered:_____

4. Comments:_____

_____

www.tucsonaz.gov/water

From: John Kmiec
To: Vespalec, Thomas
Subject: RE: TW Webmail (Projected Groundwater Uses)
Date: Tuesday, January 31, 2012 8:00:49 AM

Hi Tom,

I can answer for the Sweetwater Recharge Facility. Sweetwater will be adding three new recharge basins on the north side of Sweetwater Drive, north of the current Tucson Treatment Plant. This will increase recharge capacity for the facility from 10,000 ac-ft/year to 13,000 ac-ft/year. I am anticipating these will be constructed within the next 24-months.

As far as plans for the Silverbell Landfill area, I will have to direct you to the person over that area in the City of Tucson's Environmental Services Department. Her name is Molly Collins. Her e-mail is Molly.collins@tucsonaz.gov

Molly should be able to help with questions on that site.

Sincerely,
John

John Kmiec
Environmental & Regulatory Compliance Supervisor
Water Quality & Operations Division
Tucson Water
(520) 837-2433

To learn more about the future of water, please go to
www.athirstyplanet.com

>>> "Vespalec, Thomas" <Thomas.Vespalec@arcadis-us.com> 1/31/2012 7:50 AM >>>
Hi John,

This is Tom with ARCADIS and wanted to ask you a about the future development plans of the Silverbell Landfill. As part of the RI report, I need to add in "Land Use". Is there any future proposed plans? I did notice that it is zoned R-1 (residential), for urban, low density, single-family, residential development with schools, parks, and other public services necessary. If you do not know, is there someone specific that I should speak to?

Second, is the recharge facility have any plans to expand? Possibly add in another pond.

Thank you for your help in this effort.

Thomas Vespalec
Project Geologist
ARCADIS
480-905-9311

-----Original Message-----
From: John Kmiec [mailto:John.Kmiec@tucsonaz.gov]
Sent: Tuesday, November 01, 2011 12:58 PM
To: Vespalec, Thomas
Cc: Fernando Molina
Subject: Re: TW Webmail (Projected Groundwater Uses)

Thomas,

I may be able to help you with your inquiry. Please try to reach me at my office number at 520-837-2433. I should be in my office most of the day Wednesday.

Thanks,
John

John Kmiec
Environmental & Regulatory Compliance Supervisor
Water Quality & Operations Division
Tucson Water
(520) 837-2433

To learn more about the future of water, please go to
www.athirstyplanet.com

>>> "Vespalec, Thomas" <Thomas.Vespalec@arcadis-us.com> 11/1/2011 10:02 AM >>>
Dear Tucson Water Management Department,

I am inquiring about information for current and reasonably foreseeable uses of water within the area surrounding our Site. I am preparing a Remedial Investigation Report (RI) for the Arizona Department of Environmental Quality and under Arizona Administrative Code (AAC) R18-16-406D, the RI shall include collection of information regarding current and foreseeable use of land and water impacted by subject Site. The Site is located west of the I-10 Freeway, north of Grant Road, along Silvercroft Wash, in the City of Tucson, Pima County, Arizona. The Site lies in the NW 1/4 of the SW 1/4 of the NW 1/4 of Section 34, Township 13 South, Range 13 East, as shown on the Jaynes, Arizona 7.5 Minute U.S. Geological Survey Topographic Quadrangle.

As stated in the ACC, uses to occur within 100 years must be addressed from any well owner, written management plans, etc. I know that there is a Water Plan: 2000-2050, but would like any additional or site specific future uses of the water from the City of Tucson. Any information would be helpful to include into the RI report. Thank you for your time and assistance in this matter.

Sincerely,

Thomas J. Vespalec, P.G. | Project Geologist | Thomas.vespalec@arcadis-us.com<mailto:firstname.lastname@arcadis-us.com>

ARCADIS U.S., Inc. | 14201 North 87th Street, Suite 135 | Scottsdale, Arizona 85260
T: 480.905.9311 | M: 562.833.2477 | F: 480.905.9353
www.arcadis-us.com<http://www.arcadis-us.com/>

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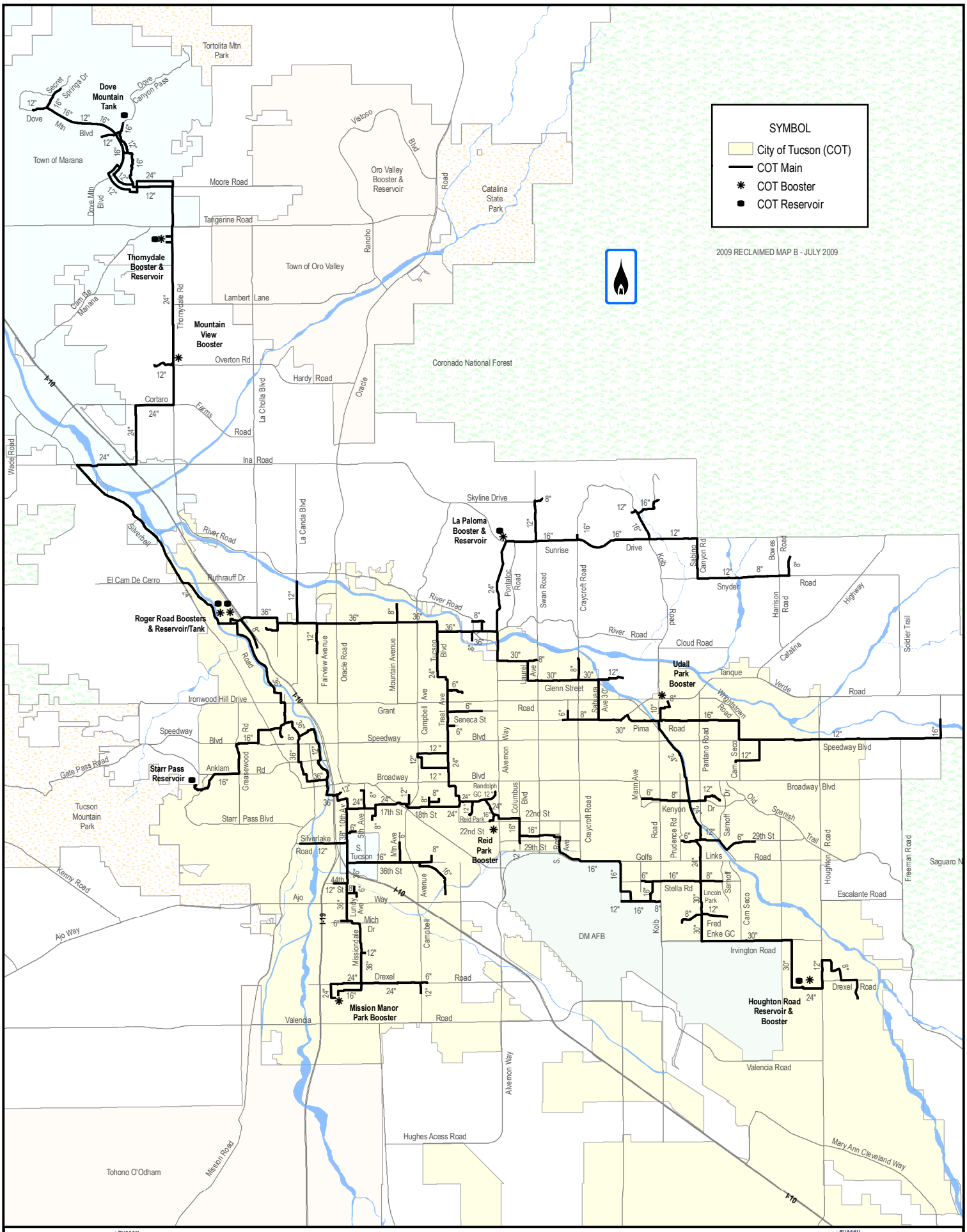

CITY OF TUCSON - TUCSON WATER - RECLAIMED WATER SYSTEM - JULY 2009

Sweetwater Recharge Facilities: Effluent Storage and Recovery for Reuse

Wally R Wilson
Tucson Water

ABSTRACT

As a part of Tucson Water's integrated water management strategy, the reuse of effluent in the City's Reclaimed Water System is a critical component for preserving groundwater and surface water supplies. Tucson Water utilizes both direct treatment and recharge/recovery to meet growing reclaimed water demands. The Sweetwater Recharge Facilities (SRF) is an effluent Underground Storage and Recovery Project which annually provides approximately 6,500 acre-feet of the City's reclaimed water supply. The facility consists of a constructed wetland and constructed recharge basins. The SRF serves as a recharge and recovery facility, a nationally recognized research platform for SAT, and a public recreation and education site.

The recharge component of the SRF consists of eight excavated recharge basins which occupy approximately 28 acres. These surface-spreading basins recharge secondary effluent obtained from the Pima County Roger Road Wastewater Treatment Plant, secondary quality effluent from the constructed wetlands, and excess reclaimed water produced during low demand periods.

The SRF provide both flexibility and improved water quality for Tucson Water's reclaimed water system. Throughout a typical year, reclaimed demand fluctuates in response to seasonal temperatures. The recharge facility allows for storage of secondary effluent during low demand periods and subsequent recovery during peak demand periods. This provides operational flexibility since recharge can be maintained throughout the year while recovery can vary widely to match system demands.

To satisfy continued increases in reclaimed water demand, Tucson Water evaluated operational changes to develop more recharge capacity out of the existing facility. By increasing the wet-cycle flooding depth, increasing basin delivery flow rates, and increasing the frequency of basin bottom ripping, a 35% increase in annual recharge capacity is projected.

SWEETWATER RECHARGE FACILITIES: SERVING TUCSON FOR 20 YEARS

John P. Kmiec, Tucson Water, Tucson, AZ, U.S.A.
Tim M. Thomure, Tucson Water, Tucson, AZ, U.S.A.

Introduction

The City of Tucson is located in the northern semi-arid reaches of the Sonoran Desert in eastern Pima County, Arizona. Very few surface streams contain perennial flow and most of these are effluent-dominated streams located downstream from municipal wastewater treatment plants. Until the early 1990s, the Tucson community relied almost exclusively on pumped groundwater to meet water demand. Due to rapid growth in population and associated water demand following World War II, the groundwater system transitioned from an approximate state of equilibrium to one of accelerating depletion. Despite the successful implementation of water conservation programs and the "desert landscape" ethic of Tucson residents, groundwater withdrawals for municipal use continued to increase through the year 2000. Rapidly declining water levels in the metropolitan and surrounding areas have resulted in land subsidence, increased pumping costs, and the gradual loss of native riparian habitat.

Tucson Water's need to develop renewable water supplies in order to reduce reliance on groundwater and meet projected future demand has long been recognized and is a critical goal of *Water Plan: 2000-2050* (Tucson Water, 2004). Reclaimed effluent is a renewable water supply that Tucson Water has come to rely upon to help meet the community's growing thirst for water. The Reclaimed Water System supplies high-quality recycled water for non-potable uses. The Sweetwater Recharge Facilities are the key source of supply to this system and have served the community for two decades.

Tucson's Reclaimed Water System

In the early 1980s, the City of Tucson constructed one of the first reclaimed water systems in the country. This system provides tertiary treatment of secondary effluent derived from Pima County Wastewater Department facilities to produce water of sufficient quality to be used for landscape irrigation and certain industrial uses. The system began operation with 10 miles of pipeline and only one customer—a destination resort golf course. Since then, the system has grown to include over 100 miles of transmission pipelines and serves almost 13,000 acre-feet per year of reclaimed effluent to about 600 customers including multiple golf course facilities, parks, schools, industrial sites, and certain residential sites. Tucson Water's reclaimed water system remains an industry leader and serves to meet approximately eight percent of Tucson's total water demand. This reuse of wastewater effluent reduces groundwater pumping and conserves higher quality water sources for potable supply.

The secondary effluent that is received from Pima County's treatment facilities is either filtered at the Tucson Reclaimed Water Treatment Plant or recharged in a number of facilities. The recharge facilities include the Sweetwater Recharge Facilities (SRF), the Santa Cruz River Managed Underground Storage Facility (Santa Cruz Phase I), and the Lower Santa Cruz River Managed Recharge Project (Santa Cruz Phase II) as shown in Figure 1 (Tucson Water, 2004). While all of these facilities are essential to the successful operation of the Reclaimed Water System, the SRF are the core supply source providing high water quality, system reliability, and a beneficial public amenity.

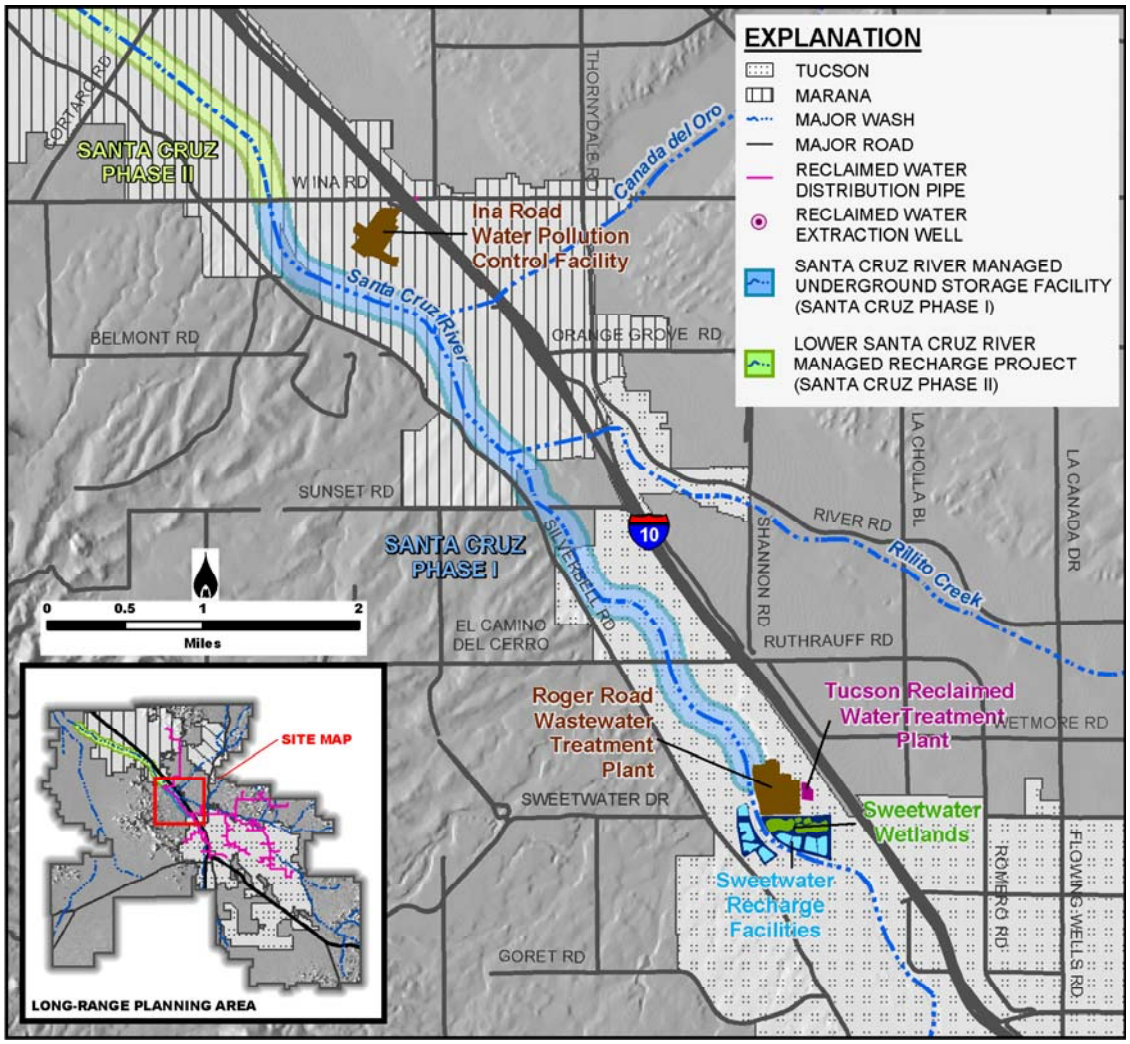

Figure 1. Sources of Supply to the Reclaimed Water System.

The Sweetwater Recharge Facilities (SRF)

Planning for reclaimed water production, recharge, and recovery officially began in 1983. It was during this time that Tucson Water, a Department of the City of Tucson, made the commitment to utilize reclaimed water in economical and feasible ways to offset water demand in the Tucson basin. At the same time, the Central Arizona Project (CAP) was nearing completion in the Tucson area. The CAP was designed to bring Colorado River water to agricultural interests, Native American communities, and municipalities in central and southern Arizona to help further reduce reliance on mined groundwater. The use of Colorado River water coupled with the new reclaimed water use program has allowed Tucson Water to be a viable desert city with a reliable water supply for years to come.

The SRF have evolved through three major phases during the last twenty years. The first ("Demonstration") phase occurred from 1984 through 1989, the second ("Developmental") phase occurred from 1989 through 1997, and the third ("Full-Scale") phase has run from 1997 to the present.

Demonstration Phase 1984 – 1989

The objectives of the Demonstration Phase of the SRF were to determine the hydrologic feasibility of aquifer recharge and recovery, evaluate the potential impacts of recharge on aquifer water quality and water levels, obtain geologic information on site characteristics during construction, and gain experience in the operation and maintenance of a recharge and recovery facility. Once the decision was made to fully investigate and prepare for the use of reclaimed water, Tucson Water hydrologists and engineers, University of Arizona researchers, and consulting professionals began the process of designing and testing a small scale demonstration project.

The demonstration project was constructed on the west bank of the Santa Cruz River near Pima County's Roger Road Wastewater Treatment Plant and Tucson Water's newly constructed Reclaimed Water Treatment Plant. A group of four recharge basins, about three quarters of an acre each, were constructed for the project. Initial design intentions were to take tertiary treated reclaimed water and utilize it for recharge and recovery. Three pipelines were constructed to convey water to and from the demonstration project. The first pipeline was used to deliver potable water for testing purposes, the second pipeline delivered reclaimed water from the tertiary treatment plant to the recharge basins for storage, and the third pipeline conveyed recovered reclaimed water to the distribution reservoir located at the tertiary treatment plant.

By January 1986, potable water was delivered to the demonstration basins for testing. The testing goals were to determine infiltration rates, evaluate monitoring and measuring equipment, and study any possible water quality or groundwater level changes that would result from recharge operations. The first ("short-term") tests were designed to be conducted over a seven-day recharge event. Due to equipment failures and data logging problems, only two of the four basins completed the test. The second ("long-term") tests were conducted on all four basins between January 28, 1986 and May 23, 1986. The original intent of these tests was to operate through two wet and dry cycles for each basin. However, due to continued equipment problems, each basin was instead tested through a single long-term wetting cycle. These wetting cycles ranged between 18 and 83 days. The average of the infiltration rates recorded during the long-term tests was slightly above 1 ft/day (Tucson Water, 1990).

Between July 1984 and February 1988, ten monitoring wells and two extraction wells were installed at the site. The ten monitoring wells were placed throughout and along the perimeter of the demonstration project and were designed to measure water quality and water level changes in the vadose zone and the aquifer. The major water quality change during the demonstration phase was an initial increase in total dissolved solids. This was attributed to a flush of vadose zone salts.

The apparent success of the Demonstration Phase at this location led Tucson Water to continue to advance the growth of the reclaimed system and the SRF.

Developmental Phase 1989 – 1997

Tucson Water provided preliminary design specifications for the development of an operational underground storage and recovery facility based on the results of the Demonstration Phase. The initial design called for the construction of four recharge basins (RB-001 through RB-004) totaling 13 acres to be located in the vicinity of the demonstration project (Figure 2). By October 1988, the Arizona Department of Water Resources (ADWR) had approved the Underground Storage Facility (USF), Water Storage, and Recovery Well permits for the proposed facility. The final design was approved by the State in February 1989. In addition, the facility was required to obtain an Aquifer Protection Permit from the Arizona Department of Environmental Quality (ADEQ).

Facility construction began in June 1989 and the basins were excavated to a depth of 10 to 15 below ground surface to increase the efficiency of infiltration rates by taking advantage of more permeable sediments located at these depths. During the Developmental Phase, additional monitor wells and two additional extraction wells were added to the facility.

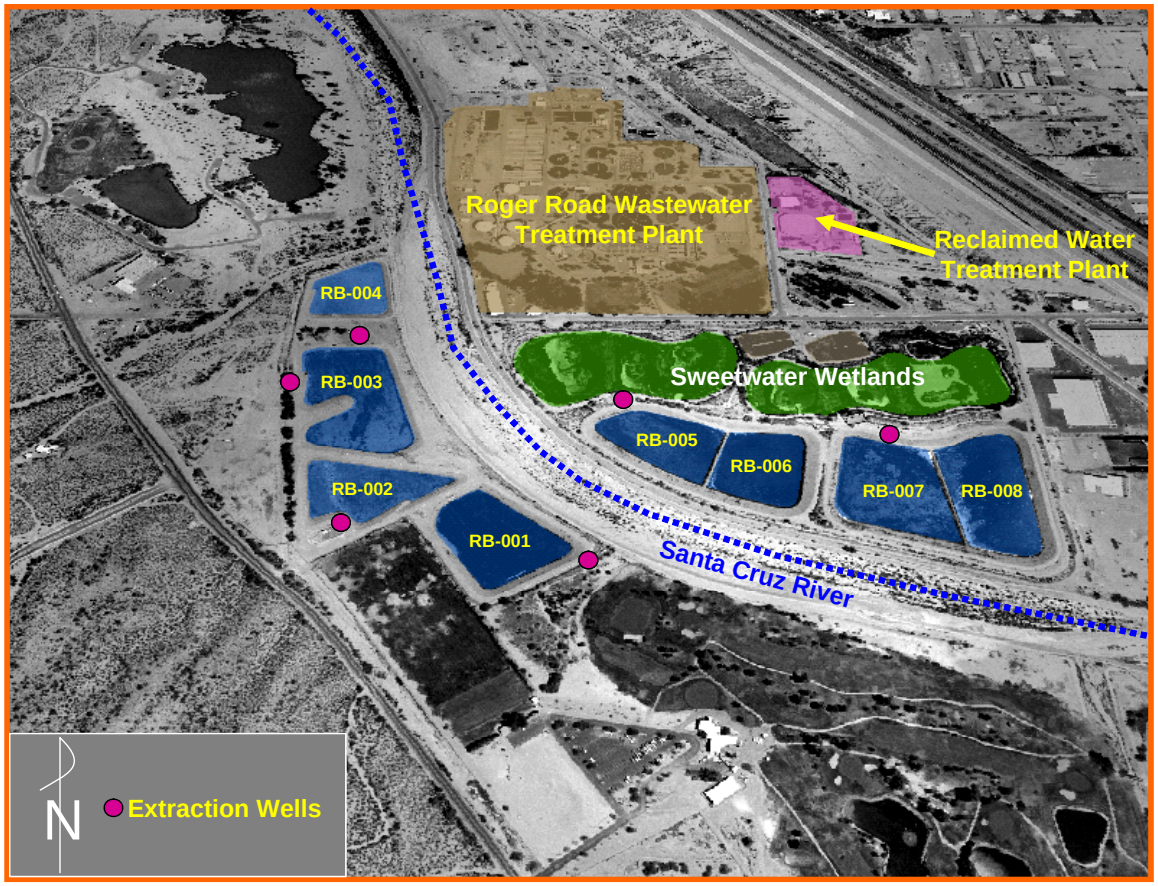

Figure 2. Site Map of Sweetwater Recharge Facilities

The first completed recharge basin, RB-004, began accepting secondary effluent on October 28, 1989. After operating wetting cycles that lasted for 10 to 13 days within this basin, algal flocculation was observed. Infiltration rates were directly impacted by the algal flocculation which greatly reduced the amount of water that could be infiltrated. Tucson Water facility operators reduced the wet cycle duration to less than one week while increasing the length of drying cycles. The advantage of the drying cycles was to desiccate, shrink, and crack the layer of algae and fine sediments that accumulated in the basin bottom during each wetting cycle. Operating in this way allowed the infiltration rates to maintain their optimum efficiency. Recharge basins RB-002 and RB-003 were completed in April and May 1990, respectively. By June 1990, three recharge basins were operational and the use of chlorinated recharge water was initiated. Chlorinated source water coupled with appropriate wet cycle durations were utilized to reduce the growth of algae in the basins.

Recharge basin RB-001 was under construction during 1990. This basin was selected as the location where the processes of Soil Aquifer Treatment (SAT) would be intensely studied. An intergovernmental agreement (IGA) was entered into by the City of Tucson, the University of Arizona, and the Salt River Project to provide funding, equipment, analysis, and materials to groups investigating SAT. Research

goals included determining the effectiveness of SAT in the Tucson basin and what benefits SAT could provide to the process of recharging the aquifer with reclaimed water. RB-001 did not receive recharge water until April 1991 when monitor wells and equipment were in place.

Basin infiltration rates were observed to decrease over time during the Developmental Phase. After completion of initial operations and SAT testing, RB-001 was ripped to help improve infiltration efficiency (Tucson Water, 1994). Ripping a basin refers to the process of using mechanized equipment to 'turn over' the basin soils at a certain depth, generally one to three feet below ground surface. The ripping process assists in breaking up or 'fluffing' the upper-most soils that may have been compacted, clogged with biological materials, or filled with fine sediments that can form a clogging layer and minimize infiltration rates.

Based on the results of several studies, Tucson Water determined it was feasible to start delivering secondary effluent directly from Pima County's Roger Road Wastewater Treatment Plant to the recharge basins in January 1994. Previously, the basins were receiving tertiary-treated effluent from the Reclaimed Water Treatment Plant. During the Developmental Phase, the SRF were permitted to recharge and recover approximately 3,200 acre-feet per year.

As a condition of a judicial consent order issued by ADEQ, Tucson Water agreed to construct a wetland facility at the SRF. The wetlands were conceptualized to provide broad community benefits in addition to their core purpose of treating backwash water from the Reclaimed Water Treatment Plant. By March 1995, Tucson Water had decided to design the wetlands and incorporate four additional recharge basins to be placed on the east side of the Santa Cruz River. With the future construction of this new expanded facility, Tucson Water proceeded with major modifications to its Aquifer Protection, Underground Storage Facility, and Water Storage permits to increase the recharge capacity to 6,500 acre-feet per year thus initiating the Full-Scale Phase.

Full-Scale Phase 1997 – Current

In 1997, the Sweetwater Wetlands and recharge basins RB-005 through RB-008 were completed (Figure 2). With these additions, the SRF was now able to double the amount of recharge and recovery capacity to 6,500 acre-feet per year.

The Sweetwater Wetlands total 17.3 acres and were built with two parallel flow pathways (east and west). Each side has a pathway that consists of two settling basins followed by one polishing basin. The outflow from the wetland area is combined with secondary effluent and delivered to the newly constructed recharge basins. A small stream feature was constructed as part of the wetlands as an aesthetic enhancement. The entire project was designed in conjunction with a strong public advisory committee. The wetlands were considered a public amenity and features such as walking paths, ramadas, public restrooms, and interpretive signage were incorporated into the design. A small evaporation bed was constructed to treat sewage from the public restrooms. The evaporation bed is a closed system and does not contribute recharge water to the basins.

Recharge Basins RB-005 through RB-008 were constructed directly south of the wetland area. The area of the four additional basins is equal to that of the first four basins located on the west side of the river. With the additional basin area, the storage capacity of the SRF approximately doubled to a permitted volume of 6,500 acre-feet per year. Infiltration rates at the SRF have averaged approximately 2.3 ft/day under full-scale operations (Tucson Water, 2005). Two additional extraction wells were drilled in December 1997 through January 1998. These wells were drilled on the east side of the Santa Cruz River

to help with the recovery of stored water generated by the new recharge basins. The wells were equipped and ready for operation in 2000. With the addition of these wells, the SRF is also fully capable of recovering the volume recharged in any given year.

Operations and Storage Balance

Storage balance is defined as the recharged volume of water available for recovery to meet customer demand for non-potable use and is calculated as the basin delivery volume minus physical losses (evaporation) minus recovery. The storage balance for the SRF from 1984 through 2004 is presented on Figure 3. The volumes reported in this paper differ from those reported in Tucson Water (1991) for several reasons. First, the volume of water recharged prior to the issuance of the initial USF and Water Storage permits is not included in the storage balance shown in Figure 3 (approximately 78.9 million gallons). Secondly, evaporation losses have been quantified and subtracted from the storage balance – these volumes were not deducted in the 1991 publication. Finally, minor errors in the volumes reported as recharged and recovered have been corrected over time.

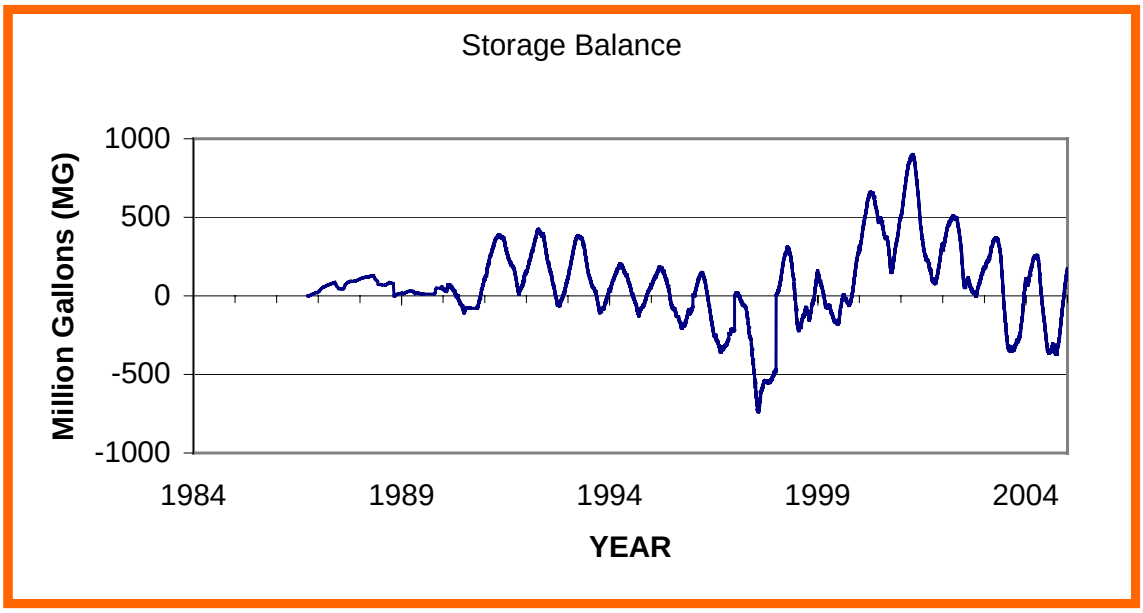

Figure 3. SRF Storage Balance (1984 – 2004)

As shown on Figure 3, the storage balance has a declining trend between 1993 and 1996 when demand was exceeding the existing capacities of the SRF and Reclaimed Water Treatment Plant. When the four additional recharge basins associated with the Full-Scale Phase were brought online, the overall storage balance increased. Prior to the Full-Scale Phase, the facility was operated so that the volume of water left in storage at the end of the peak demand season was minimal, but able to satisfy an emergency demand. Currently, the SRF is operated to store a sufficient volume of water to meet the peak season with a moderate volume left at the end.

Annual recharge operations are currently planned to recharge and recover 6,500 acre-feet each year. These trends are reflected in the annual volumes recharged and recovered for 1984-2004 (Figure 4). Also included on Figure 4 are the total annual deliveries to the Reclaimed Water System which include other sources of supply in addition to the SRF (Reclaimed Water Treatment Plant, recovery from Santa Cruz Phase I and II, potable augmentation, and the Randolph Park Reclamation Plant).

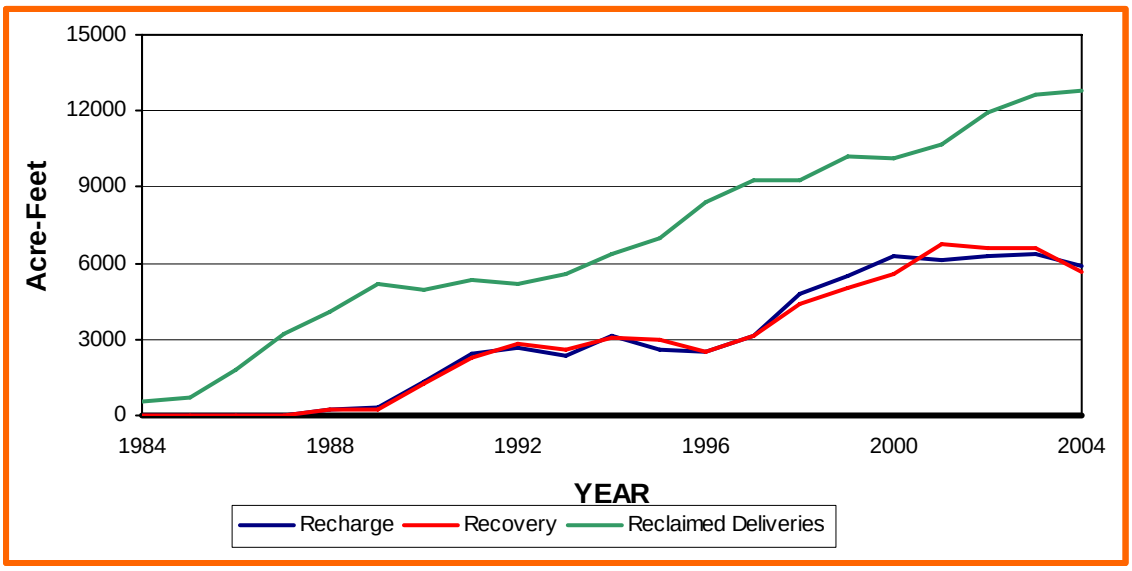

Figure 4. SRF Recharge, Recovery, and Total Reclaimed Deliveries (1984-2004)

Maintenance

The SRF are operated by using wet and dry cycles in the basins to maintain high infiltration rates. The wet portion of the cycle is operated by filling the basin to a depth of one to two feet for a period of about 3 days. At the end of each wet cycle, flow is tuned off and the remaining ponded effluent is allowed to infiltrate until the soil surface is dry. This is defined as the start of the dry cycle. The dry cycle usually lasts for a couple of days, allowing the basin to completely dry to manage algal growth. Desiccation cracks open on the basin floor which restore the infiltration pathways to the vadose zone.

Extended summer drying periods are scheduled to perform more extensive basin maintenance. The basins are typically taken offline for about one month each year and ripped to a depth of one to three feet. The upper 15 inches of the soil surface must be dry before the basin can be ripped or compaction may result. After ripping, furrows are constructed to increase the basin's exposed surface area. This process also serves to increase infiltration rates.

Due to the relatively brief duration of the wet cycles, vector control for mosquito populations is not required at the recharge basins. However, the wetlands facility provides a high potential for mosquito generation and is actively managed to reduce mosquito populations. Mosquito monitoring ("trapping") has been ongoing at the facility for a number of years and the current vector control program has evolved to a very effective combination of measures. The vector control program includes weekly monitoring throughout the year. A mosquito adulticide (*sumithrin at 2%*) is added to the wetlands one to three times per week during the mosquito season (generally May through October). A mosquito larvicide (*Bacillus thuringiensis israeliensis or Bacillus sphaericus*) is added weekly via a hydro-seeder and weekly via a miniature, remote-controlled helicopter. The hydro-seeder is most effective at reaching areas of the wetlands that underlie a vegetative canopy and the helicopter effectively treats the open water portions.

Because the wetlands provides a constant supply of water and the southern Arizona climate is quite warm, the potential growing season for vegetation at the wetlands is almost boundless. Trees that were pole-planted in 1997 have grown into tall, mature-looking stands. However, due to their ready access to

water, they typically develop shallow root systems and can topple in high winds. Periodic tree thinning is done to address this issue as well as provide adequate sight lines for operation of the vector control helicopter. Shrub and bush vegetation must be constantly cut back to provide continued access to the wetlands, recharge basins, walkways, and support facilities. A private contractor is retained to keep up with this task. Finally, the wetlands vegetation itself can quickly close off the open water portions of the settling basins if left unattended. Mechanical removal has been attempted in the past; however, the most effective means has been the use of controlled burns. The Tucson Fire Department (and surrounding fire services) performs annual controlled burns on up to 1/3 of the wetlands area to help control vegetative growth and provide wildfire training for their crews.

Finally, biosolids accumulation in the settling basins of the Sweetwater Wetlands has recently required the implementation of a management program. No solids removal was conducted from 1997 through 2004. During this time, a significant volume of biosolids accumulated which began to affect the treatment capability of the wetlands. In 2005, a program to remove these biosolids was successfully conducted utilizing a trailer-mounted centrifuge system. This effort took several weeks but resulted in the restoration of full capacity to the wetland settling basins. The solids were waste-characterized, determined to be non-hazardous, and disposed of offsite in accordance with environmental regulations. In order to maintain more continuous wetland treatment capacity and prevent such a significant accumulation in the future, current plans are to perform biosolids removal on a biennial basis.

Water Quality and Soil Aquifer Treatment

Source water quality has been continuously monitored at the SRF for two main reasons. The first is a Tucson Water goal to quantify the changes in water quality which occur during recharge operations - soil aquifer treatment (SAT). The second reason is to remain within the compliance guidelines of the Aquifer Protection Permit (APP). This State of Arizona permit requires that source water quality remain below the maximum discharge limits for a variety of parameters. In the original APP, the parameters set for source water quality were predominately metals and organic volatiles. In the current APP, source water quality sampling is conducted mainly for metals, nitrogen species, biochemical oxygen demand, total dissolved solids, sulfate, and chloride.

The source water sampling point (“510B”) is located along the pipeline that conveys secondary effluent from the Roger Road Wastewater Treatment Plant to the Reclaimed Water Treatment Plant. Water sampled at 510B reflects the quality of secondary effluent prior to tertiary treatment or delivery to the recharge basins. The main function of the Reclaimed Water Treatment Plant is to reduce the turbidity level of the effluent through dual-media pressure filtration (silica sand and anthracite coal beds). Turbidity reduction is the main qualification that provides a tertiary treatment classification. The processes of SAT that occur in the recharge basins also significantly reduce turbidity; therefore, the recovered water meets tertiary treatment standards as well.

The source water for the SRF is primarily a sodium-bicarbonate water. Major anion concentrations have remained stable over time with a few exceptions. Sulfate concentrations increased temporarily between 1992 and 1994. This source water change was related to Tucson Water’s initial use of Colorado River water in the general potable distribution system. (Tucson Water initiated the direct delivery of Colorado River water in 1992. However, due to pervasive operational problems, this system was taken offline in 1994. The Utility changed its approach for using Colorado River water to the use of recharge and recovery and successfully brought this resource back into use in 2001.) Over the time the SRF has been in operation, the average sulfate concentration has been about 106 mg/L. The average concentrations for other major anions are bicarbonate at 218 mg/L and chloride at 90 mg/L. Major cation concentrations

have been relatively stable over time. Sodium concentrations have an average of 116 mg/L. Calcium, potassium, and magnesium have averaged 48.7, 12.8, and 7.8 mg/L respectively.

Total dissolved solids (TDS) have remained somewhat stable over the duration of the facility history. During the time period of initial Colorado River water use, the average concentrations of TDS increased slightly. After the direct use of Colorado River water ceased in 1994, TDS concentrations returned to their historic patterns. The average annual concentration of TDS in the secondary effluent source water has been consistently around 550 mg/L in recent years.

The average annual total nitrogen concentration for secondary effluent entering the Reclaimed Water Treatment Plant and/or the SRF recharge basins has been 20.6 mg/L. The species contributing the largest fraction of total nitrogen is total kjeldahl nitrogen (TKN) which has an average annual concentration of 17.6 mg/L. TKN has fluctuated seasonally over the duration of the project ranging from 9.3 to 25.6 mg/L on an annual basis. Nitrite concentrations in 510B have remained very low during the project with an average annual concentration of 1.1 mg/L. The average annual concentration of Nitrate is 2.9 mg/L.

From 1987 through 1999, a bi-modal distribution trend was observed in the nitrogen species of 510B. A seasonal correlation is detected between TKN and nitrate. Nitrate values tend to increase during the warmer months of the years while TKN values tend to decline. This is attributed to the warmer climate creating an environment that is preferred by organisms that contribute to the nitrification process. As the nitrification rates increase, TKN concentrations decrease and nitrate concentrations increase (Tucson Water, 2005).

From 1993 through 2004, sample point 522 has functioned as the monitoring location for the Reclaimed Water System's Wastewater Reuse Permit. The water sampled at this point is representative of the quality of water delivered to reclaimed water customers and is a blend of plant-treated and recharged/recovered effluent from the SRF. Sample point 522 is located at the booster station that pumps the blended water to the reclaimed water delivery system. The water may be a variable mixture of both sources or from one source only depending on operational requirements.

Nitrogen species results from sample point 522 are noticeably reduced from point 510B. The average annual total nitrogen concentration at point 522 is 14.7 mg/L. The species contributing the largest fraction of total nitrogen at point 522 is also TKN; however, it is reduced to an average concentration of 8.2 mg/L. Nitrate concentrations at point 522 are greater than at point 510B, with an average annual concentration of 6.2 mg/L. Denitrification processes associated with SAT at the recharge basins have contributed greatly to the reduction of total nitrogen and conversion to nitrate species in the delivered reclaimed water. Based on overall average annual concentrations, total nitrogen reduction throughout the duration of the facility has been approximately 29%. The conversion of TKN into nitrate and eventually nitrogen gas can be recognized in the concentration changes in these constituents from pre-recharge water quality to reclaimed product water quality.

Product water from the Reclaimed Water Treatment Plant is usually blended with water recovered from the extraction wells to manage turbidity. Under the Wastewater Reuse Permit, turbidity at sample point 522 has to be 5 NTU or lower. The filters at the plant can effectively remove approximately 50% of the turbidity measured in the secondary effluent, but this can often exceed 5 NTU. The stored water that is removed through the extraction wells consistently has a low turbidity. The blending of recovered water and plant effluent continues today to be an effective formula to remain within the compliance limits.

One additional water quality transformation of note concerns total organic carbon (TOC). TOC that is present in a water supply can react with chlorine used for disinfection and result in the formation of disinfection by-products. Effluent typically contains high levels of TOC and the reclaimed water delivered by Tucson Water is disinfected to protect human health. The SAT processes that are active during recharge are highly effective at removing TOC. At the SRF, TOC concentrations have been consistently reduced from 20 mg/L to less than 1 mg/L upon recovery (Thomure and Marra, 2005).

The Future of the Sweetwater Recharge Facilities

As Tucson Water's Reclaimed Water System grows over time, additional access to tertiary-treated effluent will be required. The increasing demand is not only within the Tucson Water service area, but also in areas served by others. For instance, Tucson Water will wheel the effluent owned by other entities such as the Town of Oro Valley through the Reclaimed Water System to their facilities. The expansion of constructed recharge facilities will be evaluated as a way to provide this additional supply. Currently, a series of possible ways to expand the existing SRF are being evaluated (Figure 5).

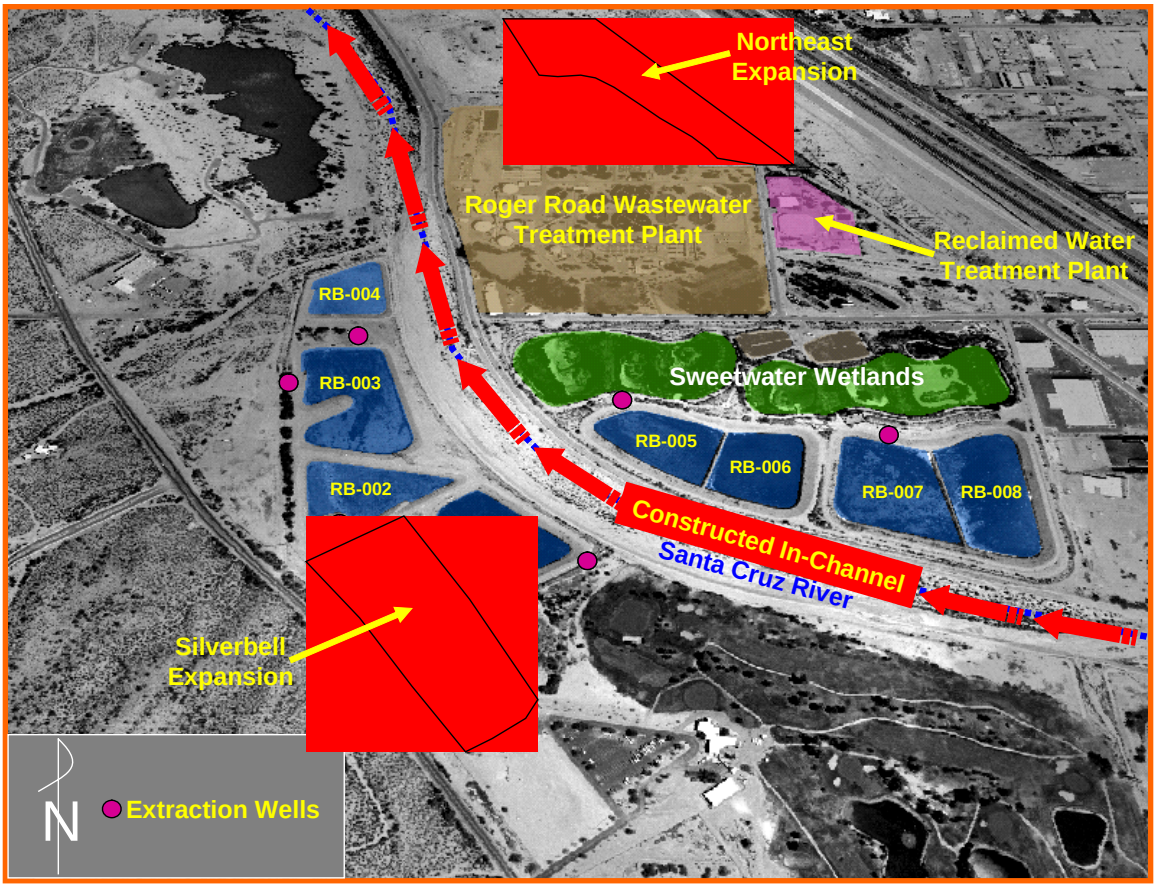

Figure 5. Potential Expansions of the SRF

Two off-channel areas have been identified for the possible construction of additional recharge basins – the Northeast Expansion and the Silverbell Expansion (Figure 5). The Northeast Expansion area has been investigated in previous years and has been determined to be a feasible location for additional recharge. In fact, an engineered design of a large recharge basin in this location was completed but never constructed. Concerns over the potential for creating perched water levels that could affect the operation

of clarifiers at the Roger Road Wastewater Treatment Plant must be alleviated before expansion in this area could proceed. To date, there is no evidence that such impacts would occur. This location is the initial area being evaluated by Tucson Water for expansion.

The Silverbell Expansion area is actually an operating driving range for the City of Tucson's Silverbell Golf Course. As part of a redesign of the golf course, this area was identified as a possible location for additional recharge and preliminary investigations have been conducted. The initial test work is positive; however, the impacts to the golf course facility would need to be mitigated. In addition, an existing groundwater contamination plume is located immediately upgradient from this area and would need to be carefully studied prior to conducting recharge. The Silverbell area is being further evaluated in conjunction with the Northeast Expansion and is considered the second highest priority location.

In addition to the construction of additional off-channel facilities, the concept of implementing in-channel constructed recharge associated with the SRF is under consideration. While there are currently two managed recharge facilities permitted along the bed of the Santa Cruz River (Santa Cruz Phase I and Phase II), these facilities only yield recharge credits for 50% of the effluent that reaches the aquifer. The conversion of parts of the river channel to a constructed facility through the use of levees, T-berms, or similar structures would greatly increase the recharge rates and generate credits for 100% of the water recharged. However, performing significant work in the bed of the Santa Cruz River would introduce a wide range of additional permitting complexities that could extend the time frame of this expansion to several years. This concept is under active consideration; however, it is likely to be dependent on the positive or negative outcomes of the off-channel options discussed above.

Finally, even though a significant portion of Tucson Water's effluent will continue to be used to meet non-potable (reclaimed) demands, a large volume of effluent will be available for use to augment the potable water supply. As Tucson Water planners project the water needs for the community into the future, it is clear that the broader use of effluent will become critical. Over time, the community will need to make critical decisions about how to develop enough water supplies for the future including the possibility of using effluent for indirect potable reuse. The recharge process will be a critical factor in making effluent available for such a use both from a water quality standpoint through SAT and from a public acceptance standpoint by providing a clear buffer between the "effluent" source and proposed end use. The SRF may play a role in the eventual indirect potable reuse of effluent in addition to its traditional and continuing role in providing high quality reclaimed effluent for non-potable uses.

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Acknowledgements

Numerous individuals have been involved with the planning, permitting, design, operations, monitoring, and maintenance of the SRF over the years. All of these individuals "own" a part of this facility and have contributed toward its long-term success. The authors wish to specifically thank the following Tucson Water staff who provided assistance in the development of this paper: Terry Miley, Wallace Wilson, Bruce Prior, and Maya Garcia.

Upper Santa Cruz & Avra Basin

Sole Source Aquifer Designated Area

Notes and Explanation:

- The Upper Santa Cruz & Avra Basin Sole Source Aquifer was designated under the authority of Section 1424(e) of the Safe Drinking Water Act, Federal Register Citiation-49 FR 2948, Publication Date - 01/24/84. Please contact US EPA Region 9 (Jamelya Curtis, 415-972-3529) for assistance in determining place locations with respect to the project review area.

Map Status and Disclaimer:

Please note that this working map is a computer representation compiled by the Environmental Protection Agency (EPA) from sources which have supplied data or information that may not have been verified by the EPA. This data is offered here as a general representation only, and is not to be used for commercial purposes without verification by an independent professional qualified to verify such data or information. The EPA does not guarantee the accuracy, completeness, or timeliness of the information shown, and shall not be liable for any loss or injury resulting from reliance upon the information shown.

Legend

- Designation Boundary
- Highways
- Major Roads
- Streams
- Tribal Lands
- Cities, Towns

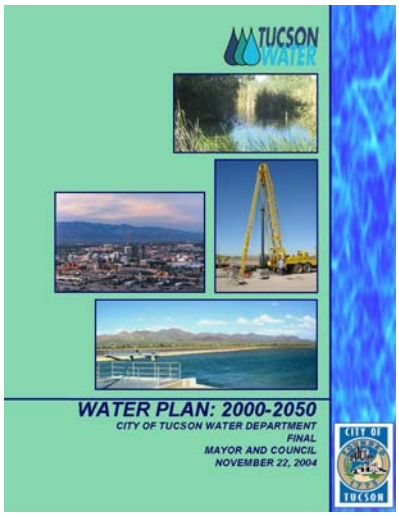
0 5 10 20 30 40 Miles

EPA
Region 9 GIS Center
WTR0801656.1 Oct. 2008

UPDATE TO *WATER PLAN: 2000-2050*

EXECUTIVE SUMMARY

This is the first update to *Water Plan: 2000-2050*, and it provides the City of Tucson's Mayor & Council with a renewed view of the community's water-resource future. The City of Tucson Water Department (Tucson Water) issued *Water Plan: 2000-2050* in 2004 to initiate a dialogue between the Utility and the community about the water-resource challenges which need to be addressed in the coming years. Although the substantive issues and challenges remain largely the same, the planning timeframes within which to address them have changed. The Update also accounts for revised population projections that have since been developed, an increase in the City's Central Arizona Project allocation, and changed planning assumptions and priorities which have evolved in the three years since *Water Plan: 2000-2050* was issued.



Both *Water Plan: 2000-2050* and this Update clearly demonstrate that the community served by Tucson Water has the water resources available to provide a long-term, sustainable water supply. This supply is sufficient not only for Tucson Water's current residents but also for those who are projected to come in the next several decades. Tucson Water's rate payers have already invested in developing the Utility's water-resource portfolio and its extensive water distribution systems. As a result, the community's remaining water-resource challenges primarily involve increasing system reliability and securing sustainable water supplies for new growth in the decades beyond.

The extent and timing of future growth in areas to be served by Tucson Water will be determined by land-use issues currently being addressed by planning authorities in the region. The recommendations in *Water Plan: 2000-2050* and this Update provide the Utility with the flexibility needed to accommodate future land-use decisions while ensuring a safe and sustainable water supply for Tucson Water's customers.

Both *Water Plan: 2000-2050* and this Update emphasize the need for the Utility to continue pursuing three general initiatives in order to ensure sustainable growth in the community:

1. Utilize fully the renewable water resources the City of Tucson currently has available;

2. Achieve more efficient water use through expanded conservation programming; and

3. Acquire additional water supplies to increase reliability and meet future demand.

Tucson Water has taken specific actions which directly support these initiatives. With regard to the first, Tucson Water plans to purchase the City's entire Central Arizona Project allocation in 2009. The Utility is also investing in additional reclaimed water production facilities to meet projected demand. Both of these actions will allow the Utility to further reduce its historical reliance on ground water and increasingly shift to renewable supplies.

Managing water demand is a critical component of any water-resource plan. Further reductions in per capita water demand will have a significant bearing on the water resources and system improvements that will be needed over time. Water conservation, improving the Utility's distribution system efficiency and drought preparedness are three areas where progressive steps have been taken with notable results.

Tucson Water has begun exploring opportunities to acquire additional water supplies to augment its already substantial water-resource portfolio. It is anticipated that acquiring additional resources will become increasingly competitive and costly both locally and statewide. Tucson Water is working with the Central Arizona Water Conservation District who is actively exploring ways to play the leading role in acquiring additional supplies for water interests in Maricopa, Pinal, and Pima Counties. If this effort proves successful, it could minimize in-state competition, reduce acquisition costs, and provide the physical means to convey additional renewable supplies to Tucson Water's service area.

This Update also highlights several developments and changes which have occurred since *Water Plan: 2000-2050* was issued in 2004:

- New population projections through 2030 have been developed that directly influence projected water demand;
- The Utility has increased its annual Central Arizona Project allocation by 8,206 acre-feet with the finalization of the Arizona Water Settlements Act;
- Inclusion of a scenario analysis which assesses potential impacts to future water demand based on possible changes in the size of its ultimate service area and to the possible implementation of more aggressive demand-management measures;
- The possibility that the Secretary of the Interior may declare a shortage on the Colorado River sooner than previously projected;
- The need to further assess the community's preference regarding the long-term mineral content of the Colorado River water/ground-water blend to provide a final recommendation to Mayor & Council in 2008;
- Greater recognition of the potential long-term impact that climate change may have on the Utility's available water resources and the community's annual and seasonal demand for water.

Many of these and other changes and developments have been discussed over time with the City Manager's Office, the City of Tucson's Citizens' Water Advisory Committee, the Environment, Planning and Resource Management Subcommittee of the Mayor & Council, and the City of Tucson Mayor & Council. This Update summarizes the substance of these discussions and provides additional information about the evolving planning environment.

LONG-RANGE PLANNING AREA REVISITED

The Long Range Planning Area, shown on Figure ES-1, includes areas currently served by Tucson Water (dark blue) and undeveloped areas that the Utility is obligated to serve (light blue). These two areas are collectively referred to as the "Obligated Area", and represent areas within the City limits or areas where the utility is currently contracted to serve. The remaining geographic areas (shown in green) are non-obligated areas of potential service. The Obligated Area and the non-obligated areas of potential service are collectively referred to as the Utility's "Potential Service Area." Areas shown in brown are those where Tucson Water has no plans to provide direct service.

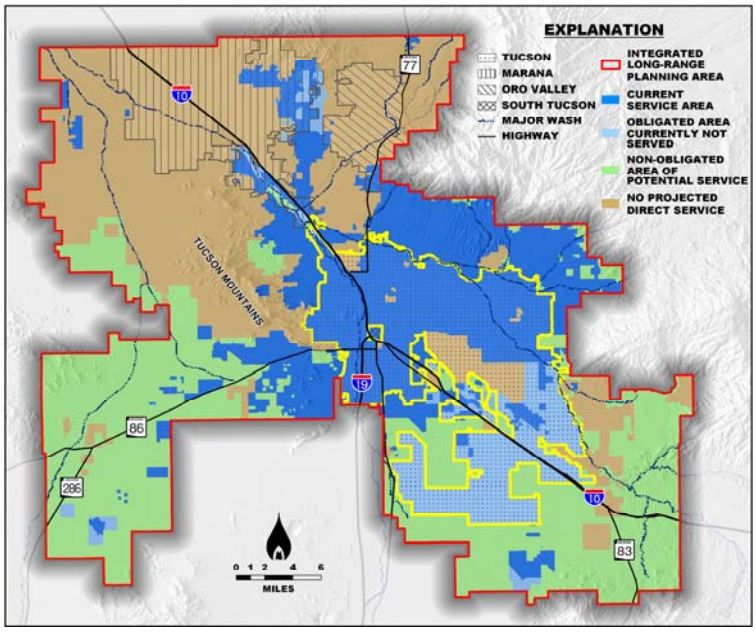


Figure ES-1: Long Range Planning Area.

Regional Cooperation within the Long Range Planning Area

Even though Tucson Water has no plans to provide direct service to areas shown in brown on Figure ES-1, the Utility continues to evaluate local water management issues and to work cooperatively with water providers that serve these areas. Over the years, Tucson Water has been an active participant in many formal and informal local groups, such as the Southern Arizona Water Users Association (SAWUA), discussing various water management issues. In 2004 Tucson Water began discussions about regional cooperation on water resource issues with the largest water providers in the area. Those discussions resulted in a 2006 proposal from SAWUA for a cooperative water supply organization.

At approximately the same time, the Central Arizona Water Conservation District (CAWCD) Board developed a strategic plan that included the goal of acquiring additional water resources on the behalf of all water providers within its three-county service area. In effect, CAWCD proposed to perform the same functions as envisioned under the SAWUA proposal but on a much larger and far reaching scale. In addition, Pima County has proposed the establishment of a countywide water-and-wastewater authority which would include all public and private water and wastewater providers within the county.

As these alternative proposals have been discussed, local water providers have also continued to discuss potential cooperative projects related to water supply and management. The discussions

have included concepts such as joint projects for delivering renewable water supplies to areas of need, common issues and concerns for coordinated lobbying at the State level, and consideration of water credit transfers to reduce costs to ratepayers and meet water management goals.

POPULATION PROJECTIONS

Revised projections were used to develop population estimates for Tucson Water's Obligated Area and its Potential Service Area; these projections are graphically shown on Figure ES-2. The Obligated Area population is estimated to increase from 638,936 in 2000 to approximately 990,000 in 2030 and to just over 1.1 million by 2050. The Potential Service Area population is estimated to be about 1.1 million in 2030 and almost 1.3 million in 2050.

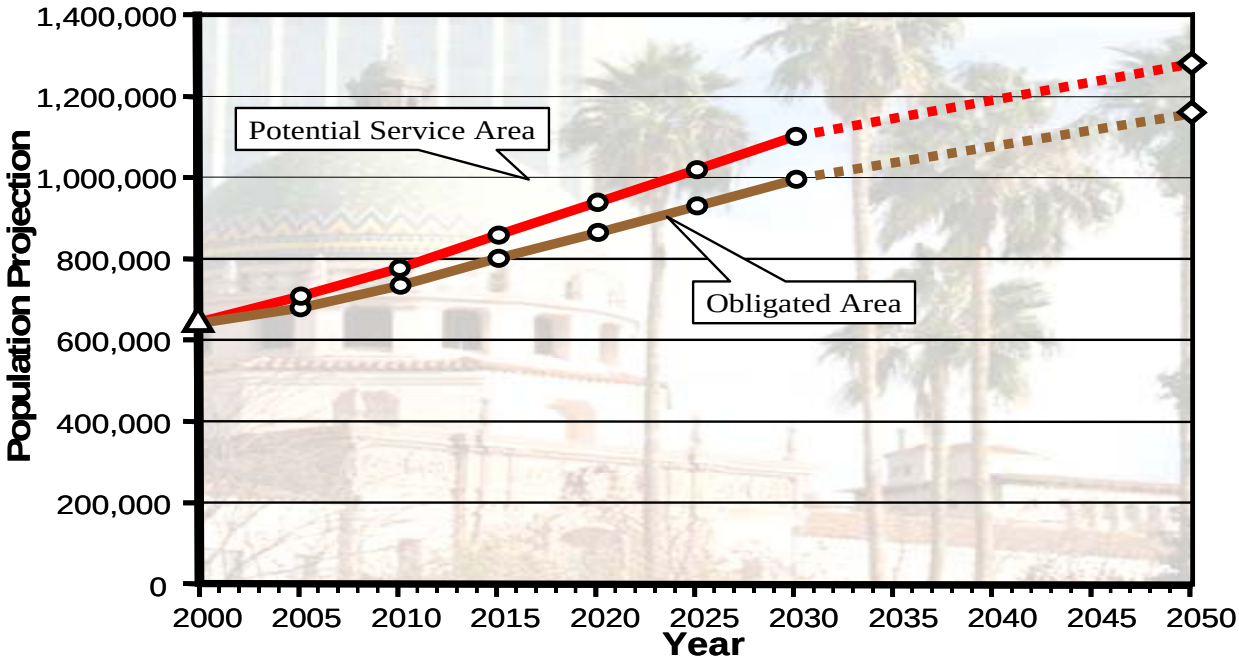


Figure ES-2: Population Projections.

PROJECTING WATER DEMAND

Two significant issues have arisen since the development of *Water Plan: 2000-2050* regarding the extent of the City's future water service area and the extent to which additional water demand-management (i.e., water conservation) measures are implemented. This Update addresses these emerging issues by presenting four future demand scenarios.

First, the City of Tucson historically has provided water service throughout the area characterized in this Update as the Potential Service Area; the City's willingness to serve within this area typically has been limited only by the availability of infrastructure to serve proposed new development. On December 11, 2007, the City Manager announced a new interim policy under which the City will not agree to serve any new developments outside its Obligated Area until such time as the Mayor & Council adopt a comprehensive policy regarding the City's future water service area. This new policy, if adopted by Mayor & Council, could significantly change demand projections and the timing of resource utilization for the Tucson Water service area.

Second, the Community Conservation Task Force recommendations have been developed but the extent to which these recommendations will be implemented has not yet been determined. Additional water conservation measures over and above what was recommended by the Community Conservation Task Force have also been recommended. However, expanding existing programs and implementing new, more aggressive conservation measures will require additional investment and community support. In combination with a potential new policy on service area expansion, decisions regarding the future level of water conservation efforts will also impact future demand and resource utilization in the Tucson Water service area.

As a result of these new developments, four water demand projections based on the combinations of two variables were developed for this Update. The two variables are service area size and level of demand management (see below). Demand management for this Update involves increased conservation measures and increased distribution system efficiencies that result in fewer system losses.

Variable #1: Service Area Size - Reduce (or increase) the size of the potential area that will be directly served by Tucson Water. In this analysis, the future service area size is projected to be either the Obligated Area or the Potential Projected Service Area.

Variable #2: Level of Demand Management - Invest (or not invest) in implementing additional, more aggressive water demand-management measures to reduce potable Gallons Per Capita Per Day. In this analysis, additional demand-management is assumed to be a ten percent reduction in potable demand by 2030. This reduction is based on information generated by the Community Conservation Task Force and by the Utility's Water Loss Control Program.

These two variables combine into four unique sets of assumptions each of which is represented in one of the demand scenarios shown in Figure ES-3. The results of a resource-demand analysis of the resultant four scenarios illustrate how changes in two planning variables could impact water resource utilization and the City's Assured Water Supply designation in future years.

	With Additional Demand Management	Without Additional Demand Management
Obligated Area	Scenario A	Scenario B
Potential Service Area	Scenario C	Scenario D

Figure ES-3: Matrix of Demand Scenarios.

Scenarios A and C approximate futures which assume additional investment in more aggressive programs will occur. For comparative purposes, *Scenarios B* and *D* represent futures which assume there would not be additional investment in such demand-management measures.

Review of Figure ES-4 indicates that projected water demand, as represented by each of the four scenarios, is highly sensitive to the size of the area to be served and whether the Utility invests in more aggressive demand-management measures.

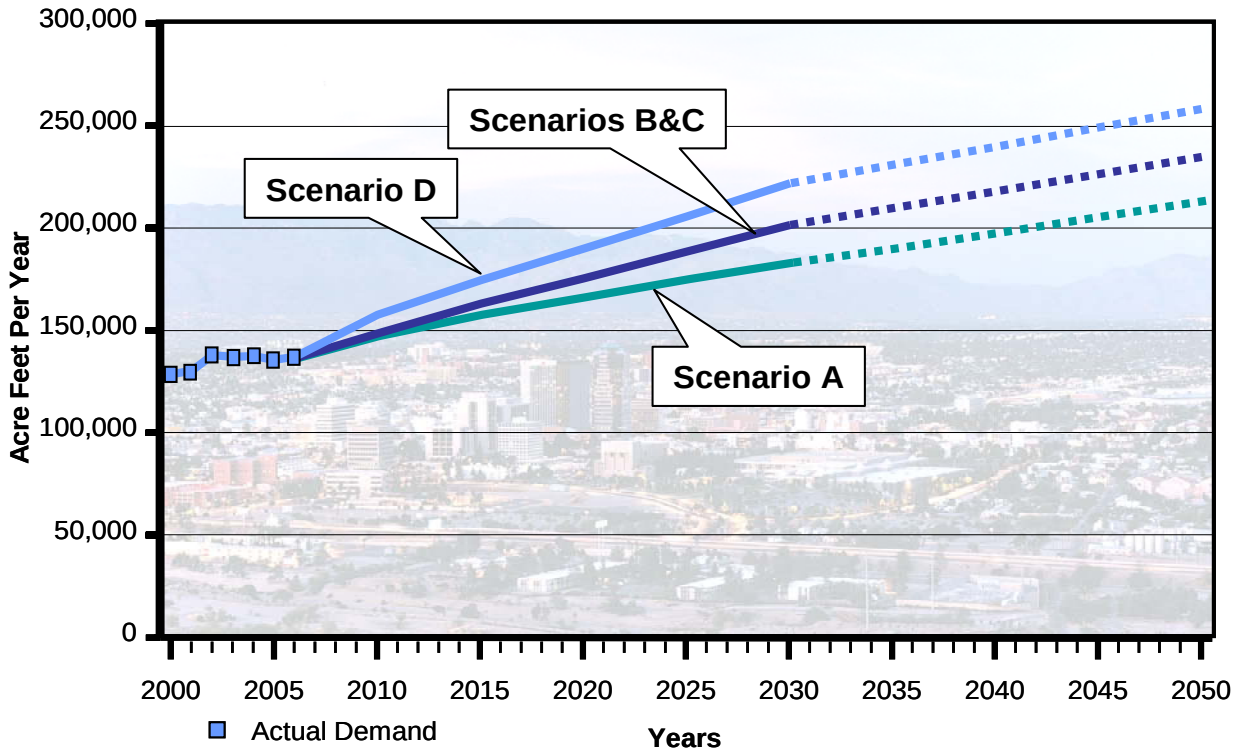


Figure ES-4: Projected Demand Scenarios.

Of the four, *Scenario A* has the smallest increase in projected water demand through 2050. This projection represents future water supply needs within the smaller Obligated Area and assumes that more aggressive demand-management strategies can be successfully implemented with the support of the community. Under this scenario, the Utility's total water demand is projected to increase from 128,141 acre-feet in 2000 to approximately 180,000 acre-feet in 2030 and to about 215,000 acre-feet by 2050.

The demand scenario which approximates the largest projected increase in demand is represented by *Scenario D*. This worst-case demand projection represents the most conservative portrayal of the Utility's future water supply needs. It assumes that the larger Potential Service Area would be served solely by Tucson Water and that additional demand-management programs would not be implemented above and beyond those already in place. Under this scenario, the Utility's total water demand is projected to increase to approximately 220,000 acre-feet per year by 2030 and about 255,000 acre-feet by 2050. *Scenarios B* and *C* are indistinguishable in terms of projected water demand and represent a mid-range increase in water demand through 2050.

IMPLEMENTING THE PLAN

The recommended resource utilization plan presented in *Water Plan: 2000-2050* consists of a schedule for implementing programs and projects common to many possible water-resource planning futures and specifies the scope and timing of critical water-management decision points within the planning horizon.

Balancing Projected Demand with Available Resources

Success in implementing the resource utilization plan and in addressing the critical water-management choices to be made in 2008 and later will help determine how the Utility's water-resources portfolio will be utilized in future years. These actions will determine to a considerable degree how quickly Tucson Water will use its available water supplies, when additional water supplies will need to be developed or acquired, and how demand may be managed in the future. For purposes of illustration, four demand-resource projections are presented which correspond to *Scenarios A, B, C,* and *D*. These demand-resource projections approximate potential resource utilization possibilities and demonstrate how future changes in the planning assumptions could impact resource planning decisions and the City's AWS designation. Only Scenarios A and D are summarized in this Executive Summary since they provide end-member perspectives on the two critical planning assumptions analyzed.

Scenario A – Increased Demand Management in the Obligated Area

In addition to decreasing future demand by limiting the Utility's service area expansion to the smaller Obligated Area, this scenario is predicated under the assumption that the Utility's potable Gallons Per Capita Per Day would gradually be reduced by ten percent by 2030. The latter would be achieved by implementing more aggressive demand-management measures beyond those already in place.

Figure ES-5 provides a view of how the Utility's resource utilization is projected to occur under *Scenario A*. The Utility's total water demand is projected to increase from 128,141 acre-feet in 2000 to approximately 180,000 acre-feet in 2030 and to about 215,000 acre-feet by 2050. This projected increase in water demand over time is the smallest of the four scenarios. Under this scenario, projected potable demand would exceed the sum of the City's annual Central Arizona Project allocation, its Incidental Ground-Water Recharge increment, and its annual Central Arizona Ground Water Replenishment District contracted volume by about year 2032. However, Tucson Water would still have available the balance of its renewable effluent resources not committed to the Utility's reclaimed water system and its reserve of non-renewable ground-water credits.

The City could extend its Assured Water Supply (AWS) designation to about 2050 by depleting its reserve of ground-water credits; instead, Tucson Water recommends these credits be preserved as long as possible to provide planning flexibility for the future. It is more prudent to use these credits as short-term transitional supplies while additional renewable supplies are being acquired and/or developed.

Tucson Water recommends that the resource planning priority be placed on developing additional renewable resources such as the City's effluent supplies, additional imported supplies or a combination of both. In this manner, new growth after 2032 would become more hydrologically sustainable and the City's AWS designation could be extended well beyond 2050. Of the four future scenarios analyzed, *Scenario A* delays the need to develop or acquire additional renewable supplies furthest into the future and maximizes planning flexibility to deal with future uncertainties.

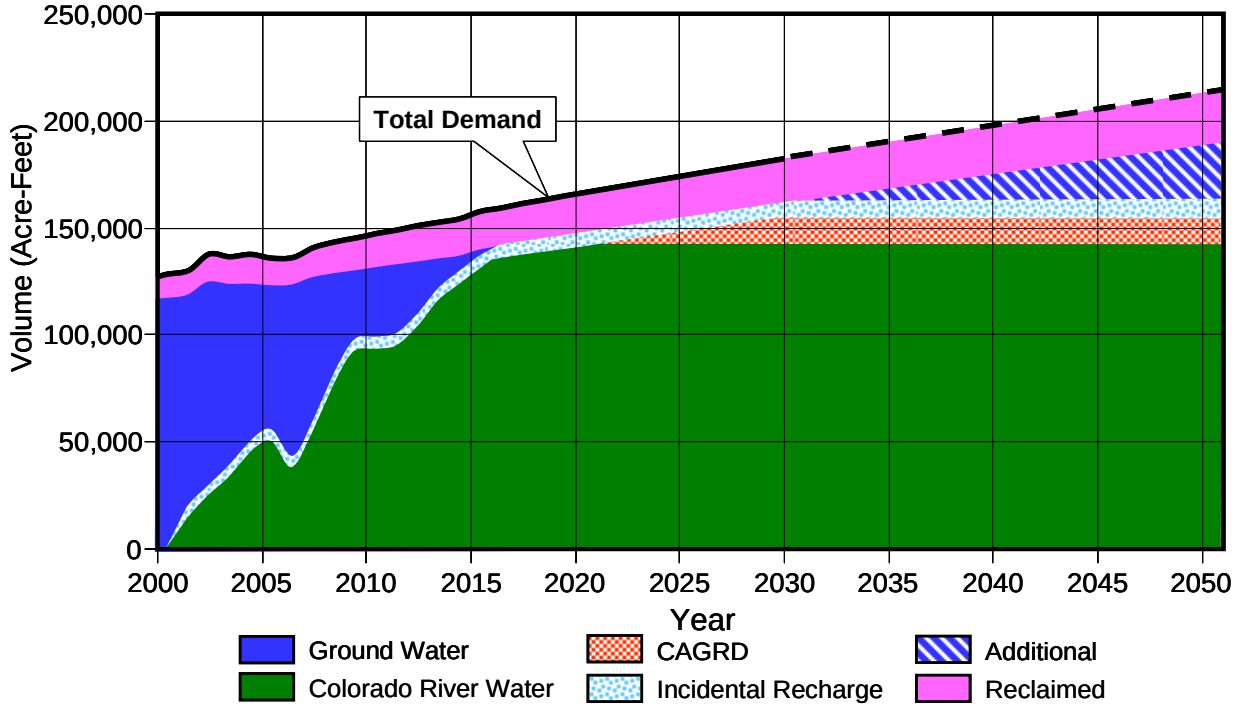


Figure ES-5: Scenario A, Projected Demand and Water Resource Utilization: 2000-2050.

Scenario D – Without Additional Demand Management in the Potential Service Area

Scenario D is based on the conservative demand assumptions used in *Water Plan: 2000-2050*. The Utility's total water demand is projected to increase to approximately 220,000 acre-feet per year by 2030 and about 255,000 acre-feet by 2050. It differs from *Scenario A* by assuming that the entire Potential Service Area would be served by Tucson Water (an area twice as large as the Obligated Area) and no additional demand-management measures would be implemented within the 50-year planning horizon.

Review of Figure ES-6 indicates that projected potable demand would exceed the sum of the City's annual Central Arizona Project allocation, its Incidental Ground-Water Recharge increment, and its annual Central Arizona Ground Water Replenishment District contracted volume by about 2017. Tucson Water would still have available beyond 2017 the balance of its renewable effluent resources and its reserve of non-renewable ground-water credits.

The City could extend its AWS designation to about 2025 by depleting its reserve of ground-water credits; as with *Scenario A*, Tucson Water recommends these credits be preserved as long as possible to provide planning flexibility for the future. Tucson Water recommends that the resource planning priority be placed on developing additional renewable resources such as the City's effluent supplies, additional imported supplies or a combination of both. In this manner, new growth after 2017 would become more hydrologically sustainable and the City's AWS designation could be extended further out in time. Of the four future scenarios analyzed, *Scenario D* is the least able to delay the need to develop or acquire additional renewable supplies and provides the least planning flexibility with which to deal with future uncertainties. The demand-resource projections associated with *Scenario B* and *Scenario C* are equivalent and would fall in between those shown for *Scenario A* and *Scenario D*.

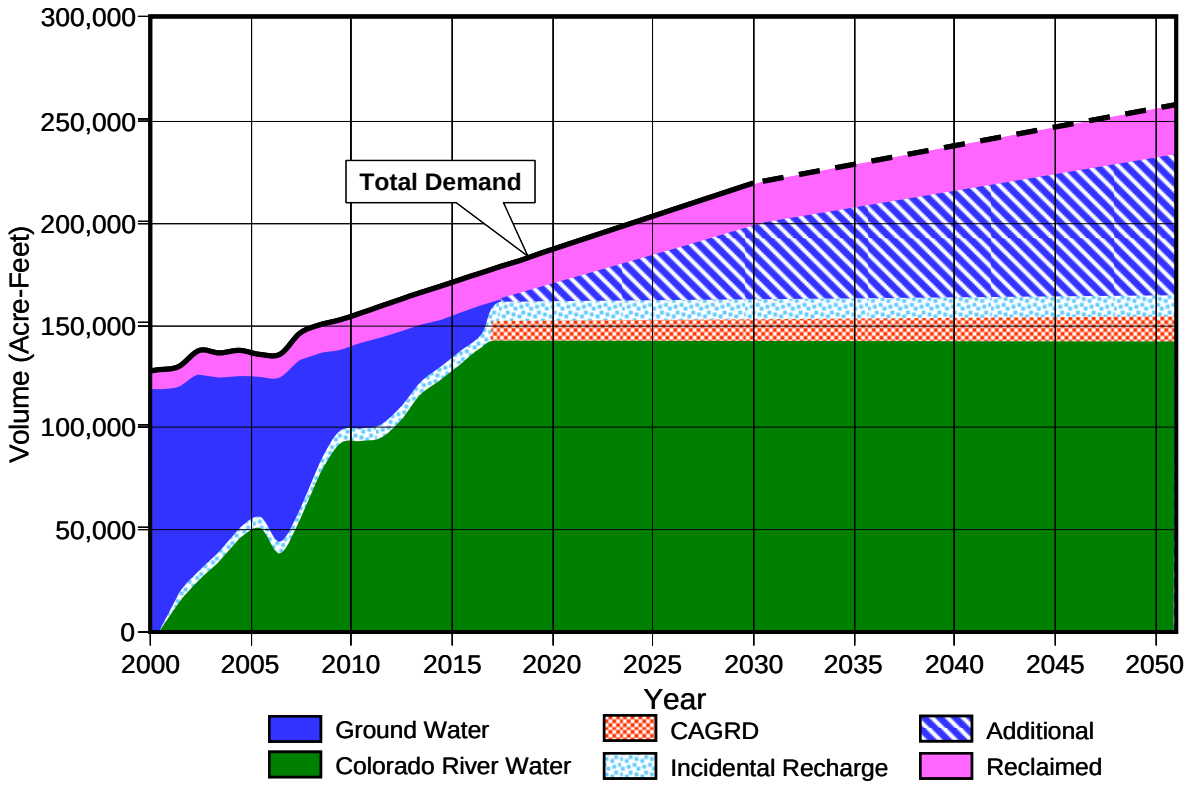


Figure ES-6: Scenario D Projected Demand and Water Resource Utilization: 2000-2050.

Decision Points

Water Plan: 2000-2050 outlined four critical decisions to be made at two key points in time: 2006 and 2014. In this Update, the key decision points have been revised. The first decision point is projected to occur in 2008 and the timing of the second decision point is dependent upon which of the four potential demand scenarios is relevant.

Decision Point 2008

In *Water Plan: 2000-2050*, the first two resource-management decisions pertaining to the use of Colorado River water were projected to be made in 2006. The first decision was concerned with

the long-term mineral content of the Clearwater blend of ground water and recharged Colorado River water. In the coming months, the Utility will provide Mayor & Council its recommendation regarding mineral content so that a final decision can be made in 2008.

The second decision focused on whether the Utility should consider bringing a surface (direct) water treatment plant into service for a portion of the City's current Central Arizona Project allocation. The results of recent analyses indicate that continuing to rely on recharge and recovery provides Tucson Water with greater operational performance and planning flexibility at less cost. Therefore, Tucson Water has implemented several projects to ensure sufficient facilities are in place to fully utilize the City's entire Central Arizona Project allocation as early as 2009.

The Next Decision Point

The Next Decision Point pertains to the development of additional renewable water supplies and is dependent upon which of the service area and demand-management options are adopted by the Mayor & Council. *Scenarios A, B, C and D* illustrate how these options impact the timing of the Next Decision Point and determine how far into the future the City's AWS designation can be extended with the City's currently available water resources. Depending on the direction from the Mayor & Council, the timing of the Next Decision Point may vary from as early as 2014 under *Scenario D* to as late as 2027 under *Scenario A*. The City's AWS designation may extend to 2025 or perhaps beyond 2050.

CONCLUSIONS

Many of the recommendations and conclusions noted in *Water Plan: 2000-2050* have already been implemented while others are currently in process or have been revised to reflect the changing planning environment. The updated recommendations are summarized below.

1. **Emphasize "Wet" Water Management Strategies**: The community's sustainable future ultimately depends on maintaining a physical hydrologic link between renewable water sources and the infrastructure needed to convey those waters to customers within the projected service area.

2. **Utilize Renewable Ground Water**: Tucson Water plans to limit its ground water withdrawals at or below this hydrologically sustainable level in order to ensure the long-term viability of the aquifer within the Utility's service area.

3. **Preserve City's Ground-Water Credits for Longer Term:** The City could extend its AWS designation under any future scenario by depleting its reserve of non-renewable ground-water credits in the near or mid terms. Instead, Tucson Water recommends that these credits be preserved as long as possible to provide planning flexibility for the future. It is more prudent to use these credits as short-term transitional supplies while additional renewable supplies are being acquired and/or developed. This would ensure that the water resources needed to support new growth will be hydrologically sustainable.

4. **Reassess the Water-Quality Target for Colorado River Water**: Customer preferences are being reassessed through the on-going *Decision H20* program by linking costs and environmental sustainability issues with potential mineral level targets. The goal is to finalize this aesthetic water-quality management decision in 2008.

5. **Fully Utilize Colorado River Water**: Between CAVSARP, SAVSARP, and the Pima Mine Road Recharge Project, the Utility will have sufficient recharge capacity in place to fully use its Central Arizona Project allocation as early as 2009.

6. **Fully Utilize Effluent for Future Supply**: Tucson Water recommends that the resource-management goal should be to maximize the future use of the City's effluent through additional treatment and recharge in order to augment the aquifer within Tucson Water's service area.

7. **Acquire Additional Water Supplies**: The City of Tucson is already exploring opportunities to acquire potentially available supplies to augment its water-resource portfolio. The availability of additional water resources will become increasingly competitive and costly both locally and statewide. The Utility is encouraged that the Central Arizona Water Conservation District is actively exploring ways to play the leading role in acquiring additional supplies for water interests in its three-county service area.

8. **Manage Water Demand**: Tucson Water is taking a number of actions to further manage demand including expanded conservation programming, reducing lost and unaccounted for water, encouraging the practice of water harvesting, and providing public information programs. Additional demand management efforts have been evaluated and recommended by the Community Conservation Task Force to further reduce per capita potable water use.

9. **Adjust Development Fees to Shift the Cost of Growth to New Customers**: Tucson Water has developed a financial plan that continues to shift the cost burden of growth to new customers as they are added to the system. The Utility recommends that in the future, development fees be adjusted to ensure that existing customers do not inordinately bear the cost of growth.

10. **Continue to Expand Regional Cooperation**: Tucson Water has taken steps to initiate new cooperative efforts and expand existing ones with local providers. These cooperative actions focus on acquiring additional sources of water supply, developing resource credit banking agreements, and exploring potential win-win arrangements to wheel renewable resources within the region.

The resource utilization plan will periodically be reassessed and revised as planning assumptions and circumstances change over time. This is the first Update to *Water Plan: 2000-2050,* and there will be others in the years to come. As the present unfolds into the future, the primary necessity is to prepare for change since it is the only certainty. This recognition reinforces the need for continuous planning and wise water management.

WATER PLAN: 2000-2050

2008 Update

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SECTION ONE

INTRODUCTION

This is the first update to *Water Plan: 2000-2050,* and it provides the City of Tucson's Mayor & Council with a renewed view of the community's water-resource future. The City of Tucson Water Department (Tucson Water) issued *Water Plan: 2000-2050* in 2004 to initiate a dialogue between the Utility and the community about the water-resource challenges which needed to be addressed in the coming years. Since that time, the substantive issues and challenges remain largely the same; however, the planning timeframes within which to address them have changed. In addition, planning assumptions and priorities have evolved and revised population and water demand projections have been developed.

Both *Water Plan: 2000-2050* and this update clearly demonstrate that the community served by Tucson Water has the water resources available to provide a long-term, sustainable water supply. This supply is sufficient not only for Tucson Water's current residents but also for those who are projected to come in the next few decades. Tucson Water's rate payers have already invested in developing the Utility's water-resource portfolio and its extensive water distribution systems. Many of the community's water-resource challenges involve increasing system reliability and securing sustainable water supplies for additional growth in the decades beyond.

The extent and timing of future growth in areas to be served by Tucson Water directly relate to land-use issues currently being discussed by planning authorities in the region. The recommendations in *Water Plan: 2000-2050* and this update provide the Utility with the necessary flexibility to accommodate future land-use decisions while ensuring a safe and sustainable water supply for Tucson Water's existing and future customers.

This update relies on *Water Plan: 2000-2050* as its primary source document; it serves as Tucson Water's most recent comprehensive revision to its long-range water resources plan. *Water Plan: 2000-2050* has received wide recognition as a significant accomplishment in water-resources planning and has become a resource document and model for others. It was predicated on a Scenario Planning approach which addresses the critical uncertainties that can affect the community's water future; the result is greater program viability and planning flexibility. *Water Plan: 2000-2050* was developed with the following resource-management goals:

- Meet Projected Total Water Demand.
- Maximize Use of Renewable Water Resources.

- Meet Water-Quality Targets.
- Achieve Sustainable Ground-Water Pumpage.
- Manage Costs and Water Rate Impacts.
- Comply with Assured Water Supply (AWS) Program.

Both *Water Plan: 2000-2050* and this update emphasize the need for Tucson Water to continue pursuing three general initiatives in order to effectively address the growing community's water-resource issues and challenges:

1. Utilize fully the renewable water resources it currently has available;
2. Achieve more efficient water use through expanded conservation programming or demand management;
3. Acquire additional water supplies to increase reliability and meet future demand.

The Utility's ability to implement these initiatives requires decision makers to address critical decisions at key points in time. These decisions will in turn ensure the timely implementation of projects and programs which will guarantee the long-term sustainability of the community's water resources.

This update highlights several developments and changes which have occurred since *Water Plan: 2000-2050* was issued in 2004. One significant change is that new population projections through 2030 have been developed that directly influence projected water demand and resource utilization. Another is the inclusion of an analysis which assesses the sensitivity of projected water demand to potential changes in the size of the area to be served and to the potential implementation of more aggressive demand management measures. The third is the possibility that the Secretary of the Interior may declare a shortage on the Colorado River sooner than previously projected. The fourth is the need to further assess the community's preference regarding the long-term mineral content of the Colorado River water/ground-water blend to provide a final recommendation to Mayor & Council in 2008. Fifth and finally, greater recognition is given to the potential long-term impact that climate change may have on the Utility's available water resources and the community's demand for water.

Many of these and other developments have been discussed over time with the City Manager's Office, the City of Tucson's Citizens' Water Advisory Committee (CWAC), the Environment, Planning and Resource Management (EPRM) Subcommittee of Mayor & Council, and the City of Tucson Mayor & Council. This update summarizes the substance of these previous communications and provides additional information about the evolving resource planning environment.

The update consists of seven sections. The first five sections document the support information used to update the recommended resource-utilization plan. Section Two

summarizes revised projections of Tucson Water's potential service area populations through 2050. Section Three discusses the impact that these revised population projections and potential demand-management initiatives can have on projected water demand. Section Four reviews Tucson Water's available water resources with emphasis given to the future availability of the City of Tucson's Central Arizona Project (CAP) allocation and the current status of the City of Tucson's Assured Water Supply (AWS) designation. Section Five reviews the needs of Tucson Water's potable and reclaimed water systems to convey water supplies within its service area to meet demand as well as potential cooperative opportunities to wheel the water resources of other local water providers.

The last two sections present the latest revisions to the recommended resource-utilization plan and update the conclusions provided in *Water Plan: 2000-2050*. Section Six refocuses Tucson Water's resource-utilization and system plan noting progress in implementing many of the previously identified common project/program elements and the results of the expanded public outreach regarding *Water Plan: 2000-2050*. Special emphasis is given to outreach efforts conducted to elicit customer preference regarding the long-term mineral content of the Colorado River water/ground-water blend. Section Seven provides an update on the key recommendations of the plan, summarizes the substantive conclusions of this update, and discusses what may lie beyond the fifty-year planning horizon. The Appendices (A through E) present more detailed information on specific issues discussed in this Update.

SECTION TWO

PROJECTIONS OF POPULATION

Tucson Water revised its aggregate and spatial population projections based on updated information generated by the Pima Association of Governments (2005a). In addition, an analysis was conducted to assess the sensitivity of population projections to variations in the ultimate size of the Utility's service area.

LONG-RANGE PLANNING AREA REVISTITED

Tucson Water's Long-Range Planning Area is outlined by the red boundary on Figures 2-1 and 2-2. The overall planning boundary has been revised in order to be more spatially contiguous with bounding jurisdictions, preserved lands, and census polygons. The Long-Range Planning Area is generally consistent with the planning areas utilized in *Water Plan: 2000-2050* and in *Tucson Water Resources Plan 1990-2100* (CH2M Hill, 1989).

As shown on Figure 2-1, the Long-Range Planning Area includes areas currently served by Tucson Water (dark blue) and those undeveloped areas that the Utility is obligated to serve (light blue). The Utility's obligation is limited by the terms of legal contracts and by the availability of its assured water supplies. These dark and light blue areas are collectively referred to as the "Obligated Area" which has a combined area of about 410 square miles. The color-coded areas shown on Figure 2-1 are portrayed with limited resolution and should not be construed to be a detailed, parcel-based determination of status. Tucson Water currently provides direct service both within and outside the City limits. The light blue areas include undeveloped lands within the existing City boundaries and a limited number of contracted areas outside the City where Tucson Water is legally required to provide service. The Obligated Area can potentially be expanded through the approval of future water-service contracts, City annexations, or by the direction of the City Manager. The City Manager recently directed Tucson Water not to provide new services outside the Obligated Area unless directed to do so.

The Long-Range Planning Area extends well beyond Tucson Water's Obligated Area. The geographic areas shown in green on Figure 2-2 are non-obligated areas which may be served by Tucson Water and/or other water providers in the future. For the purposes of this Update, the dark blue, light blue, and green areas shown on Figure 2-2 are collectively referred to as Tucson Water's "Potential Service Area" which has a combined area of approximately 780 square miles. The Potential Service Area is almost twice as large as the Obligated Area and therefore contains a significantly larger projected population. As with Figure 2-1, the color-coded areas shown on

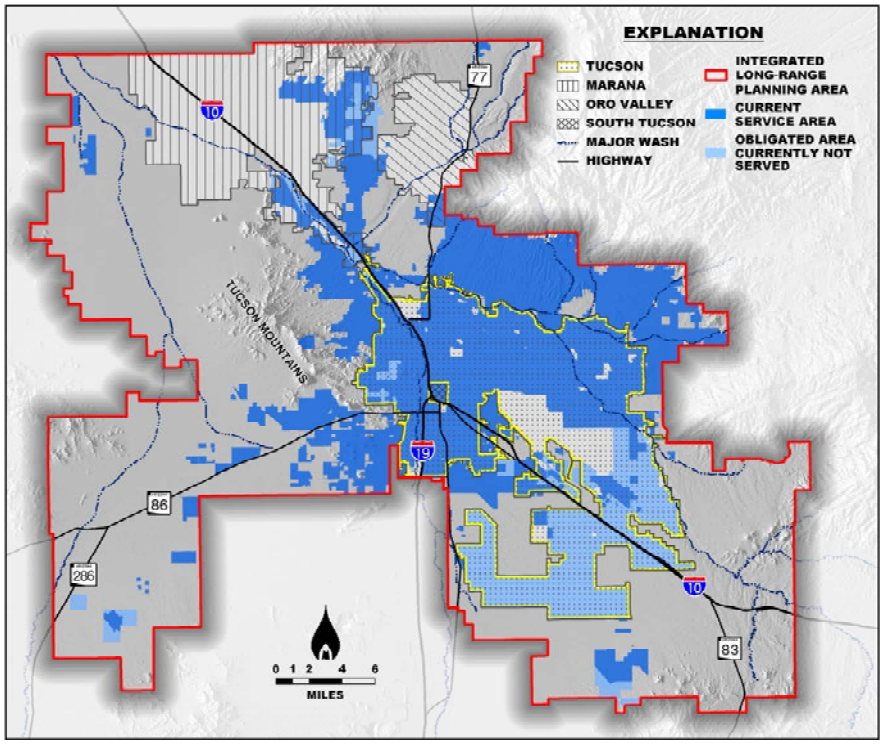


Figure 2-1: Tucson Water's Long Range Planning Boundary, Current Service Area, and Obligated Areas Currently Not Served.

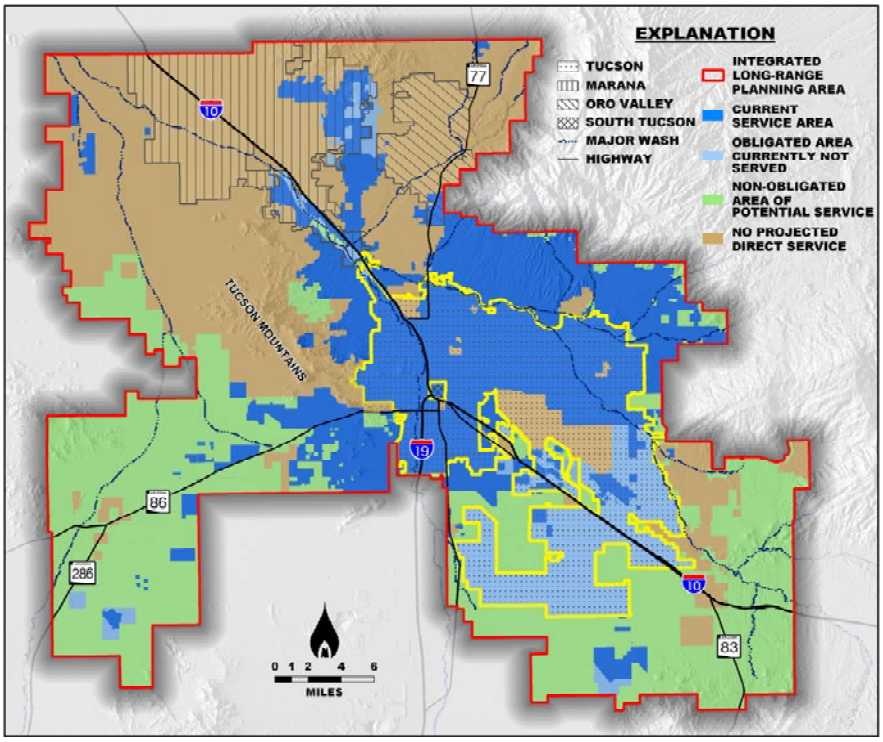


Figure 2-2: Tucson Water's Long-Range Planning Boundary and Potential Service Area.

Figure 2-2 are portrayed with limited resolution and therefore should not be considered to be a detailed, parcel-based determination of status. As per the City Manager's direction, Tucson Water will only commit to providing new services in areas shown in green when directed to do so.

Areas where Tucson Water has no plans to provide direct service are shown in brown on Figure 2-2. This area includes the many other local water providers who have chosen to pursue their own water-management objectives. The projected population contained within the brown areas is not included in Tucson Water's resource-planning projections. Nonetheless, the Utility has common interests with these providers and is already providing various forms of indirect service to many of them. Tucson Water also works with local water interests to identify and assess possible resource and water-supply arrangements that would be mutually beneficial. More details regarding more recent regional cooperative discussions and initiatives are in Section Seven.

POPULATION COUNTS AND PROJECTIONS

In *Water Plan: 2000-2050*, data sets provided by federal, state, and local governmental agencies were used to project population in the Potential Service Area through 2050. Such population data sets provide a common basis for conducting regional planning efforts. The U.S. Census Bureau provided a count of the local population in *Census 2000* which continues to serve as the decadal baseline. This baseline will be reset after *Census 2010*.

Aggregate Population Counts and Projections

In 2005, Pima Association of Governments (2005a) updated projections for Pima County and worked with local planning entities such as Tucson Water and the Pima County Regional Wastewater Reclamation Department to provide revised aggregate and spatial population estimates. The updated population projections have since been used to develop annual population estimates for Tucson Water's Obligated Area as well as revised estimates for the larger Potential Service Area. The original 2050 spatial projection provided by PAG did not have the same resolution as that shown for 2030 since the former was developed at the coarser census tract level. PAG plans to provide an updated 2050 projection with finer resolution in 2008.

Annual population projections for Tucson Water's Obligated Area and its Potential Service Area are graphically shown on Figure 2-3. The annual projections for the 30 years between 2000 and 2030 were based on traffic analysis zone assessments at five-year increments; the 20 years between 2030 and 2050 were linearly interpolated and are dashed indicating greater uncertainty. The population for the Obligated Area is estimated to increase from 638,936 in 2000 to approximately 990,000 in 2030 and to just over 1.1 million by 2050. The Potential Service Area population is estimated to be approximately 1.1 million in 2030 and almost 1.3 million in 2050.

From 2000 through 2030, significant population growth is projected to occur on the fringes of urban Tucson. This may entail further service area expansion in undeveloped obligated areas and possibly in unobligated areas if so directed. The population in the Tucson Water service area

continues to increase but at a slower rate than what was originally projected in *Water Plan: 2000-2050*. Nonetheless, the increasing number of people will create a growing need for water.

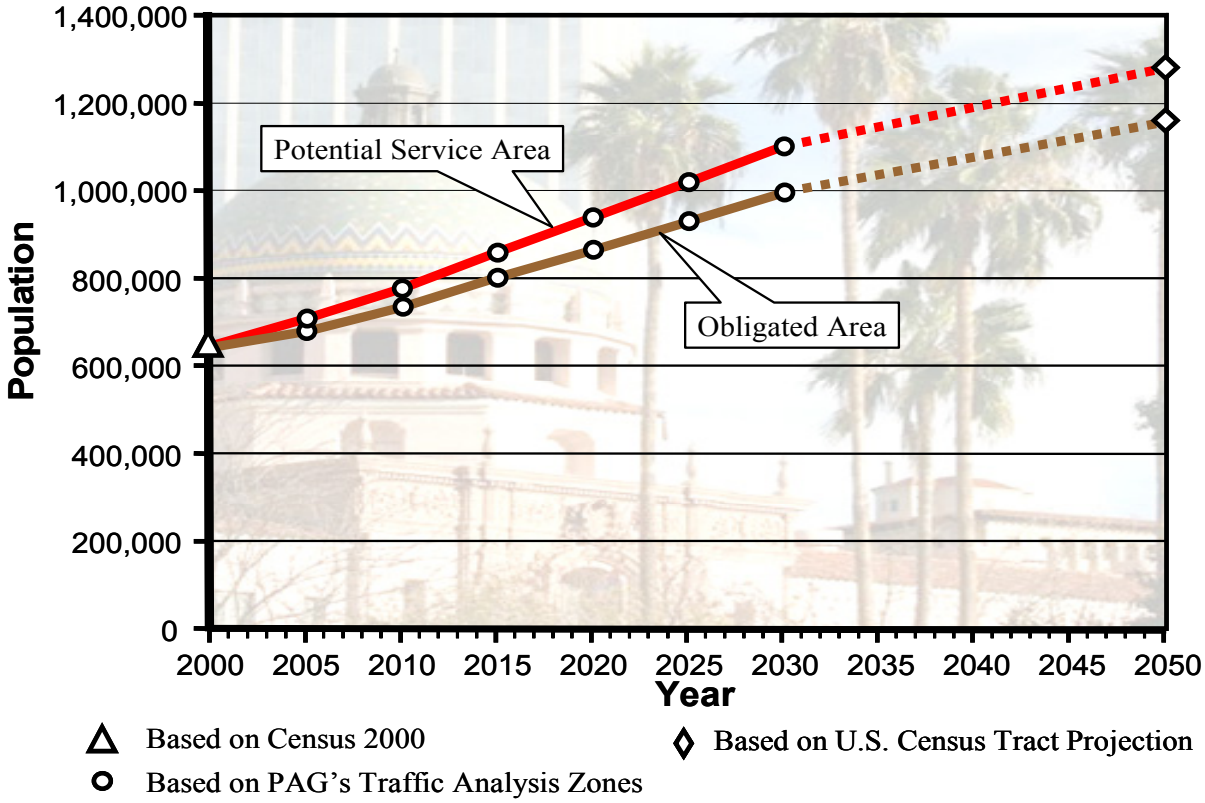


Figure 2-3: Population Projections for Tucson Water's Obligated Area and its Potential Service Area.

SECTION THREE

PROJECTED WATER DEMAND

The projections of aggregate water demand for the Obligated Area and the Potential Service Area provide supply targets that need to be met in the years to come. These projections depend in part on the size of the area (i.e. the number of people) to be served and on per capita water usage. To meet these demand targets, Tucson Water will ensure that sufficient water resources will be available when needed and that effective demand-management measures will be implemented.

PER CAPITA WATER USAGE RATES

In order to derive projected total water demand from population projections, average per capita water use of Tucson Water customers is determined. Such water usage is commonly measured in gallons per capita per day (GPCD).

The total GPCD water usage rate for Tucson Water's customer base has annually averaged about 177 GPCD for many years. The components of total GPCD include about 14 GPCD to meet reclaimed water demand and approximately 163 GPCD for all potable deliveries. Per capita potable water usage can be further broken down into total residential use at 110 GPCD, commercial and industrial water use at 35 GPCD, and water loss at 18 GPCD. Except for the past few years (which may be exceptional), the Utility's total GPCD has been relatively consistent for almost 25 years although the relative contributions of reclaimed and potable demand have changed over time. As longer-term per capita use trends change, water usage measures will similarly be revised.

PROJECTIONS OF TOTAL WATER DEMAND

Four projections of water demand were developed for this update to assess the potential impact of two variables over the 50-year planning period:

Variable #1: Reduce (or increase) the size of the potential area that will be directly served by Tucson Water; and

Variable #2: Invest (or not invest) in implementing additional, more aggressive demand-management measures to reduce potable GPCD.

The ultimate size of Tucson Water's potential future service area and its impact on projected demand was evaluated by assessing the two differently-sized areas introduced in Section Two—the Utility's Obligated Area and the larger Potential Service Area. The potential impact of additional demand-management on future water demand was assessed by assuming potable GPCD will remain constant by not investing in additional demand management measures ("without" condition) or it will gradually decrease ten percent from 163 to 147 by 2030 by making such investment ("with" condition). These two variables combine into four unique sets of assumptions each of which is represented in one of the demand scenarios shown in Figure 3-1.

Figure 3-1 indicates that *Scenarios A* and *B* focus on the smaller Obligated Area while *Scenarios C* and *D* are concerned with the larger Potential Service Area. Similarly, *Scenarios A* and *C* depict futures which assume investment in additional demand-management measures while *Scenarios B* and *D* represent futures without such investment.

	With Additional Demand Management	Without Additional Demand Management
Obligated Area	Scenario A	Scenario B
Potential Service Area	Scenario C	Scenario D

Figure 3-1: The Four Demand Scenarios and Associated Planning Assumptions.

The potential for achieving a ten percent reduction is based on analyses performed by Tucson Water's Community Conservation Task Force (2006) and the Utility's internal water-loss reduction program. The Task Force concluded that its recommended projects could reduce customers' potable demand by about 7.5% over the proposed program's implementation period. Further reductions will also be achieved through the Utility's internal water-loss reduction program which seeks to improve system efficiencies. Taking into account both of these initiatives, a water-demand reduction of at least ten percent could be realized by 2030 and beyond. For such water-use improvements to occur, Tucson Water will need both community support and greater financial investment to develop and implement more aggressive demand-management programs.

For all scenarios, the projected annual demand for reclaimed water use was increased from the eight percent assumed in *Water Plan: 2000-2050* to at least nine percent over the planning period. This increase is due to recent changes in customer usage and anticipated increases in demand in the near and mid terms.

Results of Scenario Analysis

Scenario A projects water demand in the Obligated Area through 2050 and assumes potable GPCD will gradually decrease ten percent by 2030. Under this demand projection, Tucson

Water's total water demand over the 50-year planning period would increase from 128,141 acre-feet in 2000 to about 180,000 acre-feet in 2030 and approximately 215,000 acre-feet by 2050. Of the four scenarios, *Scenario A* has the smallest increase in projected water demand as shown on Figure 3-2.

Under *Scenario B*, water demand is projected for the Obligated Area but differs from *Scenario A* by conservatively assuming that potable GPCD would remain constant throughout the 50-year planning period. Under *Scenario B*, the Utility's total water demand would increase from 128,141 acre-feet in 2000 to approximately 200,000 acre-feet in 2030 and about 235,000 acre-feet by 2050. *Scenario C* projects water demand for the larger Potential Service Area but assumes that potable GPCD will gradually decrease ten percent by 2030. Under this demand projection, Tucson Water's total water demand through 2050 would be essentially the same as in *Scenario B*. Both *Scenarios B* and *C* would result in a relatively moderate increase in water demand as shown on Figure 3-2.

Scenario D, like *Scenario C*, also projects water demand in the larger Potential Service Area but assumes potable GPCD would remain constant through 2050. Under this projection, the Utility's total water demand would increase from 128,141 acre-feet in 2000 to approximately 220,000 acre-feet in 2030 and about 255,000 acre-feet by 2050. This projection is consistent with the 50-year water demand projection in *Water Plan: 2000-2050*. *Scenario D* has the largest projected increase in water demand.

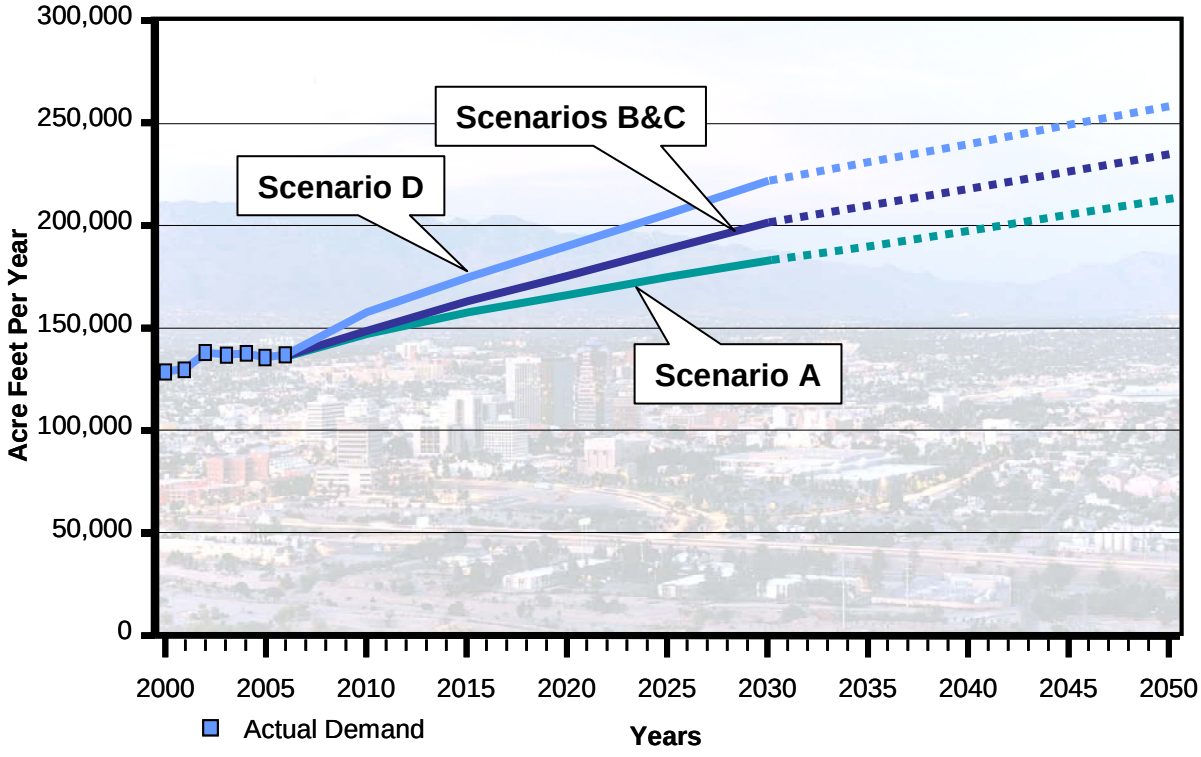


Figure 3-2: Projected Demand Scenarios: 2000-2050.

Review of Figure 3-2 indicates that future water demand is highly sensitive to the size of the area to be served and per capita water usage rate. *Scenario A* represents future water supply

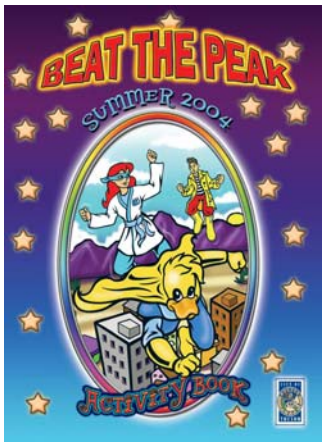
needs within the smaller Obligated Area and assumes that more aggressive demand-management strategies would be successfully implemented with the support of the community. Conversely, *Scenario D* represents a demand future which assumes that the larger Potential Service Area would be served solely by Tucson Water and that additional demand-management programs would not be implemented above and beyond those already in place. Of the four scenarios, *Scenario A* would offer the Utility the greatest resource planning flexibility while *Scenario D* would offer the least. The water-resource planning ramifications of the four scenarios are discussed in Section Six.

MANAGING DEMAND

Managing current and projected water demand is a critical component of any integrated water-resource and system plan. The extent to which future water demand can be further reduced could have a significant bearing on the water resources and system improvements that will be needed over time. Water conservation, improving the Utility's distribution system efficiency, and drought preparedness are the three demand-management programs discussed in this update.

Water Conservation

Conservation programming has been a critical component of Tucson Water's planning process for several decades. During this time, many programs have been implemented encouraging greater water-use efficiency, and they have collectively been instrumental in maintaining a low per capita potable water usage rate. This low rate has largely been maintained through extensive educational outreach efforts and ordinance-based requirements which have resonated with and contributed to the community's conservation ethic. The Utility will continue to evaluate existing programs and develop additional ones based on their effectiveness, reliability, and cost to implement.



When developing more aggressive conservation measures, proposed initiatives need to be evaluated by assessing their demonstrated effectiveness as seen in other communities and by determining their potential applicability in Tucson given the unique characteristics of the local community. If these measures are appropriate, they could yield quantifiable decreases in the community's potable GPCD and a corresponding decrease in the projected growth of water demand in future years as shown by *Scenarios A* and *C*.

Conservation Initiatives Currently Underway

Tucson Water has been moving forward with several on-going programmatic activities to further widen the reach of its conservation program. These activities include the following:

- Develop a voluntary Incentive Program for commercial water customers;

- Implement the Enhanced Water Waste Enforcement Program;

- Demonstrate community leadership by providing technical support to City General Services who will coordinate the implementation of water audits for departments within the City;

- Review the conservation measures developed by other jurisdictions;

- Complete the Irrigation Design Standards by finalizing performance targets and developing procedures to implement those standards; and

- Investigate options to reduce water waste associated with hot water distribution systems in the residential sector.

Community Conservation Task Force

In addition to developing the above measures, Tucson Water also established the *Community Conservation Task Force* in 2005 to ensure that new conservation strategies selected for implementation would be both effective and broadly supported by the community (Community Conservation Task Force, 2006). In order to achieve the latter, the members of the Task Force Committee represented a wide range of community stakeholders.

The Task Force Committee recommended 22 conservation measures that offer the greatest potential water savings and all were given the same implementation priority. The measures targeted five programmatic areas:

- Rebates and Incentives

- Ordinances Requiring Retrofits on Resale

- New Construction Ordinances

- Demonstration Programs

- Other

These measures targeted single-family residential, multi-family residential, and the commercial/industrial water-use sectors; the recommended measures are listed in Appendix A of this update. The Task Force Committee recognized that its final recommendations more heavily emphasized the multi-family residential sector over the others noting that Tucson Water's past conservation efforts and its block-rate pricing structure primarily targeted single-family residential users.

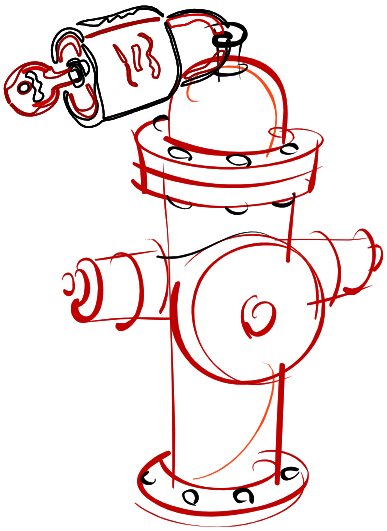
The recommended projects may potentially reduce demand by up to 7.5% over the life of the proposed program (Community Conservation Task Force, 2006). Consistent with the Task

Force Committee's recommendations, projected water demand associated with *Scenarios A* and *C* assume that such demand-management efforts would be successful in producing significant potable GPCD reductions. Further study is currently being performed by Tucson Water to assess the potential rate impacts associated with implementing the recommended measures.

Conservation is a vitally important demand-management tool. Effective conservation allows the community to maximize the use of the water it has available by optimizing efficiencies. Like any demand-management strategy, an aggressively managed conservation program can have a significant impact on when critical decisions must be made and when water-resources and system-planning projects need to be implemented to meet Utility goals.

Improving Water System Efficiency

A comprehensive Water Loss Control Program was initiated in October 2006 to better track and reduce the amount of "lost and unaccounted for" water in Tucson Water's potable system. This program integrates on-going programs and has initiated new ones to identify, control, and track system water losses. This information is used to increase water-use efficiency, reduce water losses to comply with regulations, and recover lost revenue. In essence, the Water Loss Control Program is the Utility's "internal" water conservation and product control program.



The overall purpose of the Water Loss Control Program is to control and track lost water by calculating the Utility's water balance; establishing goals, metrics, and milestones; and assessing the Utility's water-use efficiency performance. The total annual potable deliveries considered lost were 11.2, 11.9, and 12.5 percent in years 2004, 2005, and 2006, respectively.

The Water Loss Control Program will accomplish several specific objectives:

- Reduce water loss to seven percent of total annual potable deliveries within the next five years and to four percent in the longer term;
- Ensure to the degree possible that all water delivered through the potable system is accounted for;
- Increase billing accuracy;
- Comply with the conservation requirements in ADWR's Third Management Plan; and

- Establish the Infrastructure Leak Index to measure how efficiently the Utility manages and controls leaks on an annual basis.

To achieve these objectives, the specific projects managed under the Water Loss Control Program must involve all of the administrative divisions within the Utility. Tucson Water has taken steps which have reduced the potential for additional water losses in the potable system. The Water Loss Control Program integrates the Source Water Flow Meter Replacement Program, the Production Well Maintenance Program, and the Meter Replacement Program. The latter is particularly noteworthy since in the last three years, Tucson Water has replaced over 31,000 aged customer meters. Such meters tend to under-report the volume of water that passes through them which in turn results in a loss in revenue. In addition, the Utility's Water Loss Control Program has already initiated activities with the following objectives:

- Capture all non-revenue water losses in the potable system by developing a centralized water-tracking database;

- Quantify discharge volumes from pipeline breaks, leaks, and planned or unplanned distribution system releases by using standardized water discharge estimating and measurement procedures;

- Recover lost water revenue from stuck water meters by implementing a back-billing process;

- Implement the Large Reclaimed Meter Inspection and Replacement Program;

- Implement the Potable Meter Inspection and Replacement Program;

- Calculate and record water loss by updating well purging procedures; and

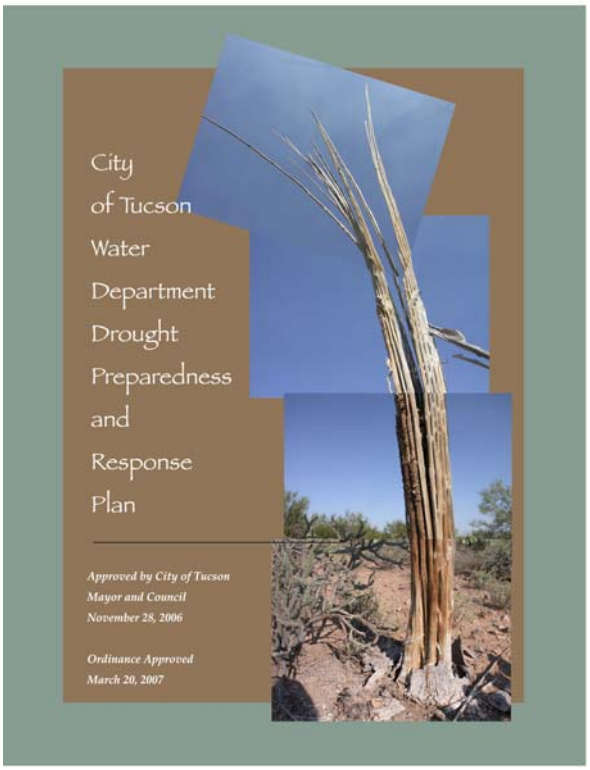
- Ensure production well meter accuracy by implementing a meter testing, calibration, and replacement program.

Plans are also in place to initiate a water system audit process to conduct an overall system water balance. The results will identify and prioritize sub-areas within the system where additional water control measures and Utility resources need to be focused. In addition, the main replacement program will focus on areas demonstrating the greatest need by considering historical outages, pipeline materials and age, and locations where mains will be relocated by road projects.

Decreases in the amount of water that is lost will help offset increasing total water demand. Tucson Water will provide the City of Tucson Mayor & Council with annual updates on the continuing development and findings of the Water Loss Control Program.

Drought Preparedness and Management

Drought preparedness and management are inextricably linked with water-resources planning. The impacts associated with drought are caused not only by dryer than normal weather patterns but also by the water demands the community places on its available supplies. The effects of drought can be worsened by managing available water resources inefficiently or through inadequate resource and/or system planning. Conversely, effective drought planning can serve as a "buffer" which can minimize the severity of drought impacts when they occur (Arizona Department of Water Resources, 2007). The *City of Tucson Water Department Drought Preparedness and Response Plan* (Drought Plan) was developed to conform with recently enacted state law and to further reinforce the Utility's existing drought management and water resource/system buffers already in place.



In response to recommendations developed by the Governor's Drought Task Force (2004), drought-related legislation became state law in 2005 and required all Arizona water systems to submit a drought preparedness and response plan to the State by January 1, 2007. The City of Tucson Mayor & Council approved the Drought Plan in November 2006 and subsequently amended the Tucson Code in March 2007 by adopting an ordinance which enforces the drought response stages and response measures embodied in the Drought Plan.

The City's Drought Plan addresses the inherent uncertainties associated with drought events such as their potential duration and severity. It was developed with the understanding that drought impacts can potentially occur more locally or regionally. For instance, drought can be only local involving the Santa Cruz River Watershed and nearby basins, or it can be more regional encompassing all or part of the Colorado River Watershed thus impacting water users in several states. It is now common knowledge that drought can occur both locally and regionally at the same time.

Tucson Water's Drought Plan consists of four drought response stages ranging from the mild to the most stringent. These stages and the associated response measures account for the unique attributes of the Utility's water system which is configured and operated to maximize reliability in both its available resources and supply infrastructure. Tucson Water's system is less vulnerable to the effects of local or regional drought because the Utility has diversified its water-resources portfolio. This means that the Utility is not fully reliant on either surface water or ground water for potable supply. In addition, Tucson Water also operates a large

reclaimed water system which meets a significant portion of the Utility's total water demand. This system also serves as a drought buffer since it reduces the magnitude of peak demand on the potable system thereby minimizing the potential impact of local or regional drought. The Utility's conjunctive use of ground water and Colorado River water for potable supply and its utilization of reclaimed water to meet non-potable demand collectively provide Tucson Water and its customers greater supply resiliency in both wet and dry years.

For more detailed information on the stages, drought indicators, and response actions, the *City of Tucson Water Department Drought Preparedness and Response Plan* can be viewed on the City of Tucson Water Department's web site at *http://www.ci.tucson.az.us/water*. Answers to frequently asked questions regarding the City's Drought Plan and a summary of the staged response actions are provided in Appendix B.

SECTION FOUR

AVAILABLE WATER RESOURCES

This section provides an update on the three water sources physically available to Tucson Water and evaluates the constraints that may affect their use for supply. In addition, it includes a summary of ADWR's Assured Water Supply (AWS) Program which places restrictions on how water providers utilize their water resources to meet growing demand. Finally, this section discusses the potential opportunities to acquire or develop additional water resources. Supplemental information on the Utility's water resources portfolio and the AWS Program are provided in Chapter Four of *Water Plan: 2000-2050* and in Appendices C and D of this update.

GROUND WATER

Tucson Water will continue to rely on local ground-water resources and its well fields throughout and beyond the 50-year planning period. Ground water will remain an important supply source for the following reasons:

- To meet peak water demand during the hottest months;
- To meet projected annual potable demand when it exceeds the City of Tucson's annual Central Arizona Project allocation and if additional renewable supplies are not available;
- To provide emergency backup supply should there be a disruption in Colorado River water supply due to problems with the Central Arizona Project infrastructure or due to supply disruptions caused by system outages in Tucson Water's own system;
- To provide backup potable supply should a temporary shortage be declared on the Colorado River; and
- To provide longer-term back-up supply to help offset potential climate change impacts on Colorado River water availability.

Potential constraints on the use of ground water were discussed in *Water Plan: 2000-2050*. In general, the regional aquifer systems have stresses placed on them not only by Tucson Water but also by other water providers, industrial and agricultural operators, and numerous private well owners. Tucson Water remains the only local water provider that is not totally

dependent on “wet” ground water as its sole source for potable supply. Management decisions that will be made by Tucson Water to balance its use of this resource will take into account the current and projected actions of other ground-water users in the Long-Range Planning Area. One recent positive development is the passage of legislation that places constraints on the ability of private interests to drill “exempt” wells within the service area of a water provider that holds an AWS designation. This was an important step toward managing the proliferation of new “unregulated” demands on the local aquifers.

Over-pumping of these aquifers over many decades has resulted in significant water-level declines, measureable land surface subsidence, and loss of riparian habitat. In order for ground water to remain a viable resource for future use, Tucson Water has continued its efforts to reduce its ground-water use to approximate a hydrologically sustainable pumping rate. For the Utility’s efforts to be beneficial in the longer-term, other local ground-water users will also need to work cooperatively to ensure that the local regional aquifers will be able to provide sustainable supply to meet the water needs of the greater community.

The Utility has a finite volume of ground-water credits that it can pump over time under the AWS Program; this is referred to as “allowable” ground water. The Utility also has access to a small volume of annually accruing ground-water credits from “incidental” recharge (defined as aquifer recharge which occurs after the Utility accesses its water sources for supply) constituting four percent of Tucson Water’s annual total demand. In addition, Tucson Water has the ability to utilize up to 12,500 acre-feet of ground water per year that would be replenished through its contract with the Central Arizona Groundwater Replenishment District (CAGRD). However, the bulk of Tucson Water’s ground-water pumping will debit against its allowable ground water account. Once these paper-water credits are exhausted, all ground water that is pumped in excess of incidental recharge must be replenished with a renewable water supply. Even if Tucson Water reduces its annual pumping and utilizes ground water at the hydrologically sustainable rate, the Utility will eventually deplete its allowable ground-water credit account. At some point in time, the credits remaining in this account will not be sufficient to renew the City of Tucson’s AWS designation. Despite these concerns, these credits will continue to be valuable because they provide planning flexibility and the legal means to transition to fully renewable water supplies.

Tucson Water’s use of its CAGRD contract adds legal authority to pump ground water. Under current state law, the replenishment (i.e. recharge) activities of the CAGRD are not required to occur in the same area as the ground-water pumping it seeks to offset. Thus CAGRD replenishment does not necessarily address local ground water declines. Tucson Water will perform CAGRD replenishment at its recharge and recovery facilities in order to maintain aquifer water levels within its projected service area and assist in achieving long term sustainability.

Potential Additional Sources of Ground Water

Substantial quantities of ground water might be available from less developed basins in western Arizona such as the Harquahala basin, McMullen Valley, and Butler Valley. Transfers of ground water from less populated areas of Arizona could yield additional water

supply in the future. These supplies could potentially be delivered to the Tucson area by utilizing existing excess capacity in the Central Arizona Project.

EFFLUENT

Municipal wastewater effluent is a renewable water supply that steadily grows along with the population. This recycled water supply is delivered through Tucson Water's reclaimed water system and provides a sustainable alternative to mining ground water to satisfy irrigation demand. In addition, this water source will continue to be recharged thereby augmenting local aquifers.

In 2006, 69,067 acre-feet of effluent were produced from the metropolitan wastewater treatment plants in the Tucson area. As shown on Table 4-1, the City of Tucson had entitlement to a total of 31,536 acre-feet (46 percent) of this effluent. Of this total, 11,983 acre-feet were reused as reclaimed water within the Tucson Water service area while the remainder (19,553 acre-feet) was discharged to the Santa Cruz River. In contrast, all of the effluent annually entitled to the Secretary of the Interior (28,200 acre-feet) was discharged to the river and constitutes the majority of the perennial effluent flow observed in the Santa Cruz River.

Entity	AF/Year
Tucson	31,536
Secretary of the Interior	28,200
Pima County	4,087
Metropolitan Domestic Water Improvement District	2,890
Oro Valley	2,354
TOTAL (rounded)	**69,067**

Table 4-1: Local Effluent Entitlements in 2006.

Updated projections of wastewater generation through 2030 were developed in consultation with the Pima County Regional Wastewater Reclamation Department. These projections indicate that annual effluent availability within the Long-Range Planning Area could approach 118,900 acre-feet by 2030. Looking beyond, *Water Plan: 2000-2050* indicated wastewater availability could approach 128,000 acre-feet by 2050. The updated wastewater volumes were based on population growth projections and assumptions regarding per capita potable water usage, sewer return flow rates, and septic tank usage and are summarized in Appendix C. Of these totals, it is projected that the City of Tucson would have annual entitlement to approximately 61,000 acre-feet by 2030 and about 66,000 acre-feet by 2050.

The City's reclaimed water system provides water of a quality appropriate for turf and ornamental landscaping, firefighting, toilet flushing, orchards, and the irrigation of some edible food crops. Tucson Water will continue to develop projects that will provide sufficient capacity to meet reclaimed water demand as the community continues to grow. A key long-term planning assumption is that the reclaimed water system will supply at least nine percent of Tucson Water's projected total demand through 2050. Accordingly, reclaimed water

demand in the Tucson Water service area is projected to increase from 11,983 acre-feet per year in 2006 to approximately 24,000 acre-feet per year in 2050. In addition to serving customers in the Tucson Water service area, the reclaimed water system provides a regional service by treating and wheeling effluent supplies owned by other regional entities. In 2006, 2,186 acre-feet of reclaimed water were wheeled to Pima County facilities and to the Town of Oro Valley for distribution and use.

As the population increases and all other available potable water supplies become fully utilized, the need for reusing effluent as a critical supply source will also grow. Treated effluent will most likely be banked in local aquifers through a sequenced program of enhanced treatment and aquifer recharge. Tucson Water considers effluent to be a vital renewable water resource that will ensure supply sustainability and drought resistance in the long term.

Potential Changes to Effluent Availability

Tucson Water has entitlement to a large volume of municipal effluent and the Utility may be able to increase its usable share in the future. This could include agreements to lease or purchase the Secretary of the Interior's effluent entitlement as well as those of others. This would result in greater utilization of the only locally generated renewable supply that grows with the community.

The effluent that Tucson Water further treats for use in the Reclaimed Water System comes from the local wastewater treatment works owned and operated by Pima County. This arrangement is unique to this region; elsewhere in the State, municipalities provide both potable water delivery and municipal wastewater treatment.

Pima County is presently engaged in its Regional Optimization Master Plan (ROMP) which will define the effluent quality and quantities that will be produced at the Roger Road Wastewater Treatment Plant and the Ina Road Water Pollution Control Facility. The outcome of the ROMP is critical to the future direction of the City's Reclaimed Water System since at the present time, most of the reclaimed supply is derived from the County's Roger Road Plant. Changes in where the effluent is produced as well as its resultant water quality may impact Tucson Water's ability to produce additional reclaimed water to meet increasing non-potable water demand. For a more detailed discussion of effluent ownership in the Tucson region and the near-term future of the Reclaimed Water System, refer to the *Reclaimed Water System – Status Report 2007* (City of Tucson Water Department, 2007a).

COLORADO RIVER WATER

The Colorado River is a major source of water supply, power generation, recreation, and environmental habitat in the western United States. It is a major part of Arizona's water supply portfolio providing more than one-third of all water used in the State (Central Arizona Project, 2007a). More than half of Arizona's annual water supply is delivered to central Arizona via the Central Arizona Project. The Colorado River is the largest renewable supply

source available to Tucson Water. This section provides an update on the status of Tucson Water's allocation of Colorado River water, information related to future shortage issues associated with drought, and the potential implications of climate change.

Colorado River water is delivered to the greater Tucson area via the Central Arizona Project which conveys water from Lake Havasu to its terminus located southwest of Tucson. The City of Tucson has rights to the largest municipal allocation of Central Arizona Project water in the State—currently 135,966 acre-feet per year. For planning purposes, however, the City's allocation is expected to reach a total of 144,191 acre-feet per year in the near future. This anticipated increase in the City's allocation is due to the recently finalized Arizona Water Settlements Act (an addition of 8,206 acre-feet per year) and a pending allocation transfer from the Flowing Wells Irrigation District (19 acre-feet per year).

Clearwater Program and the Blend

Tucson Water's efforts to fully utilize its Central Arizona Project allocation are managed under its Clearwater Program. Through the process of recharge and subsequent pumping (recovery), Colorado River water mixes with native ground water to produce a blended water supply. The Central Avra Valley Storage and Recovery Project (CAVSARP), the Hayden-Udall Treatment Plant, and the 60-million gallon Clearwell Reservoir in the Tucson Mountains currently constitute the core infrastructure of the Clearwater Program. CAVSARP is permitted to annually recharge up to 80,000 acre-feet of Colorado River water. Recovery components are currently being upgraded to increase the facility's recovery capacity to about 70,000 acre-feet per year. The core facilities are currently sized to utilize about 50 percent of the City of Tucson's annual Central Arizona Project allocation and make it available for potable supply in Tucson Water's service area.

Figure 4-1: Aerial View of CAVSARP Taken January 2008.

Phase II of the Clearwater Program, the Southern Avra Valley Storage and Recovery Project (SAVSARP), is currently under construction. Deliveries of Colorado River water for recharge at SAVSARP will begin in spring 2008 to the first three recharge basins. When construction of the balance of the facility is completed by the end of 2008, SAVSARP is expected to have about 60,000 acre-feet of annual recharge capacity. Recovery will initially be conducted through an existing well field that will be expanded over time. Upon completion of additional wells, pipelines, a reservoir/booster station, and a large-diameter recovered water transmission main, the annual recovery capacity at SAVSARP will be approximately 60,000 acre-feet.

Since issuance of *Water Plan: 2000-2050*, Tucson Water has evaluated how the Pima Mine Road Recharge Project might be more fully utilized. The Utility owns a 50 percent share of the facility which is located near the Central Arizona Project terminus at I-19. Tucson Water's Santa Cruz Well Field is located adjacent to the Pima Mine Road Recharge Project, and water levels in the vicinity of the well field benefit from its recharge activities. Tucson Water plans to continue recharging a portion of its Central Arizona Project allocation at Pima Mine Road and to recover all or part through the Santa Cruz Well Field. This well field will be expanded with additional wells and pipelines in the future.

Between CAVSARP, SAVSARP, and the Pima Mine Road Recharge Project/Santa Cruz Well Field, Tucson Water will have sufficient capacity to recharge and recover its entire Central Arizona Project allocation. The Utility currently plans to begin purchasing its full allocation in July 2008. The collective recovery capacities of these facilities will expand over time as infrastructure projects are completed and as potable water demand increases. By 2012, the vast majority of Tucson Water's service area will be served a renewable water supply through Clearwater Program facilities.

Many additional potential Clearwater Program elements are described in *Water Plan: 2000-2050*. Newer initiatives under consideration include additional expansions of the recharge and recovery capabilities of CAVSARP. An application to expand its recharge capacity to 100,000 acre-feet per year was filed with the State in January 2008; the Utility may receive its permit before the end of the year. In the longer term, the CAVSARP and SAVSARP facilities could potentially be expanded beyond 100,000 and 60,000 acre-feet per year as additional renewable water supplies are brought into service.

Shortage on the Colorado River

The primary uncertainty related to Tucson's use of Colorado River water is the future impacts of potential shortage conditions. There are several factors that could individually or in combination result in a declaration of shortage on the Colorado River. In preparation, Tucson Water has developed supply-and-demand response contingencies to augment the institutional protections already in place to help offset the impacts of eventual shortages.

Factors Contributing to Shortage

Three critical factors that could drive a future declaration of shortage on the Colorado River are as follows:

- Annual allocations to Colorado River water exceed the actual long-term average yield of the Colorado River;
- Effects of extended drought conditions on water availability; and
- Potential ramifications of long-term climate change.

It is widely recognized that the annual average yield of the Colorado River was over-estimated in the 1920s. When compared to information collected and analyzed in subsequent years, it is clear that the annual average yield is significantly lower. As a result, the magnitude of flows in the Colorado River will not always be sufficient to fulfill all of the annual Central Arizona Project allocations.

Water users in the Colorado River basin have also experienced droughts which are intermittent periods of below normal water availability; these periods can sometimes last decades. Because of the current severity of drought conditions within the Colorado River Watershed, the first shortage declaration on the Colorado River may be just years away.

The probability of shortage in the longer term may increase based on current climate change projections for the Southwest. These projections, largely based on climate modeling simulations, generally agree that a gradual long-term warming trend is likely. These projections also suggest that there will be a decrease in annual precipitation in the Southwest (Christensen et al., 2007; Lenart et al., 2007; and Overpeck; 2007). The effects of climate change could be significant with regard to the long-term yield of the Colorado River.

Regardless of the factors that result in an eventual shortage declaration on the Colorado River, the potential effects on Tucson Water and the Utility's planned responses are similar. The Utility continues to prepare for periods of time when access to Colorado River water will be reduced. In order to prepare for eventual shortages, Tucson Water has taken several proactive steps with regards to both supply and demand.

Preparations for Shortage

The Utility has participated in state-wide planning efforts to protect Arizona's renewable water resources, cooperated with the Arizona Water Banking Authority (AWBA) to store excess Central Arizona Project water in the near-term for eventual recovery during times of shortage, and developed infrastructure that will remain viable when the supply of Colorado River water is reduced. In addition, the Utility will seek to acquire and develop additional, higher-priority sources of renewable water supply such as main-stem (non-Central Arizona Project) Colorado River water as well as locally-generated effluent; these potential supplies

are particularly attractive since they will not be curtailed except during the most extreme shortages and therefore offer greater resource and supply reliability.

An important institutional buffer is the high priority of the City's annual allotment within the Central Arizona Project's hierarchical allocation structure. The City of Tucson's allocation is for municipal and industrial (M&I) use which would only be impacted after shortages have become severe. To ensure full benefit its M&I allocation, Tucson Water must fully utilize its entire annual allotment no later than the year before a shortage is declared. According to the Central Arizona Project (2007b), the current worst-case estimate of when a shortage on the Colorado River might be declared is 2011. To prepare for this possibility, the City plans to fully utilize its entire allocation beginning in 2009.

When a shortage affects M&I usage of Central Arizona Project water, providers in the Central Arizona Project's three-county service area will have access to water that has been banked in long-term storage facilities through the AWBA. Plans to recover this banked water have not yet been finalized but the Central Arizona Project is in the process of developing conceptual plans to recover the stored water (Central Arizona Water Conservation District, 2007). Tucson Water has already provided the AWBA storage capacity at its recharge facilities. The water stored in these facilities can readily be recovered during times of shortage and brought into service; however, this represents only a small part of the AWBA water that would be required in a multi-year shortage.

Tucson Water's reliance on recharge and recovery as the means to bring its Colorado River water into use will also mitigate shortage impacts. A benefit of recharge over the use of a conventional water treatment plant is that recovery wells associated with a recharge facility can continue to operate for a period of time even when the availability of the source water is reduced. In contrast, a surface water treatment plant can only produce water as long as the source water is available.

An additional contingency is the Utility's diversified water-supply portfolio. As Tucson Water further expands and diversifies its portfolio, impacts to any particular water supply can be offset by relying on other available supply sources including the City's effluent resource. Access to locally-generated effluent is not subject to curtailment due to drought, Central Arizona Project infrastructure outages, or climate change. If this resource were used to augment the regional aquifers within the Utility's service area, it would provide the community with greater supply reliability during times of shortage.

The demand-management recommendations of Tucson Water's Community Conservation Task Force could generate long-term water savings. These savings could reduce the overall strain on the Utility's available water supplies and as such can become a significant part of Tucson Water's management strategy to prepare for shortages on the Colorado River. The Utility also developed a comprehensive Drought Preparedness and Response Plan to control demand in such times of need. These and other demand-management initiatives are more fully discussed in Section Three.

As the ultimate backstop, Tucson Water also possesses extensive ground-water production facilities which tap into the large regional aquifers in both the Tucson basin and Avra Valley. While the Utility is increasingly shifting its reliance to renewable water resources, the local regional aquifers have a very large volume of ground water in storage. Under the AWS rules, there is provision to allow ground-water pumping without debiting the Utility's credit accounts during shortages. This non-renewable supply source can be used for an extended period of time to satisfy customer demand.

Acquiring Additional Sources of Colorado River Water

The City of Tucson will continue efforts to increase its Central Arizona Project allocation and to access additional Colorado River water. This may be accomplished through reallocation, lease, and/or transfer and these options are discussed in detail in Chapter Four of *Water Plan: 2000-2050*.

Another potential mechanism to acquire additional Colorado River water is to participate in an "exchange" program by providing an alternate water supply. An option under state-wide consideration is to invest in a seawater desalination facility in partnership with a coastal community in the United States or Mexico that has higher-priority rights to Colorado River water. Under such a potential agreement, Tucson could, in partnership with others, provide funding to the coastal community to desalinate seawater for use in that location in exchange for more Colorado River water to import to the Tucson area via the Central Arizona Project. If this type of arrangement were to occur, it would likely be many decades out. Tucson Water plans to participate in these discussions in order to take advantage of this potential opportunity if and when it occurs.

ASSURED WATER SUPPLY PROGRAM

Under the current AWS Designation issued in 2007, the City of Tucson's 100-year supply of water that meets all of the AWS criteria is 185,688 acre-feet per year. However, Tucson's AWS designation is currently capped at 183,956 acre-feet which was the projected demand volume for 2015 at the time of the AWS application. The City's current water supply portfolio is based on its physically available ground water, Colorado River water and effluent supplies. The controlling factor in determining this total volume is the "Consistency with Management Goal" criteria (i.e. Safe Yield).

The current AWS designation contains a sufficient volume of approved water resources to meet projected growth through 2016. To maintain the designation without interruption, the Utility will need to re-apply to extend the designation order at least two years before this demand volume is reached. Based on current projections of the Utility's available water supplies, water credit balances, and future demands, Tucson Water expects to extend its AWS designation from 2016 to about 2025. There will be subsequent extensions to the AWS designation.

Under the AWS Program, all ground-water withdrawals are debited from several potential sources of water credits. This program places a finite cap on the amount of ground water that can be pumped by Tucson Water without incurring a replenishment obligation. This is referred to as allowable ground water. Since *Water Plan: 2000-2050* was issued in 2004, Tucson Water has continued to debit its allowable ground water credit account although the annual rate of ground-water use has steadily declined as use of renewable supplies has increased. Reliance on renewable supplies would allow for sustainable growth over the longer term.

SECTION FIVE

WATER DELIVERY SYSTEMS

Tucson Water operates two types of water systems: a potable system and a reclaimed (non-potable) system. These are physically separate and distinct systems which convey water from supply sources through a pressurized hydraulic system to customers situated at different elevations. Tucson Water's systems consist of a complex network of pipes, wells, pumps, reservoirs, valves, automated controls, and treatment facilities.

The existing water systems extend throughout a 330-mile area and served a population of about 720,000 people in 2006. The existing systems provide a baseline upon which future supply and demand needs are assessed.

EXISTING POTABLE SYSTEMS

Tucson Water's potable water distribution systems currently receive supply from more than 200 wells spread over five well fields with a collective pumping capacity of 196 MGD. Figure 5-1 shows the location of the five well fields within the Tucson basin and Avra Valley. The network of large diameter pipelines in Tucson Water's potable distribution system is shown on Figure 5-2. About 4,200 miles of pipelines (ranging from 2 to 96 inches in diameter) convey water from the various potable supply sources to more than 200,000 businesses and residences. The distribution system includes 50 fully enclosed reservoirs ranging in size from 15,000 gallons to 60 million gallons; the overall system has a total storage capacity of 273 million gallons. The system has 124 booster stations used to lift water to higher delivery elevations.

The ground water served by Tucson Water meets all applicable federal and state regulatory standards. Because the water delivered through the Tucson Water distribution system must be free of pathogens, Tucson Water introduces chlorine at various locations in the system to maintain a residual disinfectant in the water delivered to customers. Areas where ground-water contamination could pose a threat to potable supplies are being managed by controlling ground-water pumping or by pumping and treating to either augment the ground-water system or for direct potable use.

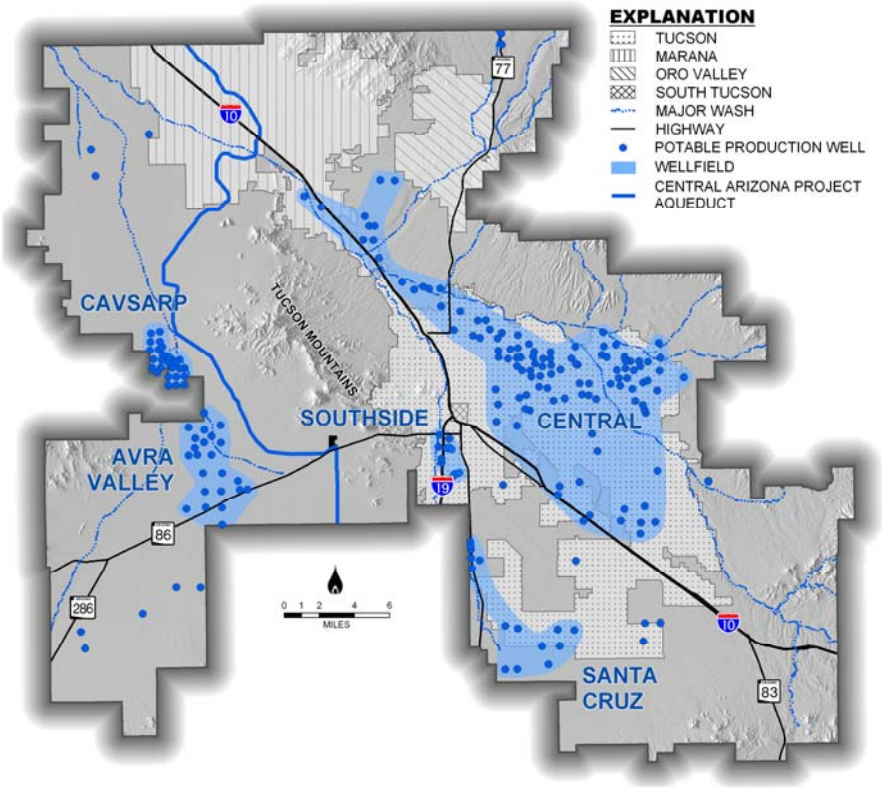


Figure 5-1: Tucson Water's Well Fields in 2006.

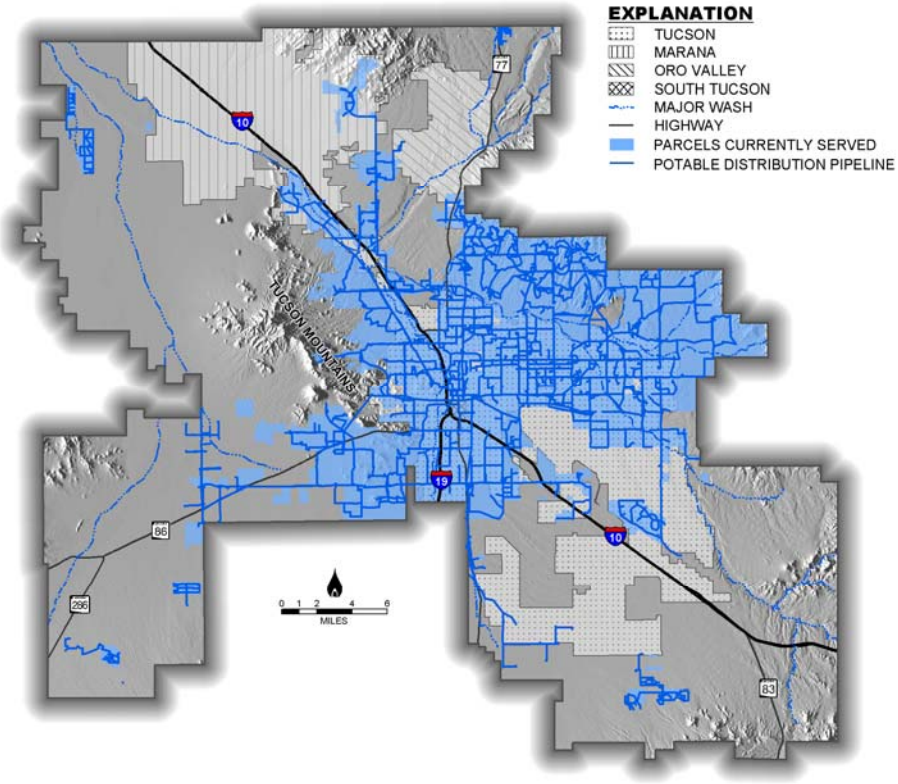


Figure 5-2: Tucson Water's Potable Distribution System in 2006.

EXISTING RECLAIMED WATER SYSTEM

Tucson Water has operated a reclaimed water system since 1984. The reclaimed system takes secondary effluent from Pima County's Roger Road Wastewater Treatment Plant, further treats it through filtration and chlorination, and delivers it for turf irrigation and other non-potable uses. The Utility delivered 14,168 acre-feet of reclaimed water through its reclaimed system in 2006. Of this total, 11,983 acre-feet of reclaimed water were utilized within the Tucson Water service area with the balance exported to Pima County and the Town of Oro Valley. Reclaimed usage in 2006 constituted about nine percent of total water demand for the Utility. The layout of the reclaimed water system is shown on Figure 5-3.

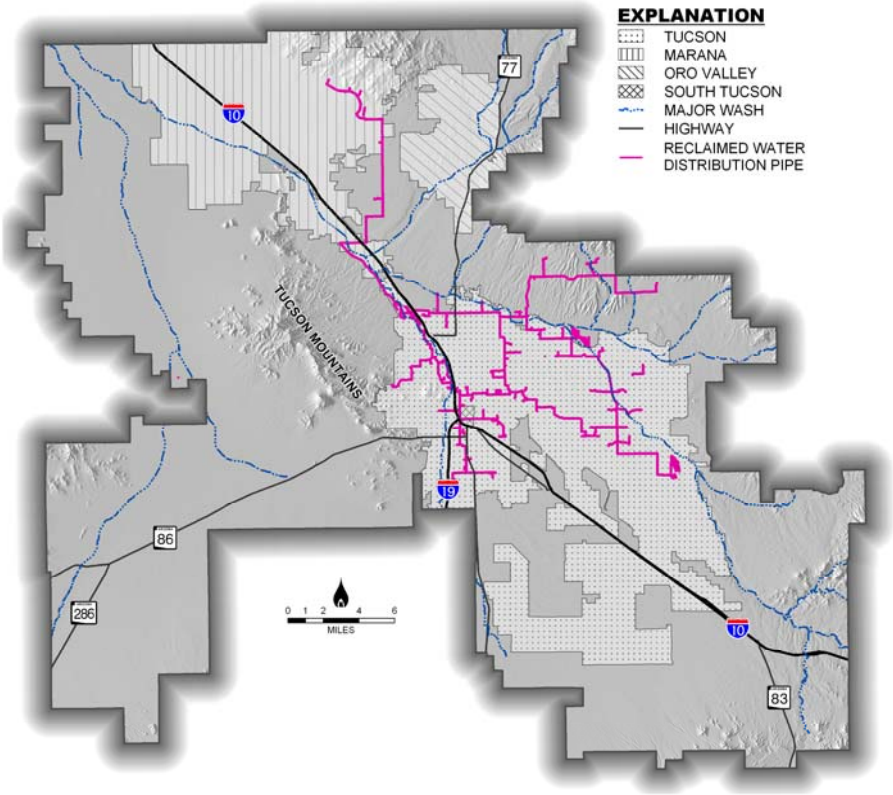


Figure 5-3: Tucson Water's Reclaimed Distribution Pipeline System in 2006.

The Utility's Reclaimed Water Treatment Plant is permitted to treat up to 10 MGD. The Sweetwater Recharge Facilities are permitted to annually recharge and recover up to 6,500 acre-feet of reclaimed water to meet seasonal peak demand requirements. The Utility plans to expand its annual recharge and recovery capacity at the Sweetwater Recharge Facilities up to 13,000 acre-feet by optimizing the operation of existing infrastructure and by constructing additional recharge and recovery facilities. The recovered effluent is blended with filtered water from the Reclaimed Water Treatment Plant, disinfected with chlorine, and boosted to customers through the reclaimed water distribution system. The total delivery capacity of blended water from the Reclaimed Water Treatment Plant and the Sweetwater Recharge Facilities is currently 27 MGD with plans to expand it to 33 MGD in 2009. In addition, the reclaimed water system receives about 2.5 MGD from the Randolph Park Water Reclamation Facility and up to 2.5 MGD from the Santa Cruz River Managed Underground Storage Facility.

IDENTIFYING POTABLE AND RECLAIMED SYSTEM NEEDS

Existing and future water system needs are identified and evaluated using computer models to simulate water flow velocities and pressures in the potable and reclaimed distribution systems. These computer representations of the two systems are called hydraulic models. The results of modeling assessments are portrayed schematically and are used to assess future potable and reclaimed system improvements.

Future Potable System Needs

Future potable water system needs are determined by applying a GPCD water use factor to population projections within Tucson Water's projected service area. As described in Sections Two and Three, population projections are distributed spatially to locate future delivery system needs. A hydraulic model is used to size the projected pipelines and to ensure there is adequate water supply, storage, and pressure to meet projected demands in future years. This necessitates adding infill capacity to the existing infrastructure.

In fiscal year 2006, Tucson Water spent approximately $14 million on electric power (over 100 Gigawatt-hours) and natural gas (nearly 6 million therms). Eighty-five percent of the electricity and 100 percent of the natural gas was used to power potable system facilities. Meeting the operational and regulatory requirements of the water distribution systems will increasingly require more energy in the future. As the demand for energy has increased over time, alternative energy sources have become increasingly viable because of technological advances, changes in regulations, voluntary programs, and incentives. At the same time, opportunities to develop geographically-distributed energy production facilities are being considered due to security and reliability concerns.

Tucson Water recognizes the need to utilize sustainable energy for its facilities. Opportunities are being explored to partner with the City of Tucson's Energy Manager and local electric providers to expand the use of solar power, evaluate the utility of low-head hydroelectric projects, and assess the potential of other sustainable energy technologies at potable facilities.

Future Reclaimed Water System Needs

In this Update, it is assumed that at least nine percent of the projected total water demand will be met with reclaimed water. At the present time, most reclaimed system customers are large turf facilities such as parks, golf courses, and schools. Capital improvement projects scheduled in the next decade will increase system capacity and water supplies; these projects will also improve operational efficiency to meet increasing future non-potable demand.

In fiscal year 2006, reclaimed water system facilities consumed approximately 15 Gigawatt-hours of power to meet operational and regulatory requirements. As with the potable water system, energy sustainability will also be pursued for reclaimed water facilities including installation of additional photovoltaic arrays on reclaimed reservoir roofs.

SECTION SIX

UTILIZING RESOURCES TO MEET DEMAND

This section updates Tucson Water's recommended resource-utilization plan presented in *Water Plan: 2000-2050*. This plan consists of a schedule for implementing essential programs and projects and specifies the scope and timing of critical decision points within the planning horizon.

COMMON ELEMENTS

The Common Elements are those programs and projects needed to ensure a resource-sustainable future for Tucson Water's existing customers and for future ones as well. These elements, previously identified in *Water Plan: 2000-2050*, have been actively pursued by the Utility to guarantee planning flexibility and system reliability. The following provides a status update for each project and program.

Common Elements: 2000 to 2008	Status
Acquire Additional Supplies	Local and state-wide policy discussions continue with CAWCD exploring opportunities to serve as the water broker for its three-county region. Additional allocations of Colorado River water have been acquired under the Arizona Water Settlements Act & from Flowing Wells Irrigation District.
Develop a Salinity Management Program	Initial local salinity evaluations are complete. Phase II of the regional Central Arizona Salinity Study (2006) was completed with off-shoot pilot studies continuing.
Encourage Sewer Connections	The Utility continues working with Pima County's Regional Wastewater Reclamation Department on long-range planning.
Additional Conservation Programming	Community Conservation Task Force was formed and a conservation consultant retained to assess potential options. The Task Force made 22 recommendations and these are discussed in Section Three and summarized in Appendix A. Some are being implemented while others are under review.
Evaluate Emerging Contaminants	Utility is involved with American Water Works Association Research Foundation and WateReuse Association which are conducting cutting-edge research and workshops.
Expand Public Outreach	The *Decision H2O* Program has fostered community dialogue on the first critical decision point of *Water Plan: 2000-2050.*
Provide Water-Resource Information	Tucson Water has met frequently with local water providers, state agencies, regulatory agencies, local business groups, professional organizations, and educators involved with water-resources planning efforts.

Common Elements: 2000 to 2008	Status
Pursue Regional Cooperation	Regional cooperation on long-range planning assumptions has been greatly improved. Several cooperative opportunities are currently under discussion in the local water community.
Reduce Lost and Unaccounted for Water	The Utility has established a capital program to replace aged meters in the distribution system to obtain more accurate water delivery information. A comprehensive system-wide "water audit" will be conducted in the near future.
Conduct SAVSARP Feasibility Assessment	Complete – the facility is under construction.
Construct Spencer Interconnect Pipeline	This project has been split into two separate pipelines – the Avra Valley Blending Main (to be constructed in the future) and the Viviana Transmission Main (not currently included in the Utility's capital budget).
Design SAVSARP Facilities	Complete – the facility is under construction.
Expand Recharge Capacity of CAVSARP	The recommended action to re-permit the CAVSARP recharge capacity to 80,000 acre-feet per year is complete. A subsequent decision has initiated efforts to further expand the facility's recharge capacity to 100,000 acre-feet per year.
Study Secondary Disinfectants	An initial assessment is complete. Additional studies will be conducted as the Utility expands its use of renewable water supplies.
Upgrade the Distribution system	Routine distribution system upgrades continue. The Utility is planning to expand the capital budget devoted to infrastructure replacement over time.

In addition to the projects and programs scheduled to be initiated by 2008, a second set of Common Elements was identified. These will allow the Utility to effectively address the priorities and challenges in the mid-term (through 2025) and long-term (2025-2050) planning periods.

Common Elements: Beyond 2008	Status
Preserve Ground-Water Credits	Ongoing development of renewable supplies in order to preserve ground-water credits for the future.
Achieve Full Colorado River Water Use	Ongoing fiscal planning efforts are being conducted to achieve this goal as early as 2009.
Achieve Sustainable Ground-Water Pumping	This goal is on track to be achieved by 2012.
Evaluate Effluent Exchanges	Opportunities to exchange effluent and/or expand the use of this renewable supply continue to be explored.
Augment Avra Valley Main	This project is under conceptual design and is planned to be constructed in phases over the next five to ten years.
Develop Additional Reclaimed Water Supply	Sweetwater Recharge Facilities expansion is underway. A permit amendment to bring its recharge capacity to 13,000 acre-feet/year has been submitted to the State. This volume will be attained by making operational and maintenance changes, by constructing additional recharge and recovery facilities, and by expanding booster/conveyance capacities.
Operate SAVSARP Phase I	This project is under construction and recharge is scheduled to begin in early 2008. Expanded recovery will begin in 2012. The scope of the facility has been expanded to include 60,000 acre-feet per year of recharge and recovery.

The process of making the critical decisions is underway, but these Elements can only be initiated when issues are resolved and direction is provided.

DECISION POINTS

Water Plan: 2000-2050 outlined four critical decisions to be made at two key points in time: 2006 and 2014. Since the plan was released in 2004, the Utility has focused primarily on resolving the first decision and has conducted a reassessment of the need, timing, and format of the others. The basic rationale underlying the original choices remains valid, but the schedule of the latter decisions has been revised in order to account for changing circumstances, new population projections, and new planning assumptions. In this update, the first decision point is projected to occur in 2008, and the second may occur by 2014 or as late as 2027. Any significant change in population projections, water policy, and/or planning assumptions could also change the time in which decision points will occur and perhaps even the substantive issues associated with those decisions.

Decision Point 2008

In *Water Plan: 2000-2050*, the first two resource-management decisions pertained to the use of Colorado River water; these decisions were originally projected to be made in 2006. The first decision was concerned with the long-term mineral content of the Clearwater blend of ground water and recharged Colorado River water. The second decision focused on whether the Utility should consider bringing a surface (direct) water treatment plant into service for a portion of the City's current Central Arizona Project allocation.

To develop support information to address the decision on long-term mineral content, Tucson Water launched *Decision H2O* and it has since been the subject of wide-spread public discussion. The scope of *Decision H20* has included information review, extensive technological research, cost estimating, environmental impact projections, and public dialogue. Data collection and the accompanying assessment are in process with the expectation that a final decision will be made by the Mayor & Council in 2008. The current status of *Decision H2O* is discussed in Appendix E.

Since issuing *Water Plan: 2000-2050* in 2004, issues associated with the decision on the treatment plant have evolved in response to the changing planning environment. As originally conceived, this decision was centered on how best to bring the remaining balance of the City's unused Colorado River water allocation into service. The choice was either to rely on recharge and recovery or to incorporate an element of surface treatment by reconstituting the Hayden-Udall Treatment Plant. A study was conducted by Malcolm Pirnie (2007) which evaluated the two options. The study concluded that relying on recharge and recovery provided Tucson Water with greater operational performance and planning flexibility at less cost. In addition, drought-related discussions over the past few years as well as recent projections indicate that a worst-case shortage declaration on the Colorado River may occur sooner than previously predicted and before the Hayden-Udall Treatment Plant could be reconstituted. Due to the uncertainty and potential urgency regarding a possible

early declaration of shortage, Tucson Water moved forward with the following near-term initiatives in order to develop sufficient facility capacity to fully utilize the City's entire Central Arizona Project allocation as early as 2009:

- Expansion of the recharge and recovery components at the CAVSARP facility;
- Expansion of the recharge capacity of the first phase of SAVSARP; and
- Maximum utilization of the Pima Mine Road Recharge Project.

Building upon the proven success of the recharge and recovery approach, this decision has virtually eliminated the near-term uncertainty associated with having sufficient capacity in place to fully utilize the City's Central Arizona Project allocation prior to a shortage declaration. Nonetheless, the role of a surface (direct) treatment plant remains a potentially viable option as the range of possible futures evolve and new supply opportunities develop.

The Next Decision Point

In *Water Plan: 2000-2050*, the year 2014 was originally specified as the second critical decision point which focused on decisions associated with maximizing the paper-water and/or wet-water benefits of effluent reuse. With the updated assumptions of projected supply and demand, this Decision Point has been modified and may occur by 2014 or possibly as late as 2027. By the time this next decision point is reached, Tucson Water will need to have formulated its plans for bringing additional sustainable and/or non-renewable water supplies into use in order to update the City's Assured Water Supply (AWS) designation.

This next decision point will focus on how best to proceed with utilizing its available water resources. These include those that are already on hand as well as potentially new renewable supplies that would have to be imported into the area. In this process, Tucson Water will lay the groundwork for the next extension of the City's AWS designation. The options to be explored by the next decision point include the following both individually and in combination:

1. Acquire additional Central Arizona Project water;
2. Acquire higher priority rights to main-stem Colorado River water;
3. Import ground water from other basins in Arizona;
4. Initiate "full credit" effluent water banking in the Utility's service area; and/or
5. Exhaust the City's reserve of ground-water credits

In addition, other potential options to augment existing supplies such as seawater desalination and potential water exchanges may be possible in the future but such opportunities will most likely be the subject of decision points many decades further out in time.

Bullets #1, #2, and #3 all depend on the Central Arizona Project aqueduct to import new water supplies to Tucson Water's service area. As a result, the current role of CAWCD as operator of the 336-mile long Central Arizona Project system and its potential role as water broker for Maricopa, Pinal, and Pima Counties will likely prove critical in Tucson Water's efforts to augment its existing supplies with imported renewable resources. Intra-state discussions are on-going but it is unclear if and when such a new institutional arrangement will be in place to facilitate reallocations and water transfers. It is possible that imported resources may be available by 2014 but it could be later. Prudent planning dictates that all supply options be considered in the interim given the uncertainty.

The only local water resources currently available in the mid term are the City's effluent entitlement (Bullet #4) and the City's non-renewable reserve of ground-water credits (Bullet #5). The City's effluent entitlement is the only locally generated, renewable supply available to the Utility to support sustainable growth. Expanded use of effluent through marked increases in reclaimed water utilization and/or long-term full-credit banking would augment Tucson Water's renewable water supply portfolio and would further extend in time the availability of its reserve of ground-water credits. This option could ensure the City's ability to sustainably extend its wet-water supplies and its AWS designation for many years while preserving the City's non-renewable reserve of ground-water credits for their preferred purpose—as a transitional supply to be prudently debited while making preparations to acquire or develop the next renewable supply.

Without further developing the City's effluent resources and/or importing additional supplies in the mid term, the City's only option to extending its AWS designation would be to exhaust its reserve of ground-water credits. Although this action would allow the City to further extend its AWS designation for many years and in some scenarios for decades, it would be an unsustainable response to an immediate supply need which could reduce the Utility's planning flexibility in future years. If the ground-water credits were fully utilized to extend the City's AWS in the mid and longer terms, it would be in the City's interest to make arrangements with others (potentially with CAWCD) to import additional renewable supplies, develop its local effluent resources, and implement more aggressive demand-management measures to support sustainable growth in future years. As the Next Decision Point approaches, Tucson Water will provide status updates regarding the need to acquire and/or develop the next renewable supply to meet the projected water demand of anticipated growth.

PROJECTED DEMAND AND RESOURCES

The choices associated with the critical decisions to be made in 2008 and the Next Decision Point after that will help determine how the Utility's water resources will be utilized in future years. They will also affect how quickly Tucson Water will use its available water supplies, how demand may be managed in the future, and how additional wet-water supplies may be developed over time. The water-resource implications of the four demand scenarios discussed in Section Three illustrate how changes in the two critical planning variables could impact resource utilization and the City's AWS designation in future years.

Resource-Utilization Commonalities

Despite the key differences associated with *Demand Scenarios A* through *D*, the four share common resource-utilization assumptions and these are highlighted below:

- Reclaimed-water use will on average offset at least nine percent of the total projected annual water demand through 2050;

- Potable demand will be met in the near term through decreasing dependency on ground-water pumping and increasing reliance on renewable Colorado River water;

- Incidental Recharge refers to aquifer recharge which occurs after the Utility accesses its water sources for supply and constitutes four percent of Tucson Water's annual total demand;

- The City's entire Central Arizona Project allocation will be recovered before the Utility's contracted CAGRD ground-water replenishment volume of up to 12,500 acre-feet per year is utilized;

- The point in time at which renewable water resources associated with imported Colorado River water, Incidental Recharge, and the City's CAGRD contracted volume are fully utilized varies depending on the unique combination of assumptions represented by each of the four scenarios.

Additional background information and the rationales underlying each of the four water demand scenarios are provided in Sections Two and Three in this Update.

Scenario A – Increased Demand Management in the Obligated Area

In addition to decreasing future demand by limiting the Utility's service area expansion to the Obligated Area, this scenario is predicated on the assumption that the Utility's potable GPCD would gradually be reduced by ten percent by 2030. It is assumed that this reduction in per capita demand would be achieved by implementing more aggressive demand-management measures beyond those already in place.

Review of Figure 6-1 provides a view of how the Utility's resource utilization plan is projected to occur under *Scenario A*. The Utility's total water demand is projected to increase from 128,141 acre-feet in 2000 to approximately 180,000 acre-feet in 2030 and to about 215,000 acre-feet by 2050. This projected increase in water demand over time is the smallest of the four scenarios.

Under this scenario, projected potable demand would exceed the sum of the City's annual Central Arizona Project allocation, its Incidental Recharge increment, and its annual CAGRD contracted volume by about year 2032. However, Tucson Water would still have available

after 2032 the balance of its renewable effluent resources not committed to the Utility's reclaimed water system and much of its reserve of non-renewable ground-water credits.

The City could extend its AWS designation to about 2050 by depleting its reserve of ground-water credits; instead, Tucson Water recommends these credits be preserved as long as possible to provide planning flexibility for the future. It is more prudent to use these credits as short-term transitional supplies while additional renewable supplies are being acquired and/or developed.

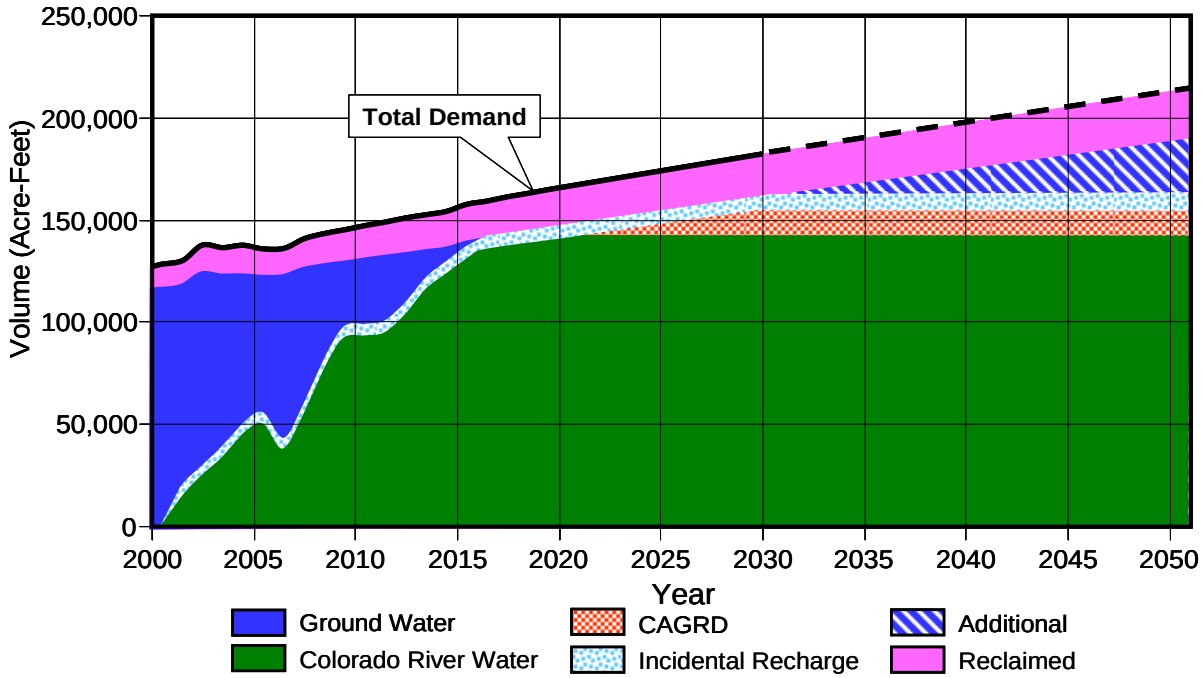


Figure 6-1: Scenario A, Projected Demand and Water Resource Utilization: 2000-2050.

Tucson Water recommends that the resource planning priority be placed on developing additional renewable resources such as the City's effluent supplies, additional imported supplies or a combination of both. In this manner, new growth after 2032 would become more hydrologically sustainable and the City's AWS designation could be extended well beyond the planning horizon of *Water Plan: 2000-2050*. Of the four future scenarios analyzed, *Scenario A* delays the need to develop or acquire additional renewable supplies furthest into the future and maximizes planning flexibility to deal with future uncertainties.

Scenario B – No Increased Demand Management in the Obligated Area

In addition to limiting future demand to within the Obligated Area, this scenario adopts the assumption that the Utility's potable GPCD would remain constant at 163 through 2050 thus assuming a lack of further investment and/or community support for further demand-management activities. Review of Figure 6-2 provides a snapshot of how the Utility's resource utilization is projected to occur under *Scenario B*. Tucson Water's total water

demand is projected to increase from 128,141 acre-feet in 2000 to approximately 200,000 acre-feet in 2030 and to about 235,000 acre-feet by 2050.

Review of Figure 6-2 indicates that projected potable demand would exceed the sum of the City's annual Central Arizona Project allocation, its annual Incidental Recharge increment, and its annual CAGRD contracted volume by about year 2022—ten years earlier than in *Scenario A.* As noted previously, Tucson Water would still have available after 2022 the balance of its renewable effluent resources not already utilized in the Utility's reclaimed water system and most of its reserve of non-renewable ground-water credits.

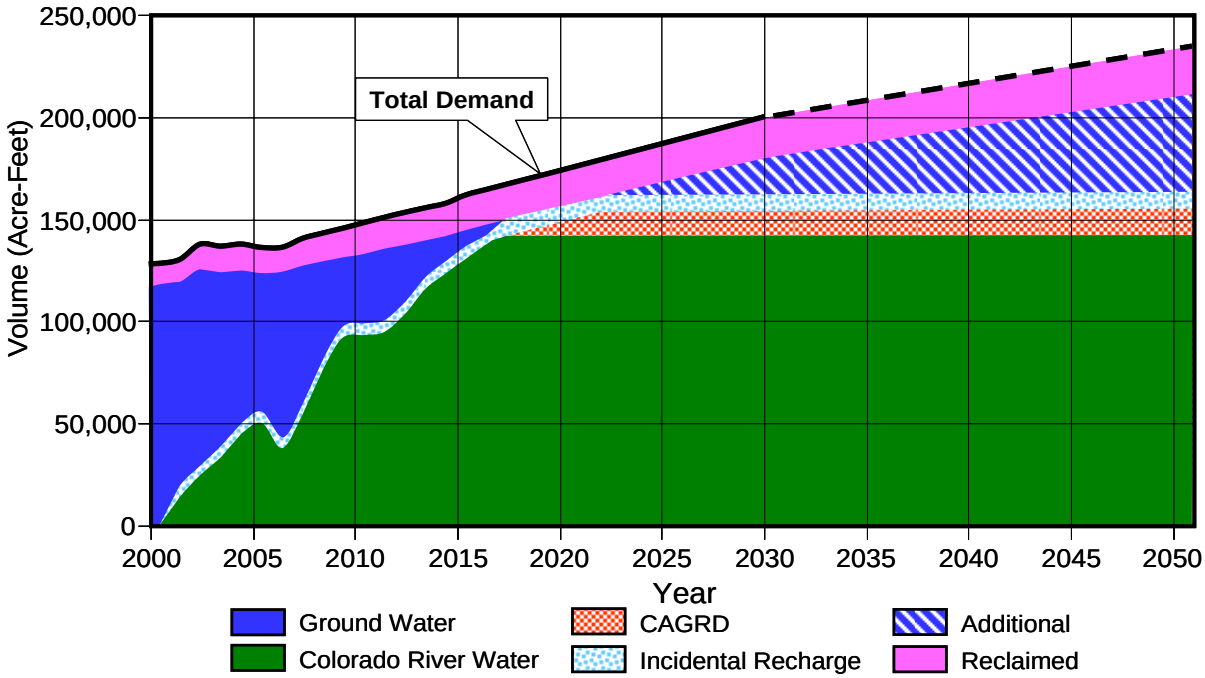


Figure 6-2: Scenarios B & C, Projected Demand and Water Resource Utilization: 2000-2050.

The City could extend its AWS designation to about 2035 by depleting its reserve of ground-water credits. Consistent with *Scenario A*, Tucson Water recommends these credits be preserved as long as possible to provide planning flexibility for the future. It is more prudent to use these credits as short-term transitional supplies while additional renewable supplies are being acquired and/or developed.

Tucson Water recommends that the resource-utilization priority be placed on developing additional renewable resources such as the City's effluent supplies, additional imported supplies or a combination of both. In this manner, new growth after 2022 would become more hydrologically sustainable and the City's AWS designation could be extended even further. Of the four future scenarios analyzed, *Scenario B* only moderately delays the need to develop or acquire additional renewable supplies and provides limited planning flexibility.

Scenario C – Increased Demand Management in the Potential Service Area

Scenario C assumes that Tucson Water's ultimate service area would coincide with the larger Potential Service Area. This scenario also assumes that the Utility's potable GPCD would gradually be reduced by ten percent by 2030. The Utility's total water demand is essentially the same as shown for *Scenario B* in Figure 6-2. This means that *Scenario C* would also exceed the sum of the City's entire annual Central Arizona Project allocation, its Incidental Recharge increment, and its annual CAGRD contracted volume by about year 2022. Similarly, the City could extend its AWS designation to about 2035 by depleting its reserve of ground-water credits. The same water-resource utilization strategy previously discussed for *Scenario B* would apply to *Scenario C*. Again, this scenario would only moderately delay the need to develop or acquire additional renewable supplies and provides limited planning flexibility.

Scenario D – No Increased Demand Management in Potential Service Area

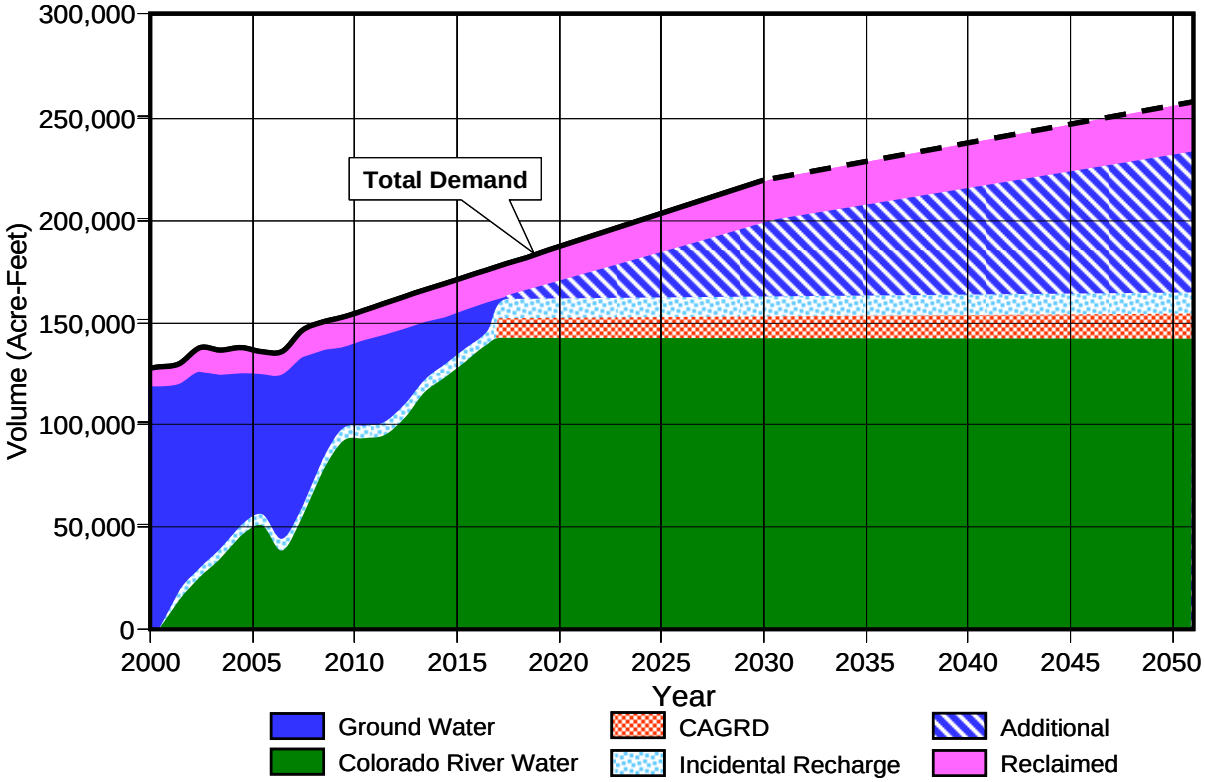


Figure 6-3: Scenario D, Projected Demand and Water Resource Utilization: 2000-2050.

Scenario D is based on the conservative demand assumptions used in *Water Plan: 2000-2050*. *Scenario D* assumes that Tucson Water's future area of service is the larger Potential Service Area and that the Utility's potable GPCD remains constant at 163 through 2050. The Utility's total water demand is projected to increase to approximately 220,000 acre-feet per year by 2030 and about 255,000 acre-feet by 2050.

Review of Figure 6-3 indicates that projected potable demand would exceed the sum of the City's annual Central Arizona Project allocation, its Incidental Recharge increment, and its annual CAGRD contracted volume by about 2017. Tucson Water would still have available beyond 2017 the balance of its renewable effluent resources and most of its reserve of non-renewable ground-water credits.

The City could extend its AWS designation to about 2025 by depleting its reserve of ground-water credits; instead, Tucson Water recommends these credits be preserved as long as possible to provide planning flexibility for the future. It is more prudent to use these credits as short-term transitional supplies while additional renewable supplies are being acquired and/or developed.

Tucson Water recommends that the resource planning priority be placed on developing additional renewable resources such as the City's effluent supplies, additional imported supplies or a combination of both. In this manner, new growth after 2017 would become more hydrologically sustainable and the City's AWS designation could be extended further out in time. Of the four future scenarios analyzed, *Scenario D* is the least able to delay the need to develop or acquire additional renewable supplies and provides the least planning flexibility with which to deal with future uncertainties.

WHAT LIES AHEAD

The water-resource opportunities, critical decision points, and conservation impacts described in this section are graphically summarized on Figure 6-4, a conceptual planning timeline which extends from 2000 to 2050. From 2000 to 2010, Tucson Water's primary focus is to fully utilize its annual CAP allotment before a shortage on the Colorado River is declared. To provide a solid foundation for a sustainable water future, Tucson Water must bring its full allocation of Colorado River water into use as early as 2009. The outcome of *Decision H2O* will determine if the Utility must bring an enhanced treatment plant into operation.

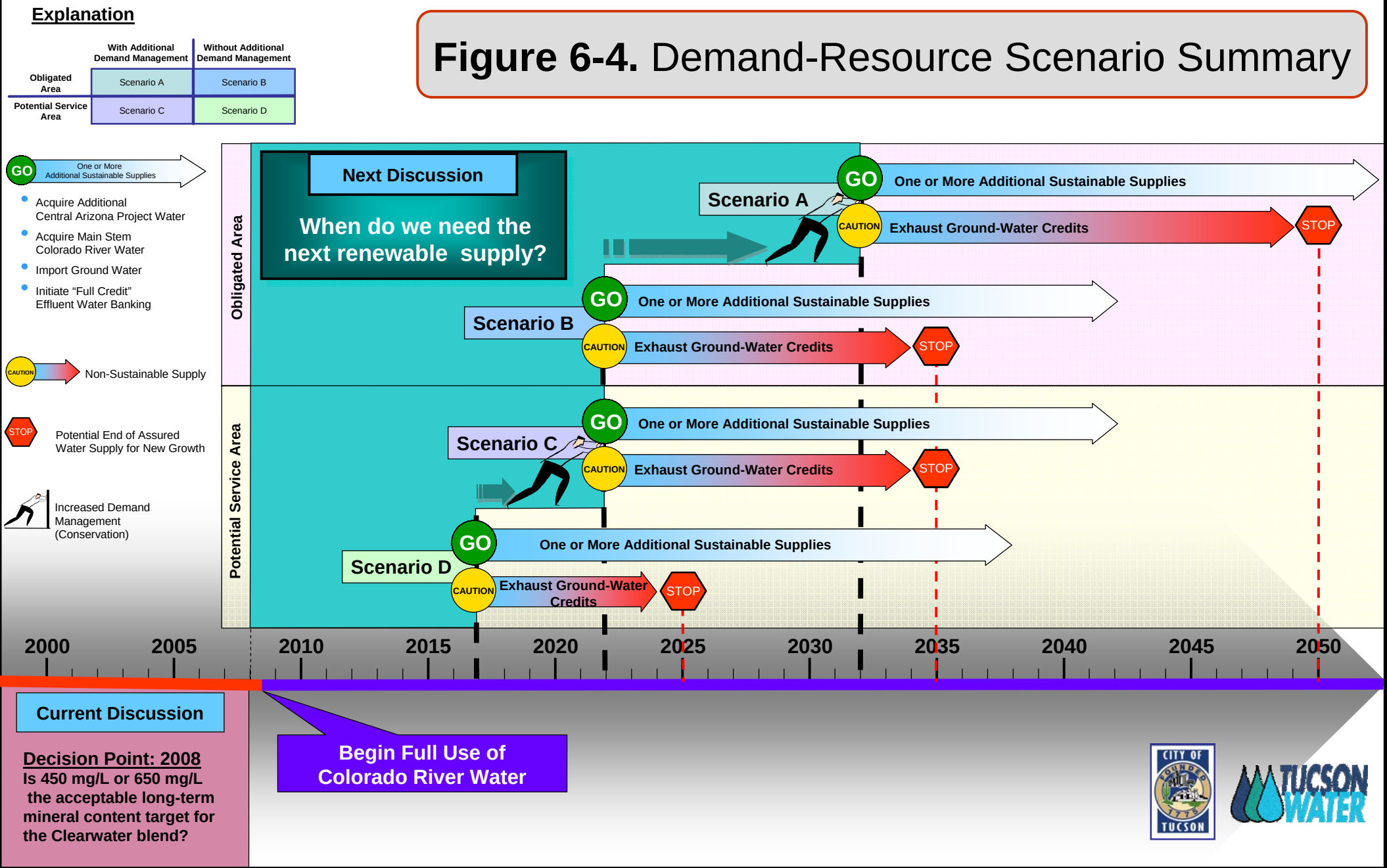
Beyond 2010, the community faces the challenge of determining its long-term water future. The Utility fortunately is not limited to exhausting its reserve of ground-water credits to extend its AWS designation to meet the needs of anticipated growth. Tucson Water has a number of potential opportunities to acquire or develop additional water supplies. These potential opportunities have been discussed in detail in this section and summarized on Figure 6-4.

Assuming either *Scenario B, C, or D* is the most representative portrayal of future demand, it is currently projected that the Utility would need to have a plan in place to acquire/develop additional supplies by about 2014 or 2017 in order to preserve its ground-water credits for the longer term. This would coincide with the time by which the Next Decision Point would occur.

In contrast, if *Scenario A* more closely approximates future water demand, Tucson Water would need to have a plan to acquire/develop additional supplies in place by about 2027. Under *Scenario A*, this would be the approximate time of the Next Decision Point by which direction would be required. If additional renewable supplies are made available for use, the limit of the Utility's hydrologically sustainable water supply for new growth can be ensured and even extended beyond 2050.

How far this threshold can be extended into the future will depend on the areal extent of Tucson Water's future service area, whether there is a commitment to invest in additional, more aggressive demand-management measures, and the volume of additional renewable resources that the Utility is able to develop locally and/or import into the Utility's service area.

Figure 6-4. Demand-Resource Scenario Summary



SECTION SEVEN

CONCLUSIONS

The water-resource planning environment is in constant flux. In *Water Plan: 2000-2050*, Tucson Water provided recommendations that would allow the Utility to achieve the specified planning goals while retaining maximum flexibility. These are updated below in order to reflect the actions and changes which have occurred since the plan was issued in 2004.

UPDATED RECOMMENDATIONS

Many of the recommendations and conclusions noted in *Water Plan: 2000-2050* have already been implemented while others are currently in process or have been revised to reflect the changing planning environment. The updated recommendations are summarized below.

1. **Emphasize "Wet" Water Management Strategies**: The community's sustainable future ultimately depends on maintaining a physical hydrologic link between renewable water sources and the infrastructure needed to convey those waters to customers within the projected service area.

2. **Utilize Renewable Ground Water**: Tucson Water plans to limit its ground water withdrawals at or below this hydrologically sustainable level in order to ensure the long-term viability of the aquifer within the Utility's service area.

3. **Preserve City's Ground-Water Credits for Longer Term:** The City could extend its AWS designation under any future scenario by depleting its reserve of non-renewable ground-water credits in the near or mid terms. Instead, Tucson Water recommends that these credits be preserved as long as possible to provide planning flexibility for the future. It is more prudent to use these credits as short-term transitional supplies while additional renewable supplies are being acquired and/or developed. This would ensure that the water resources needed to support new growth will be hydrologically sustainable.

4. **Reassess the Water-Quality Target for Colorado River Water**: Customer preferences are being reassessed through the on-going *Decision H20* program by linking costs and environmental sustainability issues with potential mineral level targets. The goal is to finalize this aesthetic water-quality management decision in 2008.

5. **Fully Utilize Colorado River Water**: Between CAVSARP, SAVSARP, and the Pima Mine Road Recharge Project, the Utility will have sufficient recharge capacity in place to fully use its Central Arizona Project allocation as early as 2009.

6. **Fully Utilize Effluent for Future Supply**: Tucson Water recommends that the resource-management goal should be to maximize the future use of the City's effluent through additional treatment and recharge in order to augment the aquifer within Tucson Water's service area.

7. **Acquire Additional Water Supplies**: The City of Tucson is already exploring opportunities to acquire potentially available supplies to augment its water-resource portfolio. The availability of additional water resources will become increasingly competitive and costly both locally and statewide. The Utility is encouraged that the Central Arizona Water Conservation District is actively exploring ways to play the leading role in acquiring additional supplies for water interests in its three-county service area.

8. **Manage Water Demand**: Tucson Water is taking a number of actions to further manage demand including expanded conservation programming, reducing lost and unaccounted for water, encouraging the practice of water harvesting, and providing public information programs. Additional demand management efforts have been evaluated and recommended by the Community Conservation Task Force to further reduce per capita potable water use.

9. **Adjust Development Fees to Shift the Cost of Growth to New Customers**: Tucson Water has developed a financial plan that continues to shift the cost burden of growth to new customers as they are added to the system. The Utility recommends that in the future, development fees be adjusted to ensure that existing customers do not inordinately bear the cost of growth.

10. **Continue to Expand Regional Cooperation**: Tucson Water has taken steps to initiate new cooperative efforts and expand existing ones with local providers. These cooperative actions focus on acquiring additional sources of water supply, developing resource credit banking agreements, and exploring potential win-win arrangements to wheel renewable resources within the region.

MORE ON REGIONAL COOPERATION

Over the years, Tucson Water has been an active participant in many formal and informal local groups such as the Southern Arizona Water Users Association (SAWUA) where local water-management issues are discussed. In 2004, Tucson Water began discussions about regional cooperation on water-resource issues with the largest water providers in the area. These discussions resulted in a 2006 proposal from SAWUA for a cooperative water-supply organization.

At approximately the same time, the Central Arizona Water Conservation District (CAWCD) Board developed a strategic plan that included the goal of acquiring additional water resources on the behalf of all water providers within its three-county service area. In effect, CAWCD proposed performing the same functions as envisioned under the SAWUA proposal but on a much larger and far-reaching scale. In addition, Pima County has proposed the establishment of a countywide water-and-wastewater authority which would include all public and private water and wastewater providers located within the county.

As these alternative proposals have been discussed, local water providers have continued to discuss potential cooperative projects related to water supply and management. The discussions have included concepts such as joint projects for delivering renewable water supplies to areas of need, common issues and concerns for coordinated lobbying at the State level, and consideration of water credit transfers to reduce costs to ratepayers and meet water-management goals.

Tucson Water has extensive credit account balances from recharged Colorado River water, recharged effluent, and groundwater credits. Making these "paper water" credits available to other water providers can benefit water ratepayers in the region and Tucson Water can leverage these resources in ways that provide benefits to its own ratepayers. In early 2007, Tucson Water took the discussions a step further and proposed principles and limitations for future credit transfers. The other local water providers agreed that the principles would include the transfer must benefit regional water management goals, must benefit water ratepayers, and must be a win-win for both parties. Tucson Water notified local water providers of the principles and limitations and the available credits for transfer. Two local water providers expressed potential interest and discussions are ongoing.

REASSESSING THE FUTURE

The recommended plan will periodically be reassessed and revised as planning assumptions and circumstances change over time. Within the 50-year planning horizon, new water planning futures will undoubtedly materialize while those currently envisioned may evolve or fade away. Tucson Water will continue to update and improve the planning tools developed to support this planning process. These tools will allow the Utility to update planning projections and to complete comprehensive revisions in an expeditious manner. Future updates and/or comprehensive revisions to this plan may be initiated by the following:

- Specific direction provided by the City of Tucson's Mayor & Council.
- Significant change in PAG's updated population projections.
- Marked change in the anticipated size of Tucson Water's future service area.

- Significant changes in the current or projected availability of water resources.

- Advent of new technologies that could alter costs and/or the technical effectiveness of planning elements.

- Marked changes in the regulatory environment in terms of water-quality and/or water-use requirements.

- Major shifts in the preferences of Tucson Water customers.

Through prudent resource planning, Tucson Water has diversified its portfolio of water resources to include not only ground water but also Colorado River water and reclaimed water. Tucson Water will ensure a sustainable water future within its service area by continuing to reduce the community's reliance on ground water while working toward maximizing the use of its renewable supplies. The Utility is also committed to continue upgrading its water storage and conveyance facilities ensuring a highly reliable and efficient link between its water supply sources and the community's many points of use.

Tucson Water currently has access to sufficient supplies of ground water, Colorado River water, and reclaimed water to extend its AWS designation for decades. Current water demand projections indicate that failure to acquire additional renewable water resources and/or not fully utilizing the balance of the City's effluent entitlement in a timely manner means that Tucson Water would have to deplete its finite paper-water reserve of ground-water credits to satisfy near- and mid-term demands. Conversely, fully utilizing the balance of the City's entitlement of effluent through long-term banking and/or acquiring additional renewable supplies that would be imported into the area would extend the City's AWS designation for many decades. And as shown in the scenario analysis, more effective conservation measures could markedly reduce projected water demand which in turn would extend the City's AWS designation even further.

This is the first update to *Water Plan: 2000-2050,* and there will be others in the years to come. As critical planning assumptions change and as new uncertainties arise, a new comprehensive revision to Tucson Water's long-range plan will be needed to reset the compass. As the present unfolds into the future, the primary necessity is to prepare for change since it is the only certainty. This recognition reinforces the need for continuous resource planning and wise water management.

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APPENDIX A

CONSERVATION MEASURES RECOMMENDED BY THE COMMUNITY CONSERVATION TASK FORCE

I	**Rebates & Incentives (8)**	Single-Family Residential	• Ultra-Low-Flow Toilet Rebate • Gray Water Incentive
		Multi-Family Residential	• Irrigation System Upgrade Rebate • High Efficiency Toilet Rebate
		Commercial/ Industrial	• In-door/Out-door Sub-metering Incentive • Ultra-Low-Flow Toilet Rebate • Pre-rinse Spray Valve Rebate • Waterless Urinal Rebate
II	**Retrofit on Resale Ordinances (5)**	Multi-Family Residential	• Irrigation System Retrofit on Resale Ordinance • Ultra-Low-Flow Toilet Retrofit on Resale Ordinance • Condominium Conversion: In-door/Out-door Sub-metering Incentive
		Commercial/ Industrial	• Irrigation System Retrofit on Resale Ordinance • Passive Water Harvesting Retrofit on Resale Ordinance
III	**New Construction Ordinances (4)**	Multi-Family Residential	• Revised Landscape Design Standards • In-door/Out-door Sub-metering Ordinance • Irrigation System Design Ordinance
		Commercial/ Industrial	• Water Harvesting and Gray Water Ordinance
IV	**Demonstration Programs (3)**	All Sectors	• Hot Water Re-circulation Program • Smart Irrigation Controller Program • Water Harvesting Program
V	**Other (2)**	Multi-Family Residential	• Ultra-Low-Flow Toilet Community-Based Distribution
		Other	• Ultra-Low-Flow Toilet Vendor-Driven Delivery

APPENDIX B

CITY OF TUCSON WATER DEPARTMENT DROUGHT PREPAREDNESS AND RESPONSE PLAN

Answers to Commonly Asked Questions

1. What is a "Drought Preparedness and Response Plan"?

A new law passed in 2005 required all Arizona water systems to develop a drought preparedness and response plan and file it with the Arizona Department of Water Resources ("ADWR") by January 1, 2007. **TUCSON WATER** developed a plan that addresses the potential impacts of drought on the water resources our community depends upon, and outlines the actions we would take in response to increasing impacts associated with sustained drought. Mayor & Council approved the Plan on November 28, 2006 and an implementation ordinance (No. 10380) was approved on March 20, 2007.

2. What does "drought" mean?

To ensure that our Drought Preparedness and Response Plan meets the requirements of the State of Arizona, **TUCSON WATER** uses the same definition of drought that is used in the State's own Plan: *"a sustained, natural reduction in precipitation that results in negative impacts to the environment and human activities."*

3. The City already has an "Emergency Water Conservation Ordinance" - Doesn't it already address drought?

The 1995 Emergency Water Conservation Ordinance (No. 8461) broadly outlines a response plan for an unforeseen event. Unlike an emergency situation, it is important to recognize that drought impacts to water supplies typically do not occur without warning, particularly for a large, multi-source water system such as Tucson's. With proper planning and investment, **TUCSON WATER** may avoid ever experiencing a water crisis as a result of drought.

TUCSON WATER's Drought Preparedness and Response Plan refines and expands upon the 1995 ordinance. Drought indicators and response measures were developed to fit the unique characteristics of the Utility's water resources, water system attributes, and customer-use patterns so that the Utility can appropriately respond to potential drought impacts on its water supplies. For example, our use of Colorado River water ("CAP" water) as part of our drinking water supply is unique in the Tucson region. The use of both groundwater and CAP water supplies, particularly the operation of the Clearwater recharge and recovery system, provides a high degree of water supply reliability to **TUCSON WATER** customers during times of local drought.

4. What does Tucson Water's Drought Preparedness and Response Plan include?

Tucson Water's Plan includes four drought response stages:

Stage 1 — *Will be declared based on regional indicators such as a severe and sustained drought on the Colorado River and/or a State declaration of drought in the Tucson region.*

Stage 2 — *Will be declared if an initial shortage (i.e., a shortage that does not affect municipal uses) is declared on the Colorado River, or if local system factors require additional response actions.*

Stage 3 — *Will be declared based on limited reductions in CAP deliveries to the City or if local system factors require additional response actions.*

Stage 4 — *Will be declared based on additional reductions in CAP deliveries to the City or if local system factors require additional response actions.*

5. How will each stage affect me?

As you might expect, the more a drought affects our ability to deliver water, the more stringent the responses must become. All response measures implemented during a lower response stage will remain in effect in later stages, along with additional measures. **TUCSON WATER**'s Drought Plan includes some of the following recommended actions.

Stage 1

Public education on drought issues;
Modify water system operations;
City departments identify water-saving and water efficiency measures for all City facilities;
Possible additional measures may include voluntary self-audit programs for commercial, multi-family and industrial users.

Stage 2

Additional public education and additional system or operational actions;
Prohibit public fountains and other non-essential uses within City operations;
Implement water savings/efficiencies identified in Stage 1 for all City uses of potable water;
All potable water users requested to make additional voluntary reductions;
Mandatory self-audits required for commercial, multi-family, and industrial users;
Irrigation restrictions required for commercial, multi-family, and industrial customers.

Stage 3

Mandatory water reductions by all potable water users; and
Plumbing retrofit on resale for residential, commercial, multi-family, and industrial users.

Stage 4

Implement the City's Emergency Water Conservation Ordinance;
Non-essential outdoor water use restricted or prohibited;
Restaurants provide water only upon request;
Outdoor misting systems in public areas prohibited;
No filling of swimming pools, fountains, spas or other exterior water features;
Car Washes only at facilities which recycle water, except for emergency vehicles; and
Additional response actions may be developed if warranted.

6. What are Tucson's back-up or emergencies water supplies?

Groundwater can serve as a short-term backup supply, but the Plan acknowledges that long-term reliance on groundwater is not sustainable. To minimize groundwater overuse, **TUCSON WATER** may require additional mandatory demand reductions and/or develop alternative renewable water supplies.

7. Will the Plan ever be changed?

The Plan will be updated regularly to reflect changing conditions and as new information is developed.

8. Who can I contact for more information?

Contact the Tucson Water Conservation Office at 791-4331 for additional information.

APPENDIX C

EFFLUENT GENERATION PROJECTION MEMORANDUM

Water Department

MEMORANDUM

Pima County Wastewater Management Department

Date: November 29, 2005

To: David V. Modeer, Director, Tucson Water
Michael Gritzuk, Director, Pima County Wastewater Management Department

From: Joint Planning Group – Population and Effluent Projections

Pima County Bill Richardson, Steve Munsell, John Regan

Tucson Water Tim Thomure, Dean Trammel, Sandy Elder, Peter Chipello

Subject: Resolution of Population and Effluent Variances between the Tucson Water and Pima County Wastewater Management Long-Range Plans

Within the last year, the Pima County Wastewater Management Department (PCWMD) and Tucson Water have each released draft long-range plans for community comment. Staff members of PCWMD and Tucson Water have met frequently over the last several months to resolve the methods used by each entity to project future population and effluent availability in the greater Tucson area. The details of this process are provided in the attached "Joint Planning Summary".

The initial drafts of Tucson Water's *Water Plan: 2000-2050* (November 2004) and Pima County Wastewater Management Department's *Facility Plan* (May 2005) presented markedly different projections of future population and effluent availability even though both plans utilized data from the Pima Association of Governments (PAG) in their analyses. These differences are attributable to the following factors:

- The data sets used by each entity were different (although both were obtained from PAG),
- The two plans covered slightly different time horizons,
  The two plans covered significantly different areas, and
- Each entity applied its own set of assumptions to project effluent volumes.

The methods used in each draft plan are defensible in their own right; however, the desire to achieve consistent results led to the formation of the Joint Planning Group.

This process has resulted in concurrence amongst the members of the Joint Planning Group on recommended projections of population and effluent availability to be used in the final versions of each plan. Both plans will project population and effluent availability within the five major sewer tributary areas (Roger Road including the Randolph Plant, Ina Road, Marana, Avra Valley, and the Southlands

including Corona de Tucson) for every five years through 2030 based on PAG's Traffic Analysis Zone (TAZ) data. Both entities will assume the same factors for the percentage of population on septic systems and the daily per capita rate of sewer return flow. For the year 2030, the Joint Planning Group projects a total of 1,247,963 customers on sewer that will generate 106.14 MGD (118,900 AF/YR) of effluent in the five sewer tributary areas.

In addition to resolving the current projections of population and effluent availability, the Joint Planning Group developed recommendations for further work. These recommendations include:

- Provide the results of this process to PAG for use in their current "208 Plan" update,
- Closely monitor water deliveries and sewer return flows in two neighborhoods (one established and one newly constructed) to collect additional information on effluent generation over time, and
- Continue an ongoing dialogue between PCWMD, Tucson Water, and PAG staff to obtain improved future projections of population and apply consistent assumptions for forecasting effluent availability in the community.

If you should have any questions regarding this transmittal memorandum or the attached Joint Planning Summary, please contact Bill Richardson (PCWMD) at 740-6567 or Tim Thomure (Tucson Water) at 791-5080 x1404.

CC:

City of Tucson – Marie Pearthree, Bruce Johnson, Dennis Rule, Ralph Marra, Jeff Biggs, Mark Seamans, Karen Dotson, Chris Avery, Joint Planning Group Members

Pima County – Paul Bennett, Ed Curley, Harlan Agnew, Paul Loucks, Jackson Jenkins, Joint Planning Group Members

Joint Planning Summary

Background

Within the last year, the Pima County Wastewater Management Department (PCWMD) and Tucson Water have each released draft long-range plans for community comment. Projections of population and effluent production are critical factors that affect both plans. In order to bring a common basis to influent/effluent forecasting, PCWMD and Tucson Water staff have met periodically to discuss and resolve the variances between their respective population and effluent projections. For purposes of this discussion, Treatment Plant influent and effluent flows are used interchangeably.

Population

Tucson Water's draft Water Plan ("Water Plan: 2000-2050" – November 2004) used the Pima Association of Governments (PAG) Transportation Analysis Zone (TAZ) population forecast to estimate the effluent flow in the Tucson Water Long Range Planning Area for the years through 2030.

Pima County Wastewater Management Department's Facility Plan first draft (May 2005) used PAG's Census Tract data in the Facility Plan Model to forecast influent flow to the five major plants (Roger Road including the Randolph Plant, Ina Road, Marana, Avra Valley, and the Southlands including Corona de Tucson) in the Eastern Pima County Area for the years through 2025. The Census Tract and TAZ population forecasts vary significantly in magnitude and location of growth.

Based on the recommendations of PAG and discussions with Tucson Water, PCWMD will use the PAG TAZ population forecasts through 2030 in its final version of the Facility Plan. PAG supplied PCWMD with its TAZ population forecasts in June 2005. PCWMD has incorporated these forecasts in its Facility Plan Model to develop the Treatment Plant influent projections that will be compared to the Tucson Water effluent projections based on TAZ data.

Tucson Water compared the PCWMD June 2005 TAZ projections with the TAZ data issued in 2003 that was originally used in the Water Plan. These two data sets are slightly different; therefore, Tucson Water will utilize the more recent PAG TAZ data to update the Water Plan projections. The 2005 PAG TAZ's will be used to generate the joint TW/PCWMD projections.

Also of note, PAG is in the process of upgrading its method of projecting population to the process currently used by the Maricopa Association of Governments (MAG). The MAG model is based on a 1-acre grid which is much more refined than the TAZ data. PCWMD and Tucson Water anticipate using the 2005 PAG TAZ data until such time as PAG develops the new system. However, if the new system is not on-line within two to three years, both entities will request updated TAZ projections from PAG for updating their respective plans.

Tucson Water Long Range Planning Area vs PCWMD Five Treatment Plant tributary areas

Tucson Water's Long Range Planning Area encompasses eastern Pima County from Robles Junction in the west to the Pima/Cochise county boundary in the east and from the Pinal County line in the north to Pima Mine Road in the south. The area defined by PCWMD's five treatment plant tributary boundaries is significantly smaller. The areas included in the Water Plan but not in PCWWM's Facility Plan are generally on the outskirts of the Metropolitan area in regions of low population density. The population in the non-overlapping areas is about 3% of the 2030 projected population (45,187 out of a total of 1,382,587 people). The use of different planning areas for each entity is appropriate due to the different purposes of each plan. However, in order for both entities to utilize the same projections of future effluent generation, these areas must be reconciled as discussed below.

Effluent/Influent Quantity Generation Methodology

Tucson Water's Previous Methodology
In the draft Water Plan, Tucson Water forecasted effluent quantities based upon a population of 1,405,799 people living within the Long Range Planning Area in 2030. Tucson Water records support potable water deliveries of 162.84 gallons/person/day (GPCD) over the past several years. This per capita water usage was assumed to remain unchanged through 2030. To project future effluent quantities, Tucson Water applied a sewer return flow factor of 60% of potable supply or 162.84 x 60% = 97.7 GPCD. Tucson Water further estimated that 90% of the population in the Long Range Planning Area will be connected to a wastewater treatment plant in 2030 (1,405,799 x 90% = 1,265,219 people). Based on these assumptions, that population would generate 123.62 MGD (138,469 AF/YR).

Pima County Wastewater Management Department's Previous Methodology
PCWMD forecasted influent flow by arranging the individual sewer basins in the five treatment plant tributary areas in a hierarchal manner from the basins on the outskirts of the metropolitan area to the basins closest to the treatment plant. The basins in each tributary area flow to the next basin through the major interceptors in the conveyance system. The population within each basin was assigned a return flow in GPCD and the calculated flow was compared to flow meters located within the collection system in 2005. A system-wide average figure of about 85 GPCD was found to most closely match the metered flow in 2005 and was thus used in the Facility Plan projections through 2025. Further, the number of people on septic within each basin as of 2005 was estimated from the Pima County Map Guide by observing the location of sewer lines in relation to housing. Housing without adjacent sewers was considered on septic. For future projections, all new development within the five treatment plant tributary areas was assumed to be connected to sewer. (Therefore, the population on septic systems is projected to remain unchanged through 2025 within the five treatment plant tributary areas.) The overall percentage of septic tank usage projected for the year 2025 within the five tributary areas was about 6.7%. The draft Facility Plan applied the calculated GPCD factors and septic percentages to the PAG Census Tract data for future years to project effluent production. The draft Facility Plan projected an effluent volume for the five treatment plant tributary areas (Roger Road including the Randolph Plant, Ina Road, Marana, Avra Valley, and the Southlands including Corona de Tucson) for 2025 of 87.27 MGD (97,750 AF/YR).

Joint Planning Future Methodology
In order to achieve consistent projections of effluent, PCWMD and Tucson Water staff discussed the most appropriate data sets and assumptions to apply. The entities agreed to the following:

PCWMD will shift toward using the PAG TAZ data and will extend their plan to 2030;
Tucson Water will continue use of the PAG TAZ's, but will update to the 2005 data set;
PCWMD will summarize the development of the GPCD sewer return flow rates (Table 1) in the final Facility Plan and Tucson Water will reference this source in the final Water Plan;
PCWMD will summarize the development of the septic usage values (Table 1) in the final Facility Plan and Tucson Water will reference this source in the final Water Plan;
Tucson Water will adopt the GPCD sewer return flow rates developed by PCWMD (instead of using 60% of potable GPCD);
Tucson Water will adjust its method of estimating the use of septic tanks as follows:

1) The population located within the Long Range Planning Area, but outside of the five sewer tributary areas, will be assumed to be on septic.
2) The population located within the five sewer tributary areas will assume to have the septic usage values presented in Table 1.

The net result of these agreements is that, for purposes of projecting effluent availability:

- Both entities will be working from the same basic data set (PAG TAZ 2005),
- Both entities will assume the same number of customers connected to septic in five-year increments (see Table 1), and
- Both entities will apply the estimated GPCD factors (Table 1) to calculate sewer return flows in five-year increments.

Utilizing this methodology, PCWMD's and Tucson Water's current estimate of the total population within the five treatment plant tributary areas in the year 2030 is 1,337,400 people. (The total population located within Tucson Water's Long Range Planning Area is 1,382,587, with the assumption that the 45,187 people living outside the five tributary areas will be served by septic systems.) Applying the septic and GPCD factors shown in Table 1 results in a projection of 1,247,963 persons on sewer in the five plant tributary areas in 2030, generating 106.14 MGD (118,900 AF/YR) of influent/effluent. This volume is then analyzed based on the various intergovernmental agreements relating to effluent to determine the projected distribution of effluent entitlements in 2030 for resource planning purposes. Table 1 presents the projected population, effluent volume, GPCD factor, and septic tank factor for every five years from 2005 through 2030.

Roger Road, Ina Road, Avra Valley, Marana and Southlands Treatment Plants

	2005	2010	2015	2020	2025	2030
Total Projected Population in Sewer Basins	837,571	928,849	1,031,142	1,133,129	1,235,513	1,337,400
Projected Population on Septic Systems	89,437	89,437	89,437	89,437	89,437	89,437
Percentage of Projected Population on Septic Systems	10.68%	9.63%	8.67%	7.89%	7.24%	6.69%
Projected Population Connected to Sewer	748,134	839,412	941,705	1,043,692	1,146,076	1,247,963
Sewer Flow GPCD Factor	85.53	85.39	85.28	85.18	85.12	85.05
Total Influent/Effluent Plant Flows (MGD)	63.99	71.68	80.31	88.90	97.55	106.14
Total Influent/Effluent Plant Flows (AF/YR) - *Rounded*	71700	80300	90000	99600	109300	118900

Table 1 – Projections of Population and Effluent, 2005-2030

Also of note, the Pima Association of Governments (PAG) is in the process of updating the regional "208 Plan" relating to wastewater planning. TW and PCWMD staff have met with PAG staff and have determined that the 208 Plan will use these same projections of population and effluent generation. PCWMD and Tucson Water have also agreed to study two test areas within the sewer collection systems to collect additional information on the GPCD factor and determine if/how this factor may change in the future as new development occurs. The two areas include an older neighborhood located in central Tucson and a newly constructed neighborhood in the Continental Ranch area. Finally, PCWMD and Tucson Water staff agree to work cooperatively in the future when forecasting effluent availability so that subsequent planning efforts are closely aligned for the community.

APPENDIX D

A PRIMER ON THE COLORADO RIVER AND THE POTENTIAL FOR SHORTAGE

The Colorado River is one of the primary sources of water supply, power generation, recreation, and environmental habitat in the western United States. The river channels runoff from a drainage area of about 246,000 square miles within seven states to meet the water supply needs of over 25 million Americans. It provides a large part of the State's water-supply portfolio and by virtue of the Central Arizona Project, it is the largest renewable water source available to Tucson Water.

A shortage has yet to be declared on the Colorado River, but one will likely occur in the coming years. Depending on its magnitude, a shortage could have negligible to very significant impact on water providers who rely on this water source to meet water demand within their service areas. This appendix summarizes what a declaration of shortage means and how prepared Tucson Water is to meet such a challenge.

BACKGROUND

The Utility's access to the Colorado River relies on the State of Arizona's annual apportionment of Colorado River water, a physical delivery mechanism called the Central Arizona Project, and the City of Tucson's Municipal and Industrial (M&I) subcontract. These elements determine the means through which Tucson Water has rights to using Colorado River water and the relative priority of the City of Tucson's Central Arizona Project allocation in times of shortage.

Colorado River Water Apportionment

The waters of the Colorado River were first apportioned between the states of the upper basin division (Colorado, New Mexico, Utah, and Wyoming) and the lower basin division (Arizona, California, and Nevada) under the Colorado River Compact of 1922. Each of the basins were allocated 7.5 million acre-feet per year. The division point between the two basins was identified as Lee's Ferry which is located where Arizona State Highway 89 crosses over to the north side of the Colorado River. However, the Compact did not apportion annual rights to Colorado River water to individual states within the upper or lower basin divisions.

The specific allocation of water between the three lower basin states was set forth a number of years later in the Boulder Canyon Project Act of 1928. Under this Act, and as shown on Figure D-1, the State of Arizona obtained rights to 2.8 million acre-feet per year of Colorado River water. In 1944, a Treaty for the Utilization of Waters of the Colorado and Tijuana Rivers and the Rio Grande was established between the United States and Mexico. Under this Treaty, the Republic of Mexico was annually allotted 1.5 million acre-feet of Colorado

River water. Allocation of Colorado River water amongst the upper basin states occurred in 1948 under the Upper Colorado River Basin Compact. Review of Figure D-1 indicates that the annual apportionment among the upper basin states were specified in terms of percentages while those among the lower basin states and Mexico were specified as quantified annual volumes.

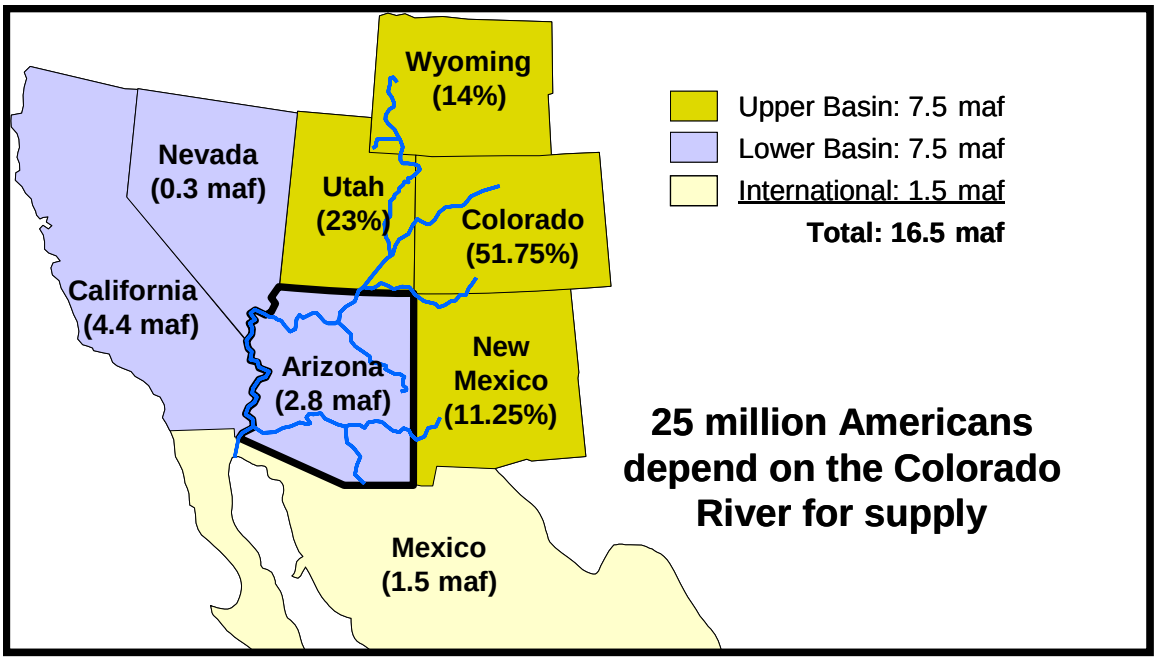

Figure D-1: Annual Allocations of Colorado River Water by State and Mexico

It took many decades before Arizona was able to fully utilize its allocation, and the State had to withstand a series of attempts to take its unused portion away. Over time, these inter-state issues were resolved, and many Arizona communities, Native American tribes, and agricultural interests have obtained their own rights to a portion of Arizona's annual allocation. These allocations were obtained pursuant to the master repayment contract between the U.S. Bureau of Reclamation and the Central Arizona Water Conservation District (CAWCD) related to the Central Arizona Project (Contract No. 14-06-W-245). In the case of the City of Tucson, an allocation of Colorado River water was acquired through its subcontract with the CAWCD and the U.S. Bureau of Reclamation (Contract No. 9-07-30-W0199). Tucson's allocation has changed over time due to various re-allocations, water system acquisitions, and legal settlements. As discussed in Section Four, the City's current allocation is 135,966 acre-feet per year with two pending reallocations that will bring the total to 144,191 acre-feet per year in the near future.

Central Arizona Project

The Central Arizona Project is a 336-mile long system of aqueducts, pipelines, and pumping plants that extends from Lake Havasu to the southwestern edge of Tucson. The project is designed to deliver about 1.5 million acre-feet of Colorado River water per year to Pima,

Pinal, and Maricopa counties, and it is the largest single source of renewable water supplies in Arizona.

Efforts to develop the Central Arizona Project began in earnest in 1946 when the Central Arizona Project Association was formed to educate Arizonans and lobby the United States Congress to authorize its construction. Construction was finally authorized in 1968 under the Colorado River Basin Project Act which enabled the U.S. Department of the Interior (and the Bureau of Reclamation) to fund and construct the Central Arizona Project and established a repayment mechanism to recover costs. In 1971, the Central Arizona Water Conservation District (CAWCD) was created to provide a means for Arizona to repay the federal government for project construction and to manage and operate the Central Arizona Project. Construction took twenty years and the entire project cost over $4 billion (Central Arizona Project, 2007a).

Pursuant to the City of Tucson's subcontract with CAWCD, the City's allocation of Central Arizona Project water is designated for Municipal and Industrial (M&I) use. An M&I allocation has the highest priority within the Central Arizona Project allocation hierarchy along with Native American allocations.

Colorado River Water Availability

In-stream flows at Lee's Ferry can vary widely from year-to-year. Review of Figure D-2 indicates that the magnitude of the annual flows at Lee's Ferry have on average been trending downward. In recent years, the annual flows have continued to decline overall due to the ongoing multi-year drought in the Colorado River basin (United States Geological Survey, 2004).

The time period used to estimate water flows for apportionment under the Colorado River Compact in 1922 was from 1905 to 1922. Unknown at the time, this time period had the highest long-term annual flow volume of the past century averaging 16.1 million acre-feet per year at Lee's Ferry (USGS, 2004). Further review of Figure D-2 indicates that annual flows of the Colorado River have generally been below 16.1 million acre-feet since 1920. This in turn means that the time will come when some Colorado River water users will experience periods of shortage despite the presence of significant storage reservoirs on the system. Projections based on current on-river conditions strongly suggest that the first shortage may be close at hand.

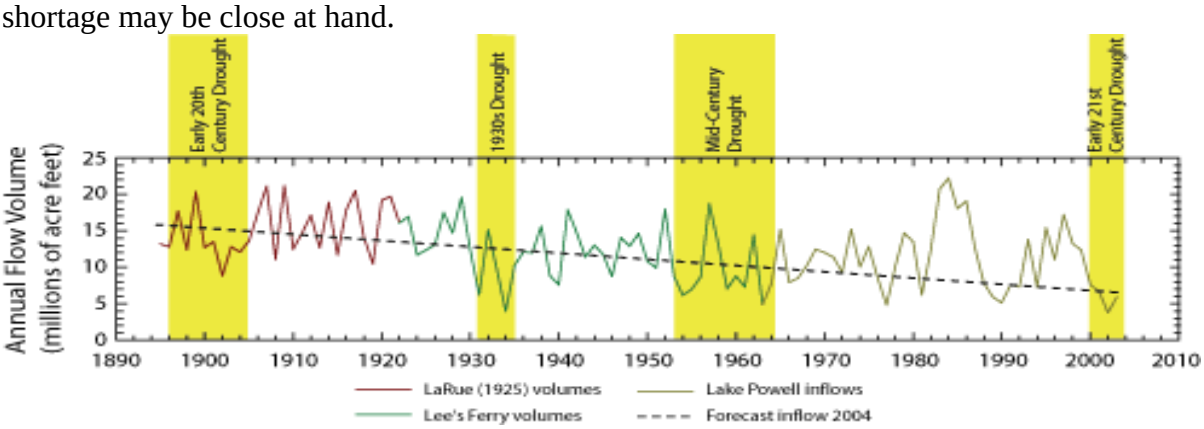

Figure D-2: Annual Colorado River Flow at Lee's Ferry (modified from USGS, 2004)

LAW OF THE RIVER AND THE CENTRAL ARIZONA PROJECT

The Colorado River is managed and operated subject to a long litany of laws, treaties, and court decisions dating back to the Colorado River Compact of 1922. Collectively referred to as the "Law of the River," a broad legal framework has evolved which addresses most issues. However, the Law of the River only provides limited guidance to the Secretary of Interior for times of shortage. Selected elements of the Law of the River that relate to a potential Central Arizona Project shortage are summarized in the following sections.

Mexican Water Treaty of 1944 (Treaty Series 994)

In 1944, a Treaty for the Utilization of Waters of the Colorado and Tijuana Rivers and the Rio Grande was established between the United States and Mexico. Amongst other things, this treaty allocated waters between the United States and Mexico for each of the three rivers included in the agreement and authorized the construction of dams, the study of flood control works, and the evaluation of the potential to produce hydro-electric power.

Colorado River shortage issues are indirectly addressed in this treaty. Article 10 indicates that in the event of extraordinary drought or serious accident which would make it difficult for the United States to make required deliveries to Mexico, the water allotted to Mexico would be reduced in the same proportion as consumptive uses in the United States. Beyond this statement in the 1944 Treaty, however, no agreement is in place which specifies how Colorado River shortages would be shared between the United States and Mexico. This apparent legal ambiguity may have significant effect on water users on both sides of the border when the Secretary of Interior eventually declares a shortage.

Arizona v. California IV (376 U.S. 340)

The 1964 U.S. Supreme Court decision in *Arizona v. California IV* resolved a long-standing dispute between the two states. Among various other issues, the Supreme Court decided the case in favor of Arizona by confirming that Arizona will have access to its full allocation of Colorado River water (2.8 million acre-feet per year) at such time as it is needed (United States Supreme Court, 1964).

In Section II(B)(3) of the 1964 decision, it was confirmed that in times of shortage, California could not use more than its allotted 4.4 million acre-feet per year just by putting a greater volume to consumptive use before Arizona could fully utilize its annual allocation. In effect, the Supreme Court upheld that agreements associated with the Law of the River had precedence over the doctrine of prior appropriation. This decree essentially laid the groundwork for the construction of the Central Arizona Project. However, the political fallout from this decision led California to apply significant pressure in Congress to work language into the Colorado River Basin Project Act of 1968 which specified a lower priority for Central Arizona Project water in times of shortage.

Colorado River Basin Project Act (U.S. Public Law 90-537)

The Colorado River Basin Project Act was signed into law in 1968 to authorize the construction, operation, and maintenance of the Colorado River Basin Project and for other purposes. Under this Act, the Secretary of Interior was directed to conduct a "full and complete" investigation in support of developing a general plan to meet the future water needs of the Western United States. The Act also included guidance on the potential to augment flows in the Colorado River in order to offset delivery obligations to Mexico under the Mexican Water Treaty of 1944. Finally, the construction, operation, and maintenance of the Central Arizona Project were authorized.

The Act contains two sections pertinent to shortage issues. Section 201(b) discusses the administration of the Supreme Court decree in *Arizona v. California IV* (376 U.S. 340) noting that during times of shortage, deliveries to the Central Arizona Project will be curtailed. Such a reduction would ensure that sufficient water is available to first satisfy the demands of other Lower Basin rights including the full 4.4 million acre-feet per year to California and right holders of similar standing in Arizona and Nevada. Section 304(e) establishes a protection for any Central Arizona Project user who legally relinquished water from other sources in exchange for Colorado River water deliveries via the project. Such users will have the first priority to receive Central Arizona Project deliveries.

Standing of the Central Arizona Project during Shortage

Based on the guidance provided to date by the Law of the River, the 1.5 MAF associated with the Central Arizona Project has the lowest priority during times of shortage. It is probable that Mexico would be co-equal with the Central Arizona Project pursuant to language in the Mexican Water Treaty of 1944; however, the specifics of this relationship have yet to be formalized. Rights to Colorado River water along the main stem in Arizona and Nevada that post-date 1968 would also be co-equal with the Central Arizona Project; however, this does not represent a large volume when compared to the 1.5 million acre-feet per year conveyed via the project. At the present time, California's entire Colorado River allocation of 4.4 million acre-feet per year would be protected during times of shortage until such time as the entire Central Arizona Project allocation and other post-1968 rights are curtailed.

SHORTAGE PROPOSAL UNDER CONSIDERATION

In order to establish guidelines for river operations during shortage conditions, the Secretary of Interior initiated a process to establish operating criteria. In 2005, the Secretary solicited recommendations for shortage guidelines and two main proposals were submitted – one crafted by the seven basin states and a second developed by a group of non-governmental environmental organizations. The Secretary also brought forward two additional potential options (a "Water Supply" alternative and a "Reservoir Storage" alternative) as well as a "No Action" alternative. The Secretary of Interior issued a draft Environmental Impact Statement (EIS) in February 2007 and a final EIS in November 2007. Detailed information on the EIS, each of the five initial alternatives, and the eventual Preferred Alternative is available

through the U.S. Bureau of Reclamation's website for the Lower Colorado River Region at *www.usbr.gov/lc/region/programs/strategies/documents.html*.

The "Preferred Alternative" was developed by the U.S. Bureau of Reclamation based on the concepts and criteria presented in the five original options. The Preferred Alternative is closely aligned with the alternative proposed by the seven basin states.

The primary goals of the Preferred Alternative are to minimize the extent and duration of shortages in the Lower Basin and to reduce the risk of a "Call on the River" where Upper Basin water usage could be curtailed to satisfy deliveries to the Lower Basin. This alternative includes the use of small-scale, proactive (stepped) shortages of 400,000 acre-feet, 500,000 acre-feet, and 600,000 acre-feet to maintain reservoir storage as long as possible; coordinated operation of Lakes Powell and Mead; and creating a mechanism to store and deliver conserved system water (through infrastructure improvements that reduce system losses) and non-system water (generally land fallowing in tributary watersheds that results in increased flows in the Colorado River). The primary purpose of the stepped shortages is to accept small-scale shortages sooner in time to forestall a major shortage later in time.

An important innovation that was proposed is the potential to accrue a new class of water credits in the Colorado River system referred to as Intentionally Created Surplus (ICS). Under this proposal, users of Colorado River water would obtain ICS credits through "extraordinary conservation" projects, tributary conservation projects, introduction and/or exchange of non-Colorado River system water, and system efficiency improvements (Basin States, 2006).

It is assumed in the Preferred Alternative that Mexico shares the reduced delivery volumes on a pro-rata basis. It is proposed that Mexico's shortage share be set at 17 percent which represents Mexico's percentage share of the total volume of Colorado River water entitled to Mexico and the Lower Basin states. Negotiations to finalize Mexico's proposed sharing level are ongoing. The proposed Lake Mead elevation triggers and stepped shortage volumes under the Preferred Alternative are summarized on Table D-1.

Lake Mead Level (Feet amsl[1])	Shortage Volume (Acre-Feet)	United States Share (Acre-Feet)	Mexico Share (Acre-Feet)
1075	400,000	333,000	67,000
1050	500,000	417,000	83,000
1025	600,000	500,000	100,000
<1025	Re-consultation	Re-consultation	Re-consultation

Table D-1- Elevation Triggers at Lake Mead and Shortage Volumes.

The Secretary of Interior issued a draft set of Colorado River Interim Guidelines for Lower Basin Shortages and Coordinated Operations for Lakes Powell and Mead on December 10, 2007. The current planning assumption is that the Secretary of Interior's final Record of Decision will reflect most, if not all, of the concepts of the Preferred Alternative. The concepts included in this Alternative have already been endorsed by the contract users of Colorado River water. It is also assumed that Mexico will share in Colorado River water shortages at the 17% level although this is not yet certain.

SHORTAGE IMPACTS AND TUCSON WATER'S PREPAREDNESS

The Colorado River is the largest renewable water resource available to Tucson Water. The Utility is currently in the process of bringing its full allocation into use to help offset ground-water mining and to comply with the State of Arizona's Assured Water Supply regulations. The City's current allocation is 135,966 acre-feet per year; two pending reallocations will bring the total to 144,191 acre-feet per year in the near future. While use of Colorado River water is a key step toward maintaining a more sustainable water supply, the Utility will also be prepared to deal with the uncertainties and impacts related to shortages of its Colorado River water supply.

Probable Shortage Impacts

To assess Tucson Water's preparedness for eventual Colorado River water shortages be they caused by extended drought and/or climate change, it is important to first evaluate what shortage conditions will mean for the Utility. Once a shortage is declared, the Central Arizona Project will be curtailed to a significant degree – presumably in accordance with the Preferred Alternative. Discounting the minor shortage contributions of other late-priority water, it is assumed that the Central Arizona Project will be curtailed at 83% of the appropriate volume for each shortage tier which assumes 17% of the shortage will be borne by Mexico.

Once shortages occur, the relative priority of different water uses will determine which Central Arizona Project water users will be impacted. Not all water uses are of equal priority. In the Record of Decision for the allocation of waters and contracting under the CAP, major categories of water allocation included Native American use (309,828 acre-feet per year), M&I (640,000 acre-feet per year), and the remaining supply for "non-Indian" agriculture (Secretary of Interior, 1983). The Record of Decision also set shortage criteria including a condition that 25 percent of the 173,100 acre-feet annually allocated to the Gila River Indian Community would be curtailed while the remaining allocation would share the same priority as 510,000 acre-feet per year of the M&I allocation. The Record of Decision goes on to state the following:

> "…During years of water supply shortages, Indian users and non-Indian M&I users would share a first priority on project water supplies…water delivery for miscellaneous uses would be reduced pro-rata until exhausted; next, non-Indian agricultural uses would be reduced the same way until exhausted; next, the Gila Tribe allocation would be reduced by 25 percent and other Indian agricultural uses would be reduced by 10 percent on a pro rata basis until exhausted.

> Thereafter, the remaining water contracted for by 11 Indian entities under existing contracts and 75 percent of the Gila River Tribe allocation would share a priority with 510,000 acre-feet of non-Indian M&I uses…and would be reduced on a proportional basis, and within each class on a pro-rata basis, ***based on the amount of water actually delivered to each entity in the latest non-shortage year***."
>
> (Emphasis added; from Secretary of Interior, 1983).

Based on the above language, Tucson Water does benefit from the relative priority of M&I uses within the Central Arizona Project's hierarchical scheme. The Central Arizona Project allocation totals 1.5 million acre-feet per year. Of the total, M&I subcontracts currently account for 555,031 acre-feet per year, Native American contracts total 555,086 acre-feet per year, and the remainder is allocated to "non-Indian" agriculture and miscellaneous uses (Central Arizona Project, 2007a). Therefore, it is highly likely that M&I allocations would not be curtailed until a shortage of 600,000 acre-feet per year or more is declared.

M&I allocations will only retain this relative priority based on the amount that was used in the most recent non-shortage year (i.e. last normal year). An M&I allocation is only as valuable as the demonstrated use of it prior to entering a shortage. The actual subcontracts held by individual entities may also have additional language that can affect the distribution of water between M&I users.

SUMMARY

Eventual shortages on the Colorado River will have a significant impact on the water providers such as Tucson Water which have come to rely on this renewable water supply. The Law of the River has evolved over time and provides limited guidance for shortage impacts. Under this framework, the Central Arizona Project has the lowest priority for water deliveries. With an ongoing drought and the increasing possibility of a shortage occurring in the near term, the Secretary of Interior is in the process of evaluating operational shortage guidelines proposed in the Preferred Alternative. Tucson Water will remain active in ongoing planning activities to ensure the Utility is adequately prepared to deal with supply impacts caused by shortage.

Tucson Water is well positioned for eventual shortages on the Colorado River. Nonetheless, there are additional steps that will be taken to further augment the Utility's protections. Of primary importance, Tucson Water plans to bring its full allocation of Central Arizona Project water into use as soon as practicable to ensure that it has access to the greatest potential volume of water during the first and second tiers (steps) of Central Arizona Project shortages. The Utility will also continue working with the AWBA to maximize the amount of firmed water that is in storage at its own facilities while working toward finalizing recovery plans for the majority of the water that currently lacks a clear recovery mechanism. Finally, Tucson Water will continue to engage in state-wide and basin-wide planning efforts related to the Colorado River.

APPENDIX E

ENGAGING THE COMMUNITY

The first sentence of *Water Plan: 2000-2050* expressed Tucson Water's commitment to public outreach and customer service:

> Water Plan: 2000-2050 was developed to initiate a dialogue between Tucson Water and the community about the water-resource challenges which must be addressed in the coming years.

This engagement with both customers and stakeholders continues to be a primary driver for the Utility.

Presentations, Discussions, and Public Outreach

Tucson Water had taken elements of *Water Plan: 2000-2050* "on the road" even before it was issued in November 2004. Utility staff and management have provided well over a hundred presentations on all aspects of water-resource planning including the analytical tools that have been developed, the overall Scenario Planning process, the various Common Elements and plan recommendations, financial impacts, and the critical decisions with the primary focus being on *Decision H20*. Audiences have ranged from local community groups and town halls to national conferences and seminars.

Public discussion of water resource availability in the Tucson area has been almost continuous since *Water Plan: 2000-2050* was issued. A subsequent report issued by the University of Arizona's Water Resources Research Center (2006) considered water resource availability throughout the greater metropolitan Tucson region. That report drew conclusions consistent with *Water Plan: 2000-2050* regarding the need to shift to renewable water resources and the growing importance of effluent utilization in the future.

To provide information more directly to its customers, Tucson Water relies on several methods of communication. In addition to the presentations referenced above, the Utility has released a number of Public Service Announcements and bill inserts to explain aspects of the water planning process. Additional printed materials have been distributed throughout the community at various forums. Staff has responded to hundreds of phone calls and e-mails on Plan related topics. Local news media, both print and electronic, were actively engaged as part of the Utility's outreach efforts, resulting in numerous articles and television and radio stories highlighting aspects of the Water Plan. Finally, all aspects of the plan have been posted on Tucson Water's website for ease of information sharing and to elicit comments from the community.

Key decisions and on-going policy direction regarding the Water Plan are provided to the Utility by Tucson's Mayor & Council. To ensure that the governing body has sufficient information to provide this direction, Tucson Water has provided periodic updates to the Mayor and Council, both in session and through individual meetings with the elected representatives. As part of this on-going process, the Utility works closely with the City Manager's Office, the Citizens' Water Advisory Committee (CWAC) and the Mayor & Council's Environment, Planning, and Resource Management (EPRM) subcommittee.

Decision H2O

One of the largest outreach campaigns ever conducted by Tucson Water has centered on issues associated with Decision #1 of *Water Plan: 2000-2050*. This campaign has been titled *Decision H2O* and is focused on determining the long-term mineral content of the Utility's Colorado River water supply delivered through the Clearwater Program. As additional Colorado River water is added to the Clearwater project, the mineral content of the blended supply will increase over time eventually reaching approximately 650 parts per million (ppm), the average mineral content of the Colorado River water. During the Utility's initial public involvement campaign which was conducted to determine acceptable mineral content of the Clearwater blend, Tucson Water customers selected 450 ppm as the preferred blend. The data collection process being conducted to support Decision #1 is intended to determine whether customers will accept the slow rise in mineral content, or would prefer to pay for a new treatment facility to maintain the minerals at 450 ppm. To support the mineral content decision, comprehensive technical and cost information was developed and shared with Tucson Water's customers through the Decision H2O outreach program.

The outreach effort is centered on determining consumer preferences between two potential future mineral levels of the Clearwater blend and customer's willingness to pay in order to meet discretionary water quality targets. Three investigations were undertaken including a Flavor Profile Analysis (taste tests conducted by a trained panel), structured consumer panels, and an extensive kiosk outreach program.

The most visible part of the outreach program involved direct interaction with Tucson Water customers at information kiosks from October 2006 through January 2007. Tucson Water operated demonstration kiosks at two retail malls and two traveling kiosks that visited locations and events throughout the community. Participants had the opportunity to taste each mineral blend (blind test) and express their taste preference. The participants were then provided additional information about water resources, environmental impacts, health considerations, treatment costs, and potential household impacts of changing mineral levels. After the customers received the additional information and staff responded to their questions, they were asked to provide their overall preference. Over a period of four months, more than 13,000 Tucson Water customers participated in kiosk activities. Throughout the course of the program, weekly results were posted on a *Decision H2O* a website established specifically for the program: *www.decisionh2o.com*.

Throughout 2007 and into early 2008, the Utility continued to conduct a number of studies to develop a final recommendation to bring forward to Tucson's Mayor & Council. These

efforts include decision-matrix analyses on the customer surveys and further investigations of the potential treatment technologies and costs to ensure that the information provided to Mayor and Council is as current and accurate as possible. Tucson Water is also in the process of conducting a comprehensive sustainability analysis to determine the environmental, financial and social impacts of the two alternative water qualities and provide a broader context within which to make the mineral decision. Factors such as carbon generation, salt loading, land usage, water efficiency, affordability and social equity are being assessed to compare the various options. It is expected that these remaining steps will be completed in 2008 and a recommendation will be forwarded to Mayor & Council.

Continuing the Engagement

Water Plan 2000-2050 is an evolving document which will change over time as new circumstances, opportunities and challenges are identified. Tucson Water is committed to continued engagement with customers and other stakeholders to ensure that the community is aware of these changes and is offered multiple opportunities to participate in the decision making process. Through community-wide education, interaction and collaborative planning, the Mayor and Council, the Utility and the community we serve will be better able to identify and meet the water management challenges that lie ahead.

Foreword

Located on a map, Tucson is seen as a geographic area with specific boundaries. Those of us who actually live in Tucson know the setting more intimately, beyond the one-dimensional view on the map. We know its mountain ranges, rivers and vegetation, and we experience its distinct sense of distance and space. And there is more. We know Tucson as a human setting or, in other words, a home to 750,000 people. The way we live our lives, our beliefs, activities and interests help explain the values that also make Tucson unique.

The human way of life and the physical setting, whether human-made or natural, are not independent of each other; instead they interact. Nowhere is this more evident than in the need for water to sustain a rich and complex urban life. Water is the beginning of such a life, but water also can be the end of it. If a sustainable source of water is not available, a community obviously is in dire straits.

Tucson now relies predominantly on groundwater, considered "old water" because of its storage underground for hundreds and even thousands of years. Most people realize the city cannot continue to pump this mostly nonrenewable source of water and that other sources of water must be utilized. This raises the important question: What must Tucson do to ensure a sustainable water supply?

Answering this complex question requires a consideration of the physical or environmental conditions of this desert city. Also to be considered are the social, cultural and economic values that prevail in the area. Science and technology are tools to be used. Not to be overlooked are the different sets of values and beliefs that also guide and motivate human actions. The perspective must consider the past, present and future. Obviously there are no simple solutions.

The following study charts a course among the many issues to be considered when attempting to plan a sustainable water future for Tucson. A guiding premise of the study is that identifying such a course is the responsibility of everyone in the community, not just politicians and those with a professional interest in water. With so much at stake, identifying sustainable water supplies might be thought of as a quest, of concern to literally everyone who uses water.

To do justice to the topic, the study provides a broad focus, examining many and varied issues that relate in some way to ensuring future Tucson water supplies, including historic, hydrologic, political, economic and technological concerns. No direct solutions are recommended, but by offering a wealth of information the study intends to demonstrate the complexity of the situation. By promoting an understanding of the various issues, the study will help Tucsonans make informed decisions about their future water supplies.

No other issue better demonstrates the complexity involved in deciding water policy than the Central Arizona Project. To use its water or not to use it and under what conditions and circumstances are considerations that have divided the community and have launched CAP as today's premier Tucson water issue. The first question is whether CAP, which promises a renewable supply of Colorado River water, should be part of Tucson's sustainable water supplies. In the absence of other viable alternatives, use of CAP water becomes a necessity for Tucson's survival. Other questions about CAP water remain. How should it be treated and how should it be distributed? Is it feasible to continue relying exclusively on groundwater for drinking water, with CAP water used only to recharge the aquifer? Is some combination of CAP water, groundwater and effluent viable for Tucson?

What are the implications of Tucson's water supply to the culture and character of the city, now and in the distant future?

This study addresses all of these questions, but it does not propose definitive answers. Ultimately the people must decide social policy. Our goal is to give everyone an opportunity to make well-informed decisions.

Peter Likins

Peter Likins, President
The University of Arizona

Acknowledgments

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Many thanks to the following UA faculty and staff who reviewed all or portions of this report and whose expertise was invaluable: Cornelius Steelink, Chemistry Department; Robert Glennon, College of Law; Marv Waterstone, Department of Geography and Regional Development; Gerald Matlock, International Agriculture; Victor Baker, Nathan Buras, Jim Washburne, Gray Wilson, Hydrology and Water Resources Department; Janick Artiola, Jim Riley, Arthur Warrick, Peter Wierenga, Soil Water and Environmental Science Department; Sol Resnick, Val Little, Water Resources Research Center.

A project of this sort builds an awareness of the incredibly varied talents, interests and abilities of members of the Tucson water community, whether employed by government or the private sector, or whose interest in water is not directly related to job or profession. Gratitude is due to many in the water community who provided advice, encouragement and information.

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Preface

How, ultimately, do we make a rich, a full, a complete water policy? The beginning of the answer is that a great many factors must go into any natural resources policy in the American West, for these are complex times. Water means too many things to too many people for it to be pat, one-dimensional, bound up in a single ideology... Another, related part of the answer is that we must move away from jargon, from bland words and thinking that dehumanize what ultimately are intensely human, even spiritual matters.
–Charles Wilkinson, The Eagle Bird, *1992*

Tucsonans face important decisions in the coming months and years that will affect the future of their community. At issue is Tucson's water supply, the true lifeblood of the area. A topic of vital importance and one that affects every citizen, Tucson's water supply has long been the focus of controversy. Debates about water issues have caused divisiveness and strife within the community. A major and ongoing source of controversy has been the city's effort to introduce Central Arizona Project (CAP) water into the city system. This did not go smoothly, and the many problems that resulted from this effort frustrated and angered many citizens. This situation helped create a climate that discouraged constructive community debate and consideration of important water information.

Tucsonans now must grapple with the question of how best to ensure a long-term water supply for the community. This involves examining various options, with special attention devoted to finding ways to more effectively use present supplies. Further, if CAP water is to be part of the solution to Tucson's water supply problem, the community must find the ways and means to use this renewable source that are both affordable and acceptable to Tucson citizens.

The many thousands of people who have moved into the Tucson metropolitan area in the past 50 years are using millions of gallons of water daily. Most of that water is "old" water, stored underground for hundreds or thousands of years. Because more "old water" is used each year than is replaced by precipitation, either by rain or snowmelt from surrounding mountains, water tables decline and wells must reach deeper and deeper to tap remaining water. If we do not reduce the amount of water we use and/or unless we utilize a new dependable supply, we will suffer the consequences of our excessive reliance on groundwater. These include the increased cost of pumping from greater depths, decreased water quality and the occurrence of subsidence which can threaten structures, homes, streets and utilities.

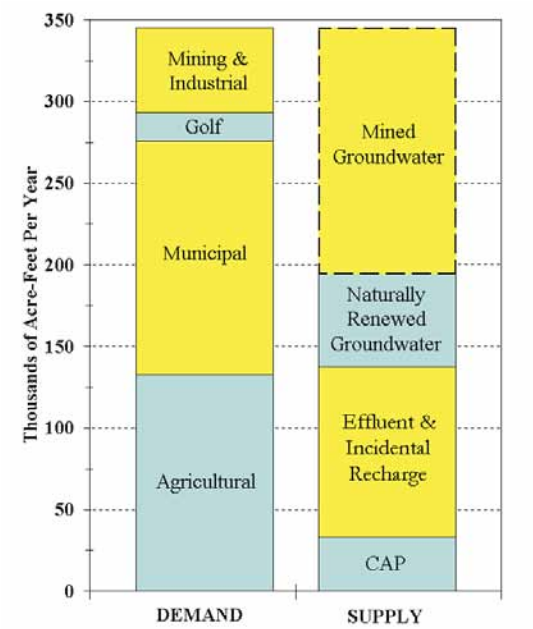
Figure 2 shows major water demand categories and sources of water supply for the Tucson area. What is readily apparent is that municipal

Figure1 View from "A" Mountain at the end of the twentieth century. Photo: UA Biomedical Communications.

uses represent the greatest demand and mined groundwater is our primary water source.

Our largest new water source is the CAP which brings water from the Colorado River.

Figure 2 Water demand and supply in the Tucson AMA (1997 conditions)



Because first efforts to introduce CAP water in Tucson met with serious problems, a majority of voters subsequently rejected its use in their homes unless certain conditions were met. Tucson Water, Tucson's largest water utility, is making efforts to meet those conditions. When contemplating CAP water use the public needs to understand how its use will affect their homes and lives and the costs involved to minimize any adverse impacts. Tucsonans could then better evaluate CAP options compared to other kinds of water management actions.

Other community water issues also need attention. For example: Who should help pay to prolong the usefulness of the aquifer? Should this be the obligation of all water users or just those users who actually use alternative supplies such as CAP and effluent? Should the mines and farms be required to use CAP water or at least help pay for it? Other management issues that need addressing include: Should all Tucson Water customers have a say in Tucson Water policy? Should there be more comprehensive basin-wide management of water supplies? Should there be further limits on total water use? The report notes areas where information for making necessary decisions is lacking. The authors do not recommend any solution, but instead have presented facts and information to assist citizens and decision-makers.

As is evident from its title, this publication is about the sustainability of our water resources. Sustainability is a popular word nowadays, often heard when natural resources is the topic of discussion. Used in varied contexts, in government reports, academic journals and the popular press, sustainability is not easily summarized in a one-size-fits-all definition. One point of shared understanding, however, is that sustainability is a desirable goal.

At one level, sustainability, when referring to water resources, means we are not consuming more water than can be renewed. Sustainability implies a balance between supply and demand. For example, groundwater is not an unlimited resource. If we use groundwater supplies at a greater rate than the aquifer is recharged, we are violating the principles of sustainability. Groundwater use at that level is not sustainable. This definition generally corresponds to the definition of safe yield, which is the management goal of the Tucson Active Management Area (TAMA).

Sustainability also has a broader definition, one that takes into account social, economic and environmental values. In this context, a sustained water supply involves more than matching water demand with supply. Sustainability also means that our water resources are managed in a way to preserve the environment, to maintain the economy, and to ensure that all water users share equitably in

This photo has been removed due to copyright restrictions on the web

Figure 3 View from "A" Mountain at the end of the nineteenth century. Photo: Arizona Historical Society/Tucson.

reaching and maintaining a balance between water supply and demand.

Both definitions, but especially the latter, involve a shift in mind set. What is involved is less emphasis on developing new water supplies, which has been the traditional approach, with more attention devoted to learning to use water in a way that allows current and future users to live in balance with nature and one another.

One final point: The geographical area covered by the report needs defining. Tucson as the "study area" of this report covers more territory than what is bounded by city limits. This presents some difficulties. Defining a "study area" is complex and often contextual. The most common term used in this report is the "Tucson area." This term is meant to encompass the most heavily populated portions of eastern Pima County, from Avra Valley on the west, to the Rincons to the east, and from Green Valley on the south, to Pinal County on the north. These boundaries are approximate and are intended to roughly delineate an area in which there are extensive political and hydrologic connections.

The maps in this document show most of the Tucson area, with the exception of Green Valley. (See Figure 4.) The choice of map extent represents a compromise between showing sufficient detail in the most heavily populated areas and showing the larger geographic extent. The map boundaries are not intended to be absolute.

In many instances this report refers to more specific boundaries, usually in the context of the source of available data. For instance, many of the data in this report come from the Arizona Department of Water Resources' Tucson Active Management Area. TAMA is based, in part, on groundwater basin boundaries.

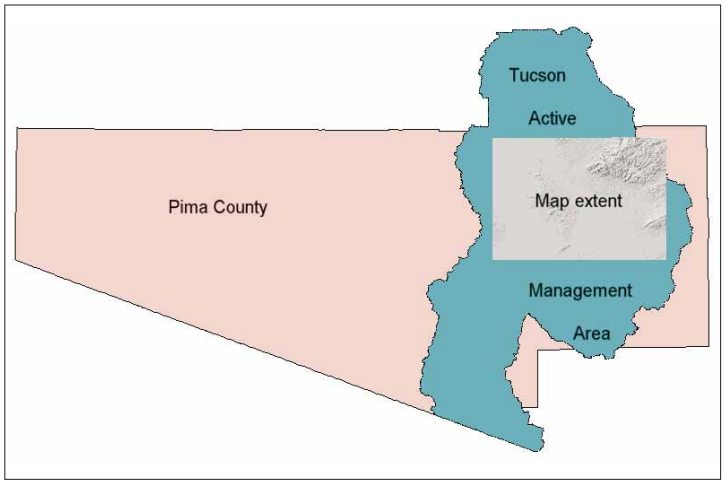
An effort has been made to be both precise and consistent in the use of terms and geographic extent. The reader should be aware, however, that there is some inherent "fuzziness" in these definitions, due to overlapping political and hydrologic boundaries.

Each of the following chapters begins with a brief summary of its content. Background information then is provided on topics crucial to understanding Tucson's water dilemma. The final chapter offers readers an opportunity to make their own choices from a range of options, based on the information in the previous chapters.

If this report can be said to have a single, underlying message, it is that there is no one simple, inexpensive solution to our water problems. Each proposed solution has both positive and negative impacts.

All of us — Tucson Water customers, private utility customers, farmers, miners, industrial water users and those with their own wells — have straws in the same glass. What we do affects everyone else. The challenge for the community is to pick an effective and desirable solution at a price it is willing to pay.

Figure 4 Study area.



This report was funded entirely by the University of Arizona and was produced by the UA Water Resources Research Center as a service to the community. Its intent is to provide useful, accurate information for Tucson citizens to use in making water decisions. The authors believe both scientific information and community values have important roles to play in deciding water issues. With this in mind, the authors have collected information from a wide variety of sources including federal, state and local agencies' reports, university research, information from private water utilities and studies by nonprofit groups. Although staff members of local agencies were consulted at various times during the preparation the report, the Water Resources Research Center researchers defined the issues and summarized the information with the assistance of other university experts.

Chapter 1
The Setting

This first chapter sets the scene by describing the climate and terrain of the Tucson area. Ultimately, climate and terrain determine water availability, from the occurrence and extent of precipitation to the storage of groundwater. Water availability – or, stated differently, water scarcity – in turn determines the course of human life in the area, from population densities to economic activities.

Southern Arizona is located within a physiographic region called the basin and range province. The region, which stretches from Nevada southeast to northern Mexico, is characterized by mountain ranges running in a roughly north-south orientation, interspersed with broad flat valleys or deep basins. (See Figure 1-1.)

Tucson is located within a broad valley, with mountains on each side – Santa Catalinas to the north, the Rincons to the east, the Tucson Mountains to the west and the Santa Ritas to the south. Most of the population of the greater Tucson area lives in the Santa Cruz Valley.

About 10,000 years ago, before the climate began to get warmer and drier, much more moisture reached the basin than does today. Water isotope studies show that much of the water now stored underground fell as rain during these ancient times. The alluvial soil that holds the subsurface water is called the aquifer. Alluvial soil or alluvium, which consists of clay, sand and rock, washed from the surrounding mountains and accumulated over many thousands of years. Groundwater is stored in the open spaces between the particles of sand and rock within the alluvium.

As is shown in Figure 1-2 various water courses transect the area. When flows occur, the Santa Cruz River runs north-northwest through the area, and the Rillito Creek runs from southeast to west, connecting with the Santa Cruz River near Orange Grove Road. The Pantano Wash flows northwest and enters the Rillito Creek before the Rillito connects with the Santa Cruz River. In years of heavy precipitation, some water will flow north to reach the Gila River west of Phoenix, then continue to the Colorado River and the Gulf of California. But in most years, flows do not get that far.

The basin's low annual precipitation results in very few streams or rivers with perennial (year-round) flow today. The most notable exception, Sabino Creek, begins at relatively high elevations and is supplied by snowmelt as well as rainfall. Most of the rivers, streams and washes in the Tucson Basin are ephemeral (i.e., they flow only immediately after rains). Overall scarcity and variability of flow has made surface water an unreliable and largely impractical water supply for a large population.

Historically, the groundwater table in the Tucson area was much higher, and surface water and groundwater were connected along much of the Santa Cruz River. At that time the water table was high enough to feed the river.

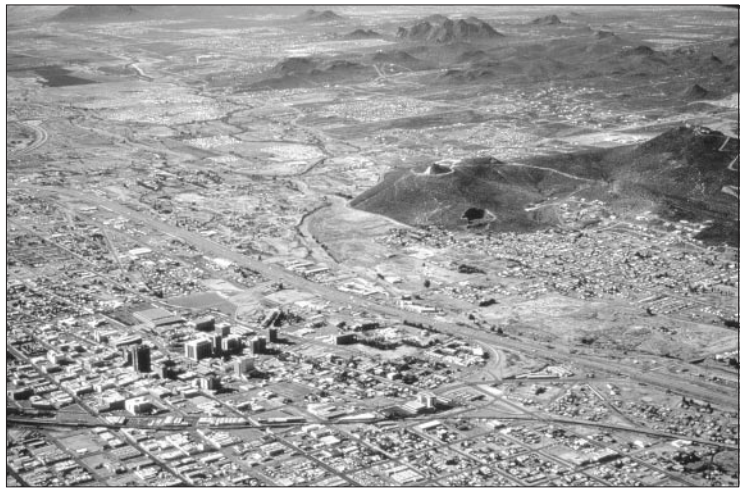


Figure 1-1 Tucson is located within a basin and range province with alternating mountains and valleys. Photo: Arizona Geological Survey.

This no longer occurs because the water table levels have dropped far below the surface due to groundwater pumping.

CLIMATIC INFLUENCES

Global Circulation

At 32.2° north latitude, Tucson lies along an arid and semi-arid zone that stretches from North Africa (Marrakech 31.2, Tripoli 32.7), the Middle East (Jerusalem 31.8, Baghdad 33.3), across Southwest and South Asia (Iran, Afghanistan, Pakistan), and into Central Asia (Tibet). (See Figure 1-5.) Air over the equator heats, rises, loses moisture and then sinks at about 30 degrees north latitude, creating large cells of stable high pressure. With low moisture content, and little to disturb the airflow, precipitation is sparse and infrequent along this global desert zone.

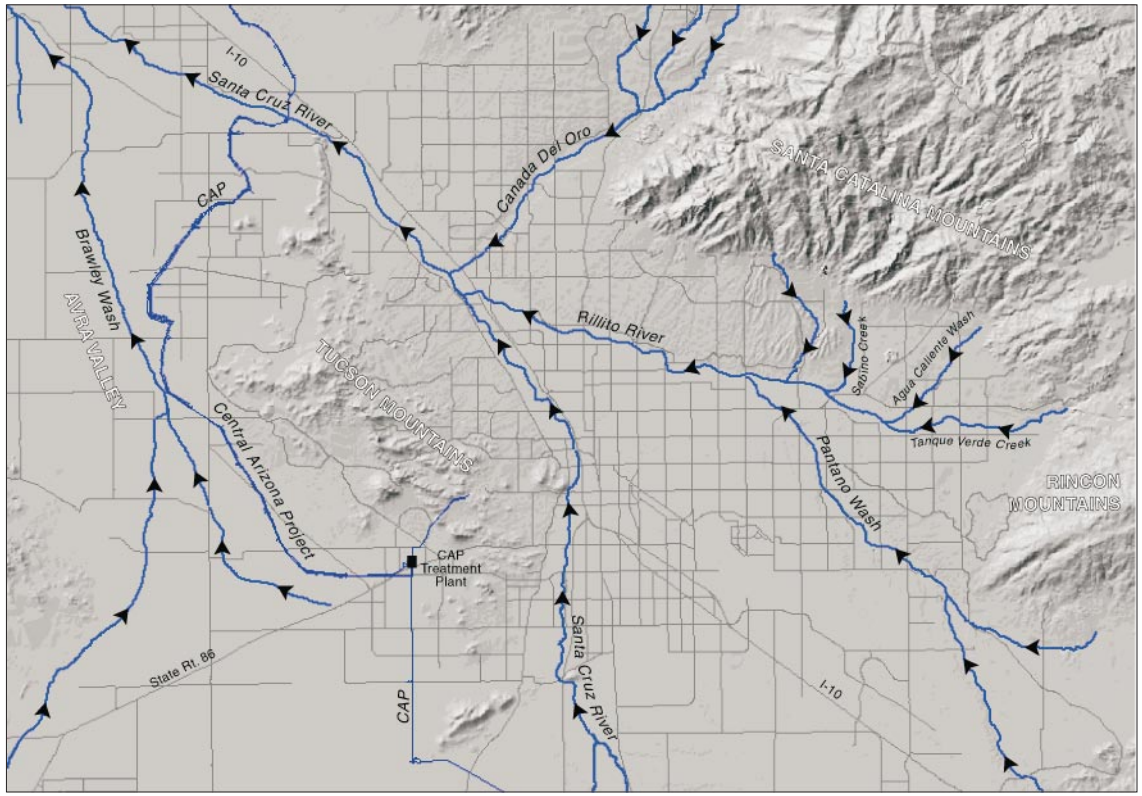
Tucson Precipitation

An annual average of 12 inches of rain falls within the Tucson Basin. Rainfall varies greatly according to the season and the location within the area. The mountains ringing the basin, particularly the Santa Catalinas, cause some local uplifting of air masses (orographic effect) resulting in annual precipitation as high as 28 inches on Mt. Lemmon. The east side of the mountain range gets less rain than the rest of the range.

The precipitation arrives in two distinct seasons. Fifty-two percent falls during a summer "monsoon" (July–September) and 28 percent from December through March. In the summer, as land temperatures rise, dense, moist air from the Gulf of California and Gulf of Mexico is drawn inland. In the afternoon, as temperatures reach their peak, the moist air is pushed upwards, forming large thunderheads. Summer "monsoon" rains are characterized by brief but intense thunderstorms with highly localized precipitation. (See Figure 1-3.)

In the winter, large fronts develop over the Pacific Ocean. The global circulation patterns, and specifically the jet stream, carry these storms eastward. The persistent high pressure normally diverts the jet stream and storms away from the Southwest. In the late fall, however, the high pressure cell is weakened and can be displaced, allowing large, slow-moving fronts to pass over the Tucson Basin. Winter rains are characterized by heavy cloud cover and precipitation that persists for many hours or even several days and covers most of the area.

Figure 1-2 Tucson area mountains and rivers.



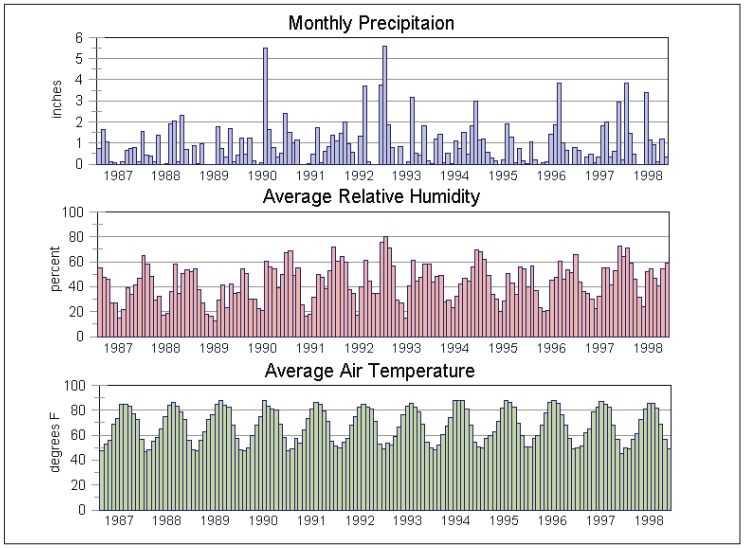
Sources: United States Geological Survey, Pima County, Water Resources Research Center.

Precipitation in October and November (about 14 percent of annual rainfall) is quite variable from year to year and is often a result of severe storms or Pacific hurricanes that "graze" the region. These storms can produce flooding, often over large areas. These rainfall patterns are distinctive of the Sonoran Desert and explain the extraordinary vegetation of the area. The Mohave Desert to the west of Tucson does not receive as much summer rain, and the Chihuahuan Desert to the east gets less winter rain than the Sonoran Desert.

The year-to-year variation of precipitation in the Tucson Basin is quite substantial. (See Figure 1- 4.) Global phenomena such as El Niño and La Niña affect the distribution and magnitude of precipitation. Winter precipitation in 1992/93 and 1997/98 was as much as 55 percent higher than the winter average in the Tucson Basin.

Figure 1-3 Summer storms in the area often are confined to isolated locations. Photo: David Bright, U.S. National Weather Service.

Figure 1-4 Climatological factors 1987-1998.



Source: U.S. National Weather Service.

Evapotranspiration

Clear skies and a relatively low latitude make Tucson one of the warmest areas in the United States. Average summer highs are in the upper 90s with peaks above 110° F. These high temperatures, along with low relative humidity, contribute to very high water loss through evapotranspiration. (Evapotranspiration is the combined effect of surface evaporation and transpiration by plants.) The potential evapotranspiration rate averages about 77 inches per year which is about 6.5 times greater than the approximate total annual precipitation in the area. Most of the precipitation that falls in summer storms evaporates without being used by plants or people or being recharged into the aquifer.

Figure 1-5 Location of cities along 30° "arid zone"

Chapter 2 LOOKING TO THE PAST TO UNDERSTAND THE PRESENT

Chapter Two summarizes Tucson's water history from the days of carrying water in olla or buckets from rivers and springs to our ability today to turn on the tap and get as much water as we desire. This change demonstrates how for over 100 years we have looked to more distant sources for a dependable water supply, starting with a pipeline from the Santa Cruz River and continuing into the present with the CAP canal carrying water from the Colorado River. The chapter also shows that the influence of politics on water affairs began early in Tucson's history.

THE SEARCH FOR WATER

The history of water use in the Tucson area is primarily one of reaching out farther and farther to provide enough good water for a growing community. From the first water suppliers who brought water from springs or the Santa Cruz River to today's Central Arizona Project (CAP), which lifts water 2,900 feet through 14 pumping plants, delivering it 335 miles from the Colorado River, people have looked for new and reliable sources of good quality water. Attempts to persuade people to conserve water also have been part of the picture for more than 100 years, as have been projects to utilize new technologies to increase supplies. People have proposed various projects over the years including dams to capture flood waters so this resource could be used rather than "wasted." Tucson also has experienced occasional water quality problems for more than 100 years. And finally, politics has played a major role in many significant water decisions over the century.

Santa Cruz River

The first people who lived in the Tucson area got their water from the Santa Cruz River or from springs that bubbled to the surface at the base of Sentinel Peak (now called "A" Mountain), Black Mountain near San Xavier Mission and several other spots. Enough water was available to satisfy the needs of a few thousand people, including irrigating crops. In fact, Santa Cruz River water has been used to irrigate farms for at least 2,000 years. The Santa

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Figure 2-1 Rincon Mountain Water truck from the early twentieth century. Photo: Arizona Historical Society/Tucson.

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Figure 2-2 A well at Fort Lowell in the 1880s. Photo: Arizona Historical Society/Tucson.

Cruz River was not a big river like the Colorado or Gila rivers, but the river did flow most of the time in the Tucson area. The Hohokam caught edible fish in the Santa Cruz, and early pioneers hunted water-loving muskrats. When Father Kino came to the area in the late seventeenth century, he stated that he believed there was plenty of water — enough to support a large town of 5,000 people.

Fort Lowell's Waterworks

When the U.S. Army established Fort Lowell near the Rillito Creek in 1873, the water supply in the area was plentiful. Acequias (canals) brought water from the river; windmills pumped groundwater from about 35 feet down; and storage tanks held water at points of high elevation to provide running water to all the buildings. But problems arose. The windmills often were inactive for days at a time, and even when water filled the storage tanks, the water was hot and unappealing. Diseases were blamed on the bad water which was polluted by livestock, people and unsanitary water storage facilities. "Squatters" diverting surface water for their farms provoked conflict. Debate raged about whether to purchase a steam- powered pump to get water from greater depths or import water from Sabino Canyon. The military built larger storage tanks, installed the steam pump and abandoned the Sabino Canyon project. By the time the fort was closed in 1891, the water problem had been solved by installing additional wells.

19TH CENTURY SUPPLIES

Before the American Civil War, Tucson women washed their clothes in the Santa Cruz River, with a guard nearby as protection against Apaches. Drinking water was available from a well inside the walled city or from the well on Bishop's Farm. El Aegypti Spring (near the Wishing Shrine, south of the present Tucson Community Center) was a reliable water source for many years, but few people dared to venture alone so far outside of town, even for water.

After the end of the Civil War and the defeat of the Apaches in the late 1860s, more and more people moved to Tucson, which became Arizona's most important city. The services of a water carrier were needed to supply the growing population. The water carrier got his water from El Aegypti to deliver to homes in bags on his burro. Later Adam Saunders and Joe Phy modernized the system, using a two-wheeled cart for delivery at five cents a bucket. At this high price, fresh water was seldom used for watering plants. Instead people used waste water from their washing for this purpose. Adam Sanders built a bath house at El Ojito, where rich and poor alike (but only males) could get their occasional bath for twenty five cents. A daily bath was considered a downright "waste of water." W.C. Davis installed Tucson's first personal bathtub in a home on Congress Street sometime in the 1880s. The uses of water were increasing.

"A tenacious eastern dream to convert the desert into a garden characterized Tucson Basin water control history since the Gadsden Purchase in 1854. The reactions of American settlers to a series of water supply crises demonstrated the persistence of this theme. When faced with each crisis, Americans responded by applying an increasingly sophisticated technology to the problem of water scarcity." Kupel, page 162.

Entrepreneurs built dams in the Santa Cruz River near the base of Sentinel Peak, backing up water into lakes which were used for

boating and fishing as well as to power flour mills. These lakes were destroyed by floods during the 1890s and not rebuilt.

Obtaining a reliable supply of potable water was a problem even in the early days. In 1870, John Bourke complained of the many holes in the town which he said were abandoned wells. "... wells, which were good and sweet in the first months of their career, but generally became so impregnated with 'alkali' that they had to be abandoned; and as lumber was worth twenty five cents a foot, and therefore too costly to be used in covering them, they were left to dry up of their own accord, and remain a menace to the lives and limbs of belated pedestrians." He describes an incident in which an inebriated citizen fell down an empty 25-foot well.

The area near Sentinel Peak was dominated by farms with a network of irrigation ditches that directed water from rivers and springs. These uses left little water in the river north of the Congress Street Bridge. During the 1870s, the city made three attempts to increase the water supply. The city contracted to have artesian wells drilled, but that effort failed. The city awarded another contract to a well driller who was to receive one block of city land for every successful well drilled, but that effort also came to naught. Some entrepreneurs south of town started building a canal to bring water to Tucson from Canoa (near present-day Green Valley), but that, too, proved unsuccessful. By the 1880s, many people had their own windmills, but the windmills often were still during the dry months when little wind was blowing. The demand for water had become so great that springs were no longer dependable.

The then-recently formed Tucson Water Company gets credit for first successfully tapping a new water source. With a franchise from the city, the company built a distribution system to bring water from Valencia Road to downtown Tucson via a redwood flume laid in the river and a 4.5-mile-long water pipe made of sheet metal coated with tar. Following this success, the Tucson Water Company in 1889 installed its first steam-driven pumping plant and dug a 40-foot deep well, capable of pumping 1,250 gallons per minute. Water came to town along the alignment of what is now Osborne Street, which is why a diagonal street is there today instead of the north-south, east-west grid common in other older sections of town.

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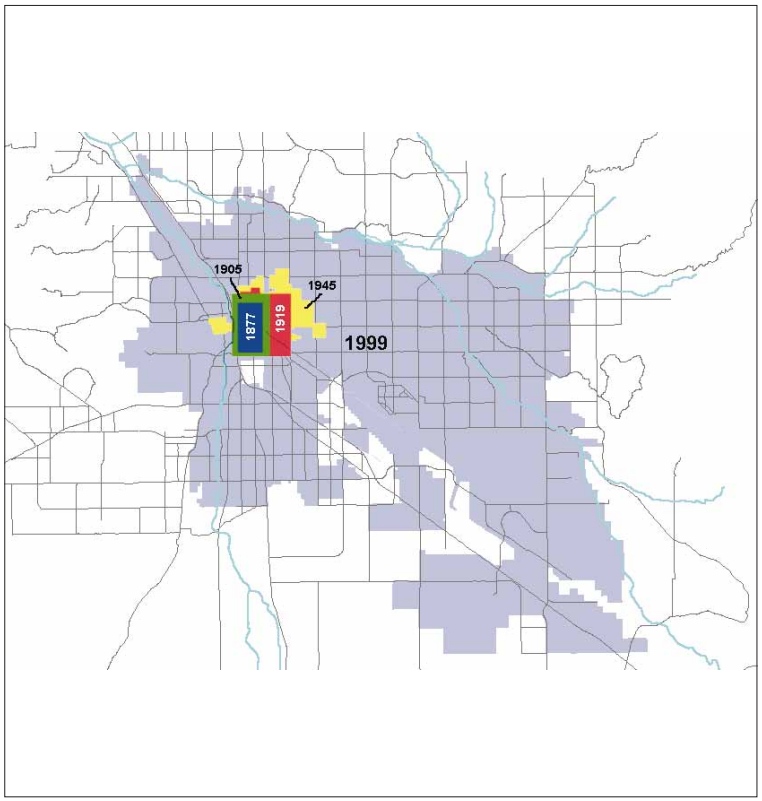
Figure 2-3 The Parker and Watts Water Company office in the late nineteenth century. Photo: Arizona Historical Society/Tucson.

This new water source would have solved the supply problem if Tucson's population had not continued to grow and if droughts did not periodically occur. In 1892, the City Council debated limiting irrigation to nighttime hours because of water shortages, but did not pass the ordinance. The mayor, however, ordered the water supply to city parks be cut off. It was not until 1903 that the City Council (which now owned the water company) passed an ordinance limiting irrigation to between 5 a.m. and 8 a.m. and between 5 p.m. and 8 p.m., with a maximum fine of $50 for violations.

EARLY 20TH CENTURY EXPANSION

In 1900, the City of Tucson bought the Tucson Water Company and its southside wells for $110,000 and formed the Water and Sewerage Department. Hetty Green, a wealthy New York financier, bought the bonds to finance the purchase. Things did not go smoothly at first. In 1908, Mayor Heeney decided to remove the water superintendent without consulting

Figure 2-4 The growth of the City of Tucson.

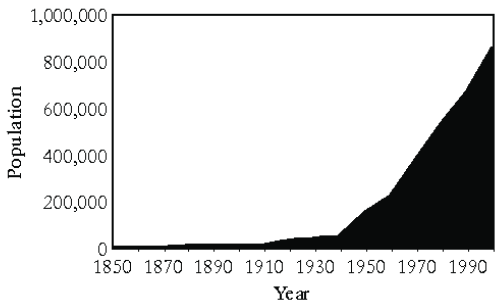


the City Council. As Councilman Moses Drachman explained, "The row which this precipitated lasted to December of that year and finally resulted in the council removing Mayor Heeney from office for misconduct." (Many other differences of opinion and accusations of scandal also contributed to the mayor's dismissal.) Also in 1908, the city faced its first water crisis when a new residential district was established, way out in the country between the University of Arizona and the railroad tracks. The windmills installed on home sites couldn't produce enough water so residents demanded that the city extend the water system to service the district. The city authorized the water superintendent to spend $260,000 to expand the system northward. In 1911, when citizens started complaining of their water bills, which were based on a flat rate per month, the city installed meters, at first only for the complainers and later for everyone. From then on people paid according to use.

In 1914, another bond issue financed six new wells and a reservoir, at the far east side of town at Second and Campbell. A new pumping technology was installed that could produce one millions gallons of water per day from one well. Windmills could extract water from shallow wells, but the new gas or electric pumps were much more efficient and could lift water from greater depths.

By 1920, water shortages again were a problem, and the City Council again banned watering except between 5 a.m. and 8 a.m. and 5 p.m. and 8 p.m. with a maximum fine of $50 for violations. The City Council also hired a staff person to provide water conservation information to the public. Meanwhile more wells were dug north of town to improve the water supply and increase water pressure for fighting fires. Over the years, more wells were added either by buying private water companies or by digging wells, until a peak of 61 wells was reached on the north side, eight of which are still active today. By that time the system had expanded and parts of the city were as much as 80 feet higher than downtown. To accommodate the situation, the city was divided into two separate pressure zones. Water circulated separately in each zone, because it could not easily be lifted to the higher areas. In later years, the zones were connected with booster stations.

Figure 2-5 Population of Pima County, 1850 to date.



Source: Arizona Department of Economic Security.

Wells were generally around 50 feet deep at this time, but water levels were dropping, and people with shallower wells had problems. Groundwater pumping near the Santa Cruz River began to affect river flow, but not until the 1940s did this pumping finally caused the water table in the area to drop so low that the river flowed only during floods. During the 1930s and 1940s, population growth slowed. In response, the water system expanded less rapidly, although the city drilled ten new wells

and purchased several water companies during this period.

Growth and Controversy

After World War II the pace of population growth quickened, and by the 1950s, the southside and northside wells could no longer produce enough water. *The Arizona Daily Star* headline read "More Water is Urgently Needed." (July 23, 1952) "Living in desert country, where a rainbucket on the roof wouldn't provide more than a good shampoo, it is natural to wonder if the city can furnish sufficient water to meet this modern expansion. The answer is a big YES, according to Water Superintendent Phil J. Martin, Jr., if the proposed $5,500,000 water revenue bond issue is given the nod by voters Aug. 12."

The big bond issue passed, and a series of wells was drilled between 1954 and 1968 along Old Nogales Highway, south of Valencia Road on the edge of the San Xavier District. Some private wells in the area also were purchased, for a total of 34 wells, 15 of which are still active today. The area is called the Santa Cruz Wellfield. This additional pumping contributed to further lowering of the area's water table,, causing the extensive mesquite bosque south of San Xavier Mission to die in the 1950s. Water problems at San Xavier intensified.

By the 1960s, population had increased to the extent that even these three established wellfields did not provide enough water. The city began to purchase farms in the Avra Valley to the west to gain access to their wells. The plan was to bring the water to the city through a large pipeline. During its period of peak operation, 27 wells were operating in the Avra Valley area, 20 of which are still active. The city also purchased land along the San Pedro River north of Benson to obtain water rights. The plan called for construction of a pipeline over the mountain pass to bring San Pedro River water to Tucson. This pipeline was never built, and the city ultimately sold the land.

During this time, the city also was buying water companies and their wells throughout the city limits. When a new area was annexed, the city would offer to buy the water company. Having all the water service under city control had the advantage of providing uniform water service and assuring adequate pressure for fire fighting (See Figure 2-6). Some areas such as Flowing Wells and Winterhaven never came under city control. The collection of almost 300 city-owned wells in the central city area is referred to as the Central Wellfield, although it is not a coherent system, but rather a collection of former private systems and some city-drilled wells. In 1998, 185 wells were active in this area

Starting in the 1960s the city adopted a policy of buying water companies outside city limits. The city also extended its water service outside city limits in areas not served by other companies. The purpose of this strategy was to enable the city to engage in basinwide management of water supplies. This would promote more equitable water service and allow sharing of costs to augment the supply. This patchwork of water systems often caused problems. Water mains had to be connected to the central system in most cases, and the quality and size of the wells and pipelines varied greatly. Serving water outside city limits also meant that many customers would have no vote on water matters and no representation on the City Council that decided water issues.

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Figure 2-6 One of Tucson's first fire brigades. An adequate water supply to fight fires has long been an important civic planning goal. Pressure and volume must be sufficient to fight fires during times of peak summer demand. Photo: Arizona Historical Society/Tucson.

CONTROVERSY OF 1975-76

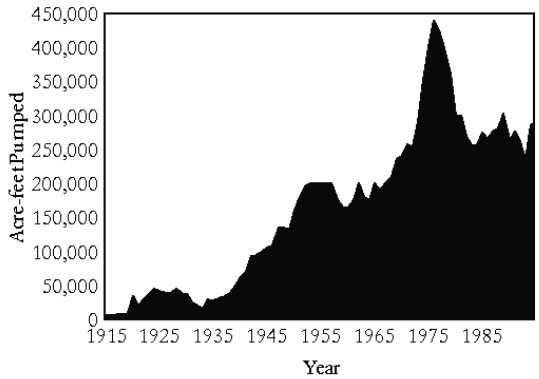
The 1970s were a period of turmoil for the community. Advocates of "controlled growth"

gained a majority on the City Council and also were a significant presence on the Pima County Board of Supervisors and in the Pima County delegation to the Legislature. Congress had approved the CAP, and Tucson had to decide whether to contract for CAP water. The controlled growth advocates were skeptical about CAP, questioning its cost, need, long-term reliability and the quality of the water. They also argued that controlling sprawl was an appropriate strategy to discourage a rapid increase in the cost of water. They supported much stronger water conservation efforts and less agricultural use of water.

Controlled growth advocates on the Tucson City Council soon found an opportunity to press for change by dealing with the pressures facing the Tucson Water Department. The distribution system was expanded rapidly in the early 1970s to keep up with growth. Revenues from relatively low water rates were not enough to keep up with increasing costs and there was not enough system capacity to meet peak demand during hot summers, such as the summer of 1974. To address the problem, a consultant's report recommended a six-year program of improvements to the distribution system, to be financed by bond sales, higher water rates and system development charges. Water rates would be designed to recover the actual costs of providing service, including a "lift charge" for providing water to customers at higher elevations, such as those in the foothills. System development charges would be applied to new customers to help pay for expansion of the system.

In 1976, the City Council voted for a water rate increase designed both to keep up with inflation and to recover actual costs of delivery. The new rates included the lift charge and retained the progressive rate structure (i.e., people who use water above certain amounts were charged higher rates for water consumed above that amount) which was first used in Tucson Water's rate structure in 1974. The new rates were adopted in June, and water bills of some customers in the high lift zones quadrupled from June to July, while bills of many others doubled.

Figure 2-7 Groundwater pumping in the Upper Santa Cruz River Basin from headwaters to Pinal County.



Source: Arizona Department of Water Resources.

The pro-CAP and pro-growth forces encouraged an angry public to revolt, and the City Council majority was recalled even though they rescinded the lift charge in August. After discovering that rates had been raised not to control growth, as had been assumed, but to build distribution systems and gain new water supplies to meet expected growth, their successors retained the rest of the new rate structure and even raised the rates again. The impact of the recall continues to this day, with City Council members and water staff reluctant to make major changes to water rates in fear of angering water customers. "Remember the recall" remains a formidable slogan.

At the next regular election in 1978 controlled growth advocates were defeated in the Board of Supervisors and the Legislature, and the City Council approved Tucson's CAP sub-contract. The sub-contract was for the entire metropolitan area, based on the assumption that the city system would continue to expand. The Council also approved water conservation programs, and Pete the Beak, cartoon star of the Beat the Peak program, was hatched. The program was originally designed to encourage landscape watering at non-peak hours, thereby delaying the need for expanding the system of water mains and reservoirs. The program, however, also had the effect of encouraging water conservation more generally.

During the 1980s, the city increased its water conservation efforts, partly in response to the requirements of Arizona's new Groundwater Management Act. Tucson had some of the lowest rates of per capita water consumption in Arizona because of these programs and the perceived high cost of water. The metropolitan area expanded rapidly beyond the central area into higher elevations. Since the main water supplies were at the lower elevations, this meant water had to be pumped uphill and stored in reservoirs, to flow by gravity to customers. The fact that all customers pay the

same rate no matter where they live is an advantage to those living in more distant and higher areas.

CENTRAL ARIZONA PROJECT

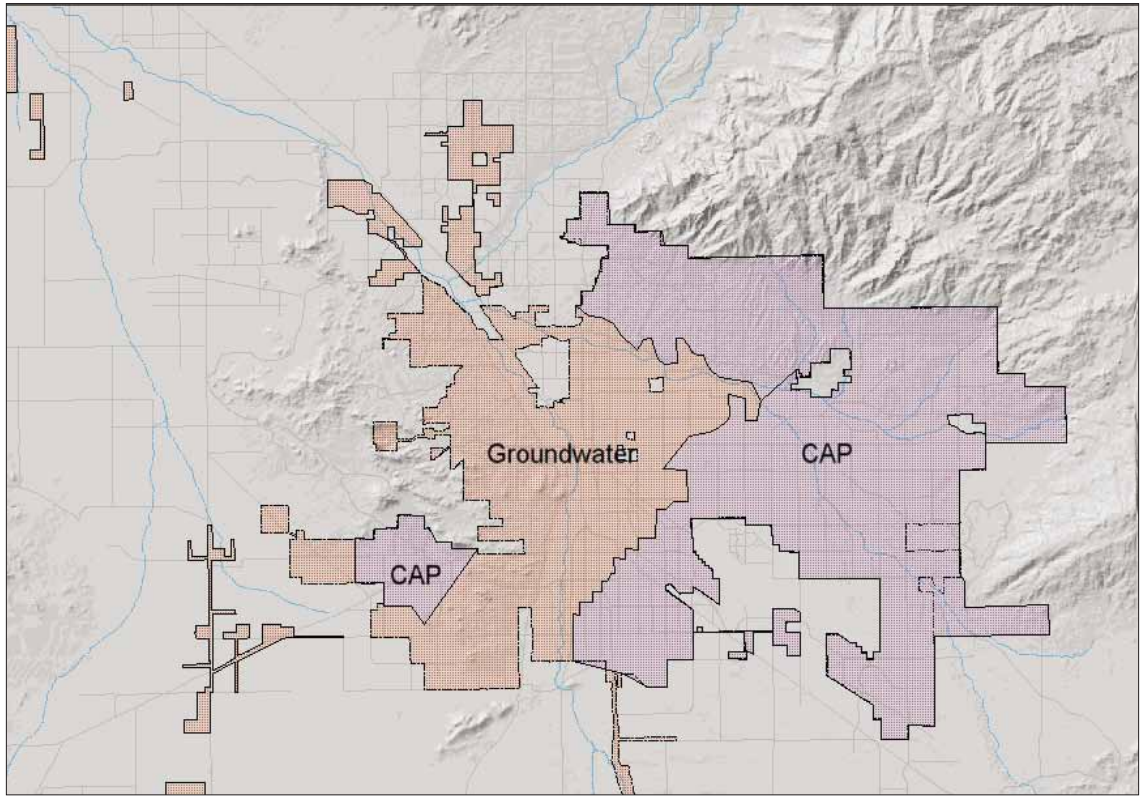
The CAP is a system of canals, pumping stations and storage facilities that brings water 336 miles from the Colorado River at Lake Havasu east to the Phoenix area and then south to the Tucson area. Fourteen pumping plants lift water 2,400 feet in elevation to the terminus.

The CAP idea preceded Arizona statehood. In the early years of the twentieth century some visionaries talked about bringing Colorado River water to central and southern Arizona. At the time this seemed infeasible. Meanwhile events were transpiring to make the vision a reality.

In the 1920s, six of the seven Colorado River states agreed to divide the river water. Arizona was the sole dissenter and did not go along with the agreement for more than twelve years. Meanwhile Hoover Dam was built in the 1930s, along with other Colorado River projects. When a large aqueduct was built to supply southern California with Colorado River water in the 1940s, Arizonans took notice and began lobbying for their own project. By 1960, all major Arizona politicians and political interests were behind the project. Congress approved CAP in 1968.

The original project included dams on the upper Gila River in New Mexico, the middle Gila River in Arizona, the San Pedro River, and the Verde River at Fort McDowell. Ultimately none of these dams was built. Instead changes were made to some existing dams, and a new dam was added along the Agua Fria River. Construction began.

Figure 2-8 Original extent of CAP delivery areas.



Sources:Tucson Water; Pima County Technical Services; Water Resources Research Center.

President Carter expressed doubts about the project-building approach to solving western water problems, and demanded changes in Arizona water laws to promote conservation. The Arizona Legislature responded to the threatened loss of CAP funding by passing the Groundwater Management Act of 1980. A three-county water district was formed to manage the project after completion and to develop water subcontracts with cities, farms, mines and other prospective users.

Completed to Tucson by 1990, the project faced problems. Few farms or mines signed CAP contracts, not even those that once enthusiastically supported the concept. Farmers found the cost too high and the supply too unreliable. The mines were concerned that the quality of the water would affect their mining

processes. The cost of extending pipelines to individual farms and mines also was a significant factor. The City of Tucson was virtually the only commercial customer for CAP in Pima County, although water was allocated to the Tohono O'odham through a legal settlement.

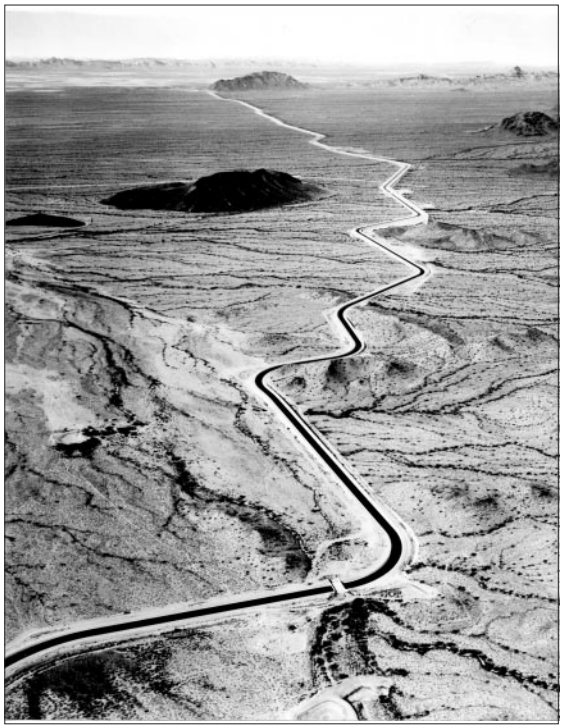


Figure 2-9 Aerial view of the Central Arizona Project canal. Photo: Central Arizona Water Conservation District.

Since Tucson Water has by far the largest municipal CAP contract, its customers, by supporting CAP, pay the majority of the costs to augment the water supply. Farms, mines and water companies meanwhile can continue to pump groundwater at a relatively low cost. Many people believed that other water users in the basin should be required to use CAP water and/or to share the costs of those switching to renewable supplies. Arizona law, however, has no provisions to enforce such a requirement.

To many people, however, CAP water represented a long-awaited water source to benefit the Tucson area. With CAP on-line, less groundwater would be pumped. CAP's Colorado River water, however, differed from the groundwater to which most people in the area were accustomed. CAP water is harder and contains more total dissolved solids than local groundwater. Despite this situation officials believed that citizens would find the new water source to be acceptable.

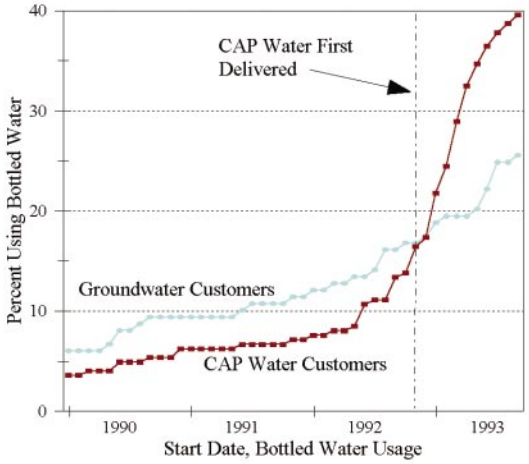
As the CAP canal neared completion in 1989, the Tucson City Council adopted the Tucson Water Resources Plan for the 110-year period, 1990-2100. It called for an aggressive phase-in of direct use of CAP water, combined with recharge and recovery of excess CAP water in early years, recovery of recharge credits, reuse of effluent and some continued use of groundwater. There was a heavy media campaign surrounding the introduction of CAP water, including a well publicized taste-test, TV and radio ads, and direct-mail fliers. The only substantive warnings about water quality were directed at kidney dialysis patients, those on restricted salt diets, and aquarium owners. In general, the introduction of CAP water was expected to go smoothly.

Starting in November 1992, CAP water was delivered to approximately 84,000 customers, or about 58 percent of the connections in the Tucson Water service area. Problems were soon reported by some customers. Many people complained of red, brown or yellow-colored water coming from their taps. Some reported broken pipes, damage to water-using appliances such as water heaters or evaporative coolers, skin rashes, and even dead fish in aquariums and damage to pools.

Many customers receiving CAP water sought to avoid some of these unpleasant effects by buying bottled water or in-home treatment systems, such as filters installed under the sink. Figure 2-10 shows the increase in bottled water usage by Tucson Water customers in response to the introduction of CAP water in November 1992. Purchases of both bottled water and in-home treatment systems have been rising on a national basis for a number of years, and aggressive marketing of bottled water by a growing number of bottled water outlets led to an increase in bottled water usage for all Tucson Water customers over this time period. However, customers switched from groundwater to CAP water increased their bottled water usage more than ten fold, compared to a tripling in the rate of bottled water usage for those kept on groundwater.

Research by the Water Resources Research Center revealed a similar pattern for purchases of in-home water treatment systems, as customers with in-home treatment systems increasing four-fold to nearly 20 percent. The study also documented dramatically higher rates of plumbing and water-using appliances failing in households switched to CAP water. While an accurate estimate of all costs could not be made, the study suggested that Tucson Water customers receiving CAP water were incurring many millions of dollars of expenses per year

Figure 2-10 Percent bottled water users over time, CAP vs. groundwater customers.



Source: Water Resources Research Center.

to avoid and compensate for the decreased water quality.

The City Council debated the possibility of ending direct delivery of CAP water, but in August 1993 twice voted by narrow margins to keep delivering CAP water. In October 1993, deliveries were halted to the east side of the CAP delivery area, which generally had a high number of older galvanized steel water mains and was most heavily affected.

As more complaints were reported, Tucson Water responded by adding a corrosion inhibitor to the water as it left the treatment plant. However, maintaining effective corrosion inhibitor levels throughout the distribution system proved difficult. The utility also began frequently adjusting the chemistry of the water in an effort to control the problems. Several different levels of pH adjustment were tried for varying lengths of time. These frequent changes in pH level were later identified as probably contributing to the problem rather than correcting it.

The City of Tucson also set up a program to handle damage claims. While not admitting fault or responsibility for damages, the City offered to pay up to specified amounts to reimburse for specific types of damage. As of 1995, the City had paid over $1 million dollars in damage claims, and has since added to this amount.

Public exasperation with the delivery problems grew as damage to homes mounted and the extent of the problem became apparent. In May 1994, voters surprised some observers by approving $31 million in bonds for improvement of the water delivery system, mostly to replace old galvanized steel or iron water mains.

All CAP water deliveries had to be halted in November 1994 to allow for repairs to siphons in the CAP system, and City Council voted not to resume deliveries. By this time, the head of Tucson Water and the CAP plant manager had resigned, and the utility's reputation had been seriously damaged in the eyes of many citizens.

Petitions were circulated for a ballot issue to limit future direct delivery and in November 1995, voters approved the Water Consumer Protection Act (WCPA), which outlawed direct use of CAP water unless it was treated to the quality of Avra Valley groundwater and was free of disinfection by-products (See chapter 7). The WCPA had the effect of shifting the focus for how to use CAP water in Tucson to artificial recharge. In 1997, voters reaffirmed their opposition to direct use of CAP water in favor of its recharge and use by farms and industry, by defeating a ballot initiative which would have repealed or substantially changed many of the provisions of the WCPA. Some citizens also joined a class-action lawsuit against the City. Resolution of this litigation is pending.

TODAY'S WATER PROVIDERS

Tucson Water now has four major wellfields — Southside, Santa Cruz, Central and Avra Valley — along with a large number of wells scattered throughout the city, and a few small isolated systems in remote areas. In addition, more than 30 water companies operate well systems in the Tucson area. The largest of these are Metropolitan Domestic Water Improvement District, Oro Valley Water Department and Flowing Wells Irrigation District. Other significant water pumpers include the University of Arizona, Davis-Monthan Air Force Base, Cortaro Marana Irrigation District, Farmers' Investment Company (FICO), Farmers' Water Company and the ASARCO Mining Co. Finally, approximately 22,000 individuals and businesses have their own wells. No one agency coordinates or regulates the activities, of all these users; instead, the Arizona Department of Water Resources (ADWR), the Arizona Corporation Commission (ACC), the Arizona Department of Environmental Quality (ADEQ), the Central Arizona Water Conservation District (CAWCD), the U.S. Environmental Protection Agency (EPA) and the courts all have roles in managing water supply, water

quality and water rates. (See Chapter 7 for additional information on regulatory agencies.)

AGRICULTURAL WATER USE

People have been irrigating fields in the Tucson area for at least 2,000 years. Before the Spaniards arrived, most crops were grown in the summer, taking advantage of monsoon rains. The Spaniards introduced winter crops that needed irrigation. They also introduced cattle and horses, animals that affected water supplies as well as vegetation near the streams. The first Anglo farmers continued in the Spanish pattern, with cooperative irrigation systems run by an irrigation master responsible for fairly distributing water. In 1886, the Arizona Mining Index described Tucson farming: "Eight streams of water run through the Santa Cruz Valley opposite Tucson. Five of these ditches are 7-feet wide that now contain a foot and a half of running water. The other three are narrower and contain less." John Davidson started to build a canal to irrigate 3,500 acres, but the floods of 1887 washed it out before it was finished.

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Figure 2-11 San Xavier Mission. The water table was high enough to obtain water with a windmill. Photo: Arizona Historical Society/Tucson.

An important technological advance in the 1890s enabled wells to be drilled in various locations, powered with wood-burning steam engines and, later, gas or electricity. In 1891, a University of Arizona professor reported that water could be pumped from underground to irrigate the campus. About that time, the first farm in the area began to use pumped groundwater. From then on, groundwater pumping increased steadily. With the new technology, wells could be drilled to much greater depths. On the Canoa Ranch south of Tucson a well was drilled to 500 feet, hitting water at 300 feet. The new steam pump could produce a flow of 2,000 gallons per hour.

In 1892, Frank and Warren Allison built a new ditch for irrigation that was later extended to lands beyond St. Mary's Hospital and constructed a reservoir near the old Warner Dam site. By 1895, they had built more ditches and acquired another source of water known as "Flowing Wells" near Sentinel Peak as well as the Tucson Farms Company south of town. This later developed into the Flowing Wells Irrigation District which stretched from far south of town all the way to Marana. That district continues to exist (although greatly reduced), supplying water for urban use on the northwest side of town through its wells.

In the 1890s, new legal systems of apportioning surface water were developed, with the first people to file water claims having the first rights to surface water. Water use increased to the extent that by 1910, all of the water flowing in the Santa Cruz River in the downtown area (other than during floods) was being diverted for agricultural or municipal purposes. With the growth of agriculture around Sentinel Peak new irrigation canals were soon insufficient, and water disputes arose.

ONGOING SEARCH FOR WATER QUALITY

Sewers and Wastewater Treatment

Before the 1890s, Tucsonans used outhouses for their sewage. In the 1890s, when water was first piped to houses, people drained their sewage into cesspools. In 1900, the city opened its new Water and Sewerage Department and laid the first public sewers along Main Avenue between 17thth Street and St. Mary's Road. The untreated sewage was delivered by open ditch to a small farm where it was used for irrigation. In 1914, people were complaining of the odor.

When the farm had a sufficient supply of sewage, a new farm was opened along the Santa Cruz River at Roger Road, four and a half miles northwest of downtown, and a new pipeline was constructed to deliver sewage water to the farm. The city considered the farm a profitable business, but the arrangement met with increased complaints. In 1928, the first treatment plant was built which reduced the solids content of the sewage. After treatment the sewage was delivered to the farm. The facility was expanded and improved in the 1940s, with the sewage still used for irrigation.

As population increased, Tucson could no longer be responsible for the sewage needs all residents, so citizens formed a sanitary district to serve residents outside city limits. It was not until 1961 that the district built a new sewage lagoon near Ina Road and the Santa Cruz River. The Roger Road treatment plant was expanded in 1960 and again in 1968. The Sanitary District was dissolved in 1968, and Pima County took over wastewater management for the area outside Tucson. In 1975, Tucson opened a Wastewater Reclamation Facility at Randolph (Reid) Park which provided wastewater for the golf course, but the facility was closed in 1995. Pima County built a new advanced treatment plant at Ina Road in 1977.

By the 1970s, both city and county officials felt a need to combine their efforts, and they formed the Metropolitan Utilities Management (MUM) Agency for better basinwide management of wastewater facilities in the metropolitan area. Tucson and Pima County, however, continued to operate separate facilities. For the first time, however, they adopted basin-wide sewer connection fees and sewer user fees, charging the approximate cost of providing services. In 1976, elected officials dissolved MUM. Tucson and Pima County then signed an intergovernmental agreement in 1979, stipulating that Pima County would own and operate all the wastewater systems for both city and county, but that Tucson would retain rights to 90 percent of the wastewater coming from metropolitan area treatments plants. The city deeded to the county its Roger Road Treatment Plant and its other wastewater facilities. Between 1980 and 1984, the Roger Road Plant was expanded and upgraded in stages. The federal government paid a large share of construction costs, sparing county taxpayers much of the expense of the expansions.

In 1985, Pima County began a project to export sludge from the wastewater process for agricultural use in the Marana area, thus lessening the burden on the nearby landfill. In 1987, a system for transferring sludge from Roger Road to Ina Road was completed. As a result, neither plant sends sludge to landfills.

In the late 1980s and early 1990s, both the Roger Road and Ina Road plants were expanded and modified and various smaller facilities were built, including the Catalina out-fall sewer and a facility in Avra Valley. Work to further expand the Roger Road facility was recently completed, and work is about to begin to expand the Ina Road plant. Pima County funded a University of Arizona wetlands research project to determine how effectively water hyacinths (and later other plants) could treat wastewater.

This photo has been removed due to copyright restrictions on the web

Figure 2-12 Woman washing clothes in the Santa Cruz River, with the ruins of the Convento in the background. Photo: Arizona Historical Society/Tucson.

Recharging Reclaimed Water

In 1983, the City of Tucson constructed a tertiary treatment plant to further treat wastewater from Pima County's Roger Road plant for use on golf courses and other turf. Over the years mains were installed to deliver water to various facilities on the far east side of town and in the central area. Today effluent is delivered to over 200 water consumers, including 13 golf facilities, 25 parks and 30 schools.

Starting in the 1980s the city began recharge experiments, with pilot projects along the Santa Cruz River opposite the Roger Road Wastewater Treatment Plant. Recharge involves adding water to the aquifer. Monitoring determined the rate recharge was occurring and detected changes in water quality. The city subsequently developed other recharge projects. The project with the largest anticipated full-scale capacity is the Central Avra Valley Storage and Recovery Project.

In the 1960s, the city experimented with a series of ponds for wastewater treatment using effluent from Roger Road. Then Tucson Water Director Frank Brooks used to boast of the high quality of the water by eating fish caught in those ponds. The last of the ponds was eliminated in the 1980s in response to fears that water leaching out of the ponds to groundwater was being contaminated by old landfill material. In 1998, the city opened its first constructed wetland to the public — the Sweetwater Wetland near the Roger Road Treatment Plant.

OTHER WATER QUALITY PROBLEMS

Treatment of sewage has been the major water quality challenge for many years, but by no means the only one. During World War II Tucson became a center of airplane construction and maintenance. Several plants located near the Tucson Airport regularly used solvents to degrease aircraft parts. Solvents were not known then to be a health hazard, and the waste products were often evaporated in unlined ponds or allowed to run into washes. A few employees expressed concern at the time, but it was not until the 1970s that people on the south side of town noticed the occurrence of an unusually high incidence of certain illnesses. The Arizona Department of Health and the EPA began studies to determine the cause. As a result of these studies and legal action, officials came to believe that trichloroethylene (TCE) had reached the groundwater and was probably creating health problems such as lupus and birth deformities. A citizen group, Tucsonans for a Clean Environment (TCE), formed on the southside to ensure that the problem was taken resolved to the benefit of the residents.

Since most of the manufacturing companies had long since left town, Hughes Aircraft (now Raytheon), the Tucson Airport Authority, the U.S. Air Force and the City of Tucson shared the burden of cleaning up the contaminated water. The city shut down three production wells and brought water from other wells to area customers. Hughes and the city installed a clean-up facility, under EPA oversight. What to do with the water after the TCE was removed became a major concern. The issue was later addressed as part of the anti-CAP initiative or Proposition 200. This passed and became the Water Consumer Protection Act. Tucson voters stated that water from polluted sources could not be used in the city system, even if federal Safe Drinking Water standards were met.

ADEQ has identified a number of other water quality problems in the Tucson area, including 17 groundwater contamination sites. The sources of contamination include historic landfills, manufacturing plants, mining and agricultural activities, aircraft waste disposal, and gas station and dry cleaning operations. In some cases the contamination exceeds federal Safe Drinking Water standards, and groundwater from the affected areas cannot be used for drinking unless treated to meet those standards. (See Chapter 6).

Chapter 3
IN SEARCH OF ADEQUATE WATER SUPPLIES

Most water issues have to do with either water supply or water quality. In more personal terms these issues have to do with our need for an adequate supply of good quality water. This chapter looks at Tucson's water supplies and our need for sufficient water resources to support our growing community. Present resources are described; methods to make present supplies go further are discussed; and possible strategies for bringing new water supplies into the basin are described. Chapter 5 discusses how we use water, and Chapter 6 discusses water quality.

TUCSON'S WATER SUPPLIES

For many centuries, people who lived in the Tucson area used less water than was available from snow in the mountains or rain. Precipitation or runoff and a high water table could be counted on to maintain the flow of the river. Those days are long gone. Today, virtually all the water we use originates as stored groundwater. This groundwater also is naturally replenished, partly by rainwater and snowmelt from the mountains and partly from return flow after various human uses, such as irrigation and wastewater effluent discharges. The surface water that replenishes the aquifer, however, is not sufficient to ensure a sustainable supply of groundwater in the face of current levels of demand. The stored groundwater supplies have not been substantially renewed for many years. In fact, our excessive pumping of groundwater is the reason little or no surface flow remains in Tucson rivers. New sources of water, such as CAP water and effluent, offer the possibility that we can stop or reduce the mining of our stored groundwater.

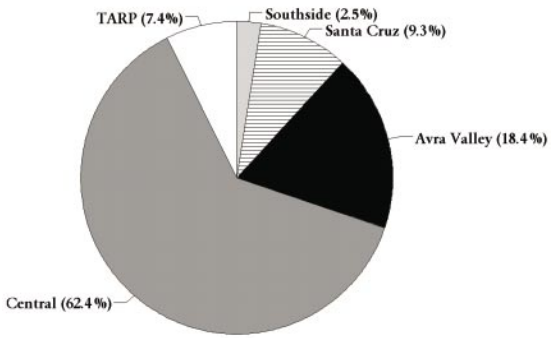
NON-RENEWABLE SUPPLIES

Stored Groundwater

Two main aquifers supply water to the Tucson area, one located in the Tucson Basin and the other in the Avra Valley Basin. In 1940, when Tucson began to increase its groundwater pumping, these aquifers held approximately 70 million acre-feet of groundwater at depths less than 1,200 feet below the surface. Since 1940, approximately 6 to 8 million acre-feet, or 9 to 11 percent of the total has been withdrawn.

A wellfield is a group of wells used by a water provider in an area where the subsurface geology is suitable for pumping. The wells may not be located close together but might still be referred to as a wellfield for administrative purposes. Tucson Water currently operates four major wellfields – Central, Southside, Santa Cruz and Avra Valley. A fifth wellfield is being developed further north in the Avra Valley, to recover recharged water from the Central Avra Valley Storage and Recovery Project. Tucson Water delivered approximately 114,000 acre-feet of groundwater in 1996. Figure 3-1 shows how

Figure 3-1 Contribution of Tucson Water wellfields to total groundwater supply.



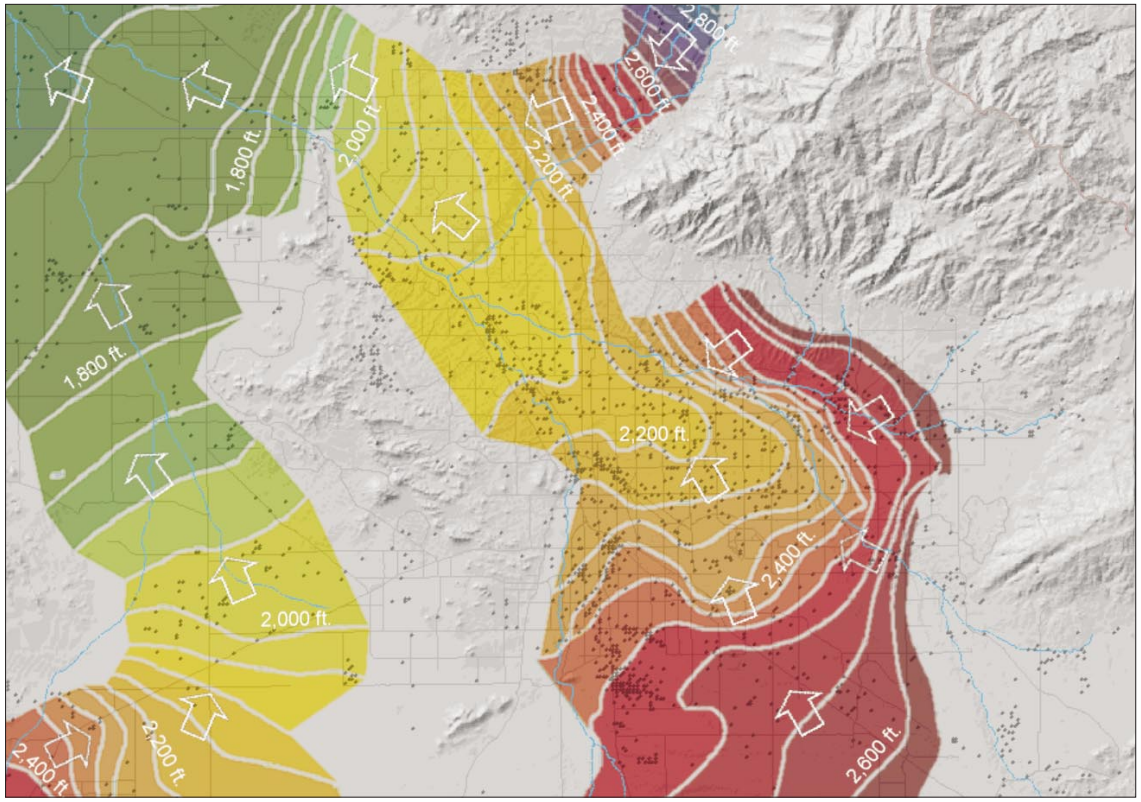
Source: Tucson Water.

WHAT IS GROUNDWATER?

Groundwater is water that fills spaces under ground, between grains of sand or rock or in subterranean cracks. The area where groundwater occurs is the "aquifer." The top level of the aquifer saturated with groundwater is the "water table." The most productive aquifers consist of water stored in sand and gravel. These areas are typical of ancient floodplains (alluvium) where water, rocks and sand were deposited at about the same time. Water and soils flowing from mountains over long periods of time created some of Tucson's most productive aquifers.

Openings between the subterranean storage areas must be interconnected for water to flow freely. Over the years, water moves slowly downward to the aquifer and also spreads out, moving generally northwest in the Santa Cruz Valley. At some point, the water will reach solid rock or a layer of clay. When such an impermeable layer is near the surface, water may occur as surface flow or springs. If the water table is relatively close to the surface, rivers can flow. Excessive pumping from aquifers causes the water table to recede, and surface flow is no longer possible except during rainy periods. Another impact of pumping is that grains of sand or rock compact as water is withdrawn. Percolating water then is much less likely to refill the spaces, especially at greater depths. Tucson's water table has significantly dropped throughout most of the region.

Figure 3-2 Elevation of water table and direction of groundwater flow.



Sources: Arizona Department of Water Resources, Water Resources Research Center.

much each wellfield contributes to total pumping.

The distance from land surface to the water table is termed "depth to water." The present depth to water in the Tucson area ranges from less than 50 feet to more than 700 feet. In certain parts of the Tucson Mountains, it is as much as 900 feet. Depth to water is greatest in the foothills of mountain fronts and shallowest in the Altar, Brawley and Cañada del Oro washes and near Rillito Creek and the Tanque Verde Wash. In the Tucson area groundwater generally flows slowly to the north and northwest, at an average rate of only about several hundred feet per year, or a foot or two per day. (See Figure 3-2.)

The figure on the inside cover of this document shows changes in groundwater levels since 1940. Between the 1940s and 1995, groundwater levels declined over 150 feet northwest of the Green Valley/Sahuarita area as a result of pumping by copper mines. Water

WHAT'S AN ACRE-FOOT?

An acre-foot is enough water to cover an acre of land to a depth of one foot. An acre-foot contains 325,851 gallons.

levels declined more than 200 feet in parts of the Central Wellfield and over 100 feet in the Southside Wellfield due to pumping by the City of Tucson. Current declines in the Central Wellfield are averaging up to four to five feet per year.

Water levels have declined over 150 feet in the southern Avra Valley. The City of Tucson retired farmland in this area, and water levels have rebounded at some locations. Water levels have continued to decline in other parts of southern Avra Valley, in areas where the Tucson Water is pumping water for municipal use.

Groundwater levels, however, are no longer declining from municipal pumping in the lower part of the Cañada del Oro area, after drops of about 50 feet. Water levels that dropped from agricultural pumping southeast of Marana are now rising, partly because of effluent recharge, increased natural recharge and decreased agricultural use. Water levels have also increased along the Santa Cruz River because of above average flood flows since the late 1970s.

Thus, the broad pattern of steady, region-wide groundwater level declines is seen at a greater level of detail to be a more complex pattern of rising and dropping groundwater levels, influenced by local water uses and recharge, and by the impacts of wet and dry years.

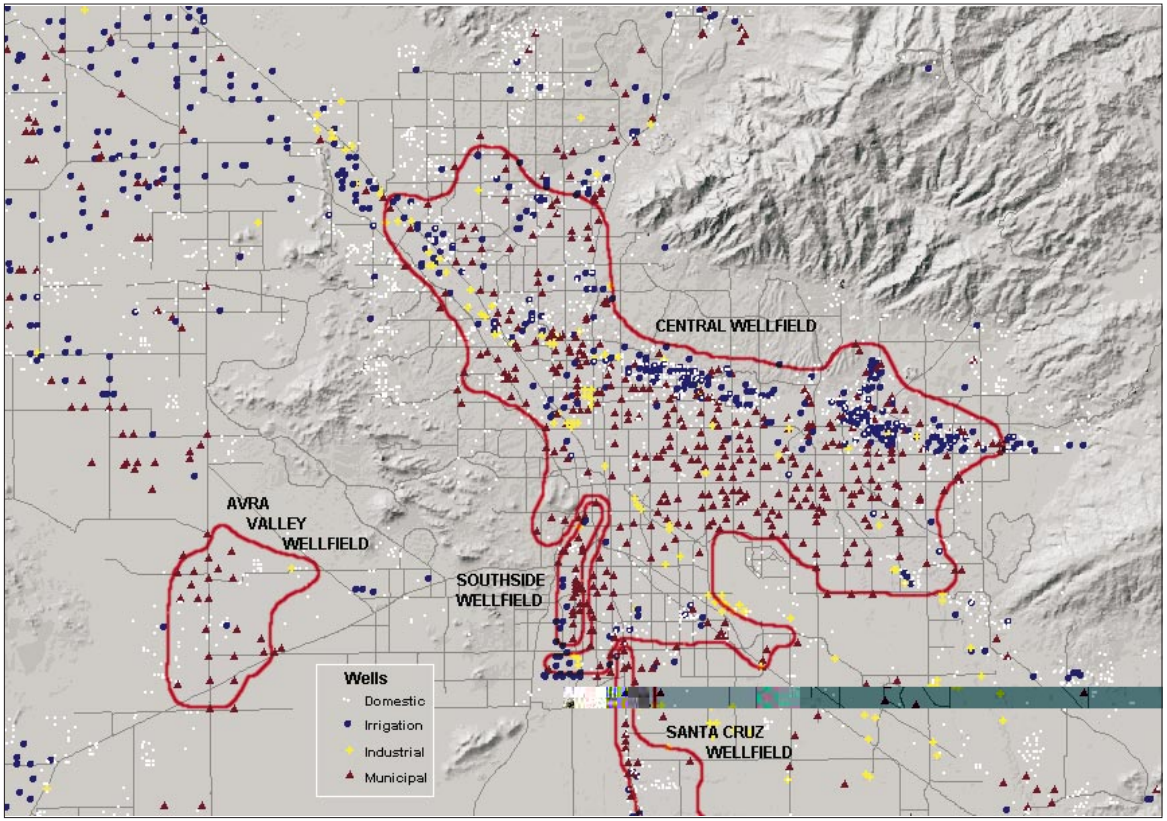
IMPACTS OF EXCESSIVE GROUNDWATER PUMPING

There are several major impacts associated with continued groundwater pumping in excess of the rate of natural recharge. The most far-reaching and potentially destructive is land subsidence and earth fissures. Other impacts include increasing costs of pumping groundwater and generally decreasing quality of groundwater pumped from greater depths.

Subsidence

A consequence of water level declines is land subsidence. According to an Arizona Geological Survey publication "subsidence is the downward movement or sinking of the earth's surface caused by removal of underlying support." In Arizona, subsidence usually results from excessive groundwater pumping. As water is pumped from an aquifer, the water occupying spaces between rock particles is removed,

Figure 3-3 Map of wells and Tucson Water wellfields.



Sources: Pima County, Arizona Department of Water Resources, Tucson Water, Water Resources Research Center.

and the water level or water table drops. Without the buoyancy of the groundwater, the particles become more tightly packed together; i.e., the particles compact and consolidate. Continued pumping of groundwater without adequate recharge causes sediments to become increasingly compressed, and the land surface to settle or subside. (See Figure 3-4.)

In most cases, subsidence resulting from groundwater pumping occurs at about the same rate over large areas and can be difficult to detect. However, abrupt changes in conditions below the land surface can cause the rate of subsidence to vary considerably over a short distance. This "differential subsidence" is more likely to cause damage to houses, commercial buildings, or infrastructure such as water and sewer lines or roads.

A related phenomenon, an earth fissure is a visible, and sometimes even spectacular manifestation of land subsidence. Fissures usually are noticed first as land cracks or crevices, a break in the earth's surface. They can then grow considerably as water erodes the fissured area. Gullies or trenches may be up to 50 feet deep and 10 feet wide, with the fissure extending hundreds of feet below the surface. The fissure may range in length from a few hundred feet to over eight miles. "El Grande" fissure system is ten miles long and is located in the Picacho Basin, northwest of Tucson. The average length of a fissure is measured in hundreds of feet. In the Tucson area fissuring has occurred west of the Tucson Mountains in Avra Valley.

RENEWABLE VS. NON-RENEWABLE SUPPLIES

In this report "renewable supply" refers to water that is naturally replenished, and "non-renewable supply" refers to stored groundwater. Thus rainfall is renewable whether it is used directly or whether it adds to the stored groundwater through recharge.

Figure 3-4 Subsidence near Eloy. Dates on the pole mark more than 15 feet of subsidence from groundwater pumping between 1952 and 1985. Photo: U.S. Geological Survey.

Arizona ranks third nationally in land area affected by subsidence, after California and Texas. More than 3,000 square miles of the state have subsided, with hundreds of fissures occurring since the 1950s. The occurrence of subsidence in south-central Arizona is a major concern because it is a core area of the state, with major agricultural and urban centers. The Phoenix and Tucson metropolitan areas are located within this area, as well as agricultural production areas within Pinal and Maricopa counties.

Urban areas are especially vulnerable to the damaging effects of subsidence. Cities are dense areas of population, with large numbers of buildings and facilities. Also within urban areas are the varied projects and structures — bridges, highways, electric power lines, underground pipes, etc. — that make up the urban infrastructure. Railroads, earthen dams, wastewater treatment facilities and canals also are prone to damages from subsidence. Sewer lines, laid at precise gradients, can have their slopes reduced or even reversed, with serious consequences. Any structure built across the path of a fissure likely will suffer serious damage. Careful and expensive construction procedures were worked out to protect the CAP canal from subsidence damage in certain areas. Despite these precautions, the canal was damaged by an earth fissure in Pima County in 1988.

The U.S. Geological Survey (USGS) reports that since 1940 groundwater levels in Central Arizona have dropped over 220 feet, with Central Tucson subsiding at least one foot since 1950. Meanwhile the rate of subsidence in the

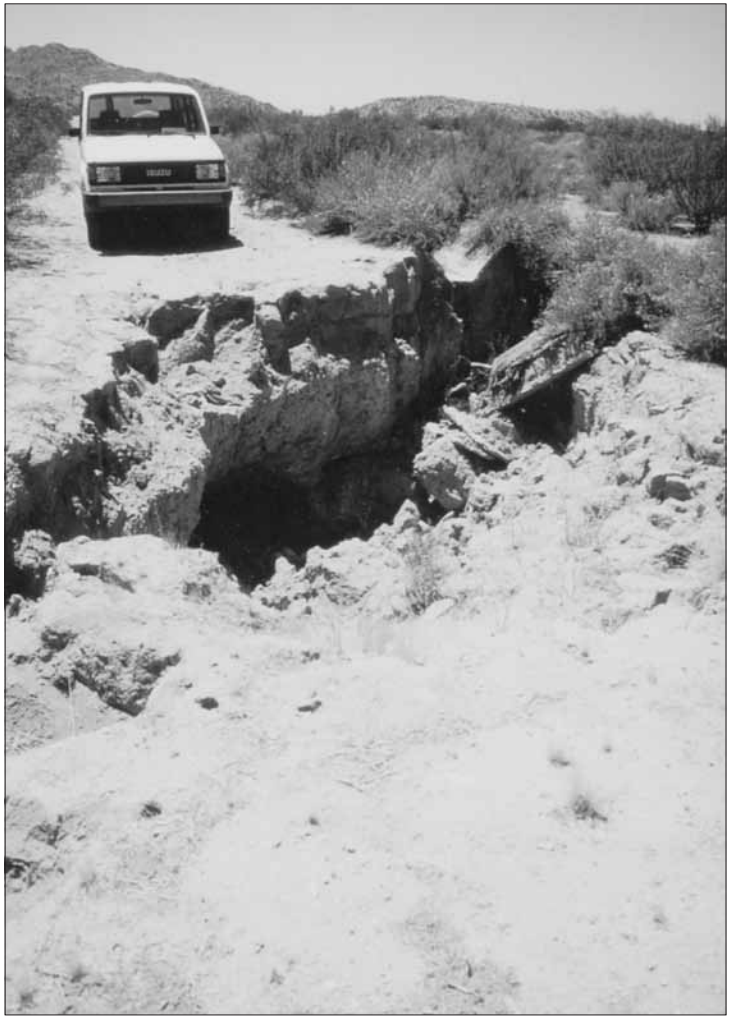


Figure 3-5 A fissure can appear as a deep gash in the earth. The above fissure is southeast of Phoenix. Photo: Ray Harris.

area is increasing. Satellite images show that sections of central Tucson are sinking at the rate of 2 centimeters or 0.8 inches per year. USGS monitors water level changes and subsidence at 19 southern Arizona sites. Some USGS sites are in Tucson.

NPA Satellite Mapping is a company that uses satellite images taken over a period of years to plot subsidence. Satellite imagery coupled with a technique called interferometry determines the subsidence rate. This procedure was applied to identify a large subsidence area in central Tucson, centered at the intersection of East Speedway and Country Club Road. This marks the spot of the greatest subsidence activity in the Tucson area.

USGS models predict levels of subsidence likely to occur in Tucson wellfields. Assuming that groundwater pumping and natural recharge rates continue at 1986 levels through 2025, and based on other assumptions about the aquifer material being compacted, USGS models indicate that maximum subsidence could range from 1.2 to 12 feet in the Central Wellfield by the year 2025. (See Figure 3-6.) Under the same assumptions, subsidence in the Santa Cruz Wellfield could reach up to 4 feet by the year 2025. For northern Avra Valley, maximum subsidence potential is estimated to range from 0.9 to 14.7 feet by the year 2025, assuming that pumping levels and natural recharge rates continue at 1970s levels. If subsidence approaches the maximum level projected for the year 2025 in the Central Wellfield, the risk of differential subsidence is significant, especially near downtown Tucson.

Subsidence can be halted by ceasing or limiting groundwater withdrawal in an area. Also, under the right conditions, overdraft may be reduced through artificial recharge, thus slowly decreasing the danger of further subsidence. In most cases, subsidence is termed inelastic because the sinking of the ground is permanent, and recharge would not reverse the process.

Well-injection recharge is likely to be more effective than other types of recharge at ensuring that water is recharged close to the compacting layers. Surface water recharge projects may be effective at restoring the water table. In most cases, however, once subsidence occurs, the water storage capacity of the aquifer is permanently reduced. In some cases, recharge projects may even worsen subsidence, as the weight of the water applied at the surface compacts the underlying aquifer materials even more.

Increased Pumping Cost

In those areas with the most pumping, water level declines may lead to lower productivity because as the water is pumped from greater depths, the aquifer materials become more compacted and hold less water. For example, well yields in the Santa Cruz and Southside Wellfields have decreased over the years. Average yield for wells in the Santa Cruz Wellfield in 1992 was less than a third of what it was in 1958. Average yield in the Southside Wellfield

in 1992 was about half of what it was in the late 1960s. Further decreases are expected for both wellfields, if pumping continues at current rates and groundwater level declines continue. If the same amount of water is to be pumped, loss of productivity in wells means higher pumping costs for water utilities. Costs can further increase if older, shallower wells need to be replaced with deeper ones.

Decreased Water Quality

The quality of water pumped also is expected to generally decline as it is pumped from greater depths. The total dissolved solids (TDS) of Tucson area groundwater currently averages about 300 parts per million, although TDS measurements in some areas are much higher. An increase in TDS shortens the useful life of many water-using appliances and water pipes because of accelerated corrosion.

RENEWABLE SUPPLIES

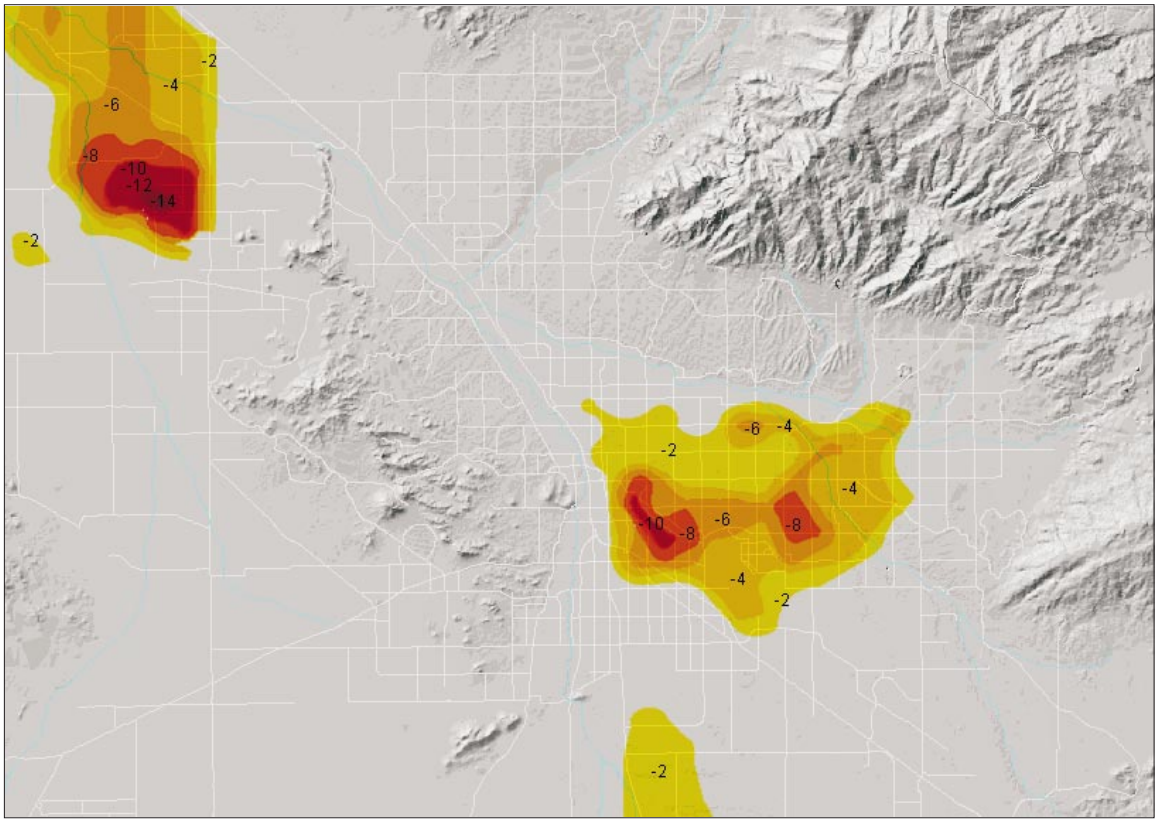
Central Arizona Project Water

CAP water is the largest renewable water supply in the Tucson area. CAP water is lifted some 2,900 feet through 14 pumping plants and transported through open canals, siphons and pipes a distance of 336 miles from the Colorado River at Lake Havasu through the Phoenix area and then south to Pima County. CAP was designed to deliver up to 1.5 million acre-feet of water annually to central Arizona.

Over 215,000 acre-feet of CAP water are allocated to entities in the Tucson area, with approximately 38,300 acre-feet subcontracted to Indian users. Appendix B lists the CAP allocations of all the local water providers. Additional CAP water that is available to the Arizona Water Banking Authority and the Central Arizona Groundwater Replenishment District could be recharged in the Tucson area.

The City of Tucson has the largest allocation of CAP water in the state: 138,920 acre-feet. This is Tucson's total allocation after the recent agreement between the City of Tucson and the Metropolitan Domestic Water Improvement District (Metro Water) that transfers 9,500 acre-feet of Tucson's allocation to Metro Water and Oro Valley. In the early 1990s, the City of Tucson intended to use increasing amounts of its allocation by directly delivering treated CAP water to its customers and to other municipal water providers on the northwest side, and recharging additional amounts for later use. CAP water was first delivered to approximately 60 percent of Tucson Water cus-

Figure 3-6 Maximum potential subsidence in feet.



Sources: United States Geological Survey, Arizona Department Water Resources.

tomers starting in 1992. Direct deliveries were suspended for some of those customers in September 1993 and halted indefinitely for all customers in November 1994, after problems arose with the taste, odor and color of the water, and pipes and water-using appliances were damaged.

The aborted effort to introduce CAP water caused city residents to be wary of the resource, and in 1995 they approved the Water Consumer Protection Act. This voter initiative prohibits direct delivery and injection recharge of CAP water unless stringent water quality criteria are met. As a result of the initiative, the city has switched its CAP use strategy from mostly direct use to recharge. After declining from a peak of approximately 52,000 acre-feet in 1993 to 10,200 acre-feet in 1995, CAP water deliveries to the Tucson Active Management Area (TAMA) have grown to 19,800 acre-feet in 1996 and 34,200 acre-feet in 1997. Almost all of the water was delivered to direct recharge projects or Groundwater Savings Facilities (See section on recharge, below).

Some municipal providers with CAP contracts, such as those in the Green Valley area, cannot use their allocations directly because the canal does not reach them. To better service them, a group of water users in the Upper Santa Cruz basin studied the possibility of extending the CAP canal from its current end point near Interstate 19 and Pima Mine Road south of Tucson to the Green Valley/Sahuarita area. In a 1998 study, the group identified possible alignments for the canal and estimated costs. Other municipal providers who cannot use their allocations directly plan to recharge their CAP water to offset some of their groundwater pumping.

Treated Effluent

Treated effluent is water that has been used in homes and businesses and then collected by the sewage system and treated at a wastewater treatment plant, for various water uses. Some 85 to 90 percent of households in the Tucson metropolitan area are connected to the central sewage system. Effluent is considered a renewable supply because it extends our stored groundwater supply. Generally as population increases, so does the supply of effluent.

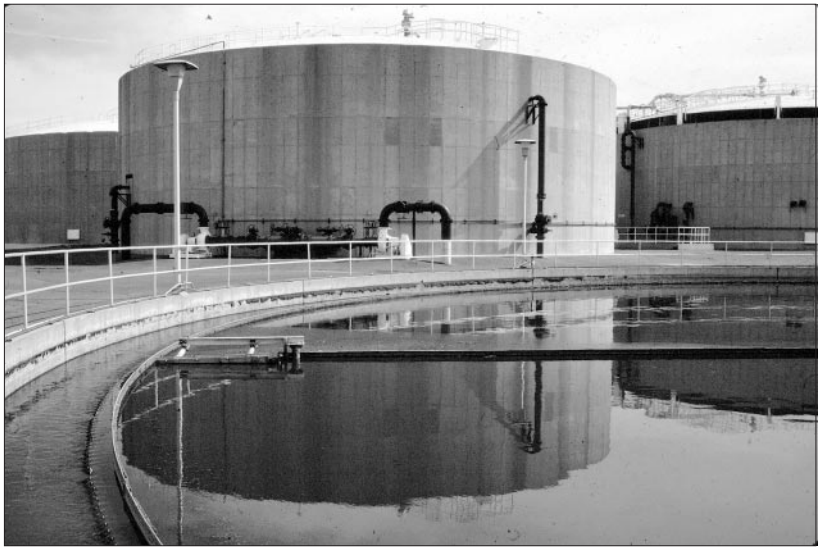


Figure 3-7 Tanks from a Pima County wastewater treatment plant. Photo: Barbara Tellman.

Total treated effluent production from wastewater treatment plants in the Tucson AMA (TAMA) was 70,100 acre-feet in 1996, or approximately 63 million gallons per day (mgd). Almost all the effluent came from the Ina and Roger road treatment plants. Nine other small treatment facilities are located in Pima County, and an estimated 11 percent of single family residences have septic tanks. Total effluent flows in Pima County are projected to reach 103 mgd, or 115,760 acre-feet, by the year 2025.

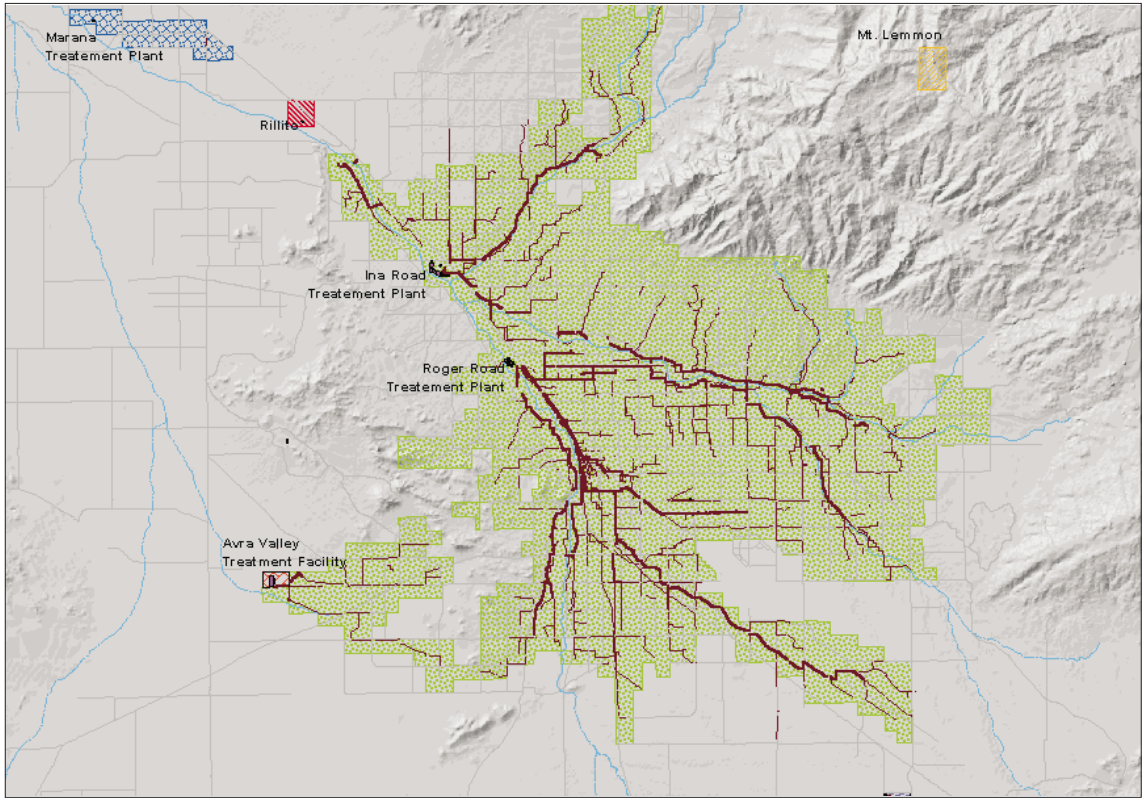
Wastewater delivered to the Ina and Roger road treatment plants undergoes primary and secondary treatment processes at treatment facilities to meet state and EPA water quality standards. Of the approximately 69,400 acre-feet of secondary-treated effluent produced at these plants in 1995, approximately 4 percent was delivered directly to farms and another 2 percent was delivered directly to turf facilities such as golf courses. Another 13 percent was sent to Tucson Water's reclaimed water facilities, located next to the Roger Road Wastewater Treatment Facility for additional treatment involving filtration through sand filters or soil and additional disinfection. Reclaimed water then is delivered for use or is recharged at the Sweetwater Underground Storage and Recovery Facility, to be pumped out when needed to meet peak irrigation demands during summer. (See Chapter 5 for more information on the use of effluent.)

The remaining 84 percent of the effluent is released into the Santa Cruz River channel. Approximately 96 percent of released discharges

eventually infiltrates the river channel to the underlying aquifer within TAMA. The remaining 4 percent evaporates or is used by riparian vegetation.

The Regional Effluent Planning Partnership has listed 20 effluent projects and potential alternatives as of January 1999 (See Appendix B). Of these 20 projects, three presently exist, seven are in the process of being built and ten are proposed for the future. Two of the proposed projects would create recharge credits for the existing discharge to the Santa Cruz River. If these projects are approved, the state would grant credits for 50 percent of the amount of effluent recharged. These credits could be used to allow groundwater pumping elsewhere in the TAMA, partially nullifying the contribution of the existing effluent discharges towards safe yield calculations for TAMA. An assessment also is currently being conducted to determine potential impacts of any changes in effluent discharge on the riparian area downstream of the wastewater treatment plants.

Figure 3-8 Wastewater treatment facilities and distribution system.



Sources: Pima County Technical Services, Pima County Wastewater.

At least seven constraints may limit full use of effluent. None of these constraints are insurmountable barriers; yet they must be taken into consideration when making plans for dealing with effluent. They include:

- A water rights settlement with the Tohono O'odham Nation obligates up to 28,200 acre-feet of effluent produced at metropolitan area wastewater treatment facilities to the U.S. Secretary of the Interior for the Indian Nation.
- Of the effluent remaining after the Secretary's share is subtracted, the City of Tucson has control of about 90 percent of the effluent produced at metropolitan area wastewater treatment facilities, under a 1979 intergovernmental agreement. Pima County processes all of the wastewater but controls 10 percent
- ADWR has complex rules for how much effluent use or recharge counts toward meeting Assured Water Supply Rules. Recharge of effluent through a constructed facility, for example, counts more than "managed" recharge of effluent in a streambed, while direct reuse has the highest value.
- ADEQ and EPA have strict water quality rules for discharge to streambeds and for various uses of effluent. As wastewater treatment plant permit conditions have become stricter in recent years, Pima County has urged that standards be relaxed or that streambed releases be discontinued.
- The cost of building distribution systems for use can be high, especially for golf courses or other facilities far from the treatment plant

and usually requiring uphill pumping. Tucson currently sells effluent for $475 per acre-foot, which is about$100 per acre-foot less than the full cost of treating and delivering it. Pima County sells effluent for a fraction of that cost at $11, but does not provide tertiary treatment and delivers effluent to customers downhill, not too distant from the treatment plant.

- A 1989 Arizona Supreme Court decision (Arizona Public Service v. John F. Long) left regulation of effluent unclear, and the Arizona Legislature has never dealt fully with the matter. Effluent, however, is regulated with regards to its water quality.
- Although effluent is treated, it still contains some contaminants that can affect groundwater. These include nitrates which have been found in groundwater in the Marana area and are probably the result of both agricultural activity and effluent. Excess nitrates can cause serious problems for infants.

AUGMENTING THE WATER SUPPLY — RECHARGE

In Tucson — in fact, in most of the heavily populated areas of Arizona — depletion of the aquifer is a problem and is the underlying concern for much public policy. Recharge is an important tool in managing groundwater levels in the Tucson area and has attracted much attention from government agencies, university researchers, concerned citizens and others. Passage of the Water Consumer Protection Act in 1995, which directed the City of Tucson to use its CAP water allotment for recharge or to trade with area farms and mines instead of direct delivery to homes, has increased attention paid to development of recharge projects in the area.

Recharge generally refers to the addition of water to groundwater already in the aquifer. In order to recharge the aquifer, water usually must first infiltrate the soil or ground surface and then percolate though the unsaturated zone of the aquifer (referred to as the vadose zone) to reach the water table. The water table defines the top part of the aquifer which is saturated with groundwater. An important distinction exists between infiltration and recharge. Infiltration is entry of water into the soil and the movement of water from the soil into the vadose zone. Recharge is addition of water to the part of the aquifer which is saturated with groundwater and can be pumped.

Recharge of an aquifer occurs in three ways: natural recharge resulting from precipitation and runoff; incidental recharge from water that seeps into the ground after various human uses, such as irrigation; and artificial recharge by constructed or managed projects designed to put water in the aquifer. These three types of recharge help maintain a balance of water use and supply.

Natural Recharge

Natural recharge is the addition of precipitation and streamflows to groundwater supplies in the aquifer. Water from precipitation and runoff infiltrates mainly along mountain fronts and in stream channels and also as direct underflow from joints and other openings in rocks. Snowmelt and mountain precipitation often infiltrates at the foot of mountain ranges. Mountain-front recharge in TAMA averages about 39,000 acre-feet annually. Stream channel recharge in the Tucson area occurs as a result of infrequent, but occasionally large stream flow events. Some of the water that flows in streams after heavy rains infiltrates the streambed to recharge the groundwater aquifer. Total stream channel recharge in TAMA averages approximately 38,000 acre-feet per year. (See Chapter 4 for more information.)

Underground flow of groundwater also is included in calculating natural recharge to an area. Groundwater generally moves slowly (at a rate of a couple hundred feet per year) to the north and northwest in the Tucson area. On average approximately 9,000 acre-feet per year of groundwater flows underground into TAMA from the south every year and about 25,000 acre-feet per year leaves TAMA by flowing underground to the north.

Incidental Recharge

Incidental recharge is water that reaches the water table after human use. The amount of incidental recharge in TAMA depends mostly on the extent and water use efficiency of certain human activities, such as irrigated agriculture, mining and the discharge of effluent into stream channels. ADWR has estimated that annual incidental recharge in TAMA totals about 81,000 acre-feet, based on water use levels projected for the year 2000. Most is effluent discharged by the two large wastewater treatment plants.

Artificial Recharge

Artificial recharge of either CAP water or effluent is an important method of utilizing renewable supplies in TAMA. Artificial groundwater recharge generally involves constructing facilities to control the movement and rate of infiltration. The following discusses artificial recharge as a way of replenishing the aquifer. Using artificial recharge as a water treatment method is discussed in Chapter 6.

The State of Arizona's Underground Water Storage, Savings and Replenishment Program allows two types of recharge facilities: Underground Storage Facilities (USFs) and Groundwater Savings Facilities (GSFs). USFs, or direct recharge facilities, can include "constructed" projects, such as spreading basins, structures placed in a stream channel to increase percolation into the stream bed, or injection wells, as well as "managed" projects, where water is applied to stream channels without constructed facilities (See side bar for discussion of the types of direct recharge facilities). In the case of constructed projects, the rate of application of water is regulated through facility design and operating procedures to control the rate at which water reaches the aquifer and to ensure that quality is not impaired. Through GSFs, or "in lieu" recharge facilities, incentives are provided to encourage farms or other entities to use renewable supplies such as CAP water instead of groundwater. (See Chapter 5 for a discussion of CAP water use by Tucson area farms through GSFs, and Chapter 7 for additional explanation of GSFs and USFs.)

A water storage permit holder may choose to recover water in the same calendar year (annual storage and recovery) or to accumulate long-term storage credits. ADWR maintains a long-term storage credit account for each storer. In most cases involving direct recharge of CAP water, storers get credits for 95 percent of the volume of water stored minus evaporation. The state requires the other five percent to remain in the aquifer as permanent recharge. Municipal providers can use long-term storage credits to help meet their Assured Water Supply requirements and to help prove the physical availability of an assured water supply.

Little of the CAP water recharged in TAMA so far has been pumped for use, although the City of Tucson is constructing a wellfield to allow recovery of water stored at the Central Avra Valley Storage and Recovery Project (CAVSARP) in the near future. Generally, recovery of recharged water is permitted if it is recovered in the area where the water was originally stored, or in an area to which it migrated after storage. Recovery of water outside this "area of impact" is permitted under certain conditions to ensure that recovery of water does not occur in areas with substantially declining groundwater levels.

Figure 3-11 is a map of existing and proposed direct recharge facilities in TAMA. Four direct recharge facilities are currently operating in TAMA. These include CAVSARP, Pima Mine Road Recharge Project, Avra Valley Recharge Project and Sweetwater Underground Storage and Recovery Project. All of these projects utilize off-channel spreading basins to recharge CAP water, except the Sweetwater facility, which uses basins to recharge reclaimed effluent.

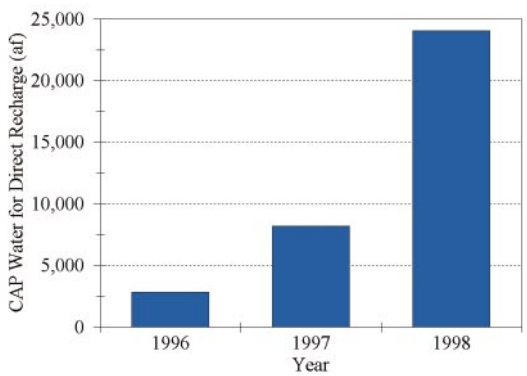
Figure 3-10 shows the amount of water stored at direct recharge facilities over time. The amount of water stored at Tucson area pro-

Figure 3-9 The Pima Mine Road recharge basins. Photo: Central Arizona Water Conservation District.

jects is small compared to the total renewable supplies available. Not including CAP water used at groundwater savings facilities, about 7,800 acre-feet of CAP water was recharged in TAMA in 1997, compared to approximately 215,000 acre-feet of CAP water available under sub-contract to entities in TAMA.

Direct injection is the most certain method of recharge because water can be directed to a specific location within an aquifer. For this reason, local recharge experts believe that direct injection may be the most effective tool in mitigating subsidence. With direct injection, water can be added as close as possible to the layers of the aquifer that are being compacted. The extent to which subsidence can be limited with this method, however, is uncertain, depending in part on the type of aquifer materials. Tucson Water stored approximately 4,000 acre-feet of CAP water using two pilot injection wells in 1993 and 1994. The Water Consumer

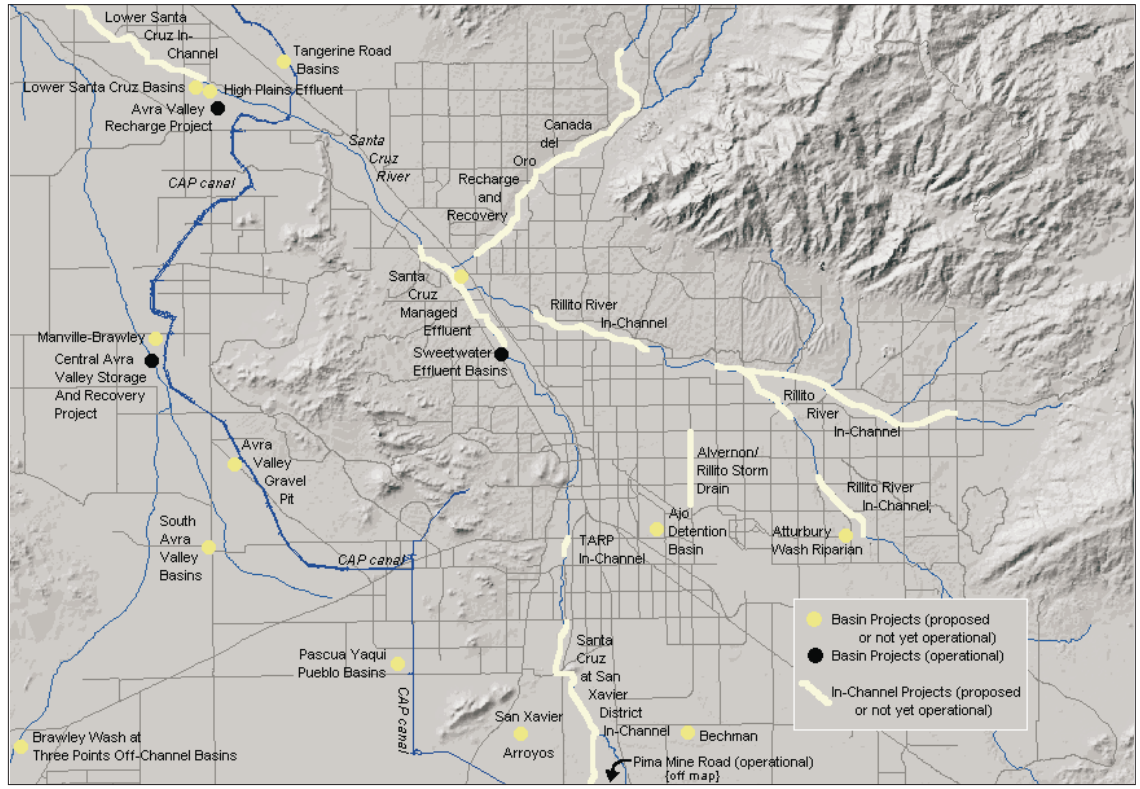
Figure 3-10 CAP water deliveries to direct recharge projects in the Tucson AMA*.



* Total CAP delivery to direct recharge projects - not adjusted for evaporation or cut to the aquifer.

Source: Central Arizona Water Conservation District.

Figure 3-11 Existing and proposed direct recharge projects.



Source: Arizona Department of Water Resources.

Protection Act, however, allows direct injection only if the water meets or exceeds the water quality of Avra Valley groundwater in terms of hardness, salinity and dissolved organic materials and is free of disinfection by-products. Costs of treating CAP water to the Avra Valley groundwater standards would be prohibitively expensive. Entities in the Tucson area other than Tucson Water are not bound by WCPA but have not attempted direct injection.

New direct recharge projects are being planned. (See Figure 3-11.) A facility permit has been issued for the Lower Santa Cruz Replenishment Project, which is projected to have a capacity of 12,000 to 13,000 acre-feet in its first phase. The facility will be located along the Santa Cruz River in northern Avra Valley. The proposed Cañada del Oro Recharge Project could add another 30,000 acre-feet of direct recharge capacity in northwest Tucson near the Town of Oro Valley. A study of the technical feasibility of the project is currently being conducted. Total direct recharge capacity on non-Indian land in TAMA is projected to be

TYPES OF ARTIFICIAL RECHARGE

In-Channel Artificial Recharge

Artificial recharge facilities operate either in-channel or off-channel. *In-channel constructed facilities* are recharge facilities built into a river or stream bed to retain water while it infiltrates through the stream bed into the underlying aquifer. These structures include inflatable dams, gated structures, levees and basins, or other devices designed to impede water flow. Levees are the least expensive of these alternatives, but are the most subject to damage from flood flows. Also operating in-channel, *managed facilities* allow water to infiltrate the stream channel without the aid of structures to impede flow.

Off-Channel Artificial Recharge

Off-channel artificial recharge facilities include *shallow spreading basins*. These basins are dug up to 20 feet deep to reach more permeable layers and are usually constructed with earthen berm walls to hold water in place. During operation, the depth of water usually does not exceed five feet. Basins are operated on a wet/dry cycle to allow periodic scrapings or other techniques to maintain high infiltration rates.

Deep basins or pits also can be used for off-channel recharge. These facilities are usually converted from other uses, such as gravel pits. During operation, water levels up to about 10 feet are usually maintained. Operating costs are usually low, since basins are drained and maintained only once every year or two. Infiltration rates, however, are usually low due to build up of organic matter.

Also operating off-channel, *injection wells* are usually existing water extraction wells converted to allow injection of water directly into the aquifer. Water injected must normally meet drinking water standards (Maximum Contaminant Levels). The Water Consumer Protection Act effectively prohibits the City of Tucson from using injection wells unless the water injected is treated to the same standards as Avra Valley groundwater and is free of disinfection byproducts.

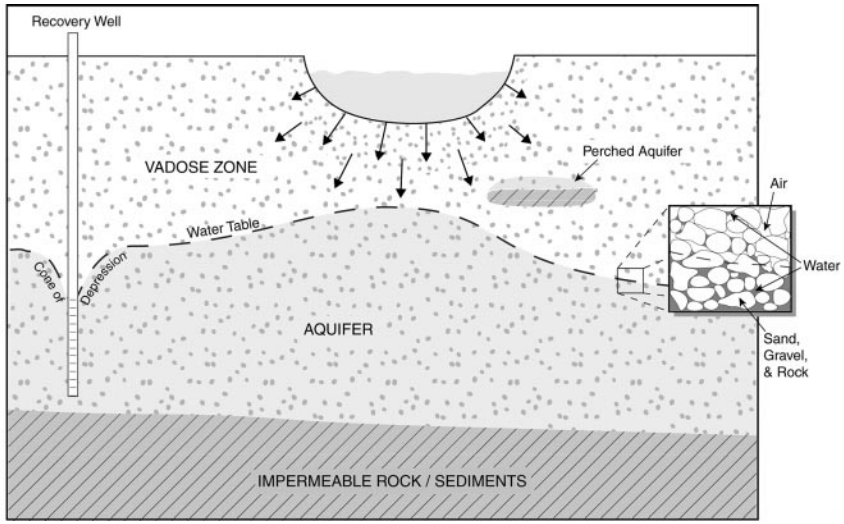
49,000 acre-feet in the year 2000, possibly rising to 131,000 by the year 2007 with the addition of a full-scale Lower Santa Cruz Replenishment Project, the Cañada del Oro Project and expansion of existing projects to full-scale. Proposed recharge projects on Indian land could add up to an additional 41,000 acre-feet of direct recharge capacity by 2007.

Recharging the Central Wellfield

The highest rate of groundwater decline in TAMA is occurring in the Central Wellfield, and USGS models project that subsidence in that part of TAMA could greatly increase. Artificial recharge has been suggested as one way of stopping declines of groundwater levels in the Central Wellfield, and the WCPA directs the City of Tucson to recharge the Central Wellfield. Although artificial recharge could help reduce groundwater level declines in the Central Wellfield, determining the best method of recharging the area is difficult, and recharging large amounts of water requires extensive facilities. With current withdrawals from the Central Wellfield ranging from 60,000 to 70,000 acre-feet per year and natural recharge estimated at 17,000 acre-feet per year, 43,000 to 53,000 acre-feet per year of recharge would be required to stop the decline of groundwater levels. This is a great deal of water to recharge every year in central Tucson.

One possible way of recharging the Central Wellfield is by releasing CAP water into the Rillito Creek, Tanque Verde Creek and the Pantano Wash. These stream channels generally overlap the Central Wellfield, although most of their flows are to the north-northwest, not toward the Central Wellfield. The high infiltration rates in local stream channels would seem to support the premise that large amounts of CAP water could be successfully recharged using such channels to replenish the Central Wellfield. The long-term recharge rate, however, often differs from the short-term surface infiltration rate. The short-term rate is the rate at which water enters the coarse-grained channel alluvium. Water generally infiltrates this alluvium very easily. The long-term recharge rate is the rate at which water actually reaches the aquifer, and is determined by basin fill deposits closer to the aquifer. Because these deposits are less permeable than the recently deposited alluvium near the surface, the long-term recharge

Figure 3-12 Movement of recharged water through the aquifer.



rate is lower than the short-term infiltration rate. If water were released in the stream channel over a long period of time (perhaps greater than a year), water would mound up in the channel alluvium. Water then would eventually rise to the stream channel, and water released at the surface would infiltrate at the long-term rate, or be rejected as subflow or surface flow.

A panel of hydrologists and other technical experts formed by ADWR in 1996 estimated the maximum long-term average annual volume of artificial recharge possible in stream channels generally overlying the Central Wellfield (Rillito Creek, Tanque Verde Creek and the Pantano Wash). The panel concluded that the maximum long-term average annual volume that could be effectively infiltrated through those channels is approximately 29,000 acre-feet. When the volume of natural recharge is considered, total maximum potential average annual volume of artificial and natural recharge in the stream channels is approximately 50,000 acre-feet per year. Some of these stream reaches have landfills, however, containing contaminants that could pollute recharged water. After excluding stream reaches with known landfills, the maximum long-term average annual volume of artificial and natural recharge would be about 27,000 acre-feet, or only 38 to 44 percent of present annual withdrawals from the Central Wellfield.

Recharge experts also have pointed out that some of the water which infiltrates the stream channels generally overlying the Central Wellfield may not reach the underlying aquifer. This is because some of the water applied to local stream channels would likely move downstream as subsurface groundwater flow just beneath the streambed instead of recharging the Central Wellfield. This subflow would travel downgradient to the alluvium underneath the Santa Cruz River after its confluence with the Rillito Creek and move towards Pinal County. Any of this subflow eventually reaching the aquifer would be too far from the Central Wellfield to benefit it. Preliminary results of attempts to date groundwater based upon isotopic analyses indicate that groundwater located a couple miles south of the Rillito is hundreds or thousands of years old. This suggests that limited recharge of the Central Wellfield is occurring.

The City of Tucson is planning to address water decline problems in the Central Wellfield by pumping instead from CAVSARP. The projected full-scale capacity of CAVSARP is 60,000 acre-feet per year. If enough water is recovered annually from CAVSARP to offset current annual pumping in the Central Wellfield, most of the Central Wellfield groundwater pumps could be shut off. Groundwater level declines could then be stopped or slowly reversed with the help of natural recharge. Water recovered from CAVSARP would be sent though the Hayden-Udall (CAP) Treatment Facility before being delivered to homes.

USGS has begun a project to study the location and timing of recharge in the 12-mile stretch of the Rillito Creek from Craycroft Road to the Santa Cruz River. Approximately $635,000 is budgeted to collect the needed data and build groundwater models to investigate various recharge scenarios. This study is expected to greatly improve assessment of the feasibility of artificial recharge in the Rillito Creek to benefit the Central Wellfield. (For more information see Chapter 4.)

OTHER STRATEGIES

In response to our ongoing water worries, various strategies have been proposed to increase regional water supplies of our region. Options for increasing water supplies in Tucson, however, are limited. Using CAP water is currently Tucson's only major strategy for increasing water supplies. Whether it is used directly in municipal systems or by agriculture or mines, or whether it is recharged for later use, CAP water can add considerably to the basin supply. Use of effluent does not bring new water into the basin, but does help prolong the water supplies by reducing the need to use stored groundwater.

Following is a discussion of various strategies for increasing water supplies in the Tucson Basin. A few obviously require a large-scale investment of funds and other resources; others can be done by individuals in their homes and communities. A few appear doable; others seem far-fetched.

Import Water From Outside the Basin

CAP has not been the only project designed to import water from outside the basin to increase Tucson's water supplies. Its distinction is that it was the only such project to be built. Over the years, other strategies have been proposed to bring water here from elsewhere. One scheme offered in the 1970s would have brought water from the Yukon, through Canada to the Great Lakes and ultimately to the Southwest. Another heroic scheme would have imported water from the Pacific Northwest to California and Arizona. Both strategies were found to be excessively costly, not to mention being unacceptable to people in the Northwest and Canada.

Figure 3-13 The Pacific Northwest Water Plan of the 1970s proposed bringing water from Canada to a wide region including Arizona. Photo: Barbara Tellman.

The City of Tucson tried a much less ambitious scheme in the 1960s when it purchased land with water rights north of Benson along the San Pedro River, with the intent of building a pipeline to Tucson. A lack of funds and a questionable supply of water, coupled with opposition from residents, stopped this project, and Tucson sold the land. Another effort to capture San Pedro water was the Charleston Dam, originally part of the CAP system. This, too, was defeated when Cochise County residents opposed the idea.

Other ideas for obtaining additional water include desalinating seawater, either along the Gulf of California or near San Diego and piping it to Arizona. A fanciful proposal in the 1980s suggested towing icebergs from Antarctica to the California coast and piping the melted water to Arizona. Neither of these projects appeared feasible or cost-effective.

Capture Floodwater

To many people, allowing flood water to drain out of the basin represents a lost resource. Heavy rain showers occur occasionally in the desert, filling arroyos and river beds with abundant and vigorously flowing water. Capturing more of this flow could augment our supplies, whether used directly or recharged. With Tucson riverbeds seeming to offer prom-

ising sites, Tucson water history during the twentieth century includes various references to plans for capturing runoff. At times, suitable locations to capture and control mountain runoff have been proposed. Tucsonans looked to the dams along the Salt River as models, but the Santa Cruz River and its tributaries offered no comparable sites suitable for large storage dams. Studies are underway to determine whether other methods such as inflatable dams can be effective. (See Chapter 4 for a discussion of this topic.)

Vegetation Management

In the 1960s and 1970s, removing vegetation along watersheds was considered a promising way to increase water supplies for cities. This strategy was based on the fact that vegetation uses water that otherwise could be put to human uses. Some experiments were conducted; chains, cables and chemicals were used to remove chaparral and piñon-juniper forests. Ponderosa and mixed conifer forests were harvested. While initial results often showed an increase in streamflow, long-terms results were not conclusive. Grasses often took over areas denuded of trees, using about as much water as did the trees. Where vegetation did not have a chance to regrow before heavy rains, erosion took away topsoil.

Some people have advocated removing cottonwoods along rivers such as the San Pedro because of the water they use, but the results would be mixed at best. Some gains would be offset by the loss of shade to cool the water and reduce evaporation and by the loss of a root system to help hold soil in place. The increased importance that people place on riparian vegetation for habitat and recreation further advises caution when considering vegetation management practices. This approach to increasing water supplies has generally fallen out of favor in Arizona.

Weather Modification

Advocates of weather modification look to the clouds as a source of water to augment current supplies. Arizona's interest in weather modification evolved over time, from early cloud seeding experiments to the adoption of sophisticated computer modeling techniques that simulate climatological phenomena and test weather modification premises. The evolution reflects a change in attitudes, from an optimistic expectation of immediate results to a more cautious, even skeptical regard about the potential of weather modification.

Clouds consist of small water droplets that, despite below-freezing temperatures, remain liquid. The water's purity and the lack of foreign particles in the atmosphere prevent the droplets from freezing. These "supercooled droplets" form supercooled clouds. As temperatures decrease, the droplets form ice crystals around small atmospheric particles such as dust. Cloud seeding introduces additional particles or nuclei into the atmosphere, causing more ice crystals to form. Silver iodide compounds or dry ice are the usual cloud seeding agents. Aircraft or ground-based generators introduce the agents into the atmosphere. The ice particles grow and attract nearby water vapor and droplets. The enlarged ice particles eventually fall as snow. Clouds which form over mountainous areas are preferable for seeding because they last longer, and weather modification experiments can be more readily arranged.

A number of legal, social and environmental issues would have to be resolved before weather modification could be used on a large scale, even if it proves to be effective. Who is liable for damages from floods or other weather events resulting from weather modification? How are the rights of those who want rain to be reconciled with the rights of those who prefer sunshine? What if precipitation increases in a basin in which cloud seeding occurred but decreased during the same period in another basin? Has the latter basin been wrongfully deprived of its precipitation?

And there are other questions: How is it determined that precipitation was in fact the result of weather modification? How is the amount of new water to be quantified for credit and distribution? On what basis is the new water induced by weather modification to be allocated among water users? How can those who pay for the weather modification be ensured that they will in fact receive their share of the new water?

Environmental problems also may arise. For example, increased precipitation might mean increased weed growth, and a heavier snowpack could disrupt the winter food habitat of large mammals. Concern has also been expressed about the effects of introducing artificial ice-crystal nuclei (e.g. silver iodide, dry ice and liquid propane) into the atmosphere. Environmental studies are obviously needed to determine the effects of cloud seeding.

STRATEGIES FOR INDIVIDUALS

Graywater reuse and water harvesting can be effective ways for individuals to decrease their use of groundwater and thus lower their water bill. Both strategies, however, probably do not contribute very much to the overall water supply picture in the basin. In areas connected to the central sewage system, use of graywater reduces the amount of effluent produced and consequently the amount available for reuse or recharge. Water harvesting also reduces the need to pump groundwater and may help relieve flooding problems. At Casa del Agua, a water conservation demonstration house that was supported by the University of Arizona, Tucson Water and ADWR, UA researchers tested and evaluated various water saving devices and strategies, including graywater use and water harvesting.

Use of Graywater

Graywater is water from the bath, shower, washing machine or bathroom or kitchen sinks in homes. Graywater can supply most, if not all the irrigation needs of a domestic dwelling landscaped with vegetation of a semiarid region. Along with its use in outside irrigation, graywater can be used in some situations for toilet flushing. Metro Water, a utility serving northwest Tucson, recently conducted a survey that found nine percent of its customers use some portion of their graywater.

Graywater systems vary from simple low-cost systems to highly complex and costly units. The technology involved in such systems ranges from the sophisticated to the crude, from engineered systems with filters and pumps to a washing machine draining directly onto oleander bushes.

A permit is technically required to install a graywater system although few people bother. Although ADEQ regulates graywater use in the state, the agency allows counties to issue permits. Any request that involves an exception to what is allowed in the regulations, however, must go directly to ADEQ for consideration. Some observers believe this splitting of regulatory authority for graywater use adds undue complicates the process of obtaining a permit.

The main concern of regulations is that graywater use will result in water quality problems and pose a threat to public health. Regulations prohibit graywater systems from being connected to potable water systems and do not allow surface applications of graywater. Instead graywater must be released below the surface, as underground landscape irrigation, to prevent human contact with it. Many advocates claim the regulations are needlessly complex, and the expense is a deterrent to graywater use.

Despite regulatory requirements estimates indicate that there are several thousand graywater systems in the metropolitan area, and virtually none are permitted. Some residents merely drain their washing machines to water their shrubs or trees.

Some researchers question whether graywater really poses a significant health risk. If the health risks are not as high as some fear, graywater might gain more acceptance as a water source, and regulations could be eased.

With an ADWR TAMA Conservation Assistance Grant, the Water Conservation Alliance of Southern Arizona (Water CASA) is conducting a study to determine what health risks, if any, result from the low-tech methods of graywater use now occurring. Water CASA is in the process of analyzing several "wildcat graywater systems," to accurately analyze and evaluate their water quality, soil chemistry and system design. The intent of the study is to raise public awareness, provide information not available elsewhere regarding graywater quality

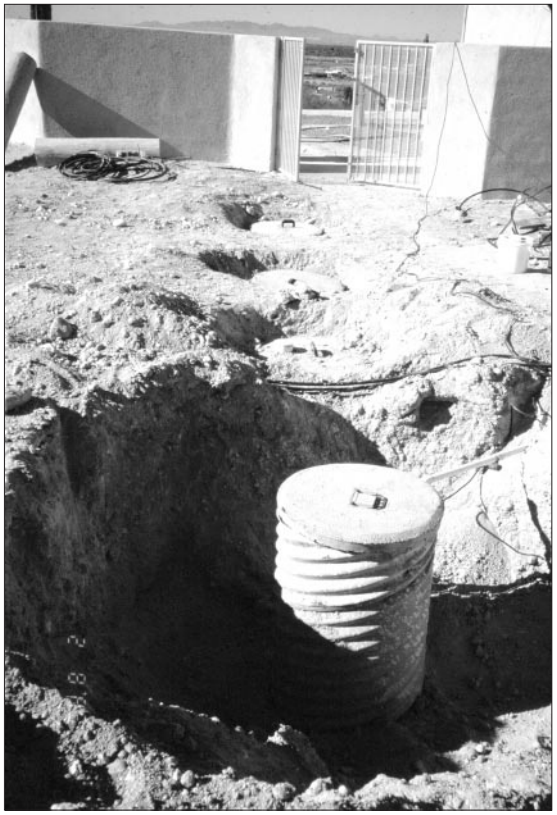


Figure 3-14 Cistern installed as part of a graywater reuse system. Photo: Val Little.

and its effect on soil, collect data on actual, feasible residential graywater system design and determine the potential graywater has to increase water use efficiency.

Water Harvesting

Rainwater harvesting is collecting rainfall to meet water needs. A rainwater harvesting system concentrates and collects rain falling on house roofs and grounds for direct use and storage.

Water is collected or harvested from concrete patios, driveways and other paved areas. Also harvested is the flow from the roof and from catchments such as gutters. Houses can be designed to maximize the amount of catchment area, thereby increasing rainwater harvesting possibilities. For example, at Casa del Agua, 600 square feet of additional catchment area was added to the porch and greenhouse roof to maximize runoff. This additional surface increased the amount of collected annual rainfall by more than 3,700 gallons. Downspouts are located about every 20 feet along the gutter, instead of the more common 40 feet. This ensured that heavy rains were not likely to overflow the gutter and instead would flow to catchments.

Collected and stored rainwater can be used for evaporative cooling, toilet flushing, car washing, chlorinated swimming pools, and surface irrigation, especially in food gardens. In the United States harvested rainfall mostly is used for irrigation, with limited other domestic uses. At Casa del Agua, where the landscape was almost entirely irrigated by graywater, rainwater primarily was used in the evaporative cooler, with a limited amount used for toilet flushing. Casa del Agua's rainwater storage capacity was about 8,000 gallons.

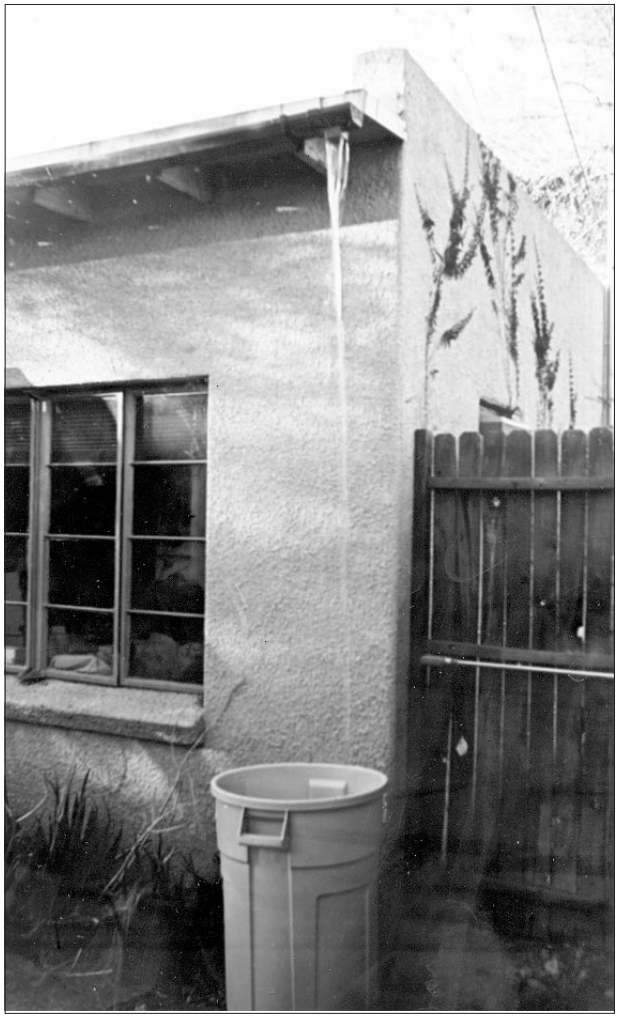


Figure 3-15 A do-it-yourself water harvesting system collects rain from roof for use to irrigate a home garden. Photo: Barbara Tellman.

Rainwater harvesting systems vary from the simple and inexpensive to the complex and very costly. Directing rainfall to plants located at contoured low points is a very simple rainwater harvesting system. No rain escapes property boundaries. More complex rainwater harvesting systems include water storage.

Rainwater harvesting is an everyman's water augmentation method. Any container capable of holding rain dripping from roof or patio can be a rainwater harvesting system, but may also breed mosquitoes unless kept covered. A plastic garbage barrel is sufficient. Sturdier and more elegant containers create a more pleasing effect and some are built using backyard technology, such as small ferro cement tanks collecting water at the base of down spouts. The least expensive rainwater storage system uses an above-ground swimming pool, with a lid or cover to reduce evaporation. Rainwater then can be stored for about .07 cents per gallon.

Harvested rain raises some water quality concerns. Rain in certain urban areas may contain various impurities absorbed from the atmosphere, including arsenic and lead. Certain desert conditions also can cause rainwater quality concerns. Desert rain is infrequent and, therefore, bird droppings, dust and other impurities accumulate between rain events. They then occur in high concentrations in runoff when it does rain. As a result, the quality of harvested rainfall needs frequent monitoring especially if used for potable uses. To confront these problems some systems reject the initial rooftop runoff.

Chapter 4
COPING WITH FLOODWATER

Chapter Four discusses floodwater and its contribution to natural and artificial streambed recharge. A heavy rain can cause problems but also is an important part of the renewable water supply picture. Since rivers in the area are very different than they were 150 years ago, floods and natural recharge occur differently now than in the past. Increased urbanization, use of flood control structures, natural recharge and artificial recharge are interrelated issues that need careful consideration. Water quality problems can arise when urban runoff carries various pollutants from paved areas to riverbeds; some of the runoff could then enter the groundwater and become part of Tucson's water supply.

FLOODING, THEN AND NOW

What is a flood? According to Webster's dictionary, a flood occurs when water overflows onto normally dry land. In this arid region the term often is used to describe a situation when an unusual amount of water flows in usually dry rivers, whether or not it overflows the banks. In Arizona an unusual amount of water flowing in a river with sufficient force to erode its banks is almost invariably referred to as a flood.

Floods provide both benefits and problems. Floods can be beneficial when they recharge groundwater, but the same flow also can damage buildings and roads, erode land, and carry pollutants that may reach the groundwater.

Years of bountiful rain and snow alternate with years of little precipitation. Heavy river flows occur occasionally and are essential for the growth of riparian vegetation. During flood years new cottonwood seedlings sprout and take hold. Traditional farming took advantage of the summer rainy season when water overflowed river banks bringing both moisture and nutrients to the soils. River flows replenished the groundwater table that remained near the surface. The water table was sufficiently high along most of the Santa Cruz River, from San Xavier to the Cañada del Oro, that cottonwood forests thrived. Such forests also were located along parts of the Rillito Creek, Tanque Verde Wash and Pantano Wash. A giant mesquite bosque flourished south of San Xavier.

Changed river conditions have destroyed much of this riparian habitat, and developing new riparian habitat would be a difficult challenge, even using CAP water and effluent. Some even argue that conditions have deteriorated to the point that many riparian areas are beyond restoration. Construction along riverbanks and flood control structures have radically changed natural river conditions. Instead of meandering and spreading out onto floodplains to benefit riparian vegetation, floods now often are contained within deep channels.

Figure 4-1 Observers watching the 1983 flooding of the Santa Cruz River in area just north of St. Mary's bridge. Photo: Peter Kresan©

Figure 4-2 The 1983 flood destroyed homes along the Rillito Creek at First Avenue. Photo: Peter Kresan.©

The occurrence and intensity of flooding in southern Arizona appears to have increased during the last 30 years. While periodic changes in weather affect floods to a degree, human factors have played a greater role in determining flood damage. Floods that occur in wilderness areas are hardly noticed because humans usually are not affected. Floods that occur in urban areas, however, can affect large numbers of people and thus attract attention.

Urbanization is an important factor to consider when assessing the intensity of floods in Arizona. As Tucson has grown, much of the natural land surface of the area has been graded and covered with impervious surfaces — buildings, roads, sidewalks, parking lots, etc. — increasing runoff. In a natural desert environment only about three percent of the rainfall reaches the washes. In an urbanized area, about 18 percent of the rainfall flows to washes. The additional water in rivers and washes means that downstream flows increase in quantity and velocity. Channels enlarge, becoming deeper and wider, with erosion posing a greater threat.

As Tucson urbanized, flooding became more menacing. Along their urban reaches, the Rillito Creek and Santa Cruz River have become deeply incised, with their channel bottoms as much as 40 feet below their banks. Waters no longer overflow the banks as they did when the rivers were shallow streams. Meanwhile homes and businesses have been constructed along river banks in the belief they are safe from floods. In reality, however, many areas become subject to bank erosion that can threaten structures. Soils that are dry most of the year quickly break up when water flows swiftly against them. Erosion is most likely to occur on bends in the river where water flows swiftly towards the bend, striking it with great force. In the 1983 flood, for example, bank erosion caused buildings to fall into the Santa Cruz River south of Ajo Way and into the Rillito Creek near First Avenue (See Figure 4-2).

Some natural resource managers stress that floods, although now influenced by human activities, are natural and often beneficial occurrences, neither bad nor dangerous. Humans, however, have put themselves in harm's way, by building on floodplains and encroaching on flood-prone areas. Floods then threaten human life and property and are perceived to be an intimidating menace to be confronted with administrative and technical ingenuity. In response, public officials devise and implement flood control measures to protect life and property. Measures that are adopted to control flooding, however, often have unintended consequences.

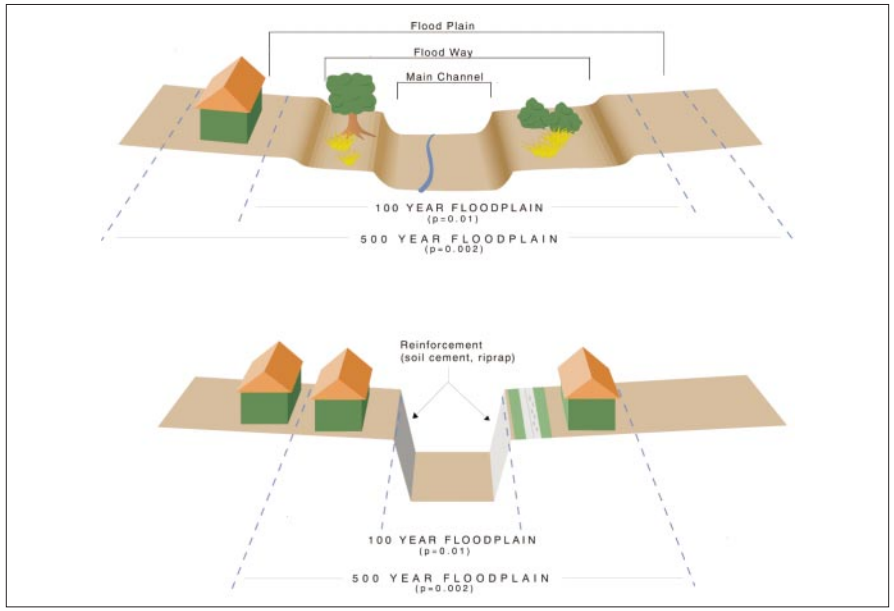
COPING WITH FLOOD HAZARDS

A comprehensive approach to flood management may encompass physical structures to protect bridges and other facilities, programs and ordinances to regulate the use of floodplains and purchases of flood prone land.

Structural Strategies

A structural approach consists of physical modifications to adjust and change the flow of floodwaters. For example, stormwater often was considered best managed and controlled if made to flow expeditiously from an area. Structural methods were adopted to widen, straighten and channelize waterways in efforts to reduce damage. Structural methods included such measures as levees, channel stabilization and storage reservoirs. These methods often

Figure 4-3 Effects of bank protection on a riverbed.



were applied to prevent bank erosion, Tucson's priority flood damage problem.

Between the 1950s and the 1970s, vegetation was often removed from channels that would then usually be straightened and coated with concrete. This was done to quickly direct water from an area. Examples of this approach can be seen at Kino Boulevard south of Broadway and at 12thth Avenue south of I-10. This operation protects the immediate area, but is liable to increase the rate of flow downstream, causing greater downstream damage. Channels subject to this procedure are not suitable recharge sites.

Starting in the 1970s, Pima County adopted a new technique and stabilized river banks with soil cement along the Santa Cruz River and Rillito Creek. (See Figure 4-5.) Soil cement is made from a mixture of cement and river soil and is applied to the banks of a channel. In some areas, large rocks are held in place along banks with wire meshing, to stabilize the banks. Called rip-rap, this construction needs regular maintenance to prevent it from deteriorating and being washed away. Both of these methods allow for recharge in the channel bottom, but not along the previous floodplain.

Such structural methods for controlling floods may successfully resolve a local concern but may result in other flood-related problems downstream. For example, with bank stabilization in place, erosion may be controlled and even eliminated along a stretch of a waterway. More runoff, however, then flows downstream with greater force, resulting in increased erosion of banks and, therefore, greater downstream flood damage. Also, the force of the water flow may move the site of natural recharge to downstream areas where it may not benefit major wells.

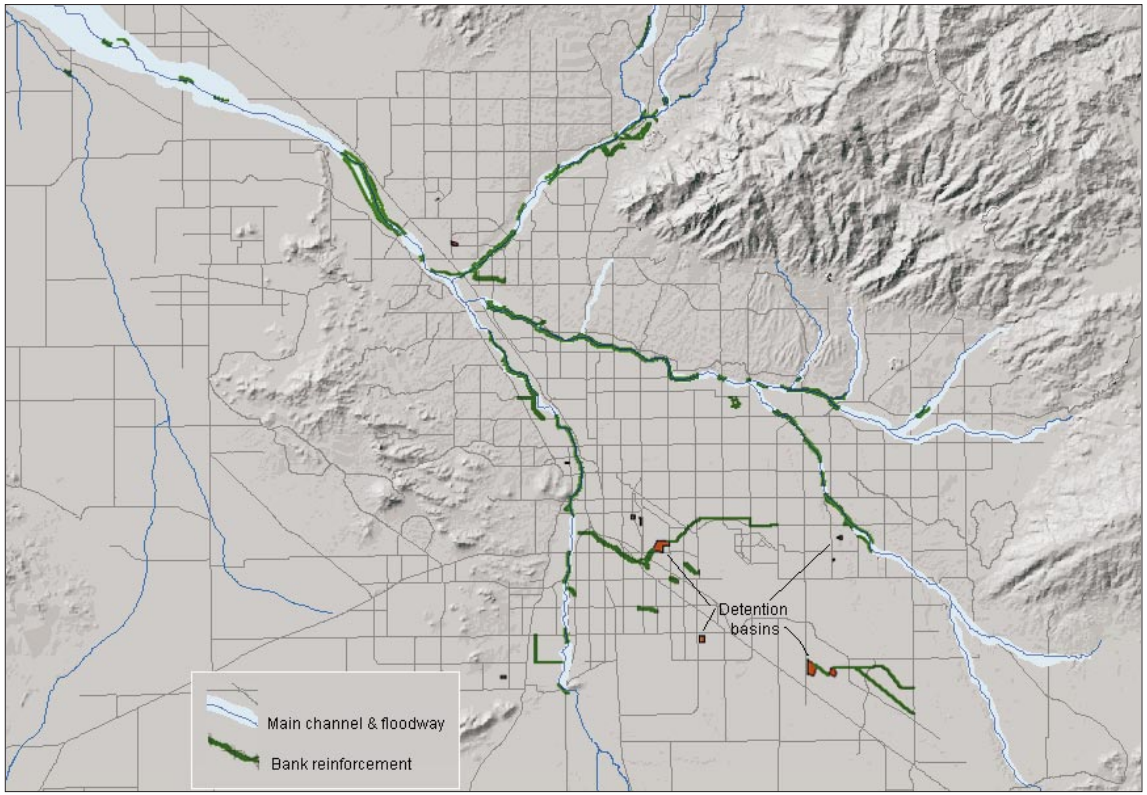
Nonstructural Measures

As the result of above-mentioned concerns — many of which are now the focus of political debate — flood control strategies that rely on nonstructural methods have grown in importance. Such methods avoid physical modifications of the environment and instead maintain the natural conditions of river channels. Nonstructural measures generally encourage society to adapt to natural flood conditions when occupying or modifying a floodplain.

Floodplain management is the full range of codes, ordinances and other regulations adopted for minimizing flood damage, including zoning codes, building codes and subdivision regulations that may either prohibit

Figure 4-4 Bank stabilization structure under construction west of Campbell Avenue. Photo: Peter Kresan.©

Figure 4-5 Main floodway and bank reinforcement.



Sources:Tucson Water; Pima County Technical Services.

construction in flood-prone areas or allow some construction under certain conditions. Floodplain regulations also may be enacted to prevent consumer fraud by requiring disclosure of possible flood hazards. It can also include flood forecasting, information and education, disaster preparedness and assistance, warning systems, evacuation, flood insurance and floodproofing.

Arizona law requires cities and counties to have flood management programs. Both Tucson and Pima County, however, go further than the state requires and have ordinances to encourage leaving floodplains as natural as possible, including the use of native vegetation. The Federal Emergency Management Agency (FEMA) requires communities to adopt approved floodplain maps and to regulate use of the identified floodplains for residents to qualify for flood insurance. EPA requires management of urban stormwater to minimize pollution, and both Tucson and Pima County have approved stormwater management plans. A full discussion of these requirements is beyond the scope of this report, although some additional information is contained in Chapter 7.

Floodplain Acquisition Since the 1980s Pima County has actively acquired flood-prone lands to keep them from being developed in order to minimize downstream flood problems and reduce flood rescue costs. These areas can then be used for open space recreation and wildlife habitat. Cienega Creek, a perennial stream south of Saguaro National Park East, is a prime example of this approach. Pima County owns a portion, and most of the upstream area is also public land under ownership of the U.S. Bureau of Land Management and the U.S. Forest Service. Tucson and Pima County also have acquired flood-prone lands and developed linear parks, often in cooperation. Much of the land along the Santa Cruz River, both upstream and downstream of the downtown area, is now in public ownership and used as a linear park. The City of Tucson's Multiple Benefit Water Projects propose ways of using CAP water to develop areas along the Santa Cruz River for wildlife habitat and recreational purposes.

Tucson's Stormwater Master Plan

A watershed is a geographic area defined by the flow and movement of surface water, with all flow feeding one watercourse. The Colorado

River watershed is made of many smaller watersheds, including the Gila River watershed, which in turn is made up of many smaller ones, including the Santa Cruz River watershed. Encompassing the flow of runoff within an area, a watershed is a hydrologically appropriate unit to determine the management of stormwater. Without such an approach, land use policies upstream may not be coordinated with the principles for managing stormwater runoff downstream.

The City of Tucson's Stormwater Master Plan is an ongoing effort to develop a comprehensive stormwater management plan with a regional, watershed focus. A comprehensive program covering an entire watershed provides a much more favorable basis to plan present and future runoff management needs. A "system" or watershed approach also enables the city to minimize its reliance on structural stormwater control solutions and better preserve and enhance natural water courses.

To help accomplish its goal, the master plan has identified 59 urban watersheds within six general hydrologic units or areas with similar geographic and hydrologic characteristics, all located within Tucson. In this context, a watershed is defined as a geographical area which contributes stormwater runoff to a particular point.

During Phase II of the stormwater study a database was established that included information on the physical characteristics of the drainage systems in each of the city's 59 watersheds. The study established a prioritization scheme to identify how individual watersheds ranked with regards to the potential for stormwater quality problems. Watersheds were examined by looking at human and natural considerations affecting them. Factors considered include estimated contaminant loadings, locations and extent of industrial and commercial areas as well as the existence of riparian areas.

Figure 4-6 Floods damage the Ina Road Bridge. Photo: Peter Kresan.©

Santa Cruz River Watershed Basin Project

An ongoing Santa Cruz River Watershed Basin study is addressing flooding and other issues. The Santa Cruz River watershed covers approximately 8,600 square miles in Southern Arizona. The watershed study is concentrating on the portion of the Santa Cruz River system within Pima County.

The intent of the project is to address a cluster of public concerns including environmental resources, floodplain management, regulatory activities, erosion control, wastewater management, groundwater management and flood control. The goal of the study is to develop a basin management plan for the Santa Cruz River system. This plan is to guide future projects attempting to balance watershed concerns of environmental protection/restoration and economic development. Projected benefits of the project include a flood control river plan; land-use and regulatory tools for balancing competing uses; a protection and management guide for existing and future riparian areas; a river maintenance guide to maintaining flood conveyance and storage capacity while protecting environmental resources; and water quality identification and recharge opportunities.

The U.S. Army Corps of Engineers is conducting the study, with the involvement of state, county, city and other federal agencies, San Xavier District of the Tohono O'odham Nation, International Boundary and Water Commission and various public and private interest groups. The study is expected to cost $2 million, to be shared between federal and non-federal partners, and to be completed January 2000.

CAPTURING RIVER FLOW

For many years people have looked for ways to keep more river water in the area, rather than letting it flow downstream to Pinal County. They noted the construction of dams along the Salt River which retain water in reservoirs to be released for later use. A major difference between the Santa Cruz watershed and the Salt River watershed, however, is that no practical sites for large storage dams are located along the Santa Cruz River or its tributaries.

In recent years, the U.S. Bureau of Reclamation, the U.S. Army Corps of Engineers and Pima County have looked at the feasibility of using inflatable dams to detain water temporarily so that it will infiltrate the riverbed and seep underground. Inflated to capture runoff, the dams can be deflated when major flooding could pose a threat to the structure. So far no project has been built.

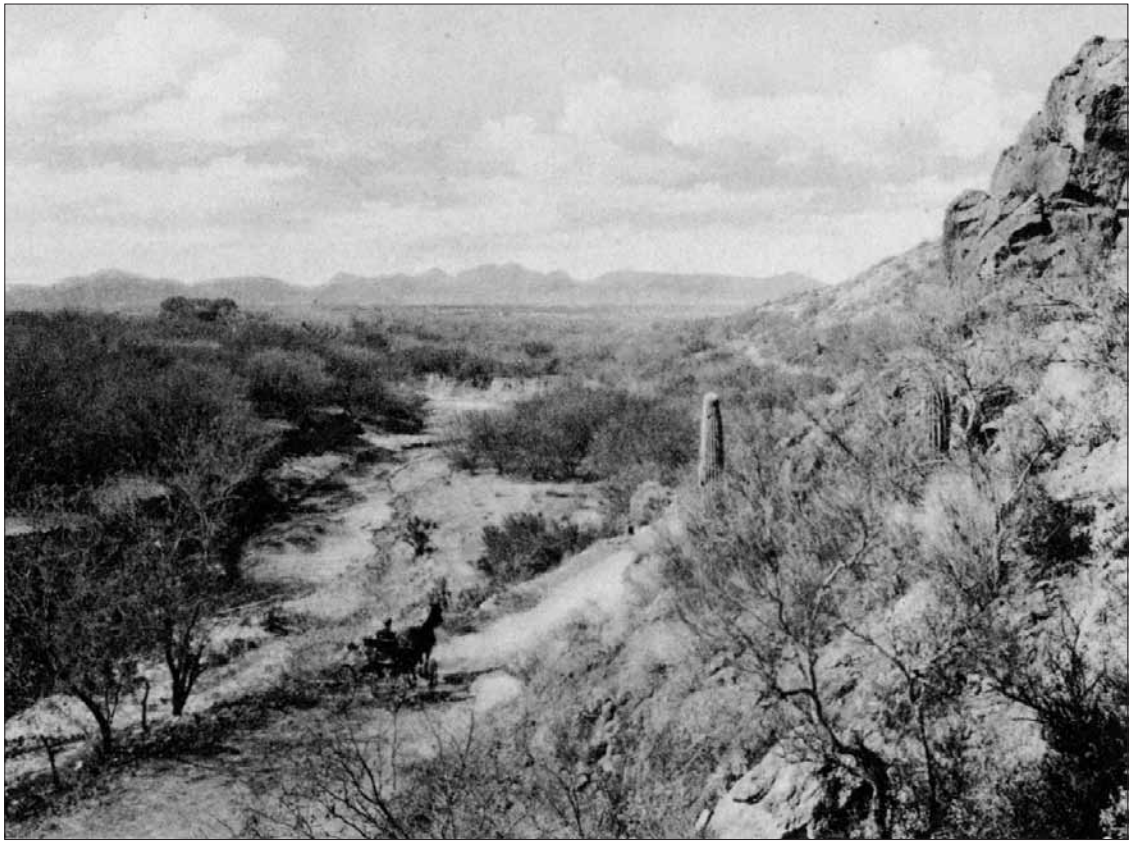


Figure 4-7 A view towards the Santa Rita Mountains around 1900, showing the Santa Cruz River and part of its watershed. Source: Tucson Souvenir Portfolio about 1904.

Artificial Instream Recharge

Artificial recharge is discussed in Chapter 3. In this section we look at the possible impacts of instream recharge projects on rivers. Many people view streambeds as ideal locations for artificial recharge since streambeds generally provide the best sites for natural recharge. Artificial recharge in riverbeds may even be seen as recreating historic conditions of river flow. While streambed recharge has many benefits, projects must be carefully designed so that they do not lead to increased flood problems downstream. If the river is already flowing at the time of a large flood event, flood impacts may increase, depending on the quantity of the cumulative flow.

If the flood event occurs when the channel alluvium and basin fill are saturated with water, mounding of recharge water may cause less storm water to infiltrate in the area of the recharge project and more recharge to occur downstream instead. In some cases it will occur out of the range of the major wells. Streambed recharge projects also may increase vegetation in the channels as a result of more available soil moisture. This vegetation could increase the risk of flood damage because it reduces the amount of water that the stream channel can carry. This vegetation, however, also can have many advantages from an aesthetic point of view, as wildlife habitat and for recreational use.

The issues are obviously complex, and proposed artificial recharge projects should be carefully studied both for their recharge potential and for their impacts on flooding. Each instream recharge project must be evaluated individually, since conditions vary so much from site to site that no generalizations about the impacts of recharge on flooding will apply to all situations.

WATER QUALITY

The variety of solutions to flooding problems has improved flood and erosion protection in many areas, but also has affected recharge in rivers. Before urbanization, flood waters spread out over a broad area and moved slowly downstream. This enhanced natural recharge, with more flood waters reaching the aquifer. With waters now often confined within rigid, usually impervious channel walls, much of the water moves swiftly downstream without recharging.

Also, more of the desert area now is covered with roads, parking areas, and buildings constructed on land where water once soaked into the soil. Impervious surfaces generally cover approximately 20 percent of a suburban watershed area which usually has two houses or less per acre. In a highly urban watershed impervious surfaces cover approximately 70 percent or more of the surface area. Highly urban watersheds contain six or more houses per acre, and include commercial, industrial and multiple dwelling uses, with extensive drainage improvements.

Flowing rapidly and temporarily flooding streets, this water can pick up a wide variety of pollutants, carrying them to rivers. Because of infrequent rains, oil tends to build up on Tucson streets. During the first big storms of summer, Tucson streets tend to be slippery from this oil that flows with the flood waters. More auto accidents occur at this time than later in the rainy season when the streets have been partially cleansed by flowing water. More information is needed to determine whether pollutants in stormwater runoff have a significant impact on groundwater quality.

Because of the various urban conditions, less recharge occurs during big storms than would occur if conditions were more natural. Not only is water that could possibly be recharged leaving the area, but some of the stormwater that does recharge may be polluted from urban conditions. Old landfills located along river channels can be the source of further pollution entering the groundwater during flooding.

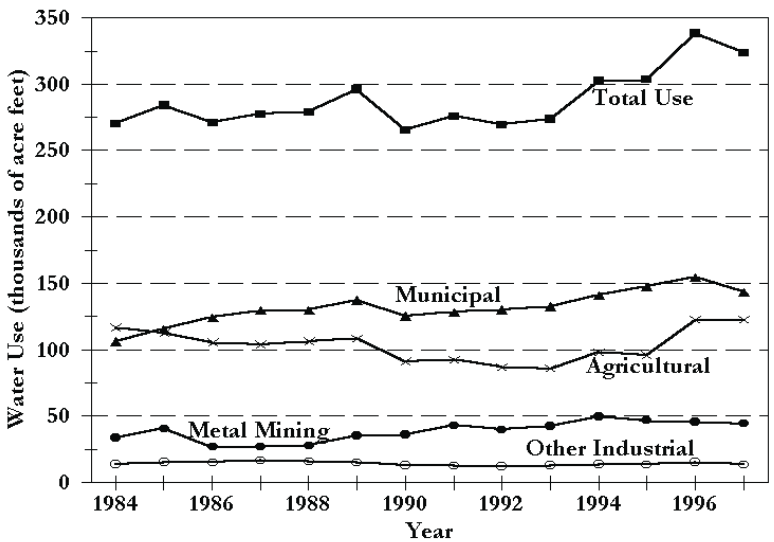
Chapter 5
THE MANY USES OF WATER

In a complex society water use is varied, from municipal and agricultural to mining and other industrial uses. This chapter discusses these broad categories of water use, describing activities that are included within each category. For example, municipal water use includes diverse activities, from plant watering to toilet flushing. Data are provided to show how much water is consumed by various types of water users. The cost of water also is discussed since cost is an important consideration when analyzing water use. Each section ends with possible ways to reduce water use.

WATER USES

Water is used for many purposes, including growing crops, producing copper, generating electricity, watering lawns, keeping clean, drinking and recreation. Balancing the water budget comes down to increasing the supply and/or decreasing the demand. In Chapter 3 we discussed the supply side of the water budget. Reducing demand involves reducing how much water each person uses, limiting the number of people using water (or slowing the rate of growth), and/or replacing some uses with other uses. To understand what these choices are, we must first understand how water has been used in the past and how it is used today.

Figure 5-1 Annual water use by sector, Tucson AMA.



Source: Arizona Department of Water Resources, 1984 - 1997 Annual Withdrawal and Use Summary, Tucson AMA.

There are three major groups of water users: homes and businesses, agricultural interests, and industry (including mining). The increase in municipal water use during the 1980s was offset by decreasing agricultural use, with total water use in the Tucson area holding steady during this period at about 275,000 acre-feet. (See Figure 5-1.) Agricultural use has risen since 1993. That, coupled with rising municipal use, pushed total water use to 323,000 acre-feet by 1997.

Agriculture has historically consumed the largest share of water of any sector in the Tucson area. After reaching a plateau between 1955 and 1975, however, agricultural water use declined during the 1980s and early 1990s. Municipal water use has increased since 1984 as the population has grown – both in total acre-feet used and in percentage of total water use, and now consumes a larger share than does agriculture.

MUNICIPAL WATER USE

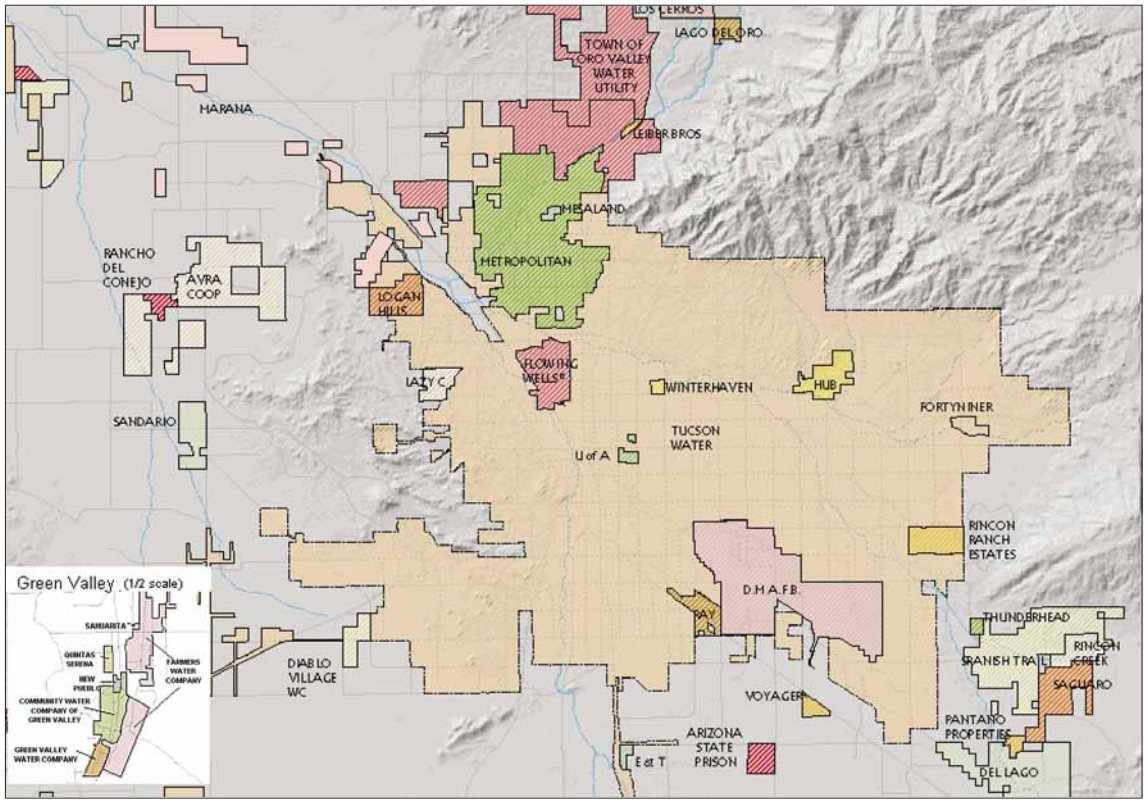
Population growth has caused municipal water use to be the fastest growing water use sector. Total municipal water use in the Tucson Active Management Area (TAMA) increased from approximately 116,000 acre-feet in 1985 to about 154,000 acre-feet in 1997.

One hundred and fifty-one municipal water providers operate in the Tucson area. Of this number, 19 large providers serve over 96 percent of total municipal demand. The service

areas of the major water providers are shown in Figure 5-2. See Appendix B for a complete list of municipal water providers and number of customers served.

Tucson Water is by far the largest municipal provider in TAMA, serving approximately 75 percent of total municipal demand. Approximately 40 percent of the population served by Tucson Water resides outside of the city limits, mostly in unincorporated areas of Pima County. Tucson Water's service area is projected to continue to grow, but the rate of growth has been slow. Metropolitan Domestic Water Improvement District (Metro Water) serves the next largest population. Other water providers closer to the edges of the Tucson metropolitan area, such as Oro Valley, Avra Water, and Metro Water, tend to be the fastest growing. Rapidly growing service areas generally are areas of rapid population growth and newer homes. These homes are likely to have water-saving fixtures and smaller yards, but are also more likely to have certain water consumptive facilities such as swimming pools.

Figure 5-2 Municipal water provider service areas.



Sources: Pima County Technical Services, Arizona Department of Water Resources, Water CASA.

TYPES OF MUNICIPAL WATER USE

Tucson Water's total water usage rate in 1955 was 172 gallons per capita per day (gpcd) including both residential and non-residential customers. It has remained fairly constant since 1985, ranging between 176 and 169 gpcd. Some changes in use relate to different weather conditions. For example, people tend to use more water during hot, dry summers than during relatively cooler, wetter ones. More homes having swimming pools and other water-using features increases water usage while installing low-water use toilets can decrease consumption.

Residential customers (single family and multi-family) are considered municipal water users along with businesses and institutions. Water use characteristics generally differ for each category of demand, with residents consuming most of the water in the municipal category. Residential demand for Tucson Water has remained fairly consistent at about 110 gpcd from 1985 to 1995. The average residential consumption rate for other large providers is higher, averaging about 121 gpcd. A number of factors explain the higher consumption rates of these large providers, including the age of the housing within the service area, the availability and effectiveness of conservation programs, income levels and water rates.

Table 5-1 Selected water providers in the Tucson metropolitan area (1995 data).

WATER PROVIDER	POPULATION SERVED	GROUNDWATER DELIVERIES (af)	RESIDENTIAL GPCD
Tucson Water	559,602	109,927	110
Metro Water	42,861	8,557	148
Oro Valley	23,229	5,707	116
Flowing Wells Irrig. Dist.	14,951	2,842	127
Community Water Company of Green Valley	12,819	2,063	112
Avra Water Co-op	5,663	771	105
Ray Water	4,617	599	106

Residential Use

Single family residents account for approximately 75 percent of residential demand in the Tucson area. Multifamily residential demand makes up the balance. These include apartment complexes, duplexes, triplexes, townhouses and condominiums. Their use is typically about 60 percent of the single family residential use rate. Multifamily complexes use less water per person in part because landscaping is generally limited to common areas, and some water uses occur away from the residence; e.g., apartment dwellers are more likely to use and car washes.

During the 1970s and 1980s new housing construction shifted towards multifamily dwellings. This increased construction of lower water-use housing promised to reduce gpcd rates. This trend, however, did not continue. Economic expansion and much lower mortgage rates caused single family home construction to rebound. In addition, the majority of multifamily units being constructed are more luxurious units which are more likely to have large turf areas, pools and other water-using amenities.

Older homes tend to consume more water both indoors and outdoors than newer homes. They generally use more water outdoors because of larger lots with more turf and landscaping. They use more indoors because they are less likely to have low-water use fixtures such as ultra low flush (ULF) toilets designed to use 1.6 gallons per flush. Homes built after 1975 are less likely to have lawns, and homes built after 1989 are required to have ULF toilets.

Nonresidential Use

Non-residential demand generally consists of turf facilities (golf courses, cemeteries, etc.), water features in public rights-of-way and commercial establishments. Non-residential demand for large providers averaged 41 gpcd in 1995. Tucson Water's non-residential demand decreased by six gpcd from 1985 to 1995. For other large providers, however, non-residential demand increased by 11 gpcd. Tucson Water has been able to reduce its gpcd rate by switching some golf courses and other facilities to effluent. (Although considered water, effluent does not count in the official calculations.) Other large providers are serving an increasing number of golf courses but do not have access to reclaimed water. As a result, their water use appears greater. Some areas served by large municipal providers are experiencing a transition from bedroom communities to areas with more retail and commercial activity, a change that is reflected in their water use.

The 35 golf courses in the area account for about ten percent of municipal water use in TAMA. The total amount of water used on TAMA golf courses has increased from 11,700 acre-feet in 1985 to 17,000 acre-feet in 1997. (See Figure 5-3.) Of the total amount of water used on golf courses in TAMA, the share of effluent increased from 24 percent in 1985, peaking at 38 percent in 1990, and has since fallen to 35 percent in 1997.

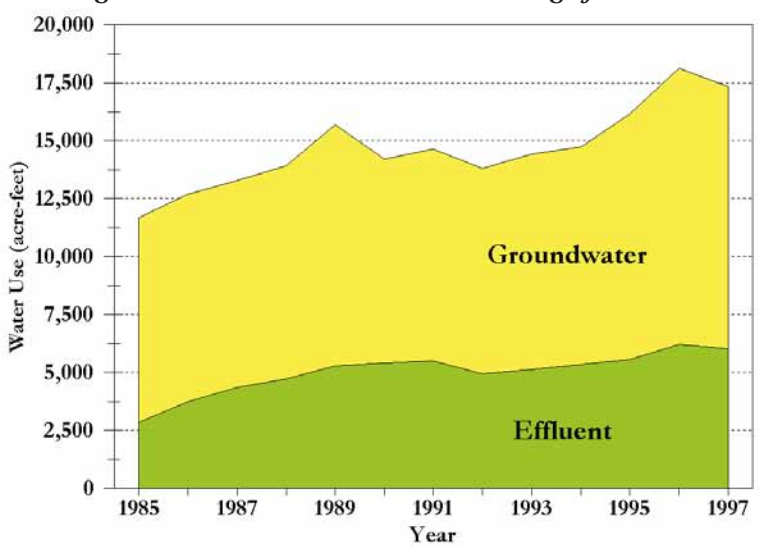
The number of holes of golf in TAMA has increased by 35 percent since 1985. Golf course design in the area has shifted towards more desert-like courses, incorporating fewer water hazards and significantly more low-water use plants along fairways instead of turf. In addition, the average number of acres of turf per hole has decreased from 5.9 in 1985 to 4.8 in 1997. However, reductions in water use resulting from these changes have been offset by a

large increase in the percentage of golf course turf which is overseeded with winter rye grass, from 21 percent in 1985 to 66 percent in 1997. The water use per hole of golf has increased over time since 1985, in part due to variations in weather.

Other large-scale turf facilities include parks, cemeteries and schools. For legal reasons Arizona Department of Water Resources (ADWR) divides turf facilities into industrial and municipal categories according to whether or not they are served by municipal water providers. All these turf facilities use about 20,000 acre-feet of water, about 33 percent of which is effluent. The remainder is groundwater.

Patterns of water use for retail and commercial establishments vary widely, but often include water for sanitary and landscaping needs. The number of employees often is a significant factor in business water use. Partly because water use patterns vary significantly among businesses, water audits tailoring conservation measures to particular needs are an effective strategy for reducing business water use.

Figure 5-3 Water use on Tucson AMA golf courses.



Source: Arizona Department of Water Resources, Tucson AMA.

CONSERVATION RULES

Under the Groundwater Management Act, ADWR sets goals for per capita water use by municipal water providers, but cannot regulate individual customers. Large providers can choose among four water conservation programs. Most often selected is the Total GPCD program, which sets targets for reductions in per capita water use for each water provider based on an analysis of conservation potential for that provider. Tucson Water and Metro Water have selected the non-per capita conservation program; they do not have to meet specific per capita water use targets, but must implement a range of conservation measures. Small providers, which account for four percent of total municipal water use, are regulated differently than large providers. Small providers are required to reduce waste and encourage conservation, but they generally lack the resources to implement conservation programs.

Other ways ADWR tries to balance supply and demand include requiring developers to demonstrate that renewable supplies are available to serve the development; that water use is consistent with TAMA's management plan and goal; and that the developer has the financial capability to construct needed water facilities. These Assured Water Supply (AWS) rules are designed to work with the conservation programs to reduce mining of groundwater.

USE OF RENEWABLE SUPPLIES

Historically, Tucson has been largely dependent on groundwater, a mostly non-renewable supply. In the past twenty years, however, effluent use has increased and CAP water has arrived in the area.

Central Arizona Project

CAP is potentially our largest renewable water source, although the only current direct use of CAP water in the municipal sector occurs for treatment plant maintenance — about 200 acre-feet in 1997. CAP's potential as a water source obviously is not fully realized.

Effluent

Effluent use currently meets about five percent of municipal water demand. Of the 69,400 acre-feet of effluent produced at the Ina Road and Roger Road wastewater treatment plants in 1998, about 13,000 acre-feet was reused, with the rest discharged to the Santa Cruz River channel, where some 96 percent eventually recharges the aquifer within TAMA. Of the amount reused, approximately 1,200 acre-feet

was delivered directly to turf facilities and some 3,000 acre-feet was delivered to the Cortaro Marana Irrigation District. This effluent only has secondary treatment and is mostly delivered downstream via gravity.

The City of Tucson processed approximately 8,700 acre-feet of secondary treated effluent at its reclaimed water facilities located next to the Roger Road Wastewater Treatment Facility. This effluent receives further treatment (tertiary treatment) by filtration through sand filters or soil and additional disinfection. The reclaimed water then is delivered for use or is stored at the Sweetwater Underground Storage and Recovery Facility (recharge facility) to meet peak demands in the summer, primarily to irrigate golf courses.

Reclaimed water flows through a different set of pipes, separate from the potable water system. So far, $66 million has been spent building the system, including the reclamation facilities, the recharge facility and the distribution system. Tucson charges $475 per acre-foot for reclaimed water. Full cost for production and distribution of reclaimed water is about $558 per-acre foot, with $323 covering debt service and capital costs and $235 covering operation, maintenance and overhead costs. The price charged for reclaimed water is substantially lower than the wholesale price Tucson Water charges for potable water. This is done to further encourage the use of effluent.

Figure 5-5 shows Tucson's 85-mile reclaimed water system, which has about 200 users. New users pay the cost of connecting to the system. This cost can be quite high, due to the expense of extending pipe to carry the effluent to the new user and modifying the user's delivery system to handle effluent.

Figure 5-4 Treated effluent at a golf course. Photo: Barbara Tellman.

A City of Tucson ordinance requires the use of effluent on new golf courses where possible. Since 1983, all new golf courses served by Tucson Water have been connected to the reclaimed water system. Currently, 12 of 16 courses in the Tucson Water service area are using reclaimed water, and one is using groundwater until effluent can be delivered. The three other courses use water from their own private wells. There is no current authority to prohibit their use of groundwater. Pima County's 1995 zoning code amendments require that all new golf courses use effluent or CAP water for turf-related watering where available. The expense of constructing pipelines usually is the limiting factor. A new ordinance passed in March 1999 requires the use of CAP or effluent at all new golf courses within three miles of a treatment plant or CAP water line. Owners of golf courses outside those areas now have to find a way to recharge CAP water to replace the groundwater they use on golf courses. Attorneys are looking at whether this ordinance also applies to 13 existing golf courses in the county.

ADWR incentives encourage the use of effluent. The most important incentive allows municipal providers to exclude effluent used on golf courses from their gpcd calculations (although the same total amount of water is actually used) which means conservation goals for individual customers can be higher.

Graywater Reuse

Graywater is water recovered after various indoor household uses, excluding toilet use. Graywater includes water from clothes washers, bathroom sinks, showers, baths, dishwashers and sometimes the rinse side of the kitchen sink. A graywater reuse system can be set up to capture and recycle such water for uses not requiring drinking water quality water; e.g., landscape irrigation. Approximately 60 to 65 percent of the wastewater generated from residential indoor use is graywater. The average resident generates an estimated 30 gallons of graywater per day. This is a significant source of water available to meet peak outdoor irrigation demands in the summer.

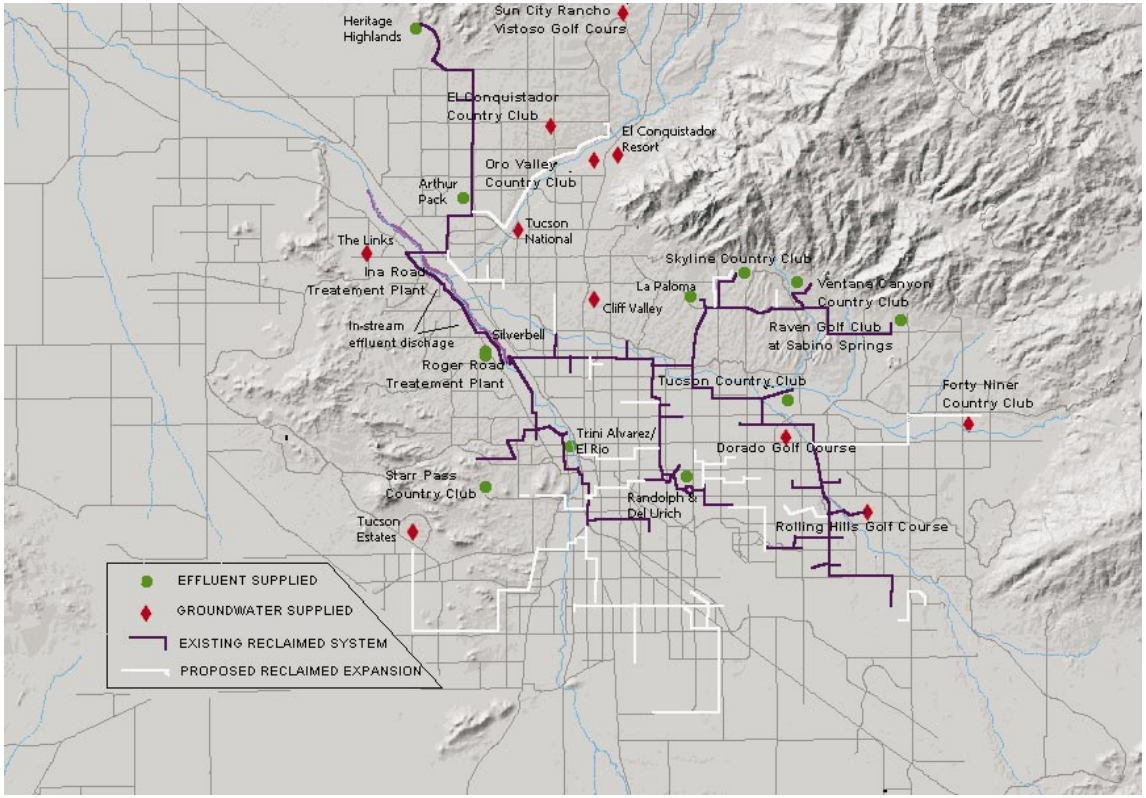
Although graywater use is common in rural areas and has been practiced by many people in urban areas for years, graywater reuse is technically illegal in many places in the United States. Plumbing codes generally require water coming from the drain to be discharged to the sewage system or a septic tank. In Arizona, a permit must be obtained from the Arizona Department of Environmental Quality (ADEQ) or the Pima County Department of Environmental Quality to operate a graywater reuse system. To issue a permit, ADEQ must approve the design and construction of the system. The system must include a settling tank to settle out grit in the water and also must have a filtration device. Water to be applied to the surface of the ground (defined as within two feet of the earth's surface) must be disinfected, meet water quality standards and be monitored. Daily testing of the samples may be required and can be expensive.

Such hurdles to legal use of graywater cause many residents to forego graywater reuse, while others become "wildcat" graywater users, applying it without official approval. A survey of Tucson Water customers in the early 1990s revealed six percent of customers had graywater reuse systems. A more recent survey of Metro Water customers showed that nine percent of households use graywater. Since graywater use is illegal, respondents may be reluctant to admit to its use, and the actual percentage of those reusing graywater may be higher than surveys show.

Concerns about public health are the biggest obstacles in legalizing graywater use. The quality varies depending on how it was used. Water from washing diapers, for example, will probably be more contaminated than water from a shower. Fecal coliform bacteria levels and nitrates have been of particular concern, although the threat is perhaps exaggerated. Salmonella and polio virus have been shown to last several days in graywater. Data accurately characterizing factors that determine graywater quality and assessing risks of use is limited. Studies are needed to develop guidelines for the safe reuse of residential graywater. The Water Conservation Alliance of Southern Arizona (Water CASA), in cooperation with ADWR, ADEQ and Pima County Department of Environmental Quality, is studying residential graywater reuse in Tucson. Study results will help determine if health risks increase with graywater reuse, and whether permitting standards can be loosened.

Graywater reuse has limited potential for helping TAMA reach safe yield. For the 85 to

Figure 5-5 Golf courses and the reclaimed water system.



Sources: Pima County Technical Services, Tucson Water, Arizona Department of Water Resources.

90 percent of homes connected to the central sewage system, water used as graywater does not enter the sewage system to be treated for reuse or discharged to the Santa Cruz River. About 96 percent of the treated water that is released into the Santa Cruz River recharges the aquifer in TAMA. The use of water at a domestic site rather than treated and used someplace else gets us no closer to TAMA-wide safe yield.

However, residential graywater reuse can be an effective tool to better manage our groundwater by matching water quality to the actual quality needed for a particular water use. Residential graywater reuse reduces the demand for groundwater. Less water will then be withdrawn from areas of serious water table declines, such as Tucson's Central Wellfield. Graywater reuse also saves the cost of moving groundwater through the water system, from disinfection to delivery to eventual sewage treatment. Further, a sizeable reduction in the waste stream going to the treatment plant could reduce its operating and capital expenses and delay the need for expanding those facilities.

RESIDENTIAL WATER USE

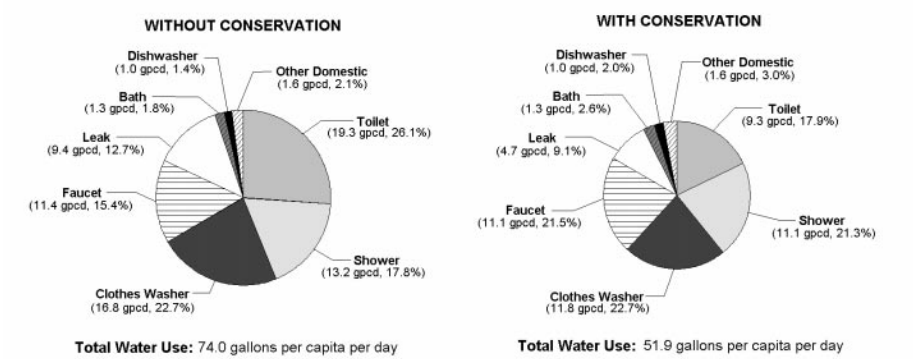
Pima County's population is projected to increase from today's figure of about 836,000 to 1.3 million by the year 2025. Most of that growth is expected to occur in the Tucson metropolitan area. As the population grows, total water use will increase.

If per capita water use rates stay about the same as today, total municipal water demand would increase from 172,900 acre-feet in 2000 to 267,100 acre-feet in 2025. The water saving potential of both new and existing housing must be examined for appropriate ways for a diverse population living in varied housing to conserve water.

Water can be conserved both indoors and outdoors. Most of the water used indoors winds up in a sanitary sewer or septic system. For homes hooked up to the sewer system, water used indoors is re-used or recharges the aquifer. Much of the water used outdoors evaporates and leaves TAMA. Therefore, saving water outdoors has a greater effect on the total water budget for the Tucson area than does saving water indoors. Saving water indoors, however, does reduce the cost of transporting water to the treatment plant and treating it.

It is important to note, however, that given Tucson's projected population growth, no level of water conservation, even if involving all types of water users, will be sufficient to ensure a balanced water budget.

Figure 5-6 Typical single family home indoor water use.



Source: Data are a copyright of the American Water Works Association and were compiled for WaterWiser, www.waterwiser.org, by John Olaf Water Resources Management.

Indoor Water Use

Indoor uses remain fairly constant throughout the year. People may wash more clothes in the summer, but in the winter the bulk of clothes washed is greater. Similarly, other indoor water uses vary little during the course of the year. This constancy is reflected in relatively flat levels of sewage water flow.

Figure 5-6 shows that the largest indoor uses of water are toilets, showers and baths, and washing machines in all types of housing. Newer models of toilets are designed to use less water than older models. Until the early 1980s, most new toilets used five to seven gallons per flush. Water-conserving 3.5 gallons per flush toilets were the standard until the early 1990s when 1.6-gallon ultra low flush () toilets became available. In 1989, both Tucson and County adopted ordinances requiring installation of ULF toilets in new construction.

Replacing older toilets with ULF toilets is one of the best ways to save water indoors. ULF toilet savings do not require a change in behavior and, if the toilet continues to function properly, will effectively save water. However,

while many models of ULF toilets function very well, recent anecdotal evidence indicates that some models of ULF toilets deteriorate over time. Further, replacement parts are not readily available for some models, forcing homeowners to find alternative parts that can negate the water saving feature of the toilet. Other people continue to use ULF toilets without making repairs; this also results in less water savings. The University of Arizona's Water Resources Research Center is conducting a study to identify the extent of this problem and to determine which models of ULF toilet have not held up over time. This information can be used to rewrite plumbing codes, upgrade ULF toilet quality, and make the correct replacement parts easier to obtain.

Toilet dams and other water displacement devices can help save water in older model toilets. Toilet dams, which are placed in the tank to keep water from fully filling the tank, typically save about one gallon per flush. Water-filled bags or plastic bottles also can be used in place of dams and typically save about the same amount.

Showers and baths are another large component of indoor water use. Showers and baths typically comprise about 20 to 25 percent of total indoor water use in older homes. Low-flow shower heads also can save water. Older shower heads typically use 3.5 gallons per minute (gpm), while low-flow shower heads typically use 2.5 gpm or less.

Clothes washers typically account for between 20 and 25 percent of indoor water use. Clothes washers vary widely in their water use. Older models used about 55 gallons per load, while more water-efficient models use around 42 gallons per load. Newer, more efficient models, including horizontal axis machines, use about 30 gallons per load.

Faucet use typically accounts for around 15 to 20 percent of indoor use. Faucet aerators reduce some water use by introducing more air into the stream, thereby increasing the water's wetting action. This can save approximately one gpm over older 3.5 gpm faucets. Other faucet uses, such as filling a glass or teapot, are unaffected by aerators.

Figure 5-7 Water is saved when a landscape consists of desert, drought-tolerant vegetation. Photo: Barbara Tellman.

Leaks average approximately 10 percent of indoor water use. Inspection of the home for leaks as part of a water audit is often an effective way to save water. Tucson Water offers free leak detection as part of its Zanjero Program, which provides customers an analysis of the water use in their home, and information on how to lower their water use and water bills.

Outdoor Water Use

In the Tucson area, single family residents use 30 to 50 percent of their water outdoors, for landscape watering, swimming pools, spas, evaporative cooling and other such uses. Outdoor water use varies over the year. In the summer before the monsoon rains starts, outdoor water use peaks as plants require more water to survive and evaporation from pools is at its greatest. In the winter, outdoor water use drops dramatically, especially during the winter rainy season from January through March. Bermuda grass is dormant during this season, and only about seven percent of landscapes have winter rye grass lawns.

Peak summer water use can be up to twice winter water use. Beat the Peak, the water conservation campaign created by Tucson Water after the 1975-76 water controversy, was designed to help cut peak consumption. Water providers must design their distribution systems to meet peak demand and allow enough reserve supply for fire fighting. If peak demand is reduced, costs are reduced. A benefit is that lower peak demand has generally also meant lower total water use.

Landscape irrigation is the largest category of outdoor water demand. Most landscaping in Tucson combines grass with desert plants. A 1992 random survey of Tucson Water customers found that about 43 percent of respondents had some grass in their landscaping. Eight percent of residents reported their landscaping was mostly grass while the other 35 percent had landscapes combining turf area with other plant materials.

Since the late 1940s, the percent of new homes with lawns has generally been declining in Tucson. A 1983 random survey revealed that about half of the homes built prior to World War II had lawns. The percentage of homes with lawns declined gradually though the mid-1970s, and then declined steeply about the time of the 1975-76 water crisis in Tucson. Most evidence indicates that roughly 20 percent of homes built in the late 1980s and early 1990s have lawns.

Lawns are rarely removed once they are installed. Converting lawns to desert landscaping, however, became more common in the late 1970s and early 1980s. A sample of Tucson households in 1979 showed that up to 20 percent of households surveyed had removed their front lawns, while 15 percent had removed their backyard lawns between 1976 and 1979. This compares to essentially no lawn removal in the several years before the crisis. Average lawn size also has declined from a peak of about 2,000 square feet for homes built around 1960 to around 600-800 square feet for homes built since the mid-1980s.

Relying on a garden hose to water vegetation is the most prevalent form of irrigation in Tucson. Drip irrigation is the second most common method of irrigation and has gained significantly in popularity since the early 1980s. At that time, one percent of households had drip, compared to approximately 27 percent of households in the early 1990s. Approximately 22 percent of Tucson Water service area households reported having in-ground irrigation systems in the early 1990s. About eight percent of homes surveyed in the early 1990s did not irrigate their landscaping at all.

Which irrigation system is most efficient is unclear. Management of the system is as important as the system hardware. Drip systems and in-ground turf irrigation systems can be put on timers and programmed to deliver the right amount of water when needed. But timers need to be reset to adjust to changing seasons and large rain events. Too often such adjustments are not made. In such instances, hand watering with a hose could be more efficient. Deep, infrequent irrigation of mature landscape plants is more efficient than frequent, shallow irrigation.

Swimming pools are less common than lawns in Tucson, but the percentage of homes with swimming pools has been increasing over time. A swimming pool typically uses three to five times as much water as the same area of turf. This is due in part to the fact that most private lawns are under-irrigated, and pool consumption includes not only evaporation but also filter back flushing and occasional draining for maintenance.

As is shown in Figure 5-8, the percentage of Tucson homes with pools is a function of when the home was built, increasing from

XERISCAPING

Xeriscaping is using efficient landscape design and lower water use vegetation to create attractive landscapes — and equally important, to save water. The word "xeriscape" combines the Greek word "xeros", meaning dry, with "scape" from "landscape." Xeriscaping principles make use of "microclimates" that exist in the landscape. Micro-climates are defined according to the amount of sun and shade, the slope, and air movement that characterize a landscape.

The property is divided into low, medium and high water use areas, with the highest water use areas close to the house, in areas with the most shade. These are cooler areas, and xeriscaping would limit turf to these areas. Drought-tolerant plants and native vegetation are used in low water use zones to provide attractive landscape with a variety of colorful and interesting plants.

Water harvesting techniques might be applied to capture and store rainwater for use on plants or to channel runoff directly to vegetation. Drip irrigation can be installed to water individual plants, while sprinkler systems are used for turf. Soil can be improved and topped with mulch to hold water from rainfall as well as irrigation. Taken together these practices help residents save both water and money while creating beautiful and interesting landscapes.

WHAT MAKES UP TUCSON'S WATER DISTRIBUTION SYSTEM?

Sources of Water - Water pumped from an aquifer to pipes for distribution and delivery has been the source of much of Tucson's water. Tucson's newest available source of water is the CAP, which brings water from the Colorado River. Tucson also has a system for using treated wastewater on facilities such as golf courses and parks.

Pipelines - Large pipelines ("water mains") bring water from its source to central points, and smaller pipes distribute that water throughout the community.

Reservoirs - These are storage areas that hold water until used. Reservoirs are important for balancing supply and demand and for ensuring that an extra amount of water is in reserve for fire fighting. At one time, elevated storage tanks provided adequate supplies of water. With our large population, however, huge reservoirs are needed, with capacities ranging from one million to twenty million gallons of water.

about 15 percent in homes built prior to the mid-1950s, to about 22 percent from the mid-1950s though the 1960s, and then to nearly 30 percent in newer homes. At present, almost 20 percent of all homes in Pima County have pools.

Many pools are not built at the same time as the home, but rather within the first seven to eight years after the home is constructed. And once constructed, pools are rarely removed. Pool removal can cost over $10,000 and usually reduces the value of the home. This suggests that the best time to provide outdoor water conservation messages to homeowners is soon after they've moved into a newly constructed home and before they have made landscaping and pool decisions.

One of the few ways to reduce pool water use is covering the pool when it is not in use to minimize evaporation. A survey of newer homes in Tucson revealed that approximately 60 percent of home pools have pool covers. But pool covers are used only about half the year. Usage is at a minimum during the summer swimming season to allow convenient and frequent access to the pool. Also covers are not used in the summer because they cause the water to become uncomfortably warm. Peak cover usage surprisingly is not in winter, but in the fall and spring, when pool users are trying to extend the swim season. Lower pool cover usage in the winter may reflect a desire to protect the cover from sun damage while evaporation rates are the lowest.

Water for evaporative cooling systems accounts for around five percent of outdoor water use in Tucson. (Evaporative cooling is classified as an outdoor water use because it results in water being consumptively used and not returned to the sewage system as is the case with other indoor uses.) In 1992, approximately 79 percent of homes in Tucson had evaporative coolers. At that time approximately 59 percent of households had only an evaporative cooler; 21 percent had both a cooler and an air conditioner; and 19 percent had only an air conditioner. As air conditioners have gained popularity in new construction, the percentage of Tucson homes with evaporative coolers, along with the amount of outdoor water devoted to evaporative cooling, has declined. Approximately 85 percent of new construction surveyed in 1996 had only an air conditioner,

Figure 5-8 Fraction of residential lots with pool by year home built, Pima County 1920-1990.

Sources: Pima County, Water Resources Research Center.

11 percent had both an air conditioner and an evaporative cooler, and four percent had only an evaporative cooler.

HIGHER WATER USE TRENDS

While newer homes have more low-flow plumbing fixtures and appliances and are likely to have less turf and no evaporative cooler, some trends in new construction cancel out these conservation gains. For example, newer homes are more likely to have water using amenities such as pools, spas and whirlpool tubs. Further, new apartment complexes and condominiums are more likely to have large amounts of turf and landscaping, as well as pools.

The number of homes with outdoor misting systems grew through the early and mid-1990s. These systems spray droplets of water into the air that evaporate to cool an area. Although manufacturers of misting devices claim water efficiency, few residential misting systems are as effective or water-efficient as advertised, and some are poorly designed. System emitters can scale up or corrode, producing drips instead of the intended mists. A survey of Tucson Water customers in 1992 showed that three percent had misting systems. A Metro Water survey conducted about 1995 indicated that seven percent of homes had misting systems, and a 1997 survey of new housing indicated that 12 percent of sampled homes had them. The 1997 survey showed that those systems were used an average of 3.4 times per week, and that the main use was for cooling pets left outdoors.

The trend in cooling system design is toward greater water use. The latest models of evaporative coolers are designed to prolong the life of the cooler by draining water after a certain number of hours of operation. This prevents mineral content from building up and corroding metal cooler parts and scaling up the pads. Some new coolers, however, empty the pan automatically after only a few hours of operation. This is excessive considering Tucson-area water quality. In older coolers, water collects in the bottom of the cooler and can be drained using a bleed-off valve. Some new air conditioners also use water. Manufacturers can achieve higher efficiency ratings by dissipating heat generated by the unit in an attached evaporative cooler.

Some water-using indoor appliances also are starting to use more water in settings designed to handle heavy loads. For example, *Consumer Reports* found that while new dishwashers have a greater number of settings to better match water use with job size, the power-scrubbing option available on many models means significantly higher water use. New dishwashers use between four and 13 gallons per load on normal settings, but can use significantly more when set for the dirtiest loads. In contrast, washing dishes by hand uses three to five gallons per load.

WATER RATES AND CONSERVATION

For decades water has been priced as if it were free. What people pay for is the cost of capturing the water, delivering it to them and making sure it is safe to drink. People who pump their own water pay to build and operate their wells, but they do not pay anyone for the water itself. ADWR, however, does charge well owners a small pumping fee which goes primarily toward conservation and augmentation (water banking) programs. In some states people pay an annual fee for their pumping permit which recognizes that the state owns the water and sets certain conditions for people to use it.

Many people will conserve water if the price is very high. The point at which people will respond to higher bills varies greatly, depending mostly on personal income and the percentage of total household expense the water bill represents. Some people may find a $100 water bill acceptable while others may have problems paying a fourth as much.

Water rates can be modified to encourage conservation in two very different ways:

- The rate structure can be designed to reward conservation and discourage excessive water use. For example, cost per gallon could increase as customers use more water; cost could increase at peak times of the day or year to reflect higher costs at that time; or cost could be higher for areas that are more expensive to serve.
- Rate levels can be raised to cover the cost of finding new future water supplies.

Changing Rate Structures

Tucson's first water rates in 1900 were flat rates, as are some of Salt River Project's rates today. A flat rate means people pay the same for water no matter how much they use. For many years, Winterhaven had a flat rate for wa-

ter, with the expectation that people would maintain lush lawns and landscapes, although this has changed and desert landscapes are now acceptable in that Tucson neighborhood. Today almost all communities nationally meter water usage and thus charge people more for increased water use.

Water bills from all water providers in the Tucson area have two basic parts — a basic rate determined by the size of the connection (this is a fixed charge applied whether or not water is used) and a commodity rate which is charged for every unit of water used over a minimum amount. For many water providers, the minimum amount is 2,000 gallons. Some water companies charge a higher commodity rate for water use above certain amounts (referred to as an increasing block rate or progressive rate structure). This type of rate structure is designed to discourage high-volume water use. Tucson Water, Metro Water and Avra Water Co-op have increasing block rates.

Another water rate structure variation designed to encourage water conservation is seasonal water rates. Seasonal rates usually involve charging a higher commodity rate during summer months than during winter months. Higher summer rates are designed to encourage more conservation when more water is needed to meet peak demand on the water system. Metro Water has had seasonal rates since 1995. Tucson Water had seasonal rates for all customer classes from 1977 to 1995 but removed seasonal rates for the single family residential and duplex-triplex classes in 1995.

Water rates are an important signal about the relative scarcity of water and the need to conserve. If rates do not keep up with inflation, the real price of water actually declines. People may take that as a signal that water is cheap and conservation is not important. Even if the real price of water is held constant, incomes in Pima County have increased at a faster rate than inflation. This is good news for the economy, but means that water bills shrink as a relative share of the overall budget. The incentive to conserve is reduced.

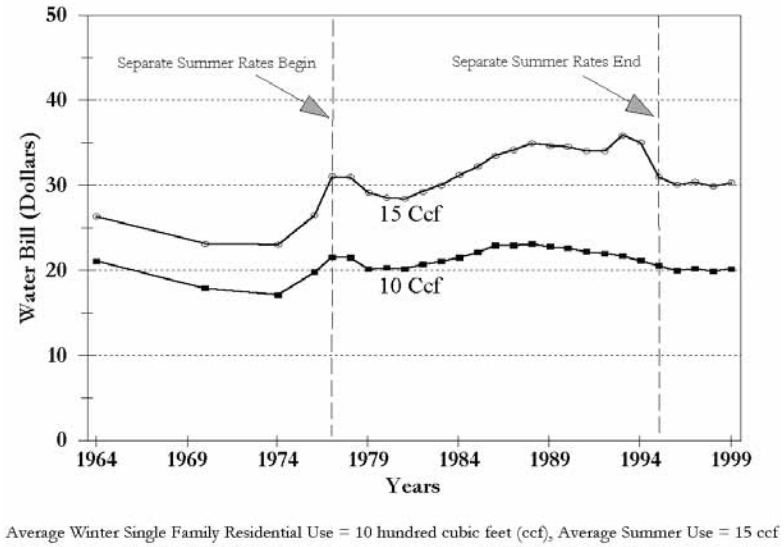
Figure 5-9 The Beat the Peak Program tried many approaches to urge the public to restrict water use during peak hours. Photo: Barbara Tellman.

Tucson Water has pursued a water rate policy designed to lower peak demand and encourage water conservation. Tucson Water instituted increasing block rates and seasonal rates as a conscious effort to discourage excessive water use. Especially after the 1975-76 water controversy (S Chapter 2), many Tucson Water customers saw significant increases in their water bills, and water use decreased significantly as the message to conserve hit home. At this time the water conservation program, Beat the Peak, was initiated.

As is shown in Figure 5-10, between 1976 and 1993 rates were updated every year. For average water use customers, bills just barely kept ahead of inflation. At least in part because the real price of water stayed about the same, and incomes in County increased at a higher rate than the rate of inflation, water use increased. In 1993, there was a significant increase in the price of water, especially the summer rate. Public reaction, however, forced a redesign of the rates and a decline in the real price of water in the summer. The real (inflation adjusted) price of water has declined since then.

Water providers must get approval to change water rates. Municipal water utilities must get approval from the city or town council. Changing the rates is much more difficult for water companies that must get approval from the Arizona Corporation Commission (). Going through this process is expensive because of the legal fees involved and costs of a rate hearing can easily reach hundreds of thousands of dollars, even for a small water company. This is required even if a company doesn't plan to raise more revenue from customers, but just change the rate structure. This

Figure 5-10 Tucson Water bill for average single family residential customer, inflation-adjusted 1998 dollars.



Sources: Water Resources Research Center, Tucson Water.

discourages many companies from changing rate structures to promote conservation.

Charging More to Pay For Future Supplies

A more controversial way to change rates is to charge more in anticipation of the need to acquire a more expensive water supply in the future. The cost of developing and delivering Tucson's new water supplies — CAP and treated effluent — are more expensive than pumping and delivering groundwater. Some economists argue that people now using the cheaper water should help pay for the future costs of developing the new, more costly supplies that eventually will be needed. According to this theory water costs should rise to build up a reserve for the future. This would make it fairer for future users who must use the more costly water, and the higher cost would encourage conservation of the existing supply. This approach is rarely adopted for many reasons. For one, it is not a politically popular approach. Also, it is virtually impossible for a private water company to acquire extra money to cover future costs through the ACC process. Municipal utilities are often run on a cost of service basis, neither making a profit nor running a deficit. Accumulation of an unused pot of money would not fit this model, although some funds can be put aside for the future.

CONTRARY VIEW

Not all Tucson citizens are committed to a water conservation ethic. Some people do not believe a water shortage exists, especially now when Arizona has more CAP water than it can use and faces the prospect of California or Nevada claiming the state's unused portion. Other people believe they have a right to as much water as they are willing to pay for, to use as they see fit. Some critics claim such people may indulge in excessive water use but, in response, they may claim theirs is an essential use of water. Not all people appreciate landscaping with low-water use native plants; some prefer green lawns all year long. While some people consider golf courses a recreational necessity or a way to raise property values, others believe such facilities waste valuable water and benefit only the few who use them.

Some people are reluctant to save water because they perceive conservation as a cynical means to justify population growth. Such skeptics argue the main reason business interests support conservation is to save water that then can be used to enable more people to move into the area. In this scenario, conservation efforts may result in reducing existing water use, but a growing population would soon consume whatever water savings are achieved.

AGRICULTURAL WATER USE

Agriculture has been the predominant user of water in Arizona in the 20th century. Since the 1940s, agriculture has accounted for about 80 to 90 percent of Arizona's water use. In the Tucson area, agriculture's share of water use in the Upper Santa Cruz Basin (which excludes the Avra Valley) was about 84 percent in 1940, shrinking to about 73 percent by 1951.

The general downward trend in agricultural water use has resulted mostly from a reduction in cropped acreage. Cropped acreage in Pima County reached a plateau in 1955 and remained fairly constant until 1975, at about 50,000 to 60,000 acres. Irrigated acreage declined after 1975 as farmland was developed for

Table 5-2 Summary of water use in major irrigation areas in the Tucson AMA.

IRRIGATION AREA	IRRIGATED ACREAGE	1987-1995 AVERAGE WATER USE (acre-feet)	WATER SOURCES
Cortaro Marana Irrigation District	10,543	33,439	Groundwater, CAP, Effluent
Avra Valley Irrigation District	11,360	26,240	Groundwater, CAP
Farmers' Investment Co.	5,909	28,026	Groundwater
Red Rock Area	3,843	n/a	Groundwater, CAP

Source: Arizona Department of Water Resources, Draft Third Management Plan, Tucson Active Management Area, 1998.

urban use along the Santa Cruz River floodplain, including the Marana area. The City of Tucson purchased over 20,000 acres of farmland in the Tucson area from the 1950s to the early 1980s, taking that land out of agricultural production in order to use its water rights for municipal purposes.

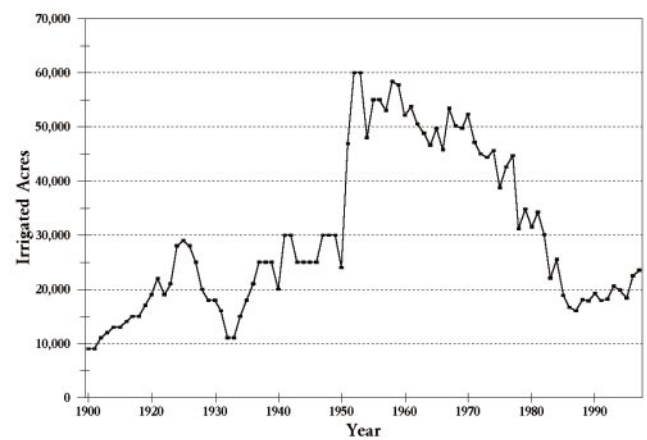
After declining through the 1980s and early 1990s, agricultural water use increased to 132,700 acre-feet in 1997. Use in 1997 includes 25,100 acre-feet of CAP water used in-lieu of groundwater under the groundwater savings program set up by the State of Arizona (See discussion below). Reasons for the increase in agricultural water use are not clear. Rules for participation in the groundwater savings program allow use of renewable water supplies only in place of groundwater that otherwise would have been pumped. Other reasons for the increase that have been cited include better market conditions and the passage of the Federal Agriculture Improvement and Reform Act of 1996. This act removed federal price support programs and increased pressure on farmers to plant as many acres as possible to cover overhead costs.

Agricultural water use in TAMA is regulated under the Groundwater Management Act of 1980 (GMA). The GMA regulates agricultural water use in several ways. First, no new agricultural land can be developed for irrigation. Second, farms are given a maximum annual allotment of groundwater to be used for irrigation. This is based on the historic amount of irrigated acres on a farm in the five years before the GMA and an amount of water to be used per acre, called a water duty. This irrigation water duty will be reduced over time as increasing water application efficiencies are required (See Chapter 7 for more detail).

Farms using less than their groundwater allowance are given a credit for the difference between their actual water use and the groundwater allowance. These credits are accumulated in a flexibility account and can be used in future years, if needed, to meet conservation requirements. There is no limit to the number of flexibility credits that can be accumulated.

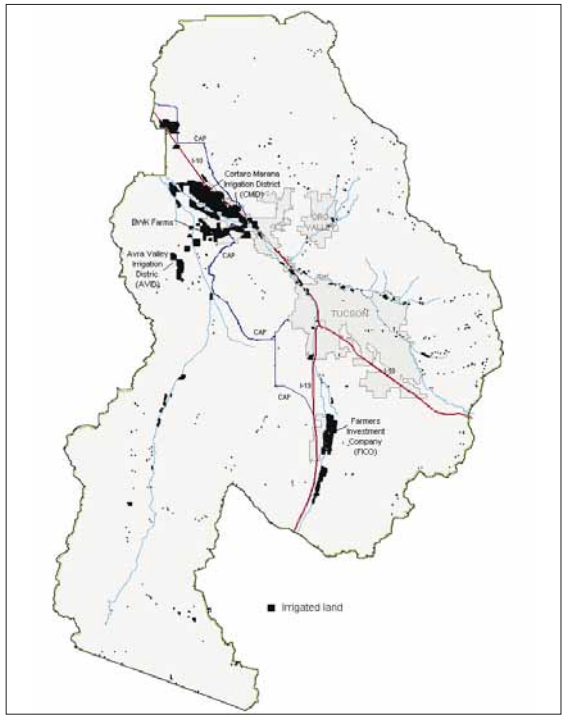
Annual groundwater allotments were set near the historic peak of irrigated acreage; thus much more groundwater than is needed is legally available to farmers each year. With irrigation efficiencies increasing on farms and significant amounts of farmland out of production, many farms have accumulated large flexibility account balances. On average, TAMA farms were using 50 to 60 percent of their groundwater allowances. ADWR projects that, even as required irrigation efficiencies are raised to 85 percent, most farms will still accumulate credits. The ex-

Figure 5-11 Irrigated acreage in Pima County, 1900-1997.



Sources: Arizona Agricultural Statistics 1966 - 1997, Arizona Agriculture 1942 - 1965, Arizona Academy 10th Arizona Town Hall, 1967.

Figure 5-12 Irrigated acreage in TAMA.



Source: Arizona Department of Water Resources.

istence of large flexibility account balances hinders the ability of agricultural conservation requirements to affect agricultural water use.

As shown in Figure 5-12, four main groups of farms are clustered in three agricultural areas remaining within TAMA. Two irrigation districts are operating in TAMA: Cortaro Marana Irrigation District (CMID), located north and west of the Town of Marana, and Avra Valley Irrigation District (AVID), located generally just south of CMID, southwest of the Santa Cruz River. Irrigation also is occurring in what is referred to as the Red Rock area, in the Pinal County portion of TAMA. Farms within the Farmers Investment Company (FICO) near Green Valley account for most of the rest of TAMA agricultural land. Agricultural water use in other areas of TAMA, such as the Tucson area, the Altar Valley and farmland in the Arivaca area, accounts for less than three percent of total agricultural water use in TAMA.

The San Xavier (south of Valencia Road) and Schuk Toak districts (western Avra Valley) of the Tohono O'odham Nation have CAP allocations, which may be applied to restore historic farmlands and add additional farmland. Projections show that about 5,000 acre-feet of CAP water may be used on the San Xavier District by the year 2005. The Schuk Toak District currently is developing a farm which is expected to use 10,800 acre-feet of CAP water per year by 2010. A pipeline to supply CAP water to the San Xavier District is now under construction.

Cotton is the predominant crop grown in TAMA, accounting for about 75 percent of planted acreage. Other crops grown include wheat, barley, sorghum, alfalfa hay, vegetables, nuts, millet and lettuce. Pecans are the predominant crop grown at FICO.

The cost of pumping groundwater for TAMA farmers depends mainly on the depth to groundwater and energy costs. With access to low-cost hydropower generated at Hoover Dam, CMID has about the lowest pumping cost in TAMA. The district controls well pumping and supplies water to farmers at a cost of $30 per acre-foot, plus an annual assessment of $40 per acre for every acre in the district. Individual farmers within AVID have their own wells and control water use decisions. Pumping costs for wells in the district were about $40 to $50 per acre foot in 1995, including operation, maintenance and repair costs. Average pumping cost for FICO wells was recently reported to be $28 per acre foot.

To encourage farms to use renewable supplies such as CAP water the cost of such supplies needs to be comparable to the cost of pumped groundwater. When originally offered to irrigation districts in Arizona, CAP water cost more than pumped groundwater. As a result, fewer irrigation districts than expected signed subcontracts for CAP water. Many irrigation districts that did sign subcontracts faced a financial crisis, if not bankruptcy, until the State of Arizona offered incentives to increase CAP water use by agriculture. The state offered irrigation districts who had signed a CAP subcontract a reduced price for the water in return for irrigation districts giving up their long-term right to use CAP water. Since none of the irrigation districts in the Tucson AMA signed subcontracts to use CAP water, they were not eligible for these favorably priced allotments of CAP water.

TAMA farms, however, are eligible to use CAP water under another incentive program designed to encourage CAP water use. Under the Groundwater Savings Facilities (GSFs), otherwise known as in-lieu recharge facilities, municipal water providers offer CAP water to farmers at prices below the cost of pumping groundwater. Farms use this CAP water in lieu of groundwater that otherwise would have been pumped. Municipal providers get credits for this "saved" groundwater. The credits then can be used in the future to offset groundwater

Table 5-3 Water delivered to Groundwater Savings Facilities (acre-feet).

GROUNDWATER SAVINGS FACILITIES	1993	1994	1995	1996	1997
BKW Farms	250	2,014	4,235	7,080	8,648
Cortaro Marana Irrigation District	2,650	0	5,902	9,581	9,746
Kai Farm at Picacho	–	–	–	0	6,701
Total In-Lieu Recharge	2,900	2,014	10,137	16,661	25,095

Source: Arizona Department of Water Resources, Draft Third Management Plan, Tucson Active Management Area, 1998.

pumping in efforts to meet state groundwater pumping restrictions.

As is shown in Table 5-3, CAP water use through the groundwater savings program has grown from about 10,000 acre-feet in 1995 to 25,000 acre-feet in 1997. CAP water use through GSFs continues to expand as new facilities are added and existing facilities are permitted to take more water. For example, CMID used almost 10,000 acre-feet of CAP water as a groundwater savings facility in 1997 and has increased its state permit to take up to 20,000 acre-feet per year of CAP water in the future. A groundwater savings facility located within AVID includes several farms. The AVID GSF is permitted to take up to 12,513 acre-feet per year of CAP water. FICO does not use any CAP water currently but is investigating the use of CAP and/or effluent. Use of CAP water at FICO could occur through a GSF with a possible capacity of up to 20,000 acre-feet per year. Kai Farms at Picacho, in the Red Rock area, converted from pecan trees to row crops in 1997, and irrigation with CAP water began under a groundwater savings project arrangement. Total CAP water used at the Kai Farm at Picacho GSF in 1997 was 6,701 acre-feet. The facility is permitted to take up to 11,231 acre-feet per year of CAP water.

A small amount of treated effluent is used on farms in the Tucson area. CMID purchases an average of about 3,000 acre-feet of effluent per year from Pima County. The effluent is delivered via a ditch from the Ina Road treatment plant and is blended with groundwater for delivery to farms.

Reducing Agricultural Water Use

ADWR has goals for increasing water use efficiency on farms. In 1980, water use efficiency in TAMA averaged about 65 percent of water applied. This means that the average amount of water applied to crops was 35 percent greater than the calculated water need for those crops after accounting for the consumptive use requirement for the crops, the amount of precipitation available for plant growth, any additional water for special needs for crops — such as water needed for germination of lettuce — and a leaching allowance to prevent buildup of salts in the soil. The water use efficiency goal set for farms to reach by the year 2000 is 85 percent efficiency. ADWR reports that many farms have already reached this goal, but other farming operations are not certain whether this goal is attainable.

Flood irrigation on sloped fields is the most common irrigation method in TAMA. Some farms have saved water by laser-leveling their fields (a method of leveling and slightly sloping fields so that water spreads evenly across the field) or installing systems to pump back water that accumulates at the end of the field. Installation of drip irrigation systems is generally considered too expensive for irrigation in the Tucson area.

Figure 5-13 Irrigation made it possible to grow a great variety of crops in the desert.

ADWR also is requiring farms to make their distribution systems more efficient. Farms can save water by lining their water distribution canals with concrete or other materials. Under ADWR's Second Management Plan, farms were required to either line all their canals or operate their delivery systems to keep lost or unaccounted water at less than ten percent. The agency reports that most of the largest irrigation districts in TAMA are meeting this requirement.

One of the biggest factors in reducing agricultural water use in the Tucson area has been purchase of agricultural land for subdivision use, especially in the Marana area. As municipal development continues in the Tucson area, more farmland will likely be converted. Whether or not the new land use will ultimately consume more water depends on many factors. In situations in which farmland is converted to apartment or business use, the total water use will probably be less than the agricultural use. In situations in which farmland is converted to high-water uses such as golf courses, total water use may be higher.

Another strategy for reducing agricultural water use is to buy agricultural land and the attached water rights to either convert rights to municipal use or permanently retire the water rights. The City of Tucson bought many acres of farmland from the 1950s through the 1970s, and mining companies also purchased farmland in the 1970s to secure water rights. The GMA has provisions for state purchase of farmland to retire agricultural water rights starting in the year 2006 but no source of funds has been identified to accomplish this goal.

INDUSTRIAL WATER USE

Industrial water users in the Tucson AMA include metal mines, sand and gravel mining facilities, electric power producers, dairy operations, and other industrial users. As is shown in Figure 5-14, metal mining is the largest water user in the industrial sector, accounting for approximately 70 percent of the total. classifies some golf courses and other turf facilities with their own wells as industrial for legal reasons. All turf uses, however, were previously discussed as municipal uses.

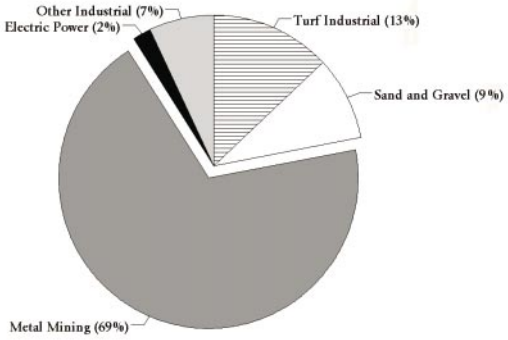
Mining

Four active metal mines operate in TAMA. The Cyprus Sierrita and Cyprus Twin Buttes mines are located adjacent to each other, south of Tucson and west of Green Valley. Water use at theses two mines totaled 26,165 acre-feet in 1997. The ASARCO Mission Mine is located several miles north of the Cyprus Sierrita/Twin Buttes mines. Copper and molybdenum are mined at two open pits and an underground mine at the site. A substantial amount of silver also is recovered as a by-product. Water use at the Mission Mine was 13,042 acre-feet in 1997. The ASARCO Silver Bell Mine straddles the TAMA boundary due west of Marana. Copper is mined in an open pit. Water use at the site was 575 acre-feet in 1997. On-site production capacity has been expanded with the mining of a new deposit and the addition of a new processing plant.

Most mining in the Tucson AMA is open-pit mining followed by milling and flotation. The ore extracted from the pits is crushed and delivered to the mill, where it is crushed again and mixed with water to form a slurry. The slurry is discharged to flotation cells. Here chemicals are added that cause the materials to float to the surface for removal. Waste rock remaining in the flotation cells is sent to thickener tanks. The solids settle in the tanks and the water is recovered. The tailings mixture, which usually is 46 to 55 percent solids by weight, is transported via pipeline to the tailings pond. The tailings slurry is deposited in the tailings impoundment with a spray, leaving standing water in the impoundment which is skimmed off and recycled back to the mill. At the Mission Mine and the Sierrita/Twin Buttes facility, approximately 30 percent of water sent to the tailings is recovered.

Copper also can be leached from piles of certain types of ore using sulfuric acid. The leachate is then piped to another facility for recovery of copper. Another form of leaching

Figure 5-14 1995 industrial water use, Tucson AMA.



Source: Arizona Department of Water Resources, Draft Third Management Plan, Tucson AMA, 1998.

Figure 5-15 Open pit copper mine. Photo: Barbara Tellman.

from buried ore, known as "in situ" leaching, has recently come into use. Both types of leaching use less water than milling and flotation, but "in situ" leaching has been applied only on a pilot scale in Pinal County, and both forms require the right kind of ore.

ADWR funded a study to analyze possibilities for additional water conservation in mining. Increasing the density of the tailings slurry was one of the most effective steps available to decrease groundwater withdrawals. For every one percent increase in the tailings density, 500 to 800 acre-feet of groundwater can be saved per year. Average tailing densities may be able to be increased from 48 percent to 50 percent at ASARCO Mission and from 52 percent to 54 percent at Cyprus Sierrita by installing smooth plastic piping to reduce friction and by pumping the slurry instead of relying on gravity. In addition, seepage of groundwater underneath the tailings ponds can be reduced by depositing fine-grained tailings on top of native soils before tailings are delivered to the ponds. Evaporation of water in tailings impoundments can be reduced by installing multiple decant towers to more quickly decant the water.

The 1997 study also examined the possibility of using renewable supplies instead of groundwater at the mines. The study found that the use of renewable supplies at the mines is unlikely to include effluent, due to the great distance between existing effluent lines and the mines. Use of CAP water was deemed theoretically possible, but several obstacles currently prevent use of this water source. First, the mines have the legal right to pump groundwater, and groundwater is significantly cheaper than CAP water. While total water use at these sites in 1997 was 39,207 acre-feet, the mines have rights to withdraw a total of 62,188 acre-feet of groundwater per year. Mines were originally expected to use CAP water in the Tucson area, but no mining facilities signed subcontracts for CAP water. The best incentive for mines to use CAP water would be if its price was lowered to equal the cost of pumping groundwater. This price adjustment likely would have to come as a subsidy from other water users. The cost of pumping groundwater, including energy and maintenance costs, was reported to be $84 per acre-foot at the ASARCO Mission Mine and $163 per acre-foot at Cyprus Sierrita in 1997.

Another obstacle to mines using CAP water is its quality. If mines use CAP water instead of groundwater, the process of recovering metals from the ore would not be as efficient. Tests conducted by the mines show that use of 100 percent CAP water resulted in declines in copper and molybdenum recovery. More study is needed to assess the potential impact on recovery rates when using a blend of CAP and groundwater.

Yet another obstacle to CAP water use is the question of CAP delivery reliability. Mines need water for ore extraction 24 hours a day, seven days a week. CAP water delivery interruptions would cause fluctuations in the quality of water delivered to the mill storage reservoirs and result in a need to readjust the rates at which chemicals are added to maintain mineral recovery efficiencies. Emergency outages present the greatest problem in adjusting to changes in water quality because of the lack of advance warning.

A final obstacle is that mines are concerned about the spread of polluted water. By pump-

ing groundwater mines have created a cone of depression that confines polluted water to the area near the mines.

Mining in TAMA is projected to remain at approximately the current level into the near future, and total water use is estimated to increase slightly to 47,500 acre-feet per year by 2025. The level of future production and water use in the mining sector, however, is difficult to predict. The health of the mining sector is highly dependent on the fluctuating price of copper and molybdenum and advances in mining technology. Proven reserves at Cyprus Sierrita are reported to be 20 years at current production levels and extraction technology. Producers continue to add to capacity, such as the expansion at Silver Bell Mine, but water use efficiency also is increasing.

Sand and Gravel Facilities

The approximately 15 sand and gravel facilities operating in TAMA used 5,176 acre-feet of groundwater in 1995. This is projected to increase to 7,000 acre-feet per year by 2025. Most sand and gravel facilities recycle much of the water used for washing mined stream deposits. Facilities can save additional water by reducing water use for dust control and other clean-up related activities. Sand and gravel facilities could theoretically use CAP water, effluent or poor quality groundwater. Secondary effluent could be an inexpensive and feasible alternate supply. Because sand and gravel operations are able to pump groundwater at relatively low cost, switching to CAP water would not be economical without a subsidy.

Other Industrial Uses

Other industrial uses include water for electric power generation and dairy facilities. In 1995, the electric power industry used 1,609 acre-feet, and the only remaining dairy in TAMA used 73 acre-feet in 1995. Since little power is generated locally, electrical usage is not expected to go up over time. Other miscellaneous industrial users consumed 4,026 acre-feet in 1995. Cooling towers and large-scale power plants may be able to switch to effluent.

RIPARIAN AREAS AND WILDLIFE HABITAT

For many years official studies did not recognize wildlife habitat or riparian vegetation as a legitimate use of water. Diversion from streambeds is what counted, whether for use by humans, cattle or to irrigate crops. The Santa Cruz River through Tucson once had enough water to support cottonwood-willow forests and bosques of giant mesquite that provided habitat for creatures such as muskrats, beaver, edible fish and wild turkey. All of these creatures are gone from the area today, as are most of the riparian forests. Human demand for water outweighed the values of flowing streams and riparian habitat. In recent years, however, this attitude has begun to change. Proposals have been made to allocate a certain percentage of CAP water for establishing some riparian vegetation along the Santa Cruz River, Rillito Creek and Cañada del Oro Wash.

Riparian Water Needs

A riparian area in our desert environment needs a reliable supply of water year round (base flow), and it needs occasional spring floods. The base flow may sometimes be just below the surface. Spring floods are needed so that seeds can germinate in the moist soil, then begin to extend their roots downward as the flood waters recede. Even in a natural system, spring floods don't always set the stage for young trees to get started. In an artificial environment, such as the area along the Santa Cruz River through Tucson, even if trees do get

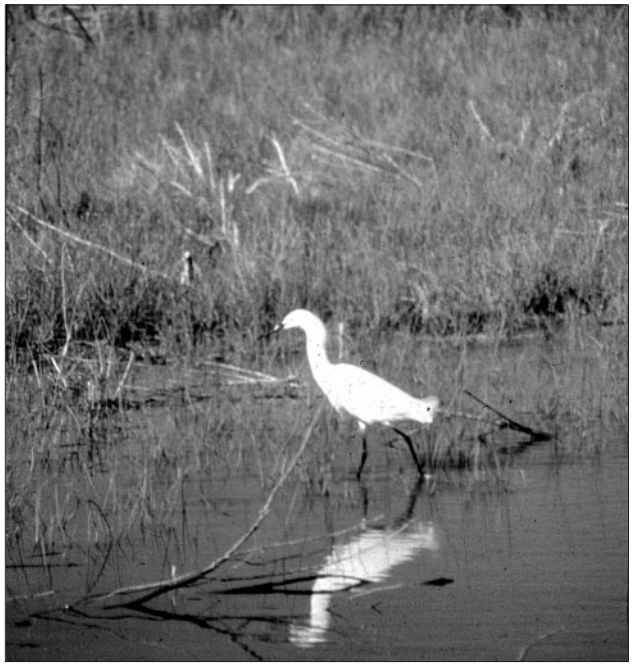


Figure 5-16 Riparian areas are vital to some 85 percent of Arizona's wildlife, including migrating birds. Photo: Barbara Tellman.

started, they may not have enough base flow to support their continued growth.

If the groundwater is at the surface, a variety of wetland plants might grow, such as cattails or rushes. As the water table drops, plants needing constant water are the first to die. Shrubs and trees can survive in areas where groundwater is available down to ten feet below the surface. Mesquite can survive in desert areas without a constant supply of water to the roots, but they grow into very large trees in areas where their roots can reach groundwater. Large mature trees have roots that can go down more than 50 feet to reach water.

If the water table is so far below the surface that roots cannot reach water, the plants may still be able to survive if water is available from other sources such as wastewater from a treatment plant. Downstream of Nogales, for example, a rich riparian area survives on effluent from the Nogales International Wastewater Treatment Plant. The effluent provides the base flow that groundwater would have provided and normal variations in rainfall provide the spring floods needed for seedlings. CAP water could also augment flood water in this way.

Riparian Vegetation Water Use

Quantifying how much water is used by riparian vegetation is difficult. A mature cottonwood tree can use a lot of water in the growing season, but uses very little when leaves fall in the winter. As a result some people argue that if cottonwood forests were cut down along streams such as the San Pedro, more water would be available for human use. Others counter that this is only partly accurate, because trees and other vegetation perform important functions, some of which actually help to conserve water in the region. For example, the roots of the riparian vegetation hold soil in place, helping to control erosion. Vegetation slows rushing flood waters so that more water remains in the immediate area for recharge. Finally, vegetation provides shade, keeping the water temperature lower than would be the case in the blazing sun, reducing evaporation. The overall impact of tree removal on water resources available for human use is a debated issue, in need of further research.

Figure 5-17 Hikers enjoy a visit to Pima County's Cienega Creek Preserve. Photo: Barbara Tellman.

Establishing Riparian Areas & Creating Wetlands

Water can be used to create wetlands off the stream or to establish vegetation and habitat in the stream channel itself. A stream, however, needs more than water to form a healthy riparian area. A stream in its natural state tends to meander and over time changes its course over a wide flood plain. Cottonwoods may germinate along a new channel, while mature cottonwoods still grow along an old channel. Terraces tend to form and different vegetation is found on successively higher terraces. These conditions often are not possible in a populated area such as downtown Tucson, where buildings exist along the banks, and flood control structures constrain the river within a narrow channel.

Where the stream channel is in a relatively natural state, as is the case with many washes, restoration does not pose great difficulties. The addition of water may be all that is needed. The Rillito Creek at Craycroft Road, for example, had a lush cottonwood and walnut forest until very recent times. Pumping has depleted the aquifer to the point that the trees are stressed. Cessation of pumping would probably very quickly lead to res-

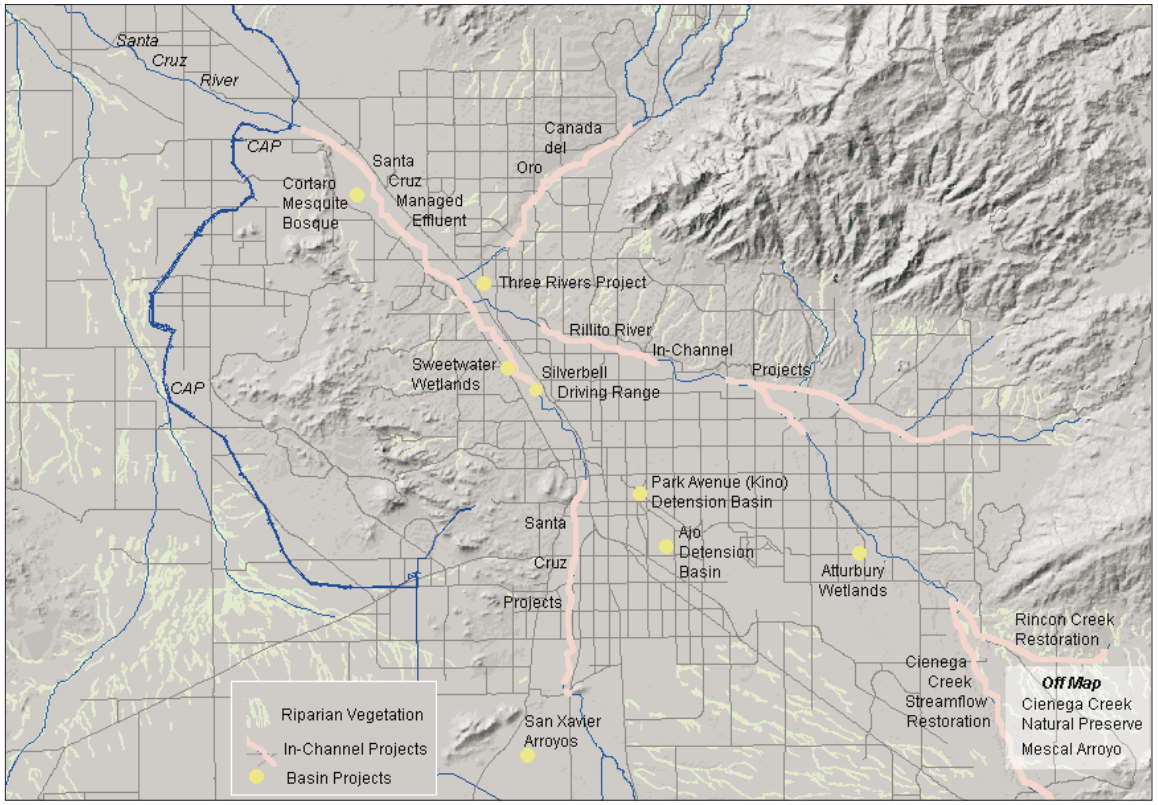
toration of a vigorous riparian habitat. Similarly, the Tanque Verde and Pantano washes have areas where pumping has lowered the water table, but conditions are still good for restoration if pumping levels decline significantly. When water was added to the Santa Cruz River north of Nogales, the riparian vegetation came back quickly. The river in that area is shallow, and a broad flood plain stretches out on both sides of the river where flood waters can spread out onto farm land and meander in changing channels. The Santa Cruz River between El Camino del Cerro and Ina Road has a riparian habitat dominated by willows. Effluent from the Roger Road Wastewater Treatment Plant waters this area.

Where the stream channel is deeply incised, however, and/or where the banks have been stabilized to prevent erosion, establishing a riparian area is much more difficult. The Santa Cruz River, through the downtown Tucson area, is not only deeply incised, but has soil cement on both sides of the river, keeping the waters within steep banks. This part of the river is no longer conducive to spontaneous development of cottonwood willow forests merely by creating a flow. In the San Xavier District, the U.S. Bureau of Reclamation built a rock structure to encourage the growth of riparian trees within the channel along one side of the river, even though the banks are steep and subject to erosion. Downstream of the downtown area, effluent from the wastewater treatment plants supports a small riparian area, that is interrupted, however, by bank protection. The Rillito Creek, similarly, is incised and has bank protection along much of its length. The best possibilities for riparian habitat are probably in the upstream areas and along certain washes.

Tucson Area Riparian Restoration Projects

A number of water-based projects which have riparian restoration benefits are being developed or considered in the Tucson area. Many of these projects involve one or more governmental entities and are included as part of the City of Tucson's "Multiple Benefits Water Projects" or County's "Sonoran Desert Conservation Plan." Figure 5-18 shows a number of the current and proposed projects, extending from Pima Mine Road to Marana and from Avra Valley to Tucson's east side. In some cases proposals are being developed

Figure 5-18 Projects which include riparian and wildlife benefits.



Sources: Pima County, City of Tucson.

jointly by the city and county and are included in both plans.

The county's water-related restoration projects include a recharge project along the Santa Cruz River in Marana that will enhance the riparian area by using treated wastewater. A proposed project will restore a higher water table along the Rillito. A detention basin along Arroyo Chico at Park Avenue is to provide urban wildlife habitat through alteration of the current flood control structures. Additional proposed projects include restoration of riparian habitat along the Cañada del Oro using CAP water.

Tucson's Multiple Benefit Water Projects include a number of water-based projects which would provide recreational opportunities, wildlife habitat as well as recharge of groundwater.

Four of the recharge projects have essentially no restoration component (Central Avra Valley, Pima Mine Road, Rillito Recharge Project, and Santa Cruz Managed Underground Storage Facility). The Sweetwater Wetlands, which has a rich habitat, is a constructed wetland located a slight distance from the Santa Cruz River channel. The Atturbury Project uses reclaimed effluent for riparian habitat restoration. The Kino Sports Park involves a lake incorporated into a golf course area, while the Silverbell Driving Range Project involves a small constructed wetland to treat restroom water. The Tucson Airport Remediation Project is a pollution remediation facility, and its water could be made available for riparian habitat development along the Santa Cruz River. However, community approval would be needed and legal constraints surmounted. Three projects are primarily stream restoration (Rillito Creek, Santa Cruz River, and San Xavier). The Rio Nuevo Project near downtown Tucson is also part of this plan.

If the city decides to dedicate a portion of its CAP allocation to habitat establishment, long-term community support is needed. An increase in population could eventually justify using the entire CAP allocation to serve human needs. Whether the Tucson community would agree to this reallocation or would insist that a portion of the city's CAP allocation continue to be used to maintain riparian areas is unclear.

Chapter 6 ENSURING SAFE DRINKING WATER

Our health and well being depend upon having a supply of safe drinking water. In much simpler times this might have meant having a good well or a stream nearby. Today the issue is a lot more complex. To supply a large urban population we dip into various water sources: surface water, groundwater and imported water–e.g. CAP water–each with its own water quality concerns. Also we are more aware of different contaminants in water and the need to control or remove them to ensure the safety of our water supply. (If early settlers from those simpler times knew what we know about microbial contaminants they might have been wary of their wells and the nearby streams.) In response to this situation, various water treatment methods have been developed. We are sufficiently privileged that our water quality concerns focus not only on public health matters, but also consider the aesthetic characteristics of our water supply; i.e., its taste and odor.

TUCSON WATER QUALITY

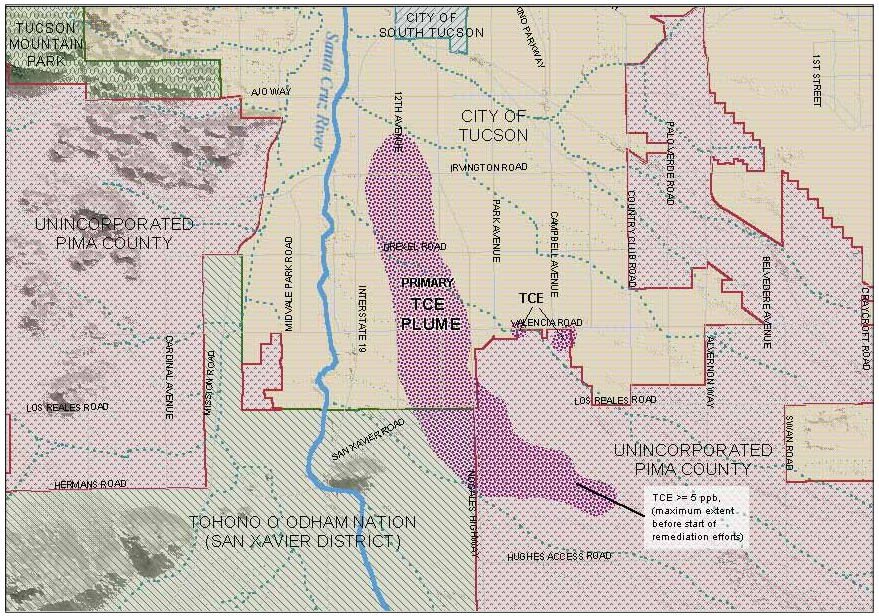
For the most part, the quality of the groundwater in the Tucson area is excellent, although problems exist in a few areas. Some water quality problems such as radon and hardness are naturally occurring, but most problems are the result of human activity. In most cases, where pollution occurs, the level is very low and does not constitute a health problem. In seriously contaminated areas, commercial drinking water wells with dangerous levels of contamination are not in use, but private well-owners may still be drawing from contaminated sources. Some of most serious pollution problems have been designated as federal Superfund (CERCLA) or state Water Quality Assurance Revolving Fund (WQARF) sites and some of those problems are being mitigated. The laws and regulations that help protect our water are described in Chapter 7.

GROUND-WATER POLLUTION

TCE Problem

In Tucson a few incidents of health problems have occurred due to water pollution. The best documented incident involves the occurrence of a plume of trichloroethylene (TCE) in groundwater that extends northwest from the Tucson International Airport. In 1981, an unusual cluster of health problems was

Figure 6-1 Maximum extent of the TCE plume.

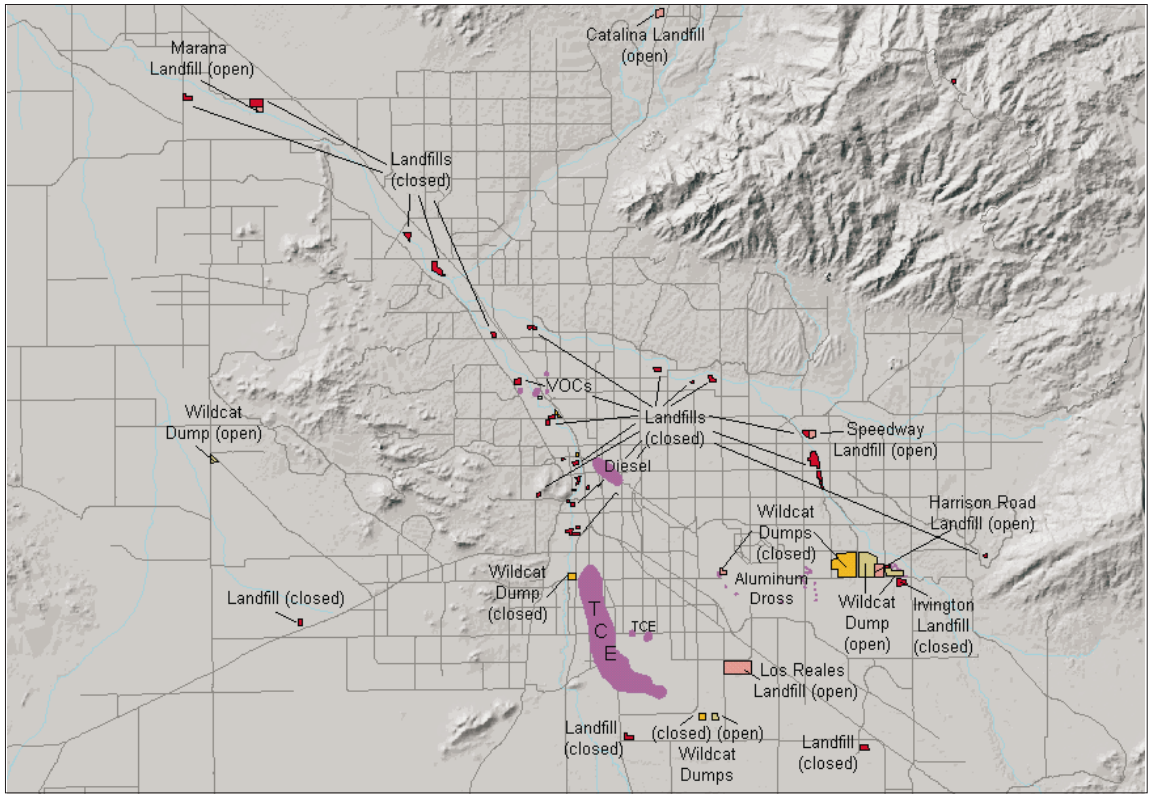


Sources: Pima County, U.S. Environmental Protection Agency.

TESTING FOR POLLUTANTS

Testing for a full range of pollutants is costly because different pollutants must be tested by different methods, and the amount of pollutant to be detected is generally very small, perhaps as little as one part pollutant in a billion parts water. Routine water testing is generally conducted for common pollutants such as coliform bacteria, nitrogen or sulfur compounds. Where reasons exist to suspect other pollutants such as TCE, tests for those pollutants become part of the testing routine. There are now well over 230 priority pollutants for which water supplies must be tested at least once a year. Standardized testing is unavailable for many uncommon potential pollutants.

Figure 6-2 Landfills and major identified hazardous plumes in groundwater.



Sources: Pima County Department of Environmental Quality, Pima County, Pima Association of Governments.

identified in the area west of the airport. Tests indicated a high level of TCE in the water. Health officials investigated to determine if a connection existed between the polluted water and the reported diseases. They found sufficient evidence to cause Tucson Water to shut down wells in the area and supply residents with water from other parts of the system.

Officials then took on the issue of what to do about the contaminated area. They first had to determine who was responsible for the cleanup and what methods were best to use. Most of the aircraft companies responsible for the problem had ceased operations years earlier. Ultimately, Hughes Aircraft (since purchased by Raytheon) built a treatment plant to deal with the problem beneath its property. As a result of a consent decree and agreement, the Tucson Airport Authority, U.S. Air Force and others built a treatment plant for the water downgrade from the airport. Operated by Tucson Water, the Tucson Airport Remediation Project (TARP) is located on the east side of the Santa Cruz River near Irvington Road. Nine extraction wells and five miles of transmission mains transport water to the plant. TARP has three 35-foot air-stripping towers with air emission controls that remove the volatile compounds to avoid air pollution problems. The plant also disinfects the water and adjusts its pH. Treated water is tested weekly, and no detectable amounts of TCE have been found. TARP costs $780,000 annually to operate. Raytheon, U.S. Air Force, McDonnell Douglas

Table 6-1 Identified groundwater contamination sites in Pima County.

CONTAMINANT	LOCATION	SOURCE
Sulfates	Green Valley	Mining
Nitrates	Green Valley	Natural
Radon	Tucson, various locations	Natural
Nitrates	Santa Cruz River	Agriculture, Sewage Effluent
Chromium	Near downtown	Manufacturing
PCE and TCE	Broadway/Pantano	Landfill
Petroleum	Davis-Monthan	Leaking Fuel Tanks
23 VOCs	El Camino del Cerro	Landfill
VOCs/Metals	ESCO - Tucson	Hazardous Waste Site
VOCs (PCE, TCE and others)	Los Reales Landfill	Landfill
TCE, PCE, Freon and others	Miracle Mile, Silverbell Jail Annex	Landfill
Diesel, PCE, TCE and others	Mission Linen	Dry Cleaning, Leaking Underground Storage Tanks
TCE and chromium	Airport	Solvents in Aircraft Cleaning
Chromium, TCE and others	Hughes (Raytheon)	Waste Disposal
Arsenic	Various	Natural

PCE - perchloroethylene; VOC - volatile organic compounds; TCE - trichloroethelyne

Source: Arizona Department of Environmental Quality, Arizona Water Quality Assessment, 1996.

Corp. and the Tucson Airport Authority pay the cost of operating the facility.

Officials also had to decide what to do with the treated water. Under a Consent Agreement, approved by EPA, Tucson Water blends the treated water with other water and distributes it in the city water system. The treated water currently goes to customers downtown, and the near northwest side. Although this water meets all EPA drinking water standards, some customers objected to its use. In 1995, when voters approved the Water Consumer Protection Act to limit the city's use of CAP water, they also restricted the city's use of this treated water since it originated from a "polluted source." Tucson Water, however, still must meet the conditions of the legally binding EPA consent agreement and continues to put the treated water into the municipal system until a solution is worked out.

Some customers are very wary of drinking water that once was contaminated with TCE, eve if it now meets drinking water standards. Several options exist for using the treated water as part of the city's drinking water supplies, subject to approval by the EPA and other parties to the consent agreement, and subject to interpretation of the Water Consumer Protection Act. These include releasing it into the Santa Cruz River; using it to create artificial wetlands; or injecting it underground with injection wells. Others argue that after the expense of purifying the water, it is wasteful to pollute it again by discharging it into the river. They argue that since the city does not have to pay to treat the water it is essentially free water. Also, they argue that the treated water is actually the cleanest water in the city system and the most frequently tested.

Pollution From Landfills

Another identified source of groundwater pollution is old landfills built before current regulations about landfill construction were in place. Some historic wildcat landfills pose problems in determining what actually was dumped there. Officials are concerned about such wastes

ESTABLISHING RISK LEVELS FOR POLLUTANTS

Of all the chemicals produced in the world today, only a fraction have been studied for their possible harmful effects. Also, each year more new chemicals are produced, although their effects may not be understood. EPA has studied only the more common chemicals, especially pesticides and herbicides, mainly concentrating on whether they cause cancer or birth defects.

A great deal remains unknown. Meanwhile we confront a dilemma : Do we take a risk on the assumption that a substance has not been proven harmful or do we avoid substances that lack completed studies of their potentially harmful effects? Do we assume that any level of a harmful substance is to be avoided or do we set acceptable limits that allow a limited amount of the substance to be in our water?

as pesticides, dry cleaning solvents, paints or discarded car batteries containing lead. Also, decaying organic material can release methane. Officials are most concerned about landfills located near riverbeds where flood waters can leach materials out of the landfills into the water table. Recharge projects must not be located in such areas.

One significant landfill pollution site is on Tucson's east side, along the Pantano Wash between Broadway and Speedway Boulevard. This is the location of a 130-acre landfill that the city and county used from 1959 to 1974. Concern exists that landfill gases may be moving either in solution or by diffusion and pressure gradients toward the water table. A plume of contaminated water is moving westward at about one and half feet per day. This rate increases when the demand for water is high because, as the nearby five wells pump water, the contamination plume moves forward. These five wells, however, are only used as a last resort when summer demand is high. The water from these wells meets water quality standards. The concern in this area is that the plume which contains PCE will migrate towards a cone of depression in an area where Tucson Water has active wells. If recharge were to occur along or near the Pantano Wash in that area, the active wellfield could become contaminated.

Other Pollution

A large area beneath the downtown area is contaminated with petroleum products from a variety of sources, probably largely from activities connected with the railroad. Some other areas also have petroleum contamination, mostly from old leaking underground storage tanks, which the state now regulates. Water is not pumped from these polluted sources.

WASTEWATER TREATMENT

Treatment Plants

Most of the sewage generated in the metropolitan area is transported by gravity through pipes to two large Pima County wastewater treatment plants, located along the lower Santa Cruz River at Roger and Ina roads. Solids are removed and, through a bacteriological process, disease-causing microorganisms are reduced. After the treatment process is complete, the wastewater is disinfected, with most of it released to the Santa Cruz River. EPA maintains strict standards for the quality of the water released, and the water is frequently tested. The treatment process is not designed to handle toxic materials; in fact, some toxics can make the treatment process less effective by killing helpful bacteria. Pima County has a pretreatment program for businesses that produce toxic wastes. The program requires such businesses to treat or reuse hazardous substances, rather than releasing them into the sewers. Many people, however, are unaware of the problems that materials such as oil and paint remover can create and flush them down the drain. Pima County attempts to educate individuals about proper disposal of hazardous materials and has a program to collect household hazardous materials.

Some of the wastewater from the Roger Road Treatment Plant receives tertiary treatment in a City of Tucson facility and distributed for use on golf courses and other turf facilities. Tertiary treatment involves treatment through sand filters or soil and additional disinfection. Part of the effluent is taken to Sweetwater Wetlands, an artificial wetland Tucson Water completed in 1998. This wetland adds another layer of treatment before discharging the water to recharge basins. Artificial wetlands have become increasingly popular in Arizona in recent years as they serve not only to treat the water, but also provide wildlife habitat and recreation. A small amount of

wastewater is taken from the Ina Road plant for agricultural use and to irrigate the county's Arthur Pack Golf Course.

Some areas, such as Green Valley, are located far from major treatment plants and have their own small facilities, almost all of which are operated by Pima County. Other areas, such as Marana, are downhill from the major treatment plants. Their sewage must either be treated on-site or pumped uphill for treatment. A few areas have privately constructed small treatment plants, with treated water applied to such uses as golf courses.

Septic Systems

An estimated 10 to 15 percent of homes in the Tucson area have their own septic tanks. Although most septic systems are in rural areas, some neighborhoods within city limits also are served by septic systems. A county permit is required to install the system, and the applicant must show that the soils are appropriate for percolation of water.

A well-designed, installed and maintained septic system can be highly effective in treating household wastewater. Conversely, a poorly designed, installed or maintained system can contribute to local groundwater pollution and can be a health hazard. This is especially true in areas with shallow groundwater. Not much information is available to determine if septic tanks in the Tucson area are in fact causing pollution problems. Evidence exists, however, that septic fields often impact drinking wells in rural areas of the state.

A traditional septic system consists of a septic tank — which receives all of the waste water from sinks, toilets, tubs, etc.—and a drainfield. Wastewater first collects in the tank, where solids are allowed to settle and break down through natural bacteriological processes. The liquid in the tank drains into a series of perforated pipes from which it percolates through gravel, sand and other permeable materials. As the liquid drains through the soil, remaining pathogens are filtered out and broken down by bacteria and other organisms in the soil.

Figure 6-3 Part of a Pima County wastewater treatment plant. Photo: Barbara Tellman.

Exceeding the capacity of the septic system is one of the most common ways systems fail. High water-use appliances and leaky faucets can cause problems, as can heavy rains. If the soils are constantly saturated, the efficiency of the microbial activity is reduced. Other situations that result in septic problems include failure to expand the septic system when the house it serves is expanded. Even short-term stresses such as visitors can overload a septic system.

Though an overloaded system may show itself in slow drains or sewage backups, a failing system may simply result in incomplete treatment of the waste. Viral contamination, and nitrate and phosphate "plumes" can jeopardize nearby wells. This is particularly troubling since many of the Tucson homes on septic systems also have their own drinking wells.

Failure to have settled solids in the tank pumped out every few years can let solids pass to the drainfield, clogging the system. Additional concerns include; soil compaction from vehicles driving over the drainfield; common household chemicals such as toilet bowl cleaners killing the microbes responsible for breaking down the waste; and lint from washing machines failing to settle in the tank, and then clogging the drain pipes. A further concern is septic tank owners adding solvents to dissolve

plugged leach fields. This puts harmful chemicals into the soil.

CENTRAL TREATMENT VS. INDIVIDUAL SYSTEMS

Centralized treatment generally offers better control over water quality than small or individual systems. Centralization also offers more opportunities to reuse or recharge wastewater or for recharge, although in some areas leachate from septic tanks may help recharge the groundwater. In the past, the county has had problems with small privately owned treatment facilities installed as part of a subdivision deteriorating once the subdivision is complete. Local policy discourages such facilities. On-site use of wastewater, however, can be an efficient way of reducing groundwater pumping, without the costs of building new pipelines and pumping the treated water to an outside facility.

Table 6-2 A summary comparison of ways of treating drinking water.

DISINFECTANT	EFFECTIVENESS	PROBLEMS	HEALTH CONCERNS
Chlorine	Highly effective, but not as long lasting as chloramines	In gaseous form can be hazardous; odor and taste problems	Byproducts (THMs) may cause health problems
Chloramine	Retains residual in large distribution systems	Nitrification can lead to loss of residual	Hazardous to fish; should not be used in kidney dialysis process; produces byproducts with unknown health effects
Chlorine dioxide	Mainly used for taste and odor control		Produces inorganic byproducts with unknown health effects
Ozone	Highly effective for very contaminated water, but doesn't leave residual	Energy-intensive/costly	Produces byproducts with unknown health effects
Ultraviolet radiation	Effective, but doesn't leave a residual	Equipment has technical limitations	Not effective against some pathogens
Reverse osmosis (RO)	Can be effective in removing pathogens and minerals, but generally requires pretreatment	Generally very costly; produces brine that must be disposed of and this can waste water	None identified
Nanofiltration	Can be effective in removing pathogens and minerals, but generally requires pretreatment	Generally very costly; produces brine that must be disposed of; mostly unproven in large-scale applications	None identified

HEALTH RISKS OF VARIOUS POLLUTANTS

Water pollution can cause a wide range of health problems. Some of these problems show up within days or weeks after contaminated water is consumed (e.g., dysentery) while others may take years to develop (e.g., cancer) and still others appear in the next generation (e.g., birth defects). Cause and effect is more readily determined when the problem appears shortly after the water is used. When the problem surfaces after a long period of time, cause and effect is more difficult to establish. This is especially true in our mobile society, with people developing a disease at a location other than where they or their parents drank the contaminated

CORROSION

Corrosion of a metal pipe is a process that involves primarily oxygen gas and the spontaneous flow of electricity. Salts found in water have a secondary role in this process. Oxygen gas (O_2) is found in small concentrations in water (4-9 mg/l), as well as in the atmosphere (20 percent by volume). Both Tucson groundwater and CAP are well oxygenated waters, though CAP has higher levels of dissolved oxygen. We can explain metal corrosion by the fact that most metals are very good conductors of electricity and that they have a natural tendency to want to react with oxygen. During the corrosion process oxygen molecules combine with electrons from the metal pipe and acid from the water to form water molecules. The process results in the formation of metal oxides (rust in the iron pipes), which is soft, reddish-brown and has a metallic taste. In essence then the metal pipe dissolves during the corrosion process.

Metal pipe corrosion can start on both sides of a pipe and often does. Poorly protected iron pipes that are buried in wet or waterlogged areas can corrode faster from the outside than from the inside.

Salts and alkalinity can either accelerate or inhibit pipe corrosion by forming scale (calcium carbonates) that limits the contact of oxygen with the metal surface or by dissolving this protective scale, as previously described.

water. Appendix B lists the major pollutants regulated by EPA under the Safe Drinking Water Act and their possible health effects.

Providing Safe Water

Most water providers throughout the nation treat their drinking water in some manner. The common methods are described below. Tucson Water chlorinates most of its water, primarily to provide protection as water flows through pipes and reservoirs. Water providers such as Metropolitan Domestic Water Improvement District (Metro Water) and Flowing Wells also chlorinate their water to prevent diseases caused by microbes. Since groundwater, which is relatively free of pathogens and other harmful substances, is the main source of drinking water in the area, the use of chlorine has been adequate to protect health. Because CAP water is from the Colorado River, a surface water source, more extensive treatment will be needed. Filtration and disinfection is required of all surface supplies or groundwater under influence of surface water. More opportunities exist for contaminants to get into open bodies of water than into groundwater.

Water treatment, which is necessary to prevent diseases such as cholera and dysentery, may cause health problems, mainly because of certain byproducts. EPA has become concerned about some of the byproducts of various disinfection processes and is currently funding research to determine the possible extent that byproducts may cause health problems.

Water treatment can serve five very different functions:

- Remove disease-causing microbes (disinfection);
- Remove toxic materials such as TCE;
- Reduce corrosivity;
- Reduce hardness or TDS;
- Improve taste, odor or appearance.

Each water quality problem is very different and must be solved by different treatment methods. When determining appropriate treatment for CAP water, each problem must be examined separately. In some cases a single treatment method will deal with more than one problem, but in most cases each type of problem requires a different solution.

Filtering Out Particles

Filtration/flocculation, which removes suspended particles from the water, is basic to most forms of treatment. Filtered particles include clays and silts, natural organic matter, precipitants from other treatment processes, iron and manganese and microorganisms. Filtration clarifies water and enhances the effectiveness of disinfection. Filters may be made of a variety of materials, including sand, anthracite, aggregate or activated charcoal. Before filtration, a flocculation agent is added to cause minute particles in the water to coagulate into larger particles to enhance filtration.

REMOVING DISEASE-CAUSING MICROBES

Chemical Disinfection

Water is usually disinfected before it enters the distribution system to ensure that dangerous microbes are killed. Further, if the water travels a distance to the customer or is stored for a period of time in system reservoirs, the disinfectant must remain effective long enough to prevent disease. Chlorine, ozone, and chloramines are most often used for initial disinfection because they are very effective disinfectants. A small amount of chlorine is often added at the end of the process to retain disinfection.

Chlorine has been used throughout this century for disinfection of drinking water to protect public health from diseases caused by bacteria, viruses and other disease causing organisms. Chlorine is highly effective and has become the most widely used disinfectant throughout the world since its introduction in the late nineteenth century. The decline of typhoid and cholera in the twentieth century is a direct result of chlorination of drinking water. While chlorine is effective, there are drawbacks to its use. These include odor, which customers can sometimes detect. Chlorine tends to dissipate in air (which is why swimming pools must be repeatedly chlorinated) and does not remain stable in the distribution system for long periods of time. Also, when used to treat water, chlorine can react with organic substances to form trihalomethanes (THMs) which are toxic disinfection byproducts. Further, when stored or transported as a gas (the usual procedure for large treatment systems) chlorine can be highly toxic if accidentally released. Some water companies have switched to other forms of disinfectants because of these problems.

Chloramines, the monochloramine form in particular, have been used as disinfectants since the 1930s. Chloramines are produced by combining chlorine and ammonia. Chloramine is a weaker disinfectant than chlorine, but is more stable, thereby extending disinfectant benefits throughout a water utility's distribution system. In fact, the primary use of chloramine is as a secondary disinfectant for maintaining a disinfectant residual in the distribution system. Chloramine is not as reactive as chlorine with organic material in water, and therefore pro-

SALINITY, HARDNESS AND ALKALINITY

The mineral content of water is referred to as Total Dissolved Solids (TDS), reported in mg/L. (Mg/L is similar to parts per million.) Total Dissolved Solids are also commonly referred to as "salinity." This is somewhat misleading, however, as not all the salts found in the water are table salts. The TDS measurement includes common elements such as sodium, calcium, magnesium, chloride, sulfate, and bicarbonate that are combined with forms of sulfur and carbon with oxygen. Thus, TDS includes all the dissolved constituents of other minerals such as table salt (NaCl), gypsum ($CaSO_4 \cdot 2H_20$) and calcium carbonate ($CaC0_3$).

Hardness refers to the concentrations of calcium and magnesium ions, but is usually reported in mg/l of $CaC0_3$. Water hardness is linked to scale formation and the reduced cleaning efficiency of soaps.

Alkalinity, also usually reported as mg/L of $CaC0_3$, refers to the amount of carbonates and bicarbonates present in the water. Alkalinity helps control the pH of water. In natural water carbonates and bicarbonates (related to atmospheric carbon dioxide gas) are the major constituents of alkalinity. These naturally occurring chemicals help control the pH of water between 7.5 and 8.5. If acid is added to water the alkalinity helps neutralize the acid without significant change in pH (Alka-seltzer effect). In natural waters moderate alkalinity is beneficial, since it is composed of carbonates that can combine with calcium. Calcium carbonate forms hard stable coatings (caliche-like) inside pipes and helps control (inhibit) corrosion. However, excessive calcium carbonate scale formation can eventually clog pipes, particularly in water heaters and other appliances (e.g., evaporative coolers) susceptible to scale formation. CAP water has about 2.5 times the hardness of Tucson groundwater, but CAP alkalinity is about 10 to 20 percent lower. Therefore, the ability of CAP water to form scale may be slightly lower than that of Tucson's groundwater.

WHAT ABOUT IN-HOME WATER TREATMENT?

Many people buy home water treatment systems to further purify or soften their water. Others use bottled water for drinking. What are the choices?

- *Water softening* Soft water can be obtained with reverse osmosis (which also reduces TDS). Ion replacement systems (also called water softeners) usually replace Ca and Mg with Na or K ions. Note that ion replacement does not change the overall TDS of water appreciably. Note also that soft water with high TDS should not be used to irrigate plants. Since soft water is mostly desirable for washing purposes, an entire water system does not have to be connected to the water softener, possibly just the hot water line. Added salt in the water can be dangerous for people on low salt diets.
- *Removing pollutants* People concerned with synthetic organic pollutants such as pesticides and solvents (TCE) in the water can install activated charcoal or other types of filters on their drinking water taps. These systems work effectively if properly maintained, but bacteria can accumulate if the systems are not cleaned regularly. In order to remove some pollutants such as lead and mercury, ion exchange filters are necessary. Usually these systems are unnecessary in the Tucson area because our water already meets all federal pollutant standards.
- *Improving taste* If the taste of water is a problem, a person can install filters as described above or can buy bottled water. While generally of good quality, bottled water is not regulated by any government agency and the quality may be no different from tap water – in fact, the water may be bottled tap water. Taste is a subjective matter, and some people have definite preferences in the brand of bottled water.

One alternative to increased treatment of all city water is for individuals who want different quality water to use in-home water systems or bottled water. Everyone then is not charged extra for water that will more than meet federal standards. This approach is used in the Yuma area where a high percentage of people have water softeners and buy bottled water. One argument against this approach is that more affluent citizens would tend to have greater access to these strategies.

duces substantially lower concentrations of disinfection byproducts in the distribution system. Because the chloramine residual is more stable and longer lasting than free chlorine, it provides better protection against bacterial regrowth in systems with large storage tanks and dead-end water mains.

Chloramine, like chlorine, is effective in controlling biofilm, which is a slime coating in the pipe caused by bacteria. Controlling biofilms also tends to reduce coliform concentrations and biofilm-induced corrosion of pipes. Because chloramine is not as reactive as chlorine with organic compounds, fewer taste and odor problems occur.

Ozonation

Ozonation is the process of feeding ozone into a water supply for the purpose of decolorization, deodorization, disinfection and oxidation. Ozone, a form of oxygen, is the most powerful disinfectant, but it is not effective in controlling biological contaminants in the distribution pipes because it does not have a long-lasting residual. Ozonation destroys bacteria and viruses and requires a shorter time period to treat water than most other water treatment methods. Ozone, a reactive gas, is made by subjecting oxygen to high electrical voltages. Ozone's reactive nature allows it to readily react with and break up many organic compounds and kill bacteria and other organisms in the water supply. On-site production of ozone is energy-intensive. Ozone treatment is becoming more common in the United States as questions arise about disinfection byproducts. Ozone has been widely used in Europe for 100 years.

Membrane Filtration

Membrane filtration is a relatively recent development. Water is forced through membranes with small pores, and anything larger than the pore size is filtered out. Along with removing materials such as minerals, membrane filtration also can be used for disinfection.

Table 6-3 Comparison of source water quality to federal standards. The figures are averages. Actual quality may vary at different times and places.

WATER QUALITY CONSTITUENT	TUCSON WATER AVRA VALLEY WELLS	TUCSON WATER PRODUCTION WELLS	RAW CAP WATER	SECONDARY EFFLUENT	RECLAIMED WATER	EPA DRINKING WATER STANDARDS
Sodium (mg/l)	41.0	40.1	96.7	112	122	None
Fluoride (mg/l)	0.39	0.36	0.425	0.80	0.93	4.0 (MCL)
Total Dissolved Solids (mg/l)	210	282	611	547	655*	500 (SMCL)
Hardness (as $CaCO_3$) (mg/l)	84	129	266	141	217	None
Alkalinity (as $CaCO_3$) (mg/l)	124	129	105	229	222	None
pH	8.1	8.0	8.12	7.35	7.0	6.5-8.5 (SMCL)
Total Trihalomethanes	No Data	<5.0	<1.83	<3.24	<11.4	100 (MCL)

* Reclaimed water includes groundwater recovered from the Sweetwater US&R Facility. Ambient groundwater is high in TDS.
MCL—Maximum Contaminant Level (EPA Primary Standard) SMCL—Secondary Maximum Contaminant Level

Sources: Adapted from Regional Recharge Committee, Technical Report, Arizona Department of Water Resources, Tucson Active Management Area, 1996.

Four major types of membrane filtration systems are in use: reverse osmosis (RO); nanofiltration (NF); ultrafiltration (UF); and microfiltration (MF). The main difference between the four types is the pore size of the membrane. This influences the amount of energy needed to force the water through the membrane. The membranes must be cleaned periodically. The smaller pore membranes require the most cleaning (backwashing) which is an energy-intensive process and wastes a significant amount of water. (See the section on desalinization below for further discussion of RO and NF.)

- RO has the smallest pore size and removes a great variety of materials from the water, from salts to organic materials and very small microbes. The water to be filtered must be pretreated to prevent pore clogging. In addition, the concentrate of materials removed by the filter is highly saline, causing loss of available water as well as disposal problems. This process is not primarily used for disinfection, although disinfection is achieved in the process of desalting water.
- NF has larger pores than RO and removes, pathogens, organics and some salts. Like RO the process requires pretreatment of water with chemicals or a sand-based system. NF has not

been used commercially on a large scale for drinking water.

- UF has larger pores than NF and is highly effective in removing pathogens, including parasites such as giardia, but does not remove salts. Because it has large pores, UF does not leave a saline concentrate, although filters must be backwashed to keep the pores open. It is used primarily in the food and pharmaceutical industries, rather than large scale water treatment plants.
- MF has the largest pores of the membrane systems and removes particles, but not pathogens or organics. MF may be used as a pretreatment process for RO or NF, thus reducing some of the problems of those systems.

Several methods can be combined in the treatment process. Tucson Water initially chose ozone plus chloramine to treat CAP water because officials viewed this as the most effective treatment method with the least risk to human health. The ozone performs the initial disinfection while the chloramine provides the residual to control microbes throughout the distribution system. Tucson Water chose not to use chlorine in the CAP water treatment plant because of concerns about THMs. Tucson Water and some private water companies such as Metro Water, however, use chlorine to disinfect groundwater. THMs generally are not a concern with groundwater since little organic matter is found in groundwater to combine with chlorine.

REDUCING CORROSIVITY

All types of water are corrosive to some degree. Under certain conditions, however, some water sources are more corrosive than others as was evident when CAP water was introduced in Tucson. Several factors influence water corrosivity. Table 6-4 lists these factors and suggests ways of control. CAP water also has sulfate and chloride ion concentrations four to five times higher than groundwater. Some evidence exists that the presence of these ions (in high concentrations) may slow down the formation of carbonate deposits on the water pipes, which impede corrosion. The composition of the pipes also is an important factor. Old iron and steel pipes are highly susceptible to corrosion. The treatment processes described below increase the acidity of the water, which then must be adjusted to avoid corrosion.

Figure 6-4 Concern about the quality of water provided by utilities has caused many people to seek alternative sources of drinking water. Photo: Barbara Tellman.

Maintaining a stable pH about 8.2 to 8.5 is an important factor in controlling corrosivity. The pH of raw CAP water varies, but is generally higher (more alkaline) than Tucson groundwater. When CAP water went through the water treatment process, however, the pH was lowered to a point even lower than most Tucson groundwater—from about 8 to about 7.4. Unless the pH is again raised, the scale forming a protective coating inside the pipes is stripped away, exposing bare metal to the corrosive water. When CAP water was released from the treatment plant, the pH was not readjusted, which was an important factor in corroding pipes. One study showed that the pH varied between 7.0 and 8.4 over the period of CAP water use. In July 1993, for example, the pH was under 7.4 and in August it rose to almost 8.4.

Tucson's long reliance on groundwater caused the inside of the pipes to be coated with calcium carbonate, forming a protective layer on the inside of the pipe. CAP water entering the system wore away this coating in some pipes and exposed the underlying metal to corrosion. In severe cases the pipes broke, and in less severe cases rust from the pipes entered the water, causing a reddish color.

Reducing corrosivity may be as simple as adjusting the pH and waiting for the water and pipes to reach a new balance, or it may be more complex. The three basic ways of dealing with corrosivity are:

- Increase pH by adding sodium bicarbonate, sodium carbonate or sodium hydroxide.
- Promote scale formation by adding phosphate inhibitors such as sodium

orthophosphate, polyphosphate, zinc orthophosphate or silicates.

- Replace or re-line old pipes most subject to corrosion. (Replacing old pipes must generally be done as a maintenance measure.)

Each of these methods has advantages and disadvantages, but most water chemists favor adjusting the pH.

The pH impacts the disinfection process because higher pH increases the amount of chlorine or ozone needed but does not affect the amounts of chloramines or chloride dioxide needed. Increased pH also tends to form higher levels of THMs, but lowers the formation of other byproducts. The disinfection process, in turn, alters the pH. Ozonation, for example, lowers the pH. Tucson Water added zinc orthophosphate to the CAP water to reduce the corrosion after damage had already begun. This strategy not only was unsuccessful but it actually may have contributed to the problem by further lowering the pH, preventing the water and pipes from achieving a new balance. Switching to copper, plastic or asbestos cement water mains would greatly help the situation, but old steel or iron pipes in individual homes might still be vulnerable to corrosion. Blending CAP water with groundwater has been proposed as a solution and is generally supported, but one study indicated that this may actually increase corrosivity unless pH is controlled. According to this study blending would result in a favorable reduction of the sulfate and chloride ion concentrations without significantly changing the beneficial alkalinity. As is shown in Table 6-5, however, many cities do blend Colorado River water without experiencing major corrosivity problems.

REDUCING TOXIC SUBSTANCES

Different toxic substances require different kinds of treatment. Removal of TCE through aeration is discussed above. Because neither CAP water nor Tucson groundwater generally contain problem amounts of other toxic substances, other treatment methods will not be discussed.

REDUCING HARDNESS AND SALINITY

Ion exchange processes are used to reduce hardness and also can be used to remove all

Figure 6-5 Out of the aborted effort to introduce CAP water to the community arose a brand of CAP humor. Above is a "Fitz" cartoon that appeared in "The Arizona Daily Star" in the spring of 1994. Used with permission from David Fitzsimmons, **The Arizona Daily Star.**

Table 6-5 How some southwestern communities treat their drinking water.

CITY	SOURCE WATER	DISINFECTION METHOD					SALINITY REDUCTION
		Chlorine	Ozone	Chloramine	Membrane Filtration	Other	
CA **Anaheim**	All Colorado River	no	yes	yes	no	hydrogen peroxide	no
Long Beach	50 percent groundwater; 50 percent Colorado River	yes	no	yes	no		no
Los Angeles	Changing blend of Colorado River, State Water Project, and groundwater	yes	no	yes	no		no
San Diego	10-20 percent local rainfall & state water project; 80-90 percent Colorado River						no
NV **Las Vegas (new)**	All Colorado River	yes	yes	yes	no		no
AZ **Buckeye**	All polluted groundwater	yes	no	yes	no	35% water loss; salt disposal in irrigation drainage canals	electrodialysis desalting
Glendale (new)	Salt River Project (SRP) water and CAP water	yes	no	no	ultrafiltration	pilot plant 1 mgd	no
Phoenix Union Hills	SRP water and CAP water	yes	no	no	no		no
Tempe 2 plants	SRP water and CAP water	yes	no	no	no	no	no

Note: Of the above plants, only the Buckeye plant does not begin it water treatment with a basic filtration/flocculation process.

OTHER COMMUNITIES CHOOSE TREATMENT STRATEGIES

The treatment strategies of three towns are described below to illustrate the importance of analyzing community circumstances and needs when choosing a suitable treatment method.

Buckeye, Arizona

Because of a long history of irrigated agriculture, the town of Buckeye's water supply was too salty to drink, having TDS (total dissolved solids) ranging from 1,500 to 4,000 ppm. The water ruined pipes and appliances and "just plain tastes bad." In 1962, the town became the first community in the United States to treat all its municipal water supply with an electrodialysis desalting plant, with a capacity of 65,000 gallons per day (gpd). In 1988, the town constructed a new 900,000 gpd electrodialysis reversal system in place of the old system. The brine from the plant is put into evaporation ponds. When the water evaporates, a saline sludge remains which is released to irrigation canals.

Glendale, Arizona

The rapidly growing City of Glendale needed to build another treatment plant to treat Salt River Project water and CAP water. Officials had four concerns:

- Land scarcity necessitated that the new water treatment plant take up as little space as possible;
- Turbidity needed to be reduced by removing particles in the water, which at times is clear and at other times murky, especially in the rainy season;
- Water had to be disinfected to meet anticipated new EPA standards for THMs;
- Taste and odor problems occurring occasionally due to algae growth in the canal had to be confronted.

Glendale officials decided to use ultrafiltration, a method to remove pathogens, particles and 20 to 30 percent of the organic matter that is a precursor of THMs. Since salinity was not a concern, nanofiltration or reverse osmosis were not considered. A pilot plant producing one million gallons a day will open this spring. If the process works well, a much larger plant will be built. The water is pretreated with chlorine, treated with alum and allowed to settle so large particles drop out. The water will again be dosed with chlorine, then put through membrane filters and finally dosed once more with chlorine in the distribution system. The use of powdered activated carbon helps to reduce occasional taste and odor problems. Glendale does not treat water for corrosivity. Construction and operating costs are acceptable to the city, especially since the cost of ultrafilters has been decreasing as this method becomes more popular, and filters last seven years or more. This type of filtration requires a smaller facility than most other methods, so land use needs were minimized.

Las Vegas, Nevada

Las Vegas gets 85 percent of its water from the Colorado River at Lake Mead and 15 percent from groundwater. The Las Vegas Valley Water District considers Colorado River water to be very high quality water needing little treatment. The treatment process in use today involves disinfection with chlorine, aeration, flocculation, filtration and more chlorine treatment to produce a residual effect in the system. Although the water readily meets EPA standards for THMs, a new treatment plant under construction will use ozone disinfection instead of chlorine to minimize the THM content and meet anticipated new EPA standards. Las Vegas' Alfred Merritt Smith Plant will be retrofitted with five 4,000 pound-per-day ozone generators, and the new River Mountain facility will use three 2,000 pound- per-day ozone generators. A small amount of zinc orthophosphate is added at the end of the process to retard corrosion and chloramine is added for residual disinfection in the pipes. Ozonation will be implemented in the year 2000 at the existing Alfred Merritt Smith Treatment Facility and at the new River Mountain Treatment Facility which will be constructed by 2002. This is the same treatment method used at Tucson Water's Hayden-Udall Treatment Plant.

types of ions, such as arsenic, chromium, excess fluoride, nitrates, radium and uranium. Different ion exchange systems are available, from those useful at the commercial level to small in-home systems. Sodium or potassium is used as the exchange agent in water softeners.

Salinity can be reduced through thermal systems (distillation) or through membrane processes. Thermal processes have been used since 4 B.C. when Greek sailors used an evaporative process to desalinate seawater. The thermal systems use heat to produce water vapor that is condensed to produce fresh water. Approximately 60 percent of the desalting systems used in the world today are thermal systems. Only between 25 percent and 50 percent of the source water is recovered, with the rest left in a highly saline brine. These systems are most useful along the coast where a water supply is not a problem, and the brine can easily be returned to the ocean.

Membrane processes include electrodialysis (ED), reverse osmosis (RO) and nanofiltration (NF). ED uses electricity to move salts selectively through a membrane, leaving fresh water behind. Because most dissolved salts are ionic (either positively or negatively charged) and the ions are attracted to electrodes with the opposite charge, membranes that allow selective passage of either positive or negative ions can accomplish the desalting. The advantage of this type of system in water-short areas is that 80 to 90 percent of the water is recovered and only 10 to 20 percent is lost to the brine.

RO and NF systems physically force water through membranes. Larger suspended solids must be removed to avoid clogging the membranes. The primary difference between RO and NF is in the size of the pores and the energy needed for pressuring the water. The smaller the pores, the more energy is needed.

In any desalting process, a saline concentrate is produced which must be disposed of in some manner. Various options have been suggested for CAP water. These include a pipeline to move the brine concentrate to the Gulf of Mexico, the Salton Sea in California or the Colorado River at Yuma. Another option is to evaporate the brine locally, leaving a solid salt which could be disposed of in landfills. Another possible option would be to join with other Arizona cities to build a desalting plant near the Colorado River. The concentrate could then be more readily taken to the ocean or Salton Sea. Since Phoenix is not interested in participating in building such a desalting plant, this may not be a feasible option. If Tucson adopts desalting as a treatment method, the community would have to accept water losses of between 15 and 25 percent as part of the process. If 130,000 acre-feet of water were desalinated, between 25,000 and 40,000 acre-feet could be lost as brine.

IMPROVING TASTE, ODOR AND APPEARANCE

If taste, odor or appearance problems still occur after one or more of the treatment methods described above, other solutions are available that treat the problem of taste or odor at the source. If the process itself is a source, such as chlorine odor, the problem can be solved through modifying the process or aerating the water. If the source is an event like an occasional algae bloom, the use of activated charcoal may solve the problem. Researchers at Arizona State University are currently researching ways to control taste and odor problems.

Blending

One way to mitigate some water quality problems is to blend water containing unacceptable levels of some contaminant with water that has little or none of the same contaminant. For example, hard water can be blended with softer water to produce water somewhere in between. Water that contains an unhealthy level of a toxic such as TCE can be blended to lower the TCE level below the danger point. Blending, however, is not always as simple as it may appear. Most studies have shown that blending would improve CAP water quality. Tucson Water's latest proposal is for a blend of approximately 45 percent CAP water with 55 percent groundwater.

Soil (Alluvium)-Aquifer Treatment

Some utilities percolate wastewater or river water through the soil for at least part of the water treatment process. The water is then pumped back up for use. Several pilot projects in the Tucson area have been conducted, and research is continuing into the ability of soil and underlying materials to remove contaminants. (The use of the term "soil" is not entirely appropriate because the soil often is scraped off to construct the basins, but since soil is the common term, it is used here.)

Experiments show that soil-aquifer treatment (SAT) removes almost all pathogens, more than 90 percent of organic matter, more

than 80 percent of total halogen, and none of the volatile organic compounds such as TCE or dissolved minerals or salts. In other words, SAT can be used for disinfection but must subsequently be treated with chlorine or another disinfectant to ensure safety and to retain residual disinfection in the distribution system. The size and to some degree the composition of the alluvium particles determines such factors as rate of percolation, clogging of the pores by algae and bacterial growth. Clogging can be reduced by alternating wet and dry cycles. This provides time for any algae to die before the water is again applied. Some soils are more porous than others, and the rate of percolation may change over time as pores fill with water. Some pollutants, such as those that are found at landfills, may appear in the water. While some utilities use SAT to treat wastewater, no major utilities use the method to treat water for drinking purposes.

QUALITY OF CAP WATER

CAP water is generally of high quality. It contains no problem levels of toxic materials, and the low levels of microbes are easily treated. The water comes from the Lake Havasu section of the Colorado River. Colorado River water of similar quality is served to more than 25,000,000 people in southern California, Nevada and Arizona. In Arizona and Southern California the water may be blended with water from other sources or used without blending. Some examples of how other communities use Colorado River water are given below.

An important difference between CAP water and Tucson groundwater is the corrosivity of the water. CAP water is more corrosive than Tucson groundwater partially because it contains higher levels of sulfate and chloride. From their experience with CAP water some Tucsonans fully realize that corrosive water can seriously damage pipes and fixtures. As described above, corrosivity depends on pH, TDS, temperature and dissolved oxygen as well as the composition of the pipes.

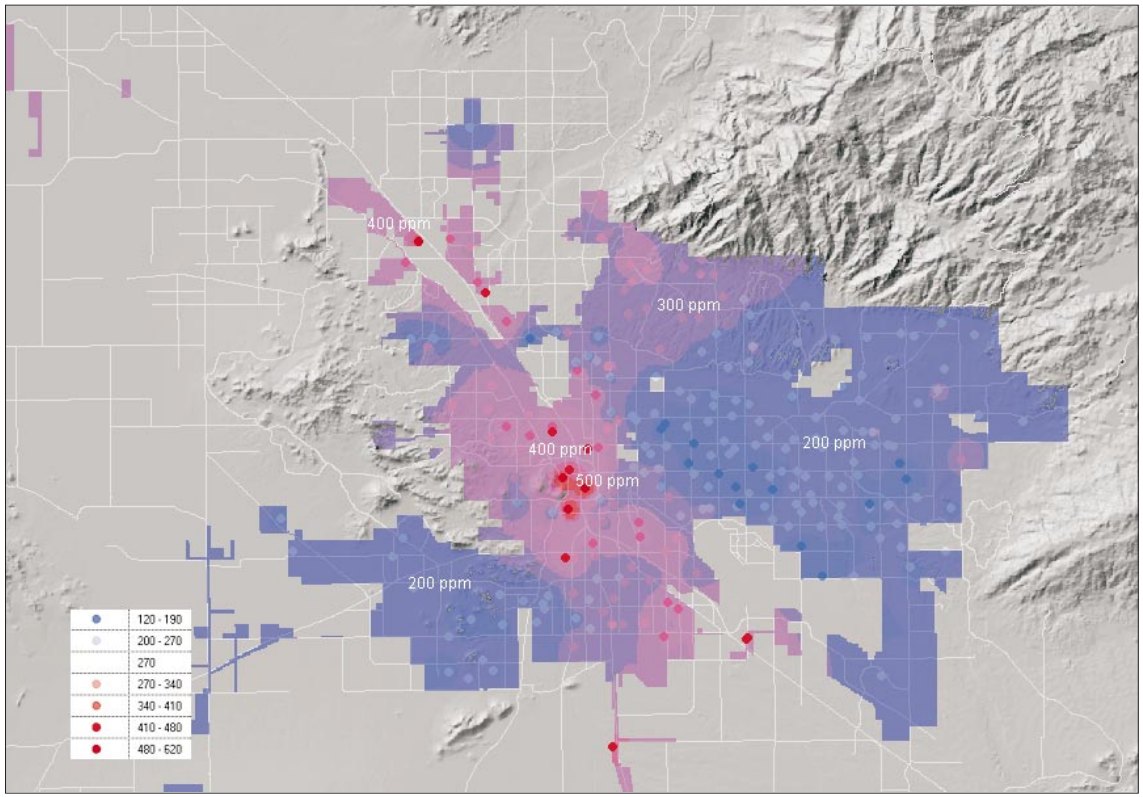
Another major difference is the level of salinitY. (This refers to dissolved minerals, generally not table salt.) Salinity of the groundwater varies greatly according to location, with average salinity in the Avra Valley about 210 mg/l and levels up to 2,500 mg/l detected in groundwater near Green Valley and the mines. As is shown in Figure 6-6, the salinity of water delivered to Tucson Water customers also varies widely. Different sets of wells serve different parts of the distribution system, causing salinity of water delivered to the customer to range from below 200 mg/l to above 650 mg/l. In general, as pumping continues and water levels decline, the salinity of pumped water is expected to increase.

The salinity level of CAP water varies seasonally and from year to year depending on flow conditions on the Colorado River. Higher than average flows generally dilute salinity. In 1995, the average annual salinity of Colorado River water below Parker Dam, when adjusted to average flow conditions, was 775 mg/l – or more than double the average of Tucson groundwater. The TDS of CAP water delivered to Tucson varies also, depending on a number of factors. (Total dissolved solids is approximately the same as salinity.)

As is indicated in Figure 6-7, Colorado River salinity comes from both natural processes and human activities. Natural processes account for much of the salinity, as the river and its tributaries pick up minerals from certain kinds of rocks and soils. Highly saline springs also raise the salinity levels. Irrigation contributes salinity by consumptively using water, concentrating the salinity of the water left behind and by returning water to the river with additional dissolved minerals from soils high in mineral content. Reservoir and canal evaporation, including the evaporation that occurs as water is delivered via the open CAP canal, increases salinity concentrations because as water evaporates, less water is left to dilute the same amount of salts.

The salinity of the Colorado River starts at about 50 mg/l in its mountain headwaters and increases to over 800 mg/l at the Mexican border. Salinity levels have been steadily increasing throughout the lower basin and Mexico as more river water is used and water evaporates from the reservoirs. As a result salinity levels have become a serious concern. Federal and state programs have been enacted to remove salt loading sources on the river and prevent further increases in TDS. These programs have removed thus far approximately 140,000 tons of annual salt load on the river. Continued Congressional funding of these programs, however, is in question. If salinity control programs are cut back or eliminated, TDS levels in the future are projected to exceed 900 mg/l at the CAP diversion point on the river.

Figure 6-6 TDS of water delivered to Tucson Water customers.



Sources: Tucson Water, Water Resources Research Center.

Salinity Concerns

Although the EPA does not consider TDS to be a health issue, TDS is of concern for several reasons. Some level of TDS is desirable in drinking water and gives it a pleasant taste, but as levels increase beyond 500 mg/l many people complain of the taste. For this reason, EPA has set a secondary (voluntary) drinking water standard for TDS of 500 mg/l.

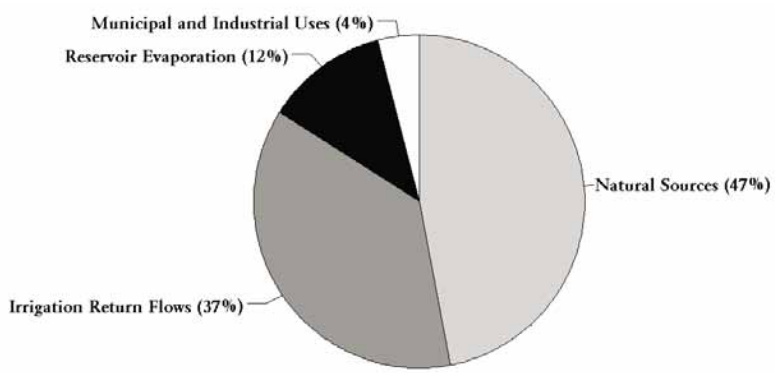
Experience in Tucson and other communities show that as TDS increases, people take action to avoid unpleasant effects. They may buy bottled water, water softeners or home treatment systems, such as charcoal filters or reverse osmosis systems to improve water taste.

Saline water supplies can corrode and shorten the useful lives of water-using appliances such as water heaters, water faucets, dishwashers, clothes washers, evaporative coolers, garbage disposals and toilet flush mechanisms. The useful lives of these appliances and fixtures shorten as TDS levels increase.

High salinity also can cause deterioration of water pipes over time. Damage can result from increased corrosion of metals that come in contact with the water and from scaling of contacted surfaces. Pipe damage resulting from salinity occurs mostly in steel or iron pipes. Damage can occur both in water mains and in domestic piping. Analysis of corroded pipe samples and interviews with Tucson Water staff after the introduction of CAP water in Tucson indicated that the most troublesome pipe was poor quality galvanized steel pipe that lost its protective zinc coating. This left the steel underneath subject to corrosion. Galvanized steel, copper and plastic (PVC or polybutylene) pipe make up a large majority of the pipe used in Tucson households. Approximately 25 percent of pipe used in Tucson area homes is estimated to be galvanized steel. Tucson water mains are mostly asbestos cement and galvanized iron. Out of 2,400 miles of Tucson water mains, 220 miles were galvanized steel or other steel in 1994. By 1998-99, approximately 140 miles had been replaced.

High salinity levels also can reduce crop yields and affect the growth rates of some landscape plants. Soil salinity is controlled by water quality and irrigation practices. For example, water TDS levels between 450 and 2,000 mg/l are considered slightly to moderately saline. Salt tolerance of vegetation varies greatly. The native mesquite, saltbush and some non-native eucalyptus have very high salt tolerance, while the native palo verde and jojoba and the non-native pomegranate and lantana have only

Figure 6-7 Sources of salinity in Colorado River water (measured at Lake Mead).



Source: U.S. Department of the Interior, Quality of Water - Colorado River Basin, 1997.

moderate salt tolerance. Citrus has low salt tolerance, but bermuda and rye grasses tolerate salts well.

Soluble salts can be removed from plant roots by adding excess water (leaching). CAP water has about 2.5 more TDS than Tucson groundwater, but most of the CAP salinity comes from salts that are benign to plants in the soil-plant environment. Dissolved gypsum and calcium carbonates, found in CAP water, are also common minerals in the semi-desert soils. These minerals quickly precipitate (form a solid) and go out of solution in the soil environment and do not raise the salinity of the soil significantly. Compared to groundwater, salt leaching estimates indicate that five to seven percent additional water may be needed to maintain the same salinity in soils when CAP water is used to water plants.

WATER TREATMENT COST

Costs Before Treatment

Your water bill reflects the various costs of pumping and delivering water, repayment of bonds to lay pipes and build reservoirs, disinfection, reading meters and sending water bills, conservation education programs and administration. Further, Tucson Water adds a CAP surcharge to cover the costs of bringing in CAP. When it sells water bonds, Tucson Water repays the principal and interest through water rates, not through taxes or the general fund. Other water providers also collect the cost of building their water systems through the water rates. The bill may also show a sewer charge Pima County.

Treatment Costs

Water treatment is currently a very small part of the water bill, but could become a significant part depending on CAP water treatment choice. Providing specific costs of treatment methods is difficult because emerging technology continues to lower the their costs. For example, the cost of membrane filters is about half what it was just a few years ago. Some generalizations, however, are valid. Adding chlorine is the least expensive treatment method and adds almost nothing to the cost of production, while desalting is the most expensive, especially when the costs of disposing of the brine are included.

Tucson Water spent more than $85 million dollars to build the existing Hayden-Udall Water Treatment Plant in Avra Valley. Customers are still paying for the plant in their water bills. If we are to use CAP water, the least costly treatment alternative probably would be to upgrade that facility using the existing ozone-chloramine system plus proper corrosion treatment. Adopting a very different method — e.g., building a new facility or changing the existing facility over to a new system — would be more expensive. Voters probably would have to approve additional bonds for any new facility.

Water treatment operating costs include the cost of chemicals, energy, salaries, and repair and maintenance. Chloramines and chlorine use almost no energy, and the cost of the chemicals is low. Ozone is energy intensive, since the ozone is produced on site. Membrane filtration is even more energy intensive since the process uses energy to force water through the membrane. The smaller the pore size, the more energy is required to operate the system. Membranes also must be cleaned out periodically since the pores become clogged, although some systems have a self-cleaning technique, which itself uses energy. Membranes must be replaced as they lose their effectiveness.

If desalting is the preferred choice, the costs of disposing of the brine can be high. For desalting systems on sea coasts, this is not a problem. The brine is usually dumped in the ocean, which is a convenient and inexpensive solution

Table 6-6 Estimated operating costs of some treatment methods, not including construction costs.

TREATMENT METHOD	ANNUAL COSTS (cents/1000 gallons)
Chlorine-Chloramines	0.4
Increased Coagulant Dose	5.2
Ozone-Chloramines	9.8
Granulated Activated Carbon (a type of filtration)	18.0 - 28.0
Membranes/NF RO (not including disposal costs)	92.0

Source: McGuire, et al., Disinfectants for Drinking Water Treatment - A White Paper, 1995.

to the problem. For land-locked places such as Tucson, however, no easy solution exists. The brine can be evaporated and the solid matter landfilled or it can be piped elsewhere as brine. In either case, between 15 and 35 percent of the water is lost, increasing water costs. Shipping the brine elsewhere would involve building a pipeline almost as long as the CAP canal itself to the Gulf of California or the Colorado River. While a federal subsidy is possible, it is not likely. If the salts are landfilled, either a new landfill for that purpose must be built or existing landfills would soon fill up. New landfills then would be needed sooner than previously expected – a cost to taxpayers, not to water rate payers. Landfilling in established landfills is not currently considered as an option for various reasons including landfill space and problems of the dried salts becoming airborne.

Although providing specific treatment costs is not possible, voters and elected officials need estimates of cost for various alternatives before choosing a water treatment method. One study found the costs of NF and RO are 10 times higher than the costs of ozone- chloramine treatment, even without considering the costs of brine disposal. According to this study the use of membranes could raise the typical residential water bill by $100 per year or more above the cost of ozone-chloramines.

Decision makers should also compare the costs of not desalinating with the costs of desalinating; e.g. what will it cost consumers to replace water fixtures or appliances that accumulate scale or corrode? What will consumers have to pay to leach salts from landscapes or to buy home treatment systems or bottled water?

ISSUES TO CONSIDER

If CAP water is to be part of the total Tucson water picture, Tucson decision makers need to determine how to deal with the water quality problems listed above. Some of the issues they need to confront are:

- Whether to use CAP water directly in the near future or to recharge it and use it later. In either case some form of treatment will be needed, since recharge does not reduce salinity or provide adequate levels of disinfection;
- Which method to use to disinfect CAP water to ensure it is safe and meets EPA primary standards;
- Which method to use to reduce corrosivity to minimize deterioration of pipes and fixtures;
- Whether or not to reduce salinity and, if salinity is to be reduced, what method should be used and how the brine is to be disposed of; and
- Determine if taste and odor of CAP water are problems and, if so, how to deal with those problems.

While decisions about specific treatment methods may be highly technical and best left to professionals, local residents need to express opinions about the levels of treatment they prefer and what they are willing to pay for CAP water.

Chapter 7
ROLES OF CITIZENS AND GOVERNMENT IN WATER POLICY

The route water takes from its source, whether that be an aquifer or the Colorado River, to its eventual flow from a faucet is a complicated journey. Much more is involved in that journey than the canals and pipes that physically convey water from source to destination. Government rules and regulations also have a powerful influence on water flow, and their workings may seem as complicated as any plumbing system, with various levels of government involved in many different water quality and water use issues. This chapter briefly summarizes the major laws and institutions that control and govern water. Some water management issues also are examined, including whether some type of basin-wide water management agency is needed; whether Tucson Water customers who live outside city limits should be allowed to participate in water decisions affecting them; and whether water service should be privatized.

THE ROLES OF CITIZENS

Over the years citizen groups and individuals have played important roles in setting water policy. People have served on advisory committees such as the City of Tucson's Citizen's Water Advisory Committee, Pima County's Wastewater Advisory Committee and the Arizona Department of Water Resources' (ADWR) Groundwater Users' Advisory Committee for the Tucson Active Management Area (TAMA).

Many non-profit groups have worked hard to support or change policies concerning water over the years. Tucsonans for a Clean Environment worked for cleanup of the TCE problem. In the 1970s, citizen groups such as Arizonans for Water Without Waste, Citizens Against the CAP and Citizens to Revise Arizona Water Law unsuccessfully opposed CAP, and specifically its use in Tucson. These groups, however, played a role in developing alternative strategies, including support of the 1980 Groundwater Management Act. The Southern Arizona Water Resources Association, on the other hand, was initially established to ensure that Tucson got its fair share of CAP water and eventually developed a much broader purpose, including providing information to the community on a wide range of topics. The Tucson Regional Water Council is another group which supports the CAP but has a broader purpose of working to ensure a long-term water supply for the area.

The importance of the "initiative process" in policy making was demonstrated in the 1995 city election when The Pure Water Coalition succeeded in reversing Tucson's policies on CAP water use by persuading voters to approve Proposition 200 and pass the Water Consumer Protection Act (WCPA). The Citizens Alliance for Water Security is following this same tradition in promoting another initiative for the 1999 ballot, which would extend the WCPA. These groups are opposed to direct use of CAP water in the municipal water system, but promote its use for alternate purposes..

Many other citizen groups such as the League of Women Voters, the Sierra Club, the Arizona Native Plant Society and others have been involved in a variety of water issues, from hazardous waste disposal to promotion of low-water use plants in landscaping.

Figure 7-1 The federal government is an important player in determining water policy, especially in water quality matters. Photo: U.S. Library of Congress.

THE ROLES OF GOVERNMENT

Over the past century, various laws and regulations at the federal, state and local levels have impacted how we manage water. In addition, interstate and even international treaties limit the amount of Colorado River water we can take. Finally, various Supreme Court decisions and legal settlements, especially those having to do with Indian water rights, affect our use of water. This chapter describes the most significant laws, regulations and court decisions that affect water decisions in the Tucson area. The annotated bibliography lists sources for more detailed information.

Managing Tucson's Water

No single entity oversees or administers all water use in the Tucson area. A combination of municipal water utilities, private water companies, irrigation districts, school districts, businesses and even individuals provide water in the area. There are 19 water companies with more than 2,000 customers and more than 130 other small water providers. (See Appendix B for a list.) Some water utilities operate within Tucson city limits, and Tucson Water operates both inside and outside city limits. All utilities provide water to customers under rules established by state and federal governments to protect the users and, in some cases, to protect future generations of users. Some laws and regulations protect people from unsafe drinking water, while others are designed to prolong the water supply. Individuals who pump their own water for domestic use are not subject to most of the rules — domestic wells that pump less than 35 gallons per minute are exempted. Those relying on such wells, however, are not protected by regulations to ensure the health and safety of water consumers. Indian tribes generally are not subject to state or federal rules, but often have their own system for managing water and protecting users.

ADWR has authority over some aspects of groundwater pumping within an area designated as the Tucson Active Management Area (TAMA). This includes most of the Pima County portion of the Santa Cruz River watershed. (See Preface, Figure 4, which is a map of TAMA.) ADWR performs overall groundwater supply planning for the area. The agency also approves or denies well drilling permits for all wells except small domestic wells and sets conservation requirements for water providers. ADWR cannot, however, regulate pumping to protect riparian areas nor can the agency coordinate the activities of various users or agencies with water responsibilities. (More information about ADWR's powers and responsibilities is provided later in this chapter.)

The Arizona Department of Environmental Quality (ADEQ) and the U.S. Environmental Protection Agency (EPA), are concerned with the quality of groundwater and surface water. Their mandate is to prevent pollution of

Figure 7-2 The Arizona Legislature has authority in various water management areas. Photo: Arizona Department of Library, Archives and Public Records.

Table 7-1 Agencies responsible for water management in Pima County.

	FEDERAL	STATE	COUNTY-CITY	OTHER
Safe Drinking Water Act	EPA	ADEQ		Water providers may set stricter standards for their companies
Clean Water Act	EPA	ADEQ		
Septic Tank Rules		ADEQ	County Health Department	
Landfills	EPA	ADEQ	County and City each operate landfills	
Pollution, Surface Water	EPA	ADEQ		
Pollution, Groundwater	EPA	ADEQ		
Areawide Water Quality Planning			PAG	
Hazardous Materials	EPA	ADEQ	PCDEQ	
Septic Tanks		ADEQ	PCDH	
Groundwater Allocation		ADWR		
Surface Water Allocation	Bureau of Reclamation for Colorado River Water	ADWR		
Water Rates and Rate Structures		ACC regulates private companies and co-ops, but not cities, or irrigation or improvement districts	Tucson, Oro Valley, Marana for their system	Boards for water companies, co-ops and districts
Floodplain and Stormwater Management	EPA and FEMA	ADEQ	County and City FCDs	

Agencies designated in bold below have the primary responsibility. Others have secondary responsibility and/or implement rules of the primary agency. **EPA -** U.S. Environmental Protection Agency**; ADEQ -** Arizona Department of Environmental Quality**; ADWR -** Arizona Department of Water Resources**; ACC -** Arizona Corporation Commission; **FCD -** Flood Control District; **PCDEQ -** Pima County Department of Environmental Quality**; PAG -** Pima Association of Governments.

water supplies to ensure that consumers get safe drinking water.

The Arizona Corporation Commission (ACC) regulates rates charged by private water companies, but not by irrigation districts or municipal utilities. Its role of protecting the water consumer sometimes conflicts with ADWR's role of requiring water conservation or the use of renewable supplies instead of groundwater. For example, ADWR might require that a utility adopt water-saving strategies. To adopt such strategies, a water provider might need to raise water rates to cover the cost. The ACC, however, has rarely allowed the increased rates. ACC has even prevented rate increases to build treatment facilities to improve water quality. A rate increase is only allowed after a facility is actually in place.

WATER QUALITY REGULATIONS

Tucsonans have experienced occasional water quality problems over the past 100 years. A flowing Santa Cruz River once was used as a water supply, and its quality at times was impaired by cattle and human waste. Shallow wells tended to produce alkali-tainted water. Outhouses contaminated the shallow water table.

Tucson was not unique. Throughout the United States in the nineteenth century water-borne diseases such as cholera, diarrhea, dysentery or typhoid were prevalent. Measures were taken to control water quality problems and laws passed to require that water providers adopt such measures. For example, chlorine was found to be a highly effective disinfectant by the late 1800s, and most major municipal supplies were chlorinated by 1920. A dramatic drop in water-borne diseases in the United States resulted. By the 1950s, however, people began to be concerned about human-made pollutants, especially toxic substances such as DDT. Developing technologies to deal with chemical pollutants took longer than working out solutions to health problems relating to bacteria and viruses. The problem was more complex, with thousands of different pollutants. Recently, concern has focused on parasites found in water supplies, such as cryptosporidium and giardia. These have caused widespread sickness, even death in several cities and are difficult to control by traditional methods.

Various legislative efforts were made to improve water quality. Congress passed the Clean Water Act in 1972 to protect surface waters from pollution. The law initially listed only a small number of pollutants, but more were added to the list as the law was applied over time. The act attempts to maintain water quality by controlling the kinds of wastes that are released to surface waters. In 1974, Congress passed the Safe Drinking Water Act to assure that drinking water supplies were safe. In 1980, Congress passed the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), more commonly known as the Superfund Act. This law is designed primarily to clean up areas that were polluted in the past and to prevent the occurrence of future contamination from hazardous materials. In 1980, the Arizona Legislature passed the Environmental Quality Act which, among other intents and purposes, protects the quality of groundwater. Other significant laws that protect water quality regulate hazardous materials and disposal of wastes. Most of these laws are discussed later in this chapter. Table 7-1 briefly shows which agencies are responsible for various water management matters.

Surface Water Quality

Federal and state laws and regulations, under the umbrella of the federal Clean Water Act, regulate surface water quality. The state and EPA administer portions of the federal program. States have the right to set their own water quality standards using EPA guidelines. These standards are to be reviewed every three years. EPA then issues permits and, if needed, takes enforcement actions based on the standards. EPA, however, also issues National Pollution Elimination Discharge System (NPDES) Permits.

Point Sources

Point sources of pollution are those sources that come from a discreet location such as a pipe. Point source discharge standards and permits are based on the adoption of the best available pollution reduction technology. Point sources are much easier to regulate than non-point sources – pollutants that come from a wide area, with no discreet discharge point. A local example of a point source is the outflow pipe from the Ina Road Water Pollution Control Facility.

The law requires that the level of water quality necessary to protect existing designated uses be maintained and protected. No degrada-

Figure 7-3 The origins of point source pollution are distinct and identifiable; hence a point source also is called an end-of-the-pipe source. Photo Barbara Tellman.

tion of existing water quality is permitted in a navigable water if the existing water quality does not meet applicable water quality standards. Where existing water quality in a navigable water meets or exceeds applicable water quality standards, the existing water quality must be maintained and protected. A procedure exists, however, for the ADEQ director to allow limited degradation in some cases.

NPDES permit conditions and water quality standards are ultimately based on criteria developed by EPA. These criteria are supposed to accurately reflect the latest scientific knowledge regarding such matters as the effects of pollutants on the health and welfare of humans and wildlife; the effects of pollutants on biological communities; and biodiversity for varying types of receiving waters.

An important purpose of regulation is to protect designated uses. An established use is not easily changed to a less protective use. Such a change can be made, however, through the "use attainability analysis" process in which the applicant must prove that the existing protected use does not actually exist in the stream.

Non-point Sources

Non-point source pollution is pollution that comes from several diffuse sources, not through a specific discharge — e.g., grazing. It is usually regulated through Best Management Practices (BMPs), which are guidelines developed through consultation between ADEQ and the affected industry. BMPs are intended to achieve a specific water quality goal, rather than mandating specific prescribed conditions. For example, Arizona has BMPs for grazing. The business or industry then is required to meet performance-based standards.

NPDES Permits.

One section of the law sets requirements on industries and local governments to abate pollution. The EPA issues NPDES permits to entities that discharge to "waters of the United States." (This is defined very broadly.) Permit conditions are set according to federal requirements, but with specific requirements often based on local conditions. The permits are for a specified period of time, but are renewable. Sometimes the conditions are changed when the permit is renewed. An example of an entity with a NPDES permit in Pima County is Pima County Wastewater Management Department.

Stormwater Permits

Stormwater runoff from urban areas is a major non-point source of pollution in watercourses. Arizona, with its dry washes and months without rain, experiences special problems with runoff. Pollutants such as oils settle on roads, and the infrequent rains allow pollutants to accumulate. During summer storms, many streets fill with water that rapidly drains to washes and ultimately to rivers, carrying large amounts of pollutants that have collected on the streets. The daily news often contains warnings to drive carefully during the first major summer rain because of oil slicks on the streets. Also insecticides, cleaning fluids and other domestic pollutants might be present in stormwater, as well as industrial pollutants, although these are more carefully controlled than domestic pollutants.

Pollution from urban stormwater runoff is very difficult to control since it comes from thousands of sources and enters washes and rivers in many different ways. As awareness of stormwater quality problems increased, Congress directed EPA to develop regulations requiring large cities to establish programs to

control urban runoff. EPA regulations considered urban population figures to determine which cities needed a NPDES permit. Both Tucson and Pima County fit the criteria for needing a permit. The county submitted a two-part permit application, with the first part submitted in 1991 and the second part in 1993. The city filed a storm water permit application with EPA in 1992 and in 1998. Both city and county permits were approved.

To obtain a NPDES permit, an applicant must address various EPA concerns. Measures must be taken to control such activities as illicit connections and illegal dumping to storm drains and to control runoff of pollutants from municipal landfills, industrial facilities and construction sites. The applicant also must inventory land uses to determine the quantity and quality of discharged water and develop a management plan for stormwater runoff. This plan involves identifying problem areas and working out strategies and practices to reduce the flow of pollutants into bodies of water. As part of the plan, the applicant must describe what already has been done to eliminate pollutants from stormwater runoff as well as what new efforts will be undertaken to further control such pollutants.

Pima County's permit requirements include street sweeping, land development controls, a household hazardous waste program and a stormwater sampling program. The county also advises businesses and construction personnel about stormwater regulations.

The City of Tucson has an ongoing Stormwater Master Plan (TSMP) incorporated into its NPDES permit. The TSMP emphasizes the preservation of naturally vegetated watercourses to improve water quality and urges residents to harvest rainwater. Retaining stormwater on property reduces runoff flowing over streets and paved surfaces and picking up various pollutants. Other aspects of the permit include conducting site inspections of private developments on five acres or more. Also, the city will inspect industrial sites that are required to obtain NPDES permits, to ensure they are in compliance. The city also monitors stormwater quality problems in the community to anticipate and prevent problems before they occur. The city also is emphasizing public education or outreach, to make people aware they have a personal effect on stormwater quality.

TREATMENT PLANT FUNDING

Another section of the Clean Water Act provides financial assistance for constructing municipal wastewater treatment plants. The law has been more successful in controlling biological pollutants than in dealing with toxic materials. During the 1980s, Congress provided funding through EPA to build wastewater treatment systems. Most of Arizona's large treatment plants were built at least partially with federal subsidies which helped pay the costs of growth. In the 1990s, these funding sources dried up as Congress cut back on federal spending. The program changed to a "revolving fund" which provides seed money for loans to communities for wastewater treatment. The loan payments are in turn made available to other communities as loans to continue support for building their wastewater treatment facilities.

Figure 7-4 Rainfall flowing over urban surfaces picks up various constituents and forms urban runoff nonpoint source pollution.

GROUNDWATER QUALITY LAWS

Arizona's Environmental Quality Act is designed to prevent groundwater pollution. Not federally mandated, the act is entirely an Arizona initiative, passed in response to serious groundwater pollution problems. The act called for the creation of ADEQ, to manage water and air quality and solid waste regulation.

The heart of the water quality section of the law is a requirement that anyone who plans water discharges that might reach groundwater must go through the Aquifer Protection Permit (APP) process. This applies to discharges directly to watercourses as well as discharges on dry land overlying a groundwater source. The applicant must show that the discharge will not cause or contribute to a violation of Aquifer Water Quality Standards as defined by regulation. All aquifers are considered to be drinking water aquifers with drinking water standards, unless reclassified for a lesser quality. An aquifer that does not meet drinking water standards for some constituents, but meets the standards for others may have a different level of standard for each constituent. The standard is not necessarily determined at the point of discharge, but may be determined at a point underground and is influenced by existing water quality. If a standard for that groundwater has already been exceeded, the applicant must demonstrate that no further degradation will occur.

Applicants must use Best Available Demonstrated Control Technology (BADCT) to obtain a permit. Certain dischargers, such as agricultural dischargers, which fit into a group sharing common characteristics, do not have to go through the full process. Instead they may be treated as part of the "General Permit" process that already has established rules. Exemptions to the APP requirements include households, stock ponds, mining overburden returned to the excavation site, water transportation systems, community sewer systems, storm water impoundments, water storage facilities and water used for public landscaping (e.g., golf courses).

The law also has a permitting system for recharge and underground storage facilities. ADWR reviews such facilities for water supply concerns and ADEQ reviews the water quality matters. The applicant must meet all APP regulations except BADCT requirements.

Wastewater reuse projects also go through a permitting process. Regulations are stricter when treated wastewater is to be used in areas accessible to the general public (e.g., school yards) than when used in areas that are fenced, with restricted public access (e.g., an industrial site). Edible crop irrigation with effluent is the most strictly regulated.

HAZARDOUS WASTES

EPA has requirements for underground storage tanks, with special emphasis on gasoline tanks. The agency also has a wellhead protection program for discharges in the vicinity of water wells. EPA also regulates hazardous waste sources and landfills and maintains the Superfund or CERCLA, which is designed to clean up hazardous waste sites. The polluter then may be charged for the cleanup. Far more sites have been identified nationally than have been cleaned up under this program. Arizona has 111 official Superfund sites, with few having been cleansed of hazardous materials. A curious feature of the Superfund program is that it exempts oil-based hazardous wastes. Arizona's WQARF (Water Quality Assurance Revolving Fund) helps pay for clean up of polluted sites that do not meet the Superfund definition. Lack of funding has plagued the program.

Wastewater and Septic Systems

If wastewater is released to a surface water source, a NPDES permit is required. ADEQ requires a permit if wastewater is reused, recharged or released into a constructed wetland. County health departments, under ADEQ oversight, administer septic tank permits under state legislative rules.

SAFE DRINKING WATER ACT

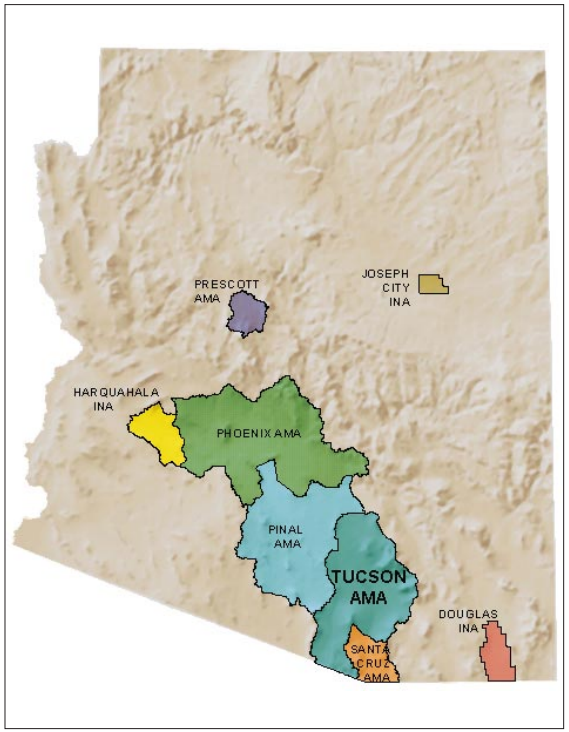
The federal Safe Drinking Water Act regulates the quality of water provided to consumers by water companies and municipalities. Under this act, EPA regulates public water systems, defined as those that pipe water to at least 25 people or 15 connections for at least 60 days per year. These systems may be owned by homeowner associations (e.g., Winterhaven), investor-owned water companies (e.g., Green Valley Water Company), cities and towns (e.g., Tucson Water), domestic water improvement districts (e.g., Metro Water), irrigation districts serving domestic customers (e.g., Flowing Wells Irrigation District) and others (e.g., The University of Arizona).

The act does not cover smaller services or individual domestic wells. EPA sets basic standards for pollutants of concern and requires water providers to take certain measures to meet those standards. EPA is supposed to identify the potential pollutants in drinking water, study their possible health effects and set standards for the problem pollutants. The list grows as new problems are detected. New regulations adopted in 1998, for example, require

water providers to control cryptosporidium, a water-borne parasite that poses a public health threat. The law requires testing at regular intervals and consumer notification if standards are not met. Although numerous violations have been recorded in recent years in the Tucson area, almost all those violations were for technical errors, such as failure to report or monitor. Almost no cases were reported of water quality standards being exceeded.

EPA recognizes that small water providers, unlike large utilities, often are unable to afford certain types of testing and treatment procedures. Variances therefore are allowed based on financial condition and the number of customers served. Smaller companies, however, must still use the best available technology within a certain price range. In addition, funding is available to assist those small companies with the greatest needs. Drinking Water Revolving Funds were created in each state to channel federal money to small water providers. EPA sets requirements for states to follow to maintain eligibility under this program

Figure 7-5 Arizona's Active Management Areas and Irrigation Non-Expansion Areas.



WATER SUPPLY REGULATIONS

Our present system of water law grew out of the intense competition for water among early American miners and settlers. People at that time were competing for surface water, and the laws that developed were intended to protect the rights of those who arrived first from the claims of those who arrived later. The law to determine surface water rights is called the prior appropriation doctrine. By the early 1880s, most of the surface water in the Tucson area was claimed for use.

Competition for groundwater developed much later when increasingly powerful pumps enabled pumpers to draw water from beneath lands owned by others. Groundwater laws were passed in the 1950s to protect existing farmers from being pumped dry by new farms. The laws, however, hardly take note of the fact that some groundwater and surface water are actually hydrologically connected. Pumping that affects surface water rights is therefore legal throughout most areas of the state because under Arizona law, surface water and groundwater are generally considered to be separate.

As more people moved to Arizona, the burgeoning urban areas competed with agriculture for groundwater. In 1980, the Legislature passed the Groundwater Management Act (GMA) which sets goals and policies for the most problem-plagued parts of the state. ADWR, which was established to administer the GMA, is responsible for allocation of both surface water and groundwater.

GROUNDWATER MANAGEMENT ACT

Central to the GMA was the establishment of four Active Management Areas (AMAs) in areas of the state with the greatest groundwater overdraft problems: the Phoenix, Prescott, Pinal and Tucson AMAs. A fifth, the Santa Cruz AMA, was created in 1994 when it was split off from TAMA. Some other areas were designated Irrigation Nonexpansion Areas (INAs). (See Figure 7-5.) In these areas, new pumping for agriculture is limited, but other pumping is not. Most of eastern Pima County is included within TAMA. There are no INAs within Pima County.

Each AMA must develop five successive plans for reaching its goal over the period 1980 to 2025. The first four plans each cover a ten-year period, while the last plan covers the final five years. The AMAs are currently preparing to enter the third management period, which covers the years 2000 to 2010. TAMA issued its draft Third Management Plan in the fall of 1998.

"PAPER" OR "WET" WATER?

"Paper water" is a term coined to distinguish between actual usable water ("wet water") and water that exists only as a calculated figure to satisfy certain requirements. A water budget, for example, may include assumptions about how much water will be recharged in a large area, without considering whether the water is in fact available for recharge or, if recharged, whether it can be recovered in an area where it is needed. The budgeted water therefore is a calculated figure and represents "paper water."

Safe Yield

The management goal designated for all AMAs except the Pinal AMA is that of reaching "safe yield" by the year 2025. Achieving safe yield involves reaching, and thereafter maintaining a long-term balance between the annual amount of groundwater withdrawn and the annual amount of natural and artificial recharge within an AMA. Each AMA has its own criteria for satisfying the requirements. For example, the Phoenix AMA allows 7.5 percent of the annual supply to be mined groundwater. In TAMA, as much as 15 percent can be mined groundwater. The balance must come from renewable supplies — CAP or other surface water. Therefore, even the GMA safe yield requirements allow depletion of groundwater, but over a long period of time. In the Draft Third Management Plan for TAMA, ADWR states that even with use of CAP water and conservation measures, the safe yield goal will not be met.

The ADWR water budget is calculated by estimating water use based on projected population, probable per capita water use, agricultural and industrial use and Indian use. Supply is based on assumptions about CAP use, recharge and effluent use. Estimating up to 45 years into the future is obviously difficult, and projections are revised in succeeding management plans. For example, population estimates for TAMA in the year 2025 have been revised downward, from 1,693,000 people in the Second Management Plan (SMP) to 1,266,500 in the Third Management Plan (TMP). These figures represent official state projections.

Assured Water Supply

New subdivisions are required to demonstrate that they have an "assured water supply" before being built. What counted as an "assured water supply" originally was very broad and included groundwater withdrawals that would lower the water table by as much as 1,000 feet. An assured water supply also could be demonstrated by contracting for CAP water or subcontracting with an entity that had contracts for CAP water, whether the CAP water ever reached the subdivision or not. Assured water supply rules have been revised and somewhat tightened to include the following criteria:

- Sufficient quantity of water is continuously available to satisfy the water demands of the development for 100 years;
- Water source meets water quality standards;
- Proposed use of water is consistent with conservation standards;
- Proposed use is consistent with water management goals; and
- Applicant is financially capable of installing the necessary water distribution and treatment facilities.

The concept of assured water supply does not assure sustainability for more than 100 years, and the requirements can be met in some ways that do not assure sustainability. Participating in a recharge program or contracting for CAP water can be sufficient to meet the requirement.

Municipal Conservation Programs

AMAs establish conservation goals for each municipal water provider or major agricultural or industrial water user. Large municipal water providers are allowed to choose among four programs to regulate their water use. The total gallons per capita per day (gpcd) program is the base program, under which gpcd goals are set for each provider. If goals are not met, a provider can be fined, although provisions allow water use in very dry years to be balanced with use in wet years. Alternative approaches include:

- **Non-Per Capita Conservation Program**, which allows water providers having resources to implement conservation programs as well as access to alternative supplies, to implement specific indoor and outdoor water conservation measures as well as education programs instead of meeting specific gpcd goals. To be accepted into this program, providers must demonstrate that they have reduced groundwater use.

Table 7-2 The draft water budget for the Tucson AMA.

Third Management Plan Scenario: Projected Future Conditions Assuming Third Management Plan Conservation Goals are Achieved by 2010 and Continue through 2025, Tucson Active Management Area

SECTOR	1990	1995	2000	2005	2010	2015	2020	2025
Projected AMA Population	655,000	768,000	838,300	921,000	1,005,300	1,092,200	1,179,200	1,266,500
Projected Irrigation Acres	40,000	36,100	35,320	35,750	33,900	30,400	26,400	21,400
MUNICIPAL SECTOR								
Total Demand	130,100	155,500	171,900	186,300	199,800	216,200	230,000	243,100
Total Supply	130,100	155,500	171,900	186,300	212,100	232,000	249,800	267,100
CAP	0	100	8,500	107,000	108,100	119,500	131,700	143,800
Effluent	6,300	7,700	11,600	23,400	32,900	36,000	37,100	37,700
Groundwater	123,800	147,700	151,800	55,900	58,800	60,700	61,200	61,600
AGRICULTURAL SECTOR								
Total Demand	93,800	98,000	104,700	117,700	107,500	97,000	85,000	70,000
Total Supply	93,800	98,000	104,700	117,700	107,500	97,000	85,000	70,000
CAP	0	0	0	10,400	15,800	15,800	15,800	15,800
Effluent	4,000	1,800	3,000	3,000	3,000	3,000	3,000	3,000
Groundwater	89,800	96,200	101,700	104,300	88,700	78,200	66,200	51,200
INDUSTRIAL SECTOR								
Total Demand	48,800	60,200	71,000	72,100	73,300	73,000	74,200	75,400
Total Supply	48,800	60,200	71,000	72,100	73,300	73,000	74,200	75,400
CAP	0	0	0	0	0	0	0	0
Effluent	800	800	1,300	1,700	2,900	3,600	4,200	4,700
Groundwater	48,000	59,400	69,700	70,400	70,400	69,400	70,000	70,700
Evapotranspiration	3,700	3,700	3,700	3,700	3,700	3,700	3,700	3,700
Total Demand	276,400	317,400	351,300	379,800	384,300	389,900	392,900	392,200
Total Groundwater use	265,300	307,000	326,900	234,300	221,600	212,000	201,100	187,200
(Less) Net natural recharge	60,800	60,800	60,800	60,800	60,800	60,800	60,800	60,800
(Less) Incidental recharge	70,300	82,300	80,800	39,600	35,000	34,400	33,600	32,300
(Less) Cuts to aquifer	0	0	5,100	32,900	35,800	37,700	41,400	45,100
(Less) Extinguished credits	0	0	11,700	8,400	7,900	7,600	0	0
Actual Overdraft	134,200	163,900	168,500	92,600	82,100	71,500	65,300	49,000
(Less) Remediation water	0	0	8,400	7,000	6,500	6,500	6,500	6,500
(Less) Allowable groundwater	0	0	10,000	32,200	34,700	36,200	36,400	36,400
Accounting Overdraft	134,200	163,900	150,100	53,400	40,900	28,800	22,400	6,100

NOTE: all units are acre-feet unless otherwise noted.

Source: Arizona Department of Water Resources, Draft Third Management Plan, Tucson AMA, 1998.

ADWR monitors the implementation and results of these measures.

- **Alternative Conservation Program**, which allows providers with an unusually large and growing amount of non-residential water use (e.g., a major new industrial plant) some flexibility in meeting conservation requirements. After limiting annual groundwater withdrawals, providers must meet gpcd requirements for residential users only, while implementing specific conservation measures for non-residential water users. ADWR monitors achievement of residential water use goals and implementation and results of non-residential conservation measures.
- **Institutional Provider Program**, which allows providers serving primarily non-residential users, including prisons, hospitals, military installations, airparks, and schools, to meet conservation requirements designed specifically for non-residential use. These conservation requirements usually include specific conservation measures for non-residential uses and a maximum residential gpcd rate.

Small water providers, defined by ADWR as serving less than 250 acre-feet of water per year, generally lack the resources to implement conservation programs, and are exempt from meeting specific gpcd requirements. Small providers are required to meet "reasonable conservation requirements," as established by the director of ADWR.

ADWR has no authority to enforce conservation requirements directly on water users or consumers, only on water providers. This causes problems for some water companies. Regulated by the ACC, private water companies have to assume the initial costs of conservation programs since they are unable to charge their customers for the cost of such programs until the program has been proven effective. Also changes in rate structures to encourage conservation have to go through a rate hearing process before the commission. The ACC does not regulate municipally-owned water companies, but such utilities including Tucson Water, Oro Valley Water and Metro Water go through their own public process before changing water rates.

Agricultural Conservation Requirements

The GMA regulates agricultural water use in several ways. First, no new agricultural land can be developed for irrigation within AMAs and INAs. Only lands which were legally irrigated with groundwater in the five years prior to implementation of the GMA in 1980 may continue to be irrigated with groundwater. Such lands received an Irrigation Grandfathered Right. Only holders of the right may withdraw, receive and use groundwater for growing crops on two or more acres of land within an AMA.

Second, farms are given a maximum annual allotment of groundwater to be used for irrigation. The allotment is calculated by multiplying the maximum number of acres irrigated at any time from 1975 through 1979 by an irrigation water duty. The irrigation water duty is calculated from the annual amount of water per acre that is reasonable to apply to produce the crops that were historically grown from 1975 through 1979. This irrigation water duty is reduced over time as increasing water application efficiencies are required.

In order to allow for variations in weather and changing agricultural market conditions, farms are given a flexibility account, allowing them to accumulate credits for the difference between their actual water use and the groundwater allowance, or borrow from the account if their actual groundwater use exceeds their allowance. Accumulated credits can be used in future years, if needed, to meet conservation requirements. There is no limit to the number of flexibility credits that can be accumulated, and farms are allowed to borrow up to 50 percent of their maximum annual groundwater allotment. Annual groundwater allotments were set near the historic peak of irrigated acreage; thus much more groundwater than is needed is legally available to farmers each year. With irrigation efficiencies increasing on farms and significant amounts of farmland out of production, many farms have accumulated large flexibility account balances.

Industrial Water Use

AWDR assigns conservation requirements specific to each category of industrial water use and encourages substitution of renewable water sources for groundwater.

- **Turf-Related Facilities** are given annual water allotments calculated for each facility. Water for golf courses is generally limited to 23.8 acre-feet per hole, or enough water for 5 acres of turf per hole at 4.6 acre feet per acre.
- **Metal Mines** must limit water loss from tailings ponds, recycle water, and reduce water use for dust control.
- **Power Plants** must achieve a specified number of "cycles of concentration" when they

are in full operation. Cycles of concentration is a measure of the degree to which cooling water is recycled. As water is recycled, salt concentrations increase due to evaporation, and fresh water must be added. Maximizing cycles of concentration saves water.

- **Large-Scale Cooling Facilities** must reach specific concentrations of silica or total hardness in the water used for cooling before the water is discharged and new water is used.
- **Sand and Gravel Operations** must recycle wash water and implement two additional conservation measures related to dust control and cleanup activities.
- **Dairies** are given annual water allotments based on assumed water needs. Dairies can alternatively apply to the director of ADWR to be regulated under the Best Management Practices Conservation Program, under which a combination of such practices will be required.

This photo has been removed due to copyright restrictions on the web

Figure 7-6 Tohono O'odham ollas, or clay water jars, from the nineteenth century are reminders of Native Americans' early water rights. Photo: Arizona Historical Society/Tucson.

INDIAN WATER RIGHTS

In general, federal environmental laws do not apply to tribal lands. Most tribes have their own environmental and/or wildlife agencies, with regulations often modeled on federal laws. Since tribes control some headwaters of Arizona rivers, actions on tribal lands may significantly affect nontribal areas. Conversely, actions on nontribal lands have affected Indian lands. In some cases, nontribal entities such as mines have been allowed to use tribal lands with fewer environmental restrictions than would apply on nontribal land. Tribes and the U.S. Bureau of Indian Affairs have become more cautious in recent years about agreements that might result in polluted, waters and have more vigorously enforced their laws.

The settlement of Indian water rights is an issue with broad implications throughout Arizona, not only to the tribes involved but also to non-Indians. Throughout much of U.S. history, Indians, their water rights systematically ignored and violated, have been an aggrieved party. The basis for Indian water rights claims is a U.S. Supreme Court decision (the Winters Decision), which established the principle that when the federal government set aside lands for Indian reservations or to serve other federal purposes, the government also implicitly reserved sufficient water rights to accomplish the purposes for which the reservations were created. These unrecorded and unquantified Indian water rights therefore were established at the time reservations were created, and so generally predate Anglo, non-Indian water rights. Although the Winters Decision was decided in 1908, only recently have Indian water rights gained serious recognition in the courts.

Settling Indian water rights is very important to Arizona. With 21 Indian tribes controlling about 28 percent of the state's land base, tribal water claims are extensive. Some observers argue that total tribal water rights in the state could exceed Arizona's total surface water supplies. With no new sources of water available to allocate to tribes, water to settle Indian claims could come from present water users. The senior priority dates of Indian water rights means such rights have precedent over later water claims, usually belonging to non-Indians. Some CAP water, however, is presently unallocated and is available for use in Indian water rights settlements.

The state of Arizona presently is involved in adjudications of the Gila River and Little Colorado River watersheds to determine the types, amounts, and priority dates of the rights of all water users in the watersheds. First initiated in 1978, the two Arizona adjudications will eventually determine the water rights of most water users in the state, including Indian tribes and the federal government. Seven tribes have filed claims in the Gila watershed, the principal watershed in Arizona incorporating the state's largest population centers, Tucson and Phoenix. The Gila River adjudication is es-

timated to be the largest lawsuit ever filed in the United States, affecting 60,000 parties, including many in Pima County.

Tohono O'odham Water Rights

Although representatives of state, federal and tribal governments usually negotiate Indian water rights, implications of settlements can greatly affect cities and counties. For example, an understanding of the Tohono O'odham (Papago) water claims is essential when considering Tucson's water future.

Tucson's early growth and development depended upon groundwater found in the Upper Santa Cruz Basin. This aquifer extends beneath the San Xavier District of the Tohono O'odham. As early as 1881, the Tucson Water Company drilled wells east of San Xavier to obtain water. This wellfield developed with the growth of the city, and by the 1970s Tucson pumped approximately 40,000 acre-feet of water annually from wells located just outside the reservation. Having by law to rely on an unresponsive federal government to promote and protect its interests, the tribe was left at a distinct disadvantage.

By 1976, after several court cases that supported and defined Indian water rights, the Tohono O'odham were in a position to claim most of the available water in the Tucson Basin. The implications to non-Indian interests of such a claim were vast, with the possibility that bond ratings would be jeopardized, private loans more difficult to obtain, economic growth halted, and water possibly reallocated from current users to the Tohono O'odham.

In 1975, the federal government, on behalf of the Tohono O'odham, sued the City of Tucson, mining companies and agricultural interests. In brief, the suit claimed the defendants damaged the tribe's water rights by excessive pumping. The tribe had at least two strategies to follow: negotiate a settlement or precede with the suit to its final resolution. In the face of the cost, time and various uncertainties associated with a court case, a consensus developed that a negotiated settlement would be in the best interest of all involved.

Tucson took the suit very seriously as is indicated by an excerpt from an *Arizona Daily Star* editorial at the time: "More than a century of government failure to preserve the Papagos' interests assured the tribe a court victory. And victory for the Papagos could have meant the permanent shutdown of mines and farms and an end to city growth and development." Such dire consequences, however, were unlikely, even with the Indians winning a court case.

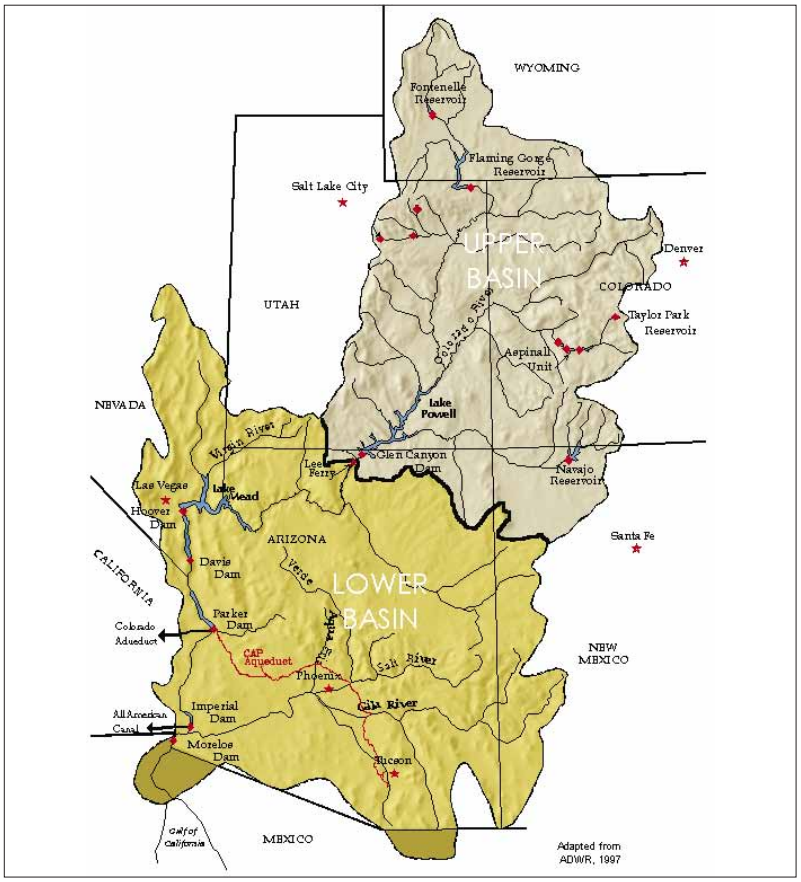
Negotiations took place with the express goal "to develop a fair and reasonable water resources plan which will satisfy the present and future water needs of eastern Pima County," including "a speedy resolution of Papago Indian water right claims." In making the best of a threatening situation, non-Indians used the suit as part of a strategy to benefit their own interests. By claiming that Colorado River water would be needed to negotiate with the Tohono O'odham, non-Indians were building a case for the federal government to complete the CAP canal to Tucson. Whatever settlement was negotiated would need to be financed by federal legislative appropriation.

Southern Arizona Water Rights Settlement Act On October 12, 1982, after agreement was reached by both House and Senate, President Reagan signed into law the Southern Arizona Water Rights Settlement Act (SAWRSA). The act obligated the U.S. Secretary of Interior to deliver 66,000 acre-feet per year to the San Xavier and Schuk Toak districts of the Tohono O'odham Nation. This total is to include 37,800 acre-feet of CAP water and 28,200 acre-feet of wastewater effluent or exchange water, which may be used to exchange for another type of water suitable for agriculture. The tribe has the right to market its negotiated water to users within TAMA or parts of the Upper Santa Cruz Basin not within TAMA. Costs associated with the delivery of CAP water under the sale, exchanges or temporary dispositions are non-reimbursable. The act also established a cooperative fund to pay operations, maintenance and repair charges related to delivery.

A schedule was set for delivering water and developing facilities for its use. Meanwhile a dispute arose among the Tohono O'odham Nation, its San Xavier District, and allottees, individual land owners on the San Xavier District. The dispute was the result of developing opposition to dismissing the U.S. v. Tucson lawsuit and to the terms of the SAWRSA settlement. The dispute spawned two additional lawsuits: Alvarez v. Tucson and Adams v. U.S.

Since about 1990, efforts have been made to negotiate an agreement between the allottees, the nation, the federal government and the major defendants to implement SAWRSA and dismiss the lawsuits. Negotiations are ongoing.

Figure 7-7 The Colorado River Basin.



Meanwhile work which was to be done by the U.S. Bureau of Reclamation to develop the facilities for delivering and using the water on the reservation has been delayed, although construction began in spring of 1999 on a pipeline to take water to the San Xavier District for agricultural purposes. The non-Indian defendants, however, have been more timely in meeting SAWRSA obligations. Tucson and Pima County have contributed effluent, with funding appropriated by the state and non-Indian interests to set up a trust fund. Until U.S. v. Tucson is dismissed, however, SAWRSA is not fully effective. As of yet, no water has been delivered to the Indian people.

CAP AND THE COLORADO RIVER

Arizona's allocation of Colorado River water is determined by the Law of the River, a collection of legislation, compacts, judicial decisions, international treaties and administrative rules that governs water allocation on the river. The Colorado River Compact of 1922 divided the river into two basins: the Upper and Lower Basins, with the river's average annual flow divided equally between the basins. Lees Ferry in northern Arizona marks the boundary between the two basins (See Figure 7-7). According to the compact each basin is to receive 7.5 million acre-feet per year. Arizona is a member of the Lower Basin, along with Nevada and California. A division of the waters of the Lower Basin originally was suggested by Congress in the Boulder Canyon Project Act and upheld in the Arizona vs. California Supreme Court decree in 1964. Arizona was allotted 2.8 million acre-feet of Colorado River water, California was allotted 4.4 million acre-feet, and 300,000 acre-feet was allocated to Nevada. Along with its Lower Basin allocation, Arizona also gets 50,000 acre-feet of Upper Basin water.

Approximately 1.3 million acre-feet of Arizona's allocation of Colorado River water is consumed along the mainstem of the river, mainly for agricultural purposes. This leaves an average of 1.5 million acre-feet per year to be carried to central Arizona via the CAP canal. The canal has a design capacity for delivery of 2.1 million acre-feet per year, which is reduced to approximately 1.9 million acre-feet per year due to the need for routine maintenance. This extra capacity allows Arizona to take water above its annual allocation if a surplus is declared on the river.

CAP deliveries may be interrupted by drought shortages on the river or by the need to repair and maintain the canal. To gain the support of California's delegation for Congressional approval of the CAP, Arizona was forced to agree that, in times of shortage, California's full 4.4 million acre-feet will be delivered before any water will be provided to the CAP. As a result, any shortages in the Lower Basin will be borne first by the CAP. The risk of drought shortage is projected to increase over time. After the year 2025, the probability of shortages affecting CAP water users is anticipated to reach approximately 30 percent. The probabil-

ity that municipal and industrial users will be affected is approximately 5 percent.

The law assigns the highest priorities for delivery of subcontracted CAP water to Indian and municipal and industrial (M&I) subcontractors. The lowest priority is assigned to non-Indian agriculture. This means if scheduled deliveries must be curtailed in any year, deliveries to non-Indian agricultural subcontractors will be cut first.

The amount of water delivered over the year is set, but the amount delivered each day varies greatly over the year, depending on demand. At times of high demand municipal users get first priority, but only for direct delivery. Municipal recharge projects have a lower priority than agriculture. In March 1997, delivery to recharge sites was halted temporarily to meet demands for direct municipal use and agriculture. This reversal of the priority system that normally places agriculture last may require recharge systems be designed to accept larger amounts of water at times when deliveries are high to compensate for the times when deliveries are cut. Possible changes to this policy are being discussed.

Concerns about CAP outages due to drought or maintenance point to the need for some mechanism to enhance delivery reliability. This could be either storage at the end of the aqueduct (terminal storage) or an operational plan that could involve keeping a certain number of groundwater pumps ready to provide water in case of an emergency. Consideration of terminal storage has been delayed indefinitely as a result of Tucson's decision to suspend direct delivery of CAP water.

The draft Environmental Impact Statement relating to terminal storage estimated that Tucson would experience planned maintenance outages of five to 30 days per year. Emergency outages are projected at zero to three times every 10 years. These emergency outages could last up to two months. An emergency outage lasting 48 to 365 days could happen zero to two times every 50 years. Situated at the end of the canal, Tucson is in the position of having the least reliable CAP water supply. Terminal storage options include a 15,000 acre-foot above-ground reservoir, a 15,000 acre-foot per year underground storage and recovery facility, and installation of redundant features to minimize maintenance outages. Cost of the above-ground reservoir was estimated to be about $100 million. If built as part of the CAP, the costs would be borne by CAP water users in Pima, Maricopa and Pinal counties, with financing by the federal government at a 3.342 percent interest rate over a 50-year period.

CENTRAL ARIZONA WATER CONSERVATION DISTRICT

The Central Arizona Water Conservation District (CAWCD) is a state agency with the primary responsibility of managing the CAP. Voters in Maricopa, Pima and Pinal Counties elect board members generally based on population. The district is concerned with water fees and property taxes for CAP, water allocation, canal operation and maintenance. CAWCD is responsible for repaying CAP reimbursable construction costs to the federal government. The district also works with the Arizona Water Banking Authority and the Central Arizona Groundwater Replenishment District to implement CAP storage and recovery programs.

PROGRAMS TO PROMOTE RECHARGE

Underground Water Storage, Savings, and Replenishment Program

Administered by ADWR, the Underground Water Storage, Savings, and Replenishment Program (UWS) encourages the use and/or storage of renewable supplies, including CAP water. There are two types of facilities allowed under this program: Underground Storage Facilities and Groundwater Savings Facilities.

Underground Storage Facilities (USFs) involve physical recharge of water through injection wells, infiltration basins, or natural watercourses. Water stored at these facilities can be designated for one of several uses: recovery in the same calendar year (annual storage and recovery), long-term recovery using storage credits, or not to be recovered at all. If the water is recovered, it does not have to be recovered in the same place as it was stored. However, recovery rules are designed to prevent recovery of water in areas where groundwater levels are substantially declining.

Groundwater Savings Facilities (GSFs) usually involve farms which agree to use CAP water rather than pumping groundwater. GSFs are referred to as "in-lieu" recharge facilities because CAP water is used in lieu of groundwater, but GSFs do not involve physical recharge. In a typical GSF arrangement, an entity such as a municipal water provider sells CAP water to a

farm, usually at a price lower than what the farm would pay to pump groundwater. In return, the state grants credits to municipal providers for the amount of groundwater that otherwise would have been used. The municipal provider can use these credits to offset pumping of groundwater in meeting ADWR conservation rules. A majority of the activity under the UWS program to date in TAMA has been through GSFs.

Arizona Water Banking Authority

Arizona cannot currently directly use all its allotted CAP water and does not expect to directly use the full allotment until the year 2030. Since California claims a right to take unused Colorado River water, Arizona has devised a way of keeping as much of it as possible in the state. The Arizona Legislature created the Arizona Water Banking Authority (AWBA) to acquire unused portions of Arizona's allocation of Colorado River water and put it to use for storage underground or, in other words, to recharge it in central Arizona. AWBA is authorized to store water to meet one of four overall goals: to protect municipal uses from possible drought situations or CAP delivery interruptions; to meet Indian water rights claims; to meet local water management objectives; or to facilitate interstate water banking with California or Nevada. AWBA is funded using property taxes, groundwater withdrawal fees in counties with CAP water (Maricopa, Pinal and Pima counties) and money from the state's general fund.

AWBA does not construct recharge facilities, but uses recharge structures built by other entities, such as Tucson Water or CAWCD. The water flows through the CAP canal to the storage facility, and AWBA pays CAWCD for the water costs. AWBA participating entities then benefit by accruing credits for the water stored and by using the water when needed under certain conditions dictated by state law. Credits earned with money from the general fund are used to benefit cities, towns and water providers along the aqueduct. Water storage credits earned with money from groundwater withdrawal fees are to be used in the AMA where the fees were collected. Credits from the property tax accrue to CAWCD to meet demands of municipal and industrial customers when CAP supplies are interrupted.

AWBA also is allowed to negotiate and enter into interstate water banking agreements with California and Nevada, subject to approval by the director of ADWR and subject to other conditions. Such agreements would allow California and/or Nevada to pay to store unused Colorado River water in Central Arizona. This obviously benefits Arizona as more water is added to our aquifers, but the other two Lower Basin states also would gain from the transaction. In later years, those states can "recover" their stored water under a forbearance agreement, through which Arizona would refrain from taking a portion of its entitlement of Colorado River water equal to the amount of water to be recovered. The state that had banked the water could then recover the banked water directly from the river. In effect, by paying to store unused Colorado River water in Arizona, California or Nevada can earn the right to later divert portions of Arizona's Colorado River allocation from the river.

The AWBA directly recharged approximately 45,000 acre-feet of excess CAP water in 1997 and approximately 70,000 acre-feet in 1998, of which about 12,000 acre-feet was in Pima County at the Central Avra Valley Recharge Project, the Avra Valley Recharge Project and the Pima Mine Road Recharge Project. The bank also accrued 149,000 in water storage

Figure 7-8 Decorative fountains raise an issue beyond supply and demand — the aesthetics of water. Photo: UA Biomedical Communications.

credits for in-lieu "recharge," none of which occurred in Pima County.

Central Arizona Groundwater Replenishment District

In 1993, the Arizona Legislature passed a law that provides an alternative method for subdivisions and water providers to meet the rules requiring a demonstrated 100-year supply of water. Entities that couldn't otherwise demonstrate an adequate physical supply can pay the Central Arizona Groundwater Replenishment District (CAGRD) a fee for the groundwater that the subdivision or water provider is "mining." The CAGRD then takes responsibility for acquiring and recharging water to offset the mined groundwater. Since "replacement" water does not have to be recharged in the same location as the withdrawal, localized groundwater declines may not be prevented by the arrangement. The overall management goal of safe yield, however, is furthered.

Under CAGRD the fees paid are the same (per unit volume) for each of the contributing "members." Members that are water providers pay the fee directly to CAGRD. In the case of certain subdivisions, each lot owner is a member and the individual pays in the form of an assessment on the property tax bill. One of the consequences of this is that the costs associated with an "assured" water supply are not borne directly by developers. This is one factor for the popularity of the CAGRD option. To date, approximately 115 subdivisions and eight water providers have applied for, or obtained, membership in the CAGRD.

Figure 7-9 The Endangered Species Act is concerned with the effects of human activity on the natural environment. Above is the federally protected desert tortoise. Photo: Barbara Tellman.

LAKES AND POOLS

In 1987, the Legislature enacted a law restricting the use of surface water or potable groundwater in artificial lakes and ponds in AMAs. A new lake cannot exceed 12,320 sq. ft. — the size of an Olympic-sized pool — unless filled with wastewater or poor quality groundwater. Lakes built before 1987 are exempted, as are lakes in public parks. The size of residential swimming pools also is limited to Olympic size, although the number of pools is not limited.

WATER TRANSFERS

In the 1970s, Tucson Water began buying farmland in the Avra Valley to obtain water rights in the area. Once the courts determined the arrangement was legal under certain conditions, Tucson considered Avra Valley groundwater an important part of its water supply. In the 1980s, other cities went even farther afield in search of water, to rural areas remote from urban centers. For example, Scottsdale bought land along the Bill Williams River in western Arizona. Some people in rural areas became concerned about losing water supplies and property tax base critical for their survival. In response, the Legislature passed a law limiting new transfers of water from non-AMAs. Because of the law, Tucson is not able to import water from outside the TAMA, such as from the San Pedro River.

FEDERAL ENVIRONMENTAL LAWS

Two federal laws that have some impact on water decisions are described briefly below, although they are not primarily water-related.

Table 7-3 Largest municipal water providers serving Pima County.

LARGEST MUNICIPAL **PROVIDERS**	SERVICE **AREA POP.**	WATER USE **(Acre-feet)**	TOTAL **GPCD**
City of Tucson	621,290	115,860	166
Metro Water District	44,153	9,161	185
Town of Oro Valley	23,416	6,503	248
Flowing Wells Irrig. District	15,000	2,945	175
Community Water Co.	14,261	2,249	141
Avra Water Co-op	6,688	935	125
Lago del Oro Water Company	6,461	1,787	247
Davis-Monthan AFB	6,191	1,969	284
University of Arizona	5,695	1,624	255
Ray Water company	4,617	658	127
Green Valley Water Company	4,390	2,318	471
AZ State Prison Complex	4,097	602	131
Hub Water Company	4,078	1,118	245
Arizona Water Company	3,984	366	82
Marana Municipal Water System	3,467	623	160
Las Quintas Serenas	2,388	345	129
Marana Water Service	1,736	337	173
Farmers Water Company	983	373	339
Forty-Niner Water Company	872	833	853

(1997 data. Figures may differ from Appendix B because they represent different years.)

Source: Arizona Department of Water Resources.

National Environmental Protection Act

The National Environmental Protection Act (NEPA) is intended to ensure that significant projects done by the federal government or that use any federal subsidies do not cause environmental damage in the process. Provisions do not apply to private, nongovernmental projects unless they have a federal component such as a housing development that involves federal loan guarantees.

When an eligible project is planned, an Environmental Assessment (EA) must be conducted. If this assessment does not indicate that environmental problems are anticipated, the public has the right to comment and either approve or request a more detailed Environmental Impact Statement (EIS). Other federal agencies such as U.S. Fish and Wildlife Service must be given the opportunity to comment on matters under their jurisdiction. The public has the right to comment on the EIS and a public hearing must be held. If troublesome issues arise, a mitigation plan is developed.

Endangered Species Act

The purpose of the Endangered Species Act (ESA), passed in 1973, is to conserve the nation's biological heritage consisting of its animal and plant species. The law enlists all federal agencies and departments in an effort to conserve threatened and endangered species and to promote the purposes of the act. As stated in Section 7 of the act, all federal agencies are "to insure that actions authorized, funded, or carried out by them do not jeopardize the continued existence" of an endangered species or "result in the destruction or modification of habitat of such species." Section 9 of the ESA includes prohibitions against "take" which is defined in the act as "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect or attempt to engage in any such conduct."

The ESA also charges the above agencies to identify and designate "critical habitat" for listed species, based upon the best scientific data available. This is to identify and protect habitat essential to the species' survival and recovery. Critical habitat is the specific areas, within or outside the species' geographical range at the time of listing, which contain essential physical or biological features for conserving the species and which may require special management or protection.

When constructing the CAP canal in the Tucson area special precautions were taken to avoid harming various species. An important deer movement area between the Tucson Mountains and the Schuk Toak District of the Tohono O'odham Nation west of Tucson is crossed by the CAP canal. To minimize disrup-

tion to deer movement and other wildlife in this unique area and to preserve this corridor, the U.S. Bureau of Reclamation buried parts of the canal under six major washes and purchased 4.25 square miles of deer habitat. The corridor will be managed by Pima County as part of the Tucson Mountain Park system and will be protected from future development.

This area also contains important habitat for the kit fox, the endangered Tumamoc globe-berry plant, and three potential endangered species: the desert tortoise, the Gila monster and the Thornber's fishhook cactus. The corridor will protect about 27,000 Thornber's fishhook cactus. Obviously any construction projects involving the movement and storage of water must proceed especially carefully to anticipate ESA concerns.

Even now, with the CAP system essentially completed, the ESA continues to impact water resource planning. Along with water, the CAP brings fish and other aquatic species from the Colorado River. Some aggressive, non-native fish pose a potential threat to Arizona's native fish species, all of which are listed as endangered or threatened. The concern is that during periods of high precipitation or snowmelt, when normally dry rivers are flowing, the CAP canal might provide a water link allowing non-native fish to reach the headwaters of streams, invading the habitat of native species. Eliminating such hazards can require building expensive fish barriers or other obstacles to non-native fish, resulting in water project delays and additional costs.

REGULATION OF WATER COMPANIES

The 19 largest municipal water providers within the Tucson area are listed in Figure 7-3. (See Appendix B for a list of all water providers in Pima County.) Tucson Water, the largest, serves about 80 percent of the total population. About 12 percent of the population is served by private domestic wells and a large number of very small companies.

Different regulations regarding water rates apply to different types of water providers. Elected officials and the mandate of the electorate control municipal water companies. This can lead to disenfranchisement when the boundaries of the water company and the municipality are different. Also voters within the Tucson city limits who receive water from utilities such as Flowing Wells Irrigation District have the right to vote on Tucson Water issues. Both of these situations prevail in Tucson. Tucson Water's service area extends far beyond city limits, and private water providers operate within city limits. Municipal water companies can approve increased rates, and they may float bond issues, spreading capital costs into future years.

Private water companies and water cooperatives, on the other hand, are regulated by the ACC. Raising or restructuring rates requires ACC approval in a rate hearing. Private companies generally are not allowed to raise rates to recover future costs. For example, if ADWR requires conservation programs, the ACC may refuse a rate increase to cover the costs until after the money has been spent and the program proven to be effective. Similarly, a small water company cannot increase rates to build a new well or a treatment system. Instead, it must build the well or the treatment system, then recover the costs. Also ACC does not allow water companies to recover CAP holding costs. These are costs for CAP water rights not presently being used.

As a result, private water companies and water cooperatives may find themselves in a regulatory bind. ACC's goal is to keep rates low to benefit consumers; the ADWR goal is to conserve water within AMAs; and an ADEQ goal is to ensure safe drinking water quality. A private water company confronting these varied regulatory goals may have problems initiating conservation programs. Without the power to borrow money or float bonds, a small water company's very survival may be threatened when major capital improvements are needed.

The ACC does not regulate irrigation districts, regardless of whether they actually provide irrigation water (e.g., Flowing Wells) or water improvement districts (e.g., Metropolitan Domestic Water Improvement District). These districts are responsible solely to their boards and members. ADWR regulates all water providers regarding water supply (assured water supply and safe yield) and water use issues (conservation), with EPA and ADEQ regulating water quality issues.

REGIONAL WATER QUALITY PLANNING

The Pima Association of Governments (PAG) is responsible for coordinating water quality and transportation planning as well as

regional population projections. Each local government entity, regardless of its size, has one vote on PAG decisions. An Environmental Planning Advisory Committee and its Water Quality Subcommittee, which is made up of government staff and local residents, study and make recommendations on such matters as new wastewater treatment facilities, water reclamation and pollution cleanup. PAG votes on their recommendations to determine whether they become policy.

FLOODPLAIN MANAGEMENT

Both Pima County and the City of Tucson are involved in flood control and the development and enforcement of floodplain ordinances. Pima County's flood control district (FCD) is governed by the Board of Supervisors acting in its capacity as Pima County FCD managers. Established by state statute in 1978, county flood control districts work to reduce the risk of flood loss, minimize the impact of floods on human safety, health and welfare, and restore and preserve the natural and beneficial values served by floodplains. Established as political taxing subdivisions of the state, FCDs have the power to levy taxes to support flood-control projects. Their area of jurisdiction may include incorporated and unincorporated areas.

Legislation also allows an incorporated city or town within a county to assume responsibility for its floodplain management. Tucson maintains its own floodplain management program within Pima County. Pima County FCD is mainly concerned with areas outside city limits. Intergovernmental agreements (IGAs) have been signed with the city, however, for the district also to be responsible for waterways within certain incorporated areas. IGAs are likely to be worked out for regional watercourses that have significant flow during 100-year flood events, such as the Rillito Creek and the Santa Cruz River. Pima County therefore maintains the major watercourses in the area, although the city may be responsible for sections of them. Finally, floodplain maps are under the jurisdiction of the Federal Emergency Management Agency (FEMA) which administers the national flood insurance program. Communities that do not comply with FEMA rules are not eligible for federal flood insurance.

POWERS OF COUNTIES AND CITIES

Counties generally have only those powers granted to them by the state, unless they have adopted charter government. Counties are required to look after the "health, safety, and welfare" of their residents. As a result, they maintain health departments, building codes, etc. Counties do not currently have the authority to operate water systems. Pima County has a department of environmental quality which is primarily involved with air quality and hazardous waste. County health departments have some water quality responsibilities related to human health; e.g., they regulate septic tanks. County zoning decisions may be based on the ability of government to provide services such as wastewater treatment. In at least one case a massive rezoning was denied on the basis of an insufficient water supply, the lack of which could have been a serious health problem.

Cities have varied levels of involvement in water management. Some cities (e.g., Tucson) operate water companies, and many cities operate wastewater facilities (e.g., Show Low). Many cities have water conservation programs (e.g., Phoenix).

Cities and counties may assess fees on new development (impact fees) to recover the cost of providing services to the new area. Such services include water and wastewater facilities. Both cities and counties operate under state and federal water quality and quantity laws.

City and County Ordinances

Cities and counties also have their own laws, referred to as ordinances. In general, these ordinances may be stricter than state or federal ones, but may not be less strict. Thus a city cannot opt out of following the Safe Drinking Water Act, but it can decide to meet more stringent standards, such as the tighter THM standard that the City of Tucson has imposed on itself. On occasion, however, the state government has preempted this right.

Water Consumer Protection Act

The Water Consumer Protection Act (WCPA), a ballot proposition passed by City of Tucson voters in 1995, (See page 139) had three major goals:

- prohibit Tucson Water from directly delivering CAP water unless the salt content was substantially reduced;

• prohibit delivery of water from polluted sources, including treated TARP water (See page 66) ; and

• compel the city to offset groundwater withdrawals with recharge, including recharge of CAP water.

Other goals included:

• encourage the city to trade and sell its CAP allotment;

• avoid recharge in areas of known landfills; and

• prevent disinfection byproducts such as THMs from being introduced into the aquifer through treatment and direct injection recharge. The WCPA did not deal specifically with corrosivity.

In 1997, Proposition 201 was on the ballot but failed to pass. It would have repealed many of the provisions of the WCPA, substituting less restrictive goals.

Tucson Xeriscape Ordinance

This ordinance applies to new multifamily, commercial and industrial developments. Its goal is to conserve water by applying xeriscape principles. These principles include using drought-tolerant plants, maintaining limited grass areas and applying mulch and soil improvements. Landscaped areas must be designed to take advantage of storm water run-off, and water-conserving irrigation systems are required.

City and County Plumbing Codes

Both city and county require that water-efficient fixtures be used in all new residential and commercial construction. Toilets must be ultra-low flush (i.e., 1.6 gallons per flush or less) and faucets must not exceed 2.5 gallons per minute. The code also applies to replacement of old fixtures. Requirements also are established for evaporative coolers, air conditioners, decorative fountains and waterfalls.

Water Waste Ordinance

Since 1984 it has been illegal for people within the City of Tucson to let water flow off their property onto public areas or other property. A "water cop" can fine individuals, property managers and landscape contractors who are guilty of this infraction. Tampering with water meters also is illegal.

Golf Course Water Use

Tucson and Pima County have ordinances requiring the use of CAP or effluent for new golf courses where feasible. (See Chapter 5 for more information.)

Emergency Water Conservation

Upon declaring a water emergency because of problems with water supply, the Tucson City Council may prohibit or restrict non-essential uses of water. Examples of restricted activities are outdoor irrigation except areas using reclaimed water, washing of sidewalks, outdoor water-based play, automatic water service in restaurants, misting systems, filling swimming pools and spas, and washing of vehicles except at facilities with recirculation systems. Exceptions can be allowed for reasons of public health, safety or economic hardship.

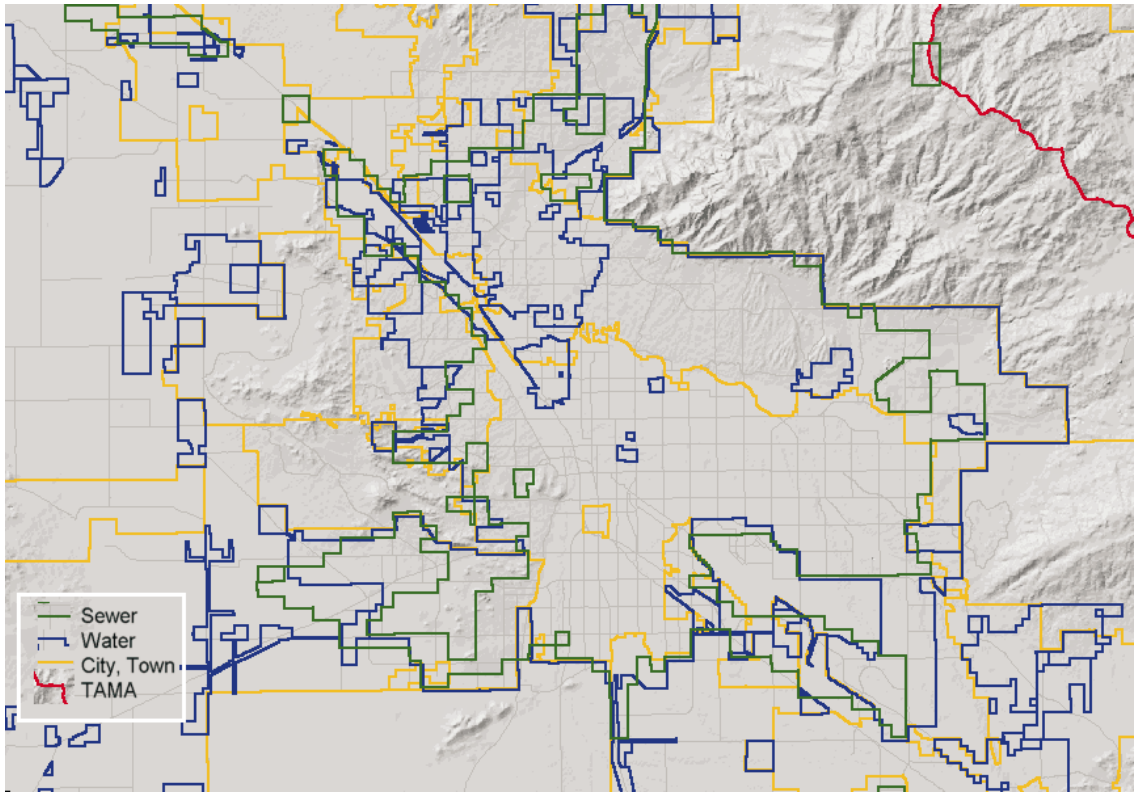
MANAGING WATER AND WASTEWATER

Tucson operates the largest water system in the area, serving about 600,000 persons an average of about 97 million gallons of water daily. The city serves customers both inside and outside city limits. Since Tucson Water is managed by the Tucson City Council, people who are not city residents have little say on city water decisions, even though they receive city water. Approximately 16 other water providers serve another 155,000 customers in the area. The remaining 81,000 water users are served by very small water companies or have their own wells. Some of these water companies are within the city limits of Tucson, Oro Valley or Marana. The cities do not regulate the activities of these water providers and cannot require their compliance in such activities as water conservation programs.

Water providers that are not municipal water departments, on the other hand, have little or no say in certain city decisions that affect them, such as rezonings and conservation ordinances. ACC regulates rates and some procedures of private water companies, but not municipal utilities or irrigation districts. ADWR can require all three types of water utilities to implement conservation measures and meet sustainability goals but has no jurisdiction over water users themselves. At times, ACC and ADWR rules conflict.

Pima County handles most wastewater in the region, with treatment plants at Roger Road and Ina Road, next to the Santa Cruz River. Pima County also runs several small treatment plants outside the metropolitan area.

Figure 7-10 Jurisdictional boundaries.



Sources: Pima County Technical Services, Arizona Department of Water Resources.

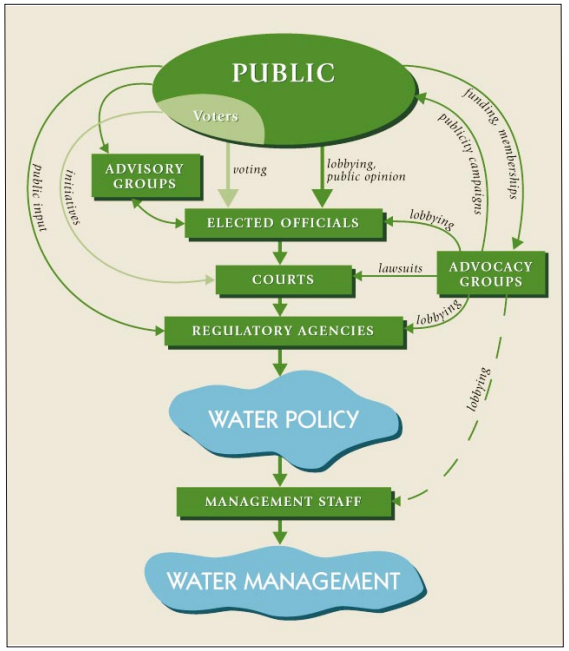
Because of an intergovernmental agreement between Tucson and Pima County, Tucson has rights to most of the effluent that comes from wastewater treatment facilities throughout Pima County. A few neighborhoods have their own treatment facilities, and some people have septic tanks or other kinds of individual treatment systems. Some subdivisions with golf courses, such as El Conquistador, use treated water from their local community for watering the golf course.

COORDINATING WATER MANAGEMENT

Despite, or perhaps because of the many laws and rules, no one agency has legal authority to coordinate water use area-wide. This is to the detriment of efficient water management. TAMA and the Pima Association of Governments (PAG), however, address some basin-wide issues that were previously discussed. The following further characterizes water management in the Tucson area:

- No agency has the authority to require water users to take a particular kind of water, such as effluent or CAP water. Some people believe mines and farms should use lower quality water and leave the groundwater for drinking purposes. But the type of water that businesses and water companies use is generally determined by the market place or historical accident. In other words, they generally use the cheapest water source, which often is groundwater. Also, individuals have the right to pump groundwater for their own domestic use, and over 24,000 private wells exist in the Tucson area. The only limiting factors are well spacing regulations and the cost of drilling and operating a well.
- No agency can mandate that all categories of water users shall contribute to help pay for solutions to water problems. For example, no agency can require businesses that use groundwater to pay a fee to support CAP activities in an effort to prevent the water table from declining. While some local taxes and pumping fees are charged, the funds do not help pay Tucson Water's cost of using CAP water.
- No agency can require individuals to conserve water. ADWR can set per capita goals that water providers must meet, but those providers in turn have no authority to require water savings of their customers. The City of Tucson could pass an ordinance limiting water use, but it would not apply to people living outside city limits and probably not even to customers of other water providers within city limits.

Figure 7-11 Generalized model of municipal water policy.



• Elected officials often make land use decisions without worrying about long-term water supplies. Rezonings within established water service areas certified for assured supply may proceed, although new developments outside such areas must go through the approval process. In 1999, a rezoning for the Canoa Ranch near Green Valley was denied partly because of water supply issues. This, however, was the exception, and other reasons existed for opposition to this rezoning.

BASIN-WIDE WATER MANAGEMENT

Local water management is characterized by a complex web of overlapping, and occasionally conflicting political and geographical jurisdictions. Overlapping jurisdictions in the Tucson area are shown in Figure 7-10. Figure 7-11 provides a generalized model of municipal water policy management. Though attention tends to be focused on elected officials, many other "players" are involved. The public, particularly the voting public, has the ultimate say in most policy matters and has several avenues for influencing water policy (rules, laws and guidelines) and water management (implementation of policy).

Coordinated and comprehensive basin-wide management has been advocated at various times. Such "watershed management" has several obvious advantages, and a few more subtle disadvantages. The most compelling reason cited for watershed management is the ability to treat water resources as part of an integrated system. In its most optimistic implementation, decisions such as land use, transportation and population growth all would be evaluated in terms of their basin-wide impact on water resources.

Critics of the existing situation note the difficulty in establishing long-term plans when so many of the critical decisions are split among different agencies and groups. Moreover the responsibility to meet long-term demands is often unevenly distributed. For example, while developers are required to demonstrate a 100-year assured water supply, they are not required to consider the basin-wide impacts of their development. This raises some thorny hydrologic issues as well as concerns about relative inequity. In another example, some have complained that the costs of renewable supplies like CAP water have been disproportionately borne by Tucson Water customers.

The expectation is that stronger basin-wide management would reduce disparities and promote true sustainability. Promoters also note that a watershed management authority could reduce some of the political and economic inefficiencies inherent in the current situation.

The splintered nature of local water management can be counted as both a cost and a benefit. The inefficiency that results from multiple jurisdictions also can provide some measure of control against a single entity having too much authority. A watershed authority could make it easier to implement ecologically sound policies, but it also could be an efficient mechanism for mischief.

Some people have argued that the Tucson region should have a government agency with powers to buy and sell water throughout the region and to determine who uses which kinds of water. There could still be private water companies under the larger umbrella agency. The Tucson City Council vetoed establishing an agency with some of these powers when it voted against establishing the Santa Cruz Valley Water District in 1993. This agency would have had some of the responsibilities of the Central Arizona Groundwater Replenishment District for this area.

Benefits of area-wide management include reserving the highest quality water for municipal use while lower quality water would be used for industry and agriculture. Also the costs of

augmenting the supply could be distributed more fairly throughout the region. The managers could either be elected directly by the voters or appointed by the county and cities in the region. One argument against this approach is that the managers would have enormous power. If they were appointed, with one vote per city (like PAG), Tucson city residents would be unfairly under-represented. If they were elected, it might be difficult to adequately educate voters about the qualifications of these managers with highly technical responsibilities. People who generally support less government are opposed to increasing government power over water. A change in state law would be required to create such an agency as well as approval of local governments and the voters. For this agency to acquire private water companies a company would either have to be willing or be acquired through condemnation. This approach, while having some benefits, has generally not been considered politically feasible.

TUCSON WATER OPERATIONAL OPTIONS

Some people have argued that private water companies should provide all water service in the area, and that Tucson (or any government) should not be in the water business. They argue that Tucson Water should privatize its operations because this would distance a professional service from political decision-making. They point out that Tucson Electric Power provides power very effectively as a stockholder-owner corporation and that Tucson Water could do the same. If it were a private water company, the ACC would oversee water rates, not local politicians. Opponents argue that customers are better protected by officials they elect directly and that a profit-making company would probably have to charge higher rates. They also argue that if the company had to go through costly rate hearings, they would have to charge more for water.

Others note that water is fundamentally different from electricity, natural gas and other utilities in ways that argue for public ownership. Water has public health, aesthetic, and environmental aspects that the others lack. The public may be willing to pay more for water supplies that are purer or sustainable, or to subsidize certain public uses or water. Thus, the private sector may not be the best provider.

Another option is to leave Tucson Water under city control, but have a private management company operate the facilities, rather than city employees. The City Council would continue to set policy, but would contract for services as it does with its public transit system. The benefits are that the council would be less involved in operational details, leaving that to outside professional management which would provide the services as contracted. Such a major transition, however, could create problems in water service, without necessarily improving it.

Another option is for Pima County to become the regional water provider, at least for the water service area now served by Tucson Water, as it is now the primary regional wastewater provider. This would require a change in state law to enable the county to take on this new charge. The principal advantage would be the enfranchising of Tucson Water customers outside city limits. This has generally been considered politically infeasible as Tucson likely would be unwilling to give up this power.

Still another option is one that was pursued for years by Tucson Water; i.e., establish Tucson Water as the only municipal water provider in the region. During the 1960s and 1970s, the city acquired numerous small water companies with the goal of providing unified water management both inside and outside city limits. Officials believed that one consolidated water system could better distribute water and costs fairly among customers, perform more effective water conservation programs and assure adequate water for fire protection in all areas. All companies were acquired through voluntary purchases. One drawback of this system is that it would serve a greater number of people who, because they live outside city limits, cannot vote on water matters that affect them.

ENFRANCHISING NON-RESIDENTS

Because the voting public has such an important influence on water decision making, having the right to vote on water matters is important. Only Tucson city residents, however, may vote for City Council and mayor or cast ballots in water bond elections, water initiatives and referendums affecting Tucson Water. Many people who live outside city limits object to this disenfranchisement. Meanwhile city residents who do not receive water from the city have the right to vote on Tucson Water matters.

If the city continues to be the major municipal water provider in the area, is there some

way to enfranchise non-residents? Various bills to deal with this issue have been introduced in the Legislature. The most recent one would give ACC responsibility for approval of water rates for people outside city limits. Opponents point out that water rates could be very different inside and outside the city, with rates outside probably increasing to cover the cost of going through rate hearings. Current state law forbids a municipality from charging substantially more to customers outside its limits; modest rate differences must be based on higher costs to deliver the water.

Most people would not consider it fair or legal for non-residents to vote for city officials since most decisions made by those officials are unrelated to water matters; e.g., decisions that impact city taxes and services. Should all water customers vote on water bond issues, since water bonds are repaid not by taxes but by water service revenues? Should they be able to vote on water initiatives and referenda? An argument can be made for these rights, but a change in state law probably would be required to enable a city to have an election outside city limits.

AFTERWORD

There was a whole folklore of water. People said a man had to make a dipperful go as far as it would. You boiled sweet corn, say. Instead of throwing the water out, you washed the dishes in it. Then you washed your hands in it a few times. Then you strained it through a cloth into the radiator of your car, and if your car should break down you didn't just leave the water to evaporate in its gullet, but drained it out to water the sweet peas. *Wallace Stegner,* Wolf Willow, A History, a Story, and a Memory of the Last Plains Frontier.

As the above quote shows, the best water managers in the West have relied on imagination and creativity to get the most out of a drop of water. Some may argue, however, that the quote describes a far simpler time than the present. Today, we use vast amounts of water for purposes frontiersmen never dreamed; we've become a bit more particular about water quality, too.

In fact, if you have read the first seven chapters of this report and aren't confused by now, then you haven't been paying attention. Tucson's water situation is a fiendishly complex, multi-dimensional conundrum. Each piece of the puzzle is linked to others, some in obvious ways, some in ways that are far more subtle.

This complexity comes from the innate nature of the resource, as well as the relationships among various factors. For instance, as a physical resource, water involves disciplines ranging from chemistry and microbiology to civil engineering and hydrogeology. In a larger context, water resources are often tied to issues like population growth, property rights and quality of life.

While individual aspects of a particular water issue may be well understood by the research community, the interactions are often poorly understood. This is true within the physical sciences, but is particularly acute when the interactions involve physical sciences, social sciences and the humanities.

To further complicate matters, only a limited community consensus exists on what we are trying to accomplish. We all want a reliable, bountiful, sustainable water supply. We demand that it be safe, palatable, and environmentally benign. And we want it provided to our homes, businesses and parks at the lowest possible cost.

We also want fairness, or equity, as each of us defines it. Here is where the consensus starts to break down. For some, equity means traditional uses of water are favored. Others demand economic equity – those who benefit, pay. In practice, this might mean that those continuing to pump groundwater should subsidize those who switch to renewable supplies. Some want political equity – those who are affected, should decide. This would require new political mechanisms whereby all water users could vote on the candidates and initiatives that determine their water future. And still others are concerned with inter-generational equity. They don't want today's consumption decisions to limit the options and quality of life of future Tucsonans.

We also would like less political strife over water. This can tempt us to put off difficult decisions, perhaps by calling for yet another study. Groundwater overdraft is the sort of problem that is easy to ignore. A declining water table is out of sight and out of mind. There is no perceived sense of urgency, no hard deadlines by which we absolutely must act. And so inaction becomes a tempting course.

As tempting and politically expedient as it may be, inaction is itself a form of decision-making, but one rarely based on sound analysis or the expressed preferences of citizens. There are other compelling reasons to act sooner rather than later. Options may diminish over

time, or grow more expensive. Political costs often rise over time, too.

The decisions we make, or avoid making in the next few years are likely to have important, lasting consequences. Assuming we act, who should decide on our course? Are technocrats or self-appointed water experts best suited to make the hard decisions? Not likely. The former tend to have deep but narrow knowledge; the latter may offer appealingly simplistic but unproven solutions.

The authors of this report also decline to make recommendations, for two reasons. First, some of the most informed water researchers are among the least certain of how to proceed. (We get confused at times, too.) Second, and more importantly, physical and social scientists simply have no basis for making policy decisions. These water resource issues aren't about right and wrong decisions. They are about values and priorities, expressed as choices with social consequences.

Does that mean voters must directly decide details of our water strategy, as they have been asked to do recently through initiatives? Is it fair or reasonable to expect a busy, preoccupied electorate to become informed on the nuances of groundwater hydrology and the finer aspects of alternative water purification systems? Clearly not. Rather, it is up to the technocrats to describe possible courses of action, and their respective costs and tradeoffs. Voters must express their beliefs, values, and preferences with respect to water. Then our elected officials must do the heavy lifting of turning this information into sound, long-term water policy.

How then can the reader help make decisions about Tucson's water future? Part of the process is examining your personal goals and values and then considering what options will best achieve your objectives. No single "magic bullet" is available to assure a long-term, high-quality water supply. Most choices have both benefits and drawbacks.

BALANCING THE BUDGET

We invite you, the reader, to work through a series of options in order to shape your recommendations to decision makers. We begin by restating the overdraft problem, and determining how important achieving a sustainable water supply is to you.

A simplified water balance was presented in bar chart form in the Preface (See page vi). This shows that in 1997, water demand in the TAMA totaled some 345,400 acre-feet. Renewable supplies, consisting of natural groundwater replenishment, CAP water, and effluent totaled only 194,500 acre-feet, leaving a water deficit of 150,900 acre-feet of mined groundwater.

A somewhat more detailed water budget is depicted on the adjoining page. This information is graphically depicted as an "octopus" on the following page. The top section of the water budget lists all water sources that contribute to the aquifer, including natural, incidental, and direct recharge. Gains to the aquifer also include underground flow into our aquifer from the Santa Cruz AMA to the south. The center section of this water budget tallies losses from the aquifer, which are mainly groundwater pumping for municipal, industrial, and agricultural uses. Other losses from the aquifer include underground flow from our aquifer into the Pinal AMA to the north, and evapotranspiration from shallow groundwater.

The bottom portion of the budget represents direct uses of effluent and CAP water, which are renewable supplies. While these uses do not directly affect the aquifer balance, there may be indirect impacts. For example, if CAP water was not available to irrigate some agricultural land, groundwater might be used instead. On the other hand, effluent not used to irrigate a golf course might be left in the riverbed, where much of it would become incidental recharge to the aquifer.

The bottom line of this water budget is the same as in the bar chart in the introduction — we are pumping far more groundwater than is being replaced in the aquifer. This situation is not sustainable in the long run. The only options for approaching or attaining sustainability are making full use of our CAP allocation, severely limiting current and future water demand, or some combination of the two.

TO SUSTAIN OR NOT TO SUSTAIN

How important is a sustainable water supply to you? Sustainability is not an all-or-nothing concept. When using our water supply, we have a range of choices, including the following:

- Try to balance water supply and water demand to guarantee water availability indefinitely;
- Try to prolong the life of the water supply over a shorter term, say 50 or 100 years;

"Wet Water" Budget*

For Tucson Active Management Area, 1997 data (in acre-feet)

GAINS TO AQUIFER	
GROUNDWATER INFLOW FROM SANTA CRUZ AMA	**8,700**
RECHARGE	
Natural: Mountain	38,900
Natural: Streambed	37,700
Natural: subtotal	76,600
Incidental: Municipal	56,900
Incidental: Industrial	5,300
Incidental: Agricultural	26,500
Incidental: subtotal	88,700
Direct: CAP	7,800
Direct: Effluent	3,200
Direct: subtotal	11,000
Total recharge	**176,300**
Total of all gains to aquifer	**185,000**

LOSSES FROM AQUIFER	
GROUNDWATER OUTFLOW TO PINAL AMA	**-24,500**
GROUNDWATER PUMPING	
Municipal	-145,300
Industrial	-57,700
Agricultural	-104,700
Total groundwater pumping	**-307,700**
EVAPOTRANSPIRATION (from shallow groundwater)	**-3,700**
Total of all losses from aquifer	**-335,900**

AQUIFER BALANCE	
Total of gains and losses (overdraft)	**-150,900**

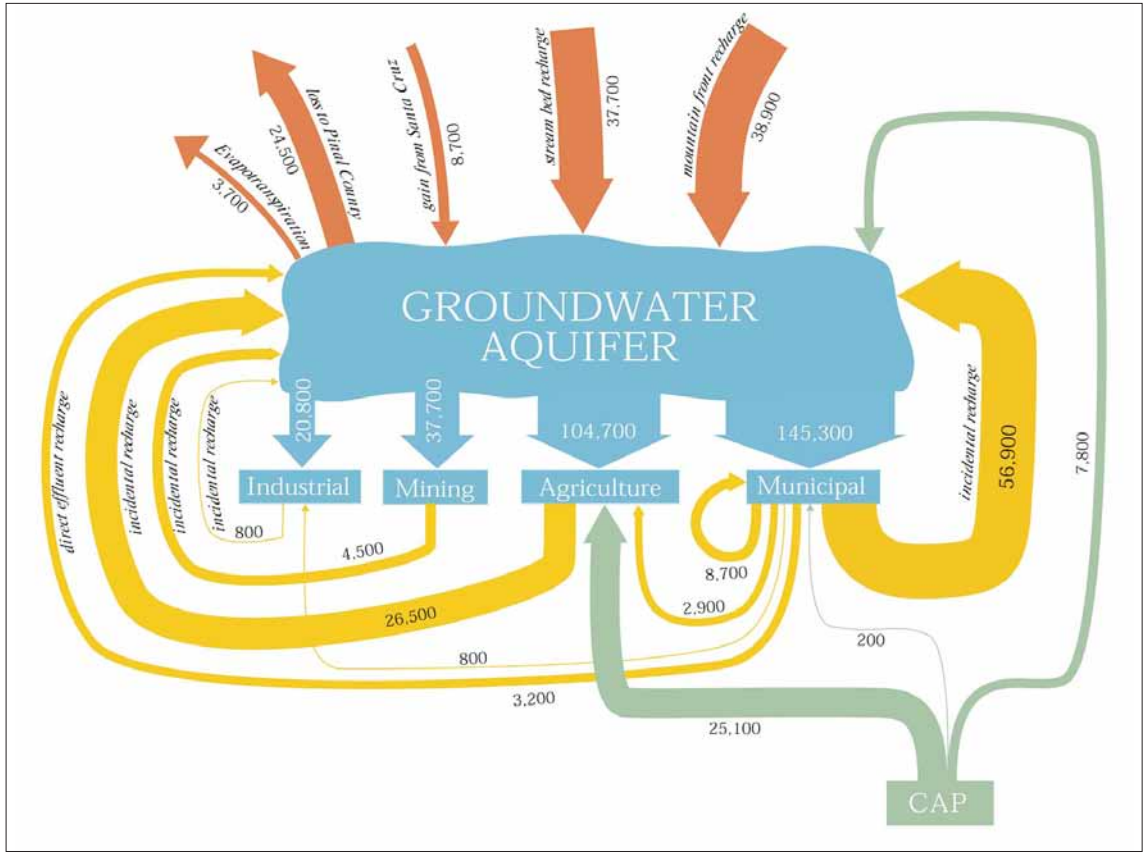
DIRECT USE OF RENEWABLE SUPPLIES**	
EFFLUENT (Direct Use)	
Municipal	8,700
Industrial	800
Agricultural	2,900
Total direct effluent use	**12,400**
CAP (Direct Use)	
Municipal	200
Agricultural	25,100
Total direct CAP water use	**25,300**
Total of direct use of CAP water & effluent	**37,700**

NOTES ON WATER BUDGET CALCULATIONS

* This budget uses data from ADWR, but differs from ADWR's "paper water" budgets by considering only the physical use and movement of water. Direct recharge is counted as a gain to the aquifer in the year recharge occurs, not when recharge credits are used. Irrigation with CAP is counted as direct CAP use, not groundwater or *in lieu* "recharge."

** These uses may indirectly benefit the aquifer by serving as a substitute for groundwater that would have been pumped. Incidental recharge from these uses is already included in the "Gains to the Aquifer" section.

Water budget flow chart. (1997 data)



Sources: Arizona Department of Water Resources, Water Resources Research Center.

- Plan to deplete some parts of the aquifer (Avra Valley, for example) while protecting the central city from subsidence; or
- Use as much water as we want for as long as it lasts.

Current state law directs us to aim towards prolonging the supply into the future, but does not require complete sustainability. This is because "Safe yield" allows a certain amount of groundwater mining.

People who support sustainability or prolonging the life of the water supply are mainly concerned about:

- Avoiding subsidence;
- Assuring an affordable water supply for future generations;
- Assuring water quality for future generations;
- Complying with requirements of state law;
- Preserving the desert from "urban sprawl" or "overdevelopment."

People who don't support sustainability usually feel that:

- The present is more important than the distant future;
- New technologies may be developed over time to solve the problem;
- The problem is too far off to be a concern;
- Information about water supplies and water quality is incomplete or not credible;
- Their family may not be here when the problems arise;

Do you recognize your views in either list? Or do you identify with some statements from both lists? How much do you value a sustainable water supply? What kind of limitations are you willing to impose on others? What sacrifices are you willing to make?

WATER BUDGET SCENARIOS

Conventional wisdom is that most people in the community support either a sustainable supply or at least prolonging our supply. But there are many divergent views as how best to approach this goal. To balance supply and demand we can control water use and/or increase the supply. We can control water use by limiting the number of people using water and/or limiting the amount each person uses. We can also transfer water use from one sector to another (e.g., reduce agricultural activities to save water for other uses). Water supplies can be increased by capturing more rainwater and snow

Supply & Demand Scenarios*

Based upon Approximate Current Levels of Demand by Sector, in Acre-Feet

	Demand (% of current)				Groundwater Pumping					
	Muni.	Indus.	Ag.	Supply	Muni.	Indus.	Ag.	Total	CAP	Balance†
Current levels	100	100	100	Groundwater for all sectors	150,000	50,000	125,000	325,000	0	-180,000
	100	100	100	Groundwater for municipal, CAP for others	150,000	0	0	150,000	175,000	-5,000
	100	100	100	CAP for municipal, groundwater for others	0	50,000	125,000	175,000	150,000	-30,000
2X Municipal	200	100	100	Groundwater for all sectors	300,000	50,000	125,000	475,000	0	-273,000
	200	100	100	Groundwater for municipal, CAP for others	300,000	0	0	300,000	175,000	-98,000
	200	100	100	CAP for municipal, groundwater for others	0	50,000	125,000	175,000	300,000	+27,000
2 Mun. ½ Ag. & Ind.	200	50	50	Groundwater for all sectors	300,000	25,000	62,500	387,500	0	-201,000
	200	50	50	Groundwater for municipal, CAP for others	300,000	0	0	300,000	87,500	-113,000
	200	50	50	CAP for municipal, groundwater for others	0	25,000	62,500	87,500	300,000	+99,000
	200	50	50	Half groundwater, half CAP for all sectors	150,000	12,500	31,300	193,800	193,800	-7,000
2 Mun., Ag. & Ind.	200	200	200	Groundwater for all sectors	300,000	100,000	250,000	650,000	0	-417,000
	200	200	200	Groundwater for municipal, CAP for others	300,000	0	0	300,000	350,000	-67,000
	200	200	200	CAP for municipal, groundwater for others	0	100,000	250,000	350,000	300,000	-117,000
	200	200	200	Half groundwater, half CAP for all sectors	150,000	50,000	125,000	325,000	325,000	-92,000

* This table represents a range of supply and demand scenarios for general illustration; it should not be used to make specific future projections. Simplified assumptions (e.g. all groundwater or all CAP for a sector) have been made to clarify the relationships between supply, demand and the aquifer balance.

† This number represents the approximate "wet water" loss or gain to the regional aquifer. The value is calculated as: (net natural recharge [76,600]) - (groundwater outflow [24,500]) - (evapotranspiration [3,700]) - (groundwater pumping) + (incidental recharge) + (groundwater inflow [8,700]). Incidental recharge is itself calculated as 38% of municipal demand (multi-year average), 20% of agricultural demand, and 12% of industrial demand. This balance does not consider factors such as long-term storage through recharge, or changes in incidental recharge rates.

melt, importing and using water from elsewhere and accepting wastewater as a supply for more uses.

Here is where you bring it all together, combining the factual information gleaned from the first seven chapters with your values and preferences, to generate tentative choices. The final step is to see what the consequences of those choices are, and how your choices interact with each other. To do that, we use water budget scenarios.

The table on the preceding page shows ten illustrative water supply and demand scenarios. The left side of the table shows municipal, industrial and agricultural demand expressed as percentages of current demand. The "supply" column describes who pumps groundwater and who uses CAP water under each scenario. (Note that use of effluent has little effect on the water budget bottom line, because nearly all effluent not re-used is directly or incidentally recharged.) These assumptions about water demand levels and supply allocations on the left side of the table are used to estimate resulting groundwater pumping by sector, CAP usage, and aquifer balance, as shown on the right side of the table.

The first three scenarios hold demand at current levels. The first scenario shows that if everyone uses pumped groundwater, we have a large deficit in the aquifer. The second scenario suggests that if all growth were halted and groundwater were reserved solely for municipal uses, the aquifer would be nearly in balance. The next three scenarios correspond to an eventual doubling of municipal demand, as population grows. Here, reserving groundwater for municipal uses does not bring the aquifer close to balance. By contrast, using CAP water for all municipal uses actually produces a surplus in the aquifer.

The third set of scenarios combines municipal growth with a halving of industrial and agricultural demand. Note that serving a 50-50 blend of groundwater and CAP water to all sectors nearly balances the aquifer. The final set of scenarios corresponds to a doubling of water demand in all sectors. This could occur, for example, if population growth continued unabated, mining expanded, and tribal water allocations were used to expand irrigated agriculture on reservation lands. In such a situation, there is not sufficient CAP water available to bring the aquifer close to balance.

Those of you with Internet access are now invited to try your hand at water budgeting by making your own assumptions. An interactive version of this budget is on the Web at:

http://ag.arizona.edu/AZWATER/

Use it to construct a scenario that reflects your values, preferences and sense of fairness. Try out a number of options. For example, you may want to limit water use by controlling population, or by requiring more conservation; or you may want to lessen long-term salinity problems by using less CAP water.

See how close your preferred options come to balancing supply and demand. Remember that if you make some changes, other figures will be affected. For example, if you eliminate agriculture and replace it with naturally vegetated park land, the water savings will be greater than if you replace it with golf courses. If you use more effluent, you will have less incidental recharge. To get close to water sustainability, you will have to make hard choices. When push comes to shove, where are you willing to compromise?

Appendix A

WATER TERMS

Acre-foot (a.f.) - The amount of water needed to cover an acre of land one foot deep, equal to 325,851 gallons.

Algae - Aquatic one- or multi-celled plants without true stems, roots and leaves but containing chlorophyll. Algae may produce taste and odor problems.

Alluvium - Debris from erosion, consisting of some mixture of clay particles, sand, pebbles, and larger rocks. Usually a good porous storage medium for groundwater.

Artesian well - A well in which water rises to the surface without pumping from a permeable geological formation that is overlain by an impermeable formation. No artesian wells remain in the Tucson area.

Artificial recharge - The deliberate act of adding water to a groundwater aquifer by means of a recharge project. Artificial recharge can be accomplished via injection wells, spreading basins, or in-stream projects. See also incidental recharge, natural recharge, recharge.

Aquifer - One or more geologic formations containing enough saturated porous and permeable material to transmit water at a rate sufficient to feed a spring or for economic extraction by a well. Combination of two Latin words, *aqua* or water, and *ferre*, to bring; literally, something that brings water.

Assured Water Supply - A technical term used in the Groundwater Management Act defined as a supply of water theoretically sufficient to meet the needs of a new development or customers of a municipal water supplier for 100 years. The methods for determining this are spelled out in AACR12-15-701.

Augmentation - Supplementing the water supply by such means as importing water from another basin or storing water.

Base flow - Streamflow derived from groundwater seepage into the stream; water that flows on the surface independent of precipitation.

Basin - See Groundwater basin.

Ccf (hundred cubic feet) - a unit of water used by some municipal water providers for metering and billing purposes. 1 Ccf = 748 gallons.

Central Arizona Project (CAP) - A facility consisting of canals, pumping stations and pipelines used to transport water from the Colorado River at Lake Havasu to Central Arizona and ultimately to Tucson.

CERCLA - The Comprehensive Environmental Response, Compensation and Liability Act, commonly known as Superfund, which regulates disposal and cleanup of hazardous materials.

Chloramine - A chemical used to disinfect and innoculate water supplies. Formed by combining chlorine and ammonia, chloramine is generally more stable but less potent than chlorine.

Chlorine - A chemical commonly used to disinfect water. It is highly effective against algae, bacteria and viruses, but not protozoa.

Coliform bacteria - a common type of bacteria found in soil and water and which grows in the intestines of warm-blooded animals. They are generally not harmful, but high levels may indicate the presence of other harmful bacteria or viruses.

Cone of depression - A drop in the water table around a well or wells which have been pumping groundwater. Depending on the rate of pumping and aquifer characteristics a cone of depression can be shallow and extend only a few feet or it can extent for several miles. Since water flows downhill underground, a cone of depression pulls water from the surrounding area into it, thus affecting the nearby water table.

Constructed wetland - A manmade wetland, usually designed to utilize wastewater and often involving a wildlife habitat component.

Consumptive use - A use that makes water unavailable for other uses, usually by permanently removing it from local surface or groundwater storage as the result of evaporation and/or transpiration. Does not include evaporative losses from bodies of water. Compare with non-consumptive use.

Corrosivity - A measure of the ability of water to corrode pipes. Corrosion occurs when metal is exposed to conditions which cause the breakdown of the metal through an exchange of ions. If corrosion is severe enough, the pipes may break entirely. EPA has no standards for corrosivity.

Desalinization - A process of removing salts and other dissolved minerals from water.

Disinfection byproducts - Compounds formed from the interaction of treatment chemicals with materials (usually organic) in the water.

Distribution system - An interconnected grid of water mains, valves, storage reservoirs and pressure boosting or reducing facilities.

Downgradient - The direction water flows by force of gravity.

Drawdown - A lowering of the groundwater level or the piezometric pressure caused by pumping, measured as the difference between the original groundwater level and the level after a period of pumping.

Effluent - Water that has been collected in a sewer for subsequent treatment (ADWR definition). The term is also commonly used to refer to water discharged from a treatment plant.

Evapotranspiration - The amount of water transpired through pores and evaporated by vegetation.

Electrodialysis - a membrane filtration process that uses an electric charge rather than water pressure to force dissolved solids through the membrane pores. Used by Buckeye, AZ.

Filtration - The process of passing water through materials with very small holes (pores) to strain out particles. Filtration can remove microorganisms including algae, bacteria and protozoa, but not viruses.

Flexibility Account - A paper account in which farmers can accumulate credits for unused portions of their groundwater allotments for use in meeting conservation requirements in the future.

Floodplain - The area near a watercourse inundated during floods. The 100-year floodplain is the area that is expected to be inundated by a flood of a magnitude that has a one-in-a-hundred probability of occurrig in any year.

GPCD (Gallons per capita per day) - The amount of water used on average by an individual each day. Total gpcd is calculated by dividing total water use in the area, including industrial and commercial uses, by the number of users. Residential gpcd is the number resulting from only considering domestic water use.

Gradient, hydraulic - The change of pressure per unit distance from one point to another in an aquifer. When an area is said to be "downgradient" it is at a lower level and water will flow in that direction.

Groundwater - Subsurface water body in the zone of saturation, or more commonly, available groundwater is defined as: That portion of the water beneath the surface of the earth that can be collected with wells, tunnels, or drainage galleries, or that flows naturally to the earth's surface via seeps or springs.

Groundwater basin - An area enclosing a relatively distinct hydrologic body or related bodies of groundwater.

Groundwater savings facility (GSF) - A facility, usually a farm, which agrees to use a renewable water supply such as CAP water instead of groundwater under the UWS program. Entities with extra renewable supplies, such as municipal water providers, sell CAP water to the farms and in return get a credit for groundwater saved, which can be used to offset future groundwater pumping.

Hardness- A water quality parameter that indicates the level of alkaline salts, principally calcium, magnesium, and iron, and expressed as equivalent calcium carbonate ($CaCO_3$). Hard water is commonly recognized by the increased quantities of soap, detergent or shampoo necessary to raise a lather.

Hydraulic gradient - see gradient, hydraulic.

In-lieu recharge - A term used by ADWR to describe the process of using a renewable supply instead of pumping groundwater at a Groundwater Savings Facility. No water is actually recharged.

Impact fee - A fee charged to developers to cover part or all of the costs of providing services, such as sewers, water connections, and roads. Such a fee is allowed but not required under state law.

Incidental recharge - Water incidentally added to a groundwater aquifer due to human activities, such as excess irrigation water applied to fields or water discharged as waste after a use. See also recharge, artificial recharge, natural recharge.

Infiltration - The process of water entering the soil or streambed surface.

Injection well - An artificial structure (usually an existing well) used to recharge the water table by forcing water down the well.

Irrigation district - A political entity created to secure and distribute water supplies. Most irrigation districts provide water for irrigation on farms, but some which originated for agricultural purposes now primarily serve municipal customers.

mg/l - Milligrams per liter - Roughly equivalent to parts per million (see below).

Microfiltration (uf) - a form of filtration using a membrane with larger pores than nanofiltration. It is highly effective in removing pathogens, including parasites such as giardia, but does not remove salts. Because it has large pores, UF does not leave a saline concentrate, although filters must be backwashed to keep the pores open.

Mineral content - See Total dissolved solids.

Mountain front recharge - Natural recharge that occurs at the base of the mountains because of rainfall or snow melt at higher elevations.

Municipal water use - All non-irrigation uses of water supplied by a city, town, private water company or irrigation district. Generally includes domestic, commercial, public and some industrial uses.

Nanofiltration (NF) - A form of filtration using membranes with larger pores than reverse osmosis. NF removes most salts, pathogens and organics. Like RO the process requires pretreatment of water with chemicals or a sand-based system. NF has not been used commercially on a large scale for drinking water.

Natural recharge - Natural replenishment of an aquifer generally from snowmelt and storm runoff. See also recharge, artificial recharge, incidental recharge.

Ozone - A highly reactive form of oxygen (O_3) used to disinfect water.

Non-consumptive use - A water use that leaves the water available for other potential uses, usually after it has been collected in a sewage system. Most indoor uses are largely non-consumptive. Compare with consumptive use.

Parts per million (ppm) and parts per billion (ppb)- A measures of the concentration of materials in a liquid, often used to describe the degree of contamination of water. One ppm indicates that for each one millions units of water there is one unit of the contaminant, One ppb indicates that for each one billion units of water there is one unit of the contaminant. 1 ppm is approximately equal to 1 mg/L.

Permeability - A measure of the relative ease with which a porous medium can transmit a liquid under a potential gradient.

pH - A measure of the relative acidity of water. Below 7 is increasingly acid, 7 is neutral and above 7 is increasingly alkaline.

Potable water - Water that is suitable for drinking, from a Latin word meaning "drink."

Primary treatment - Initial treatment given to sewage, usually removal of solids and possibly some disinfection.

Private water utility - A water provider that is owned by individuals or a corporation and sells water to customers.

Protozoa - Microscopic animals that occur as single cells. Some can cause disease in humans. They are not destroyed by disinfection, but can be destroyed by filtration.

Public utility - A water or power provider owned by a government such as a city or town.

Recharge - Augmentation of the groundwater by the addition of water. See natural recharge, artificial recharge, incidental recharge.

Reclaimed water - Tertiary-treated water available for use on turf or other facilities.

Reservoir - A facility for storing water until it is to be used. A reservoir may be open or covered.

Reverse osmosis - A process whereby water is forced through membranes that contain holes so small that even salts cannot pass through them. It removes microorganisms, organic chemicals and inorganic chemicals, producing very pure water.

Runoff - Drainage or flood discharge which leaves an area as surface flow or as pipeline flow, having reached a channel or pipeline by either surface or sub-surface routes.

Safe yield - A groundwater management goal which attempts to achieve and thereafter maintain a long-term balance between the annual amount of groundwater withdrawn in an Active Management Area and the annual amount of natural and artificial recharge within a designated area.

Secondary treatment - The most common level of treatment of sewage, involving removal of solids, use of bacterial action for purification, and the addition of disinfectants.

Service area - The area served by a municipal water provider, within which it may hold a monopoly.

Sewage - Water that has been used by individuals or businesses and needs treatment.

Sewer - A pipeline used to transport sewage to a treatment facility.

Sludge - Solids left over from the wastewater treatment process.

Sodium - A mineral which occurs naturally in most water.

Soft water - Water with relatively low concentrations of certain dissolved minerals, principally calcium, magnesium, and iron. Water from which these minerals have been mostly removed, usually through an ion exchange process.

Soil-aquifer treatment - A method of treating water by letting it seep through soil and other materials to mitigate pollution.

Subsidence - Downward movement of the land surface associated with groundwater pumping, especially where such pumping exceeds safe yield and the water table has dropped. Uneven rates of subsidence over an area can lead to differential subsidence, which can cause lateral movement of the land surface, and cracks and fissures to appear. This is more likely to occur in areas where the aquifer varies in thickness, such as near the edges of groundwater basins. Subsidence is an essentially irreversible process, not greatly ameliorated by later raising the water table.

Subsurface water - All water below the land surface, including soil moisture, capillary fringe water in the vadose zone, and groundwater.

Superfund - A commonly used name for the federal Comprehensive Environmental Response, Compensation and Liability Act (CERCLA).

Surface water - Water that flows on the surface in streams.

Terminal storage - A facility for storage of water near the end of a pipeline or canal. A facility to be used in times of water shortage in the CAP system (due, for example, to damage to the canal), that would supply water during a period of system repair or while wells are being reactivated.

Trichloroethylene (TCE) - A compound used most often for degreasing metal parts during manufacturing. Found as a pollutant in some Tucson-area groundwater, suspected of causing certain serious diseases.

Trihalomethanes (THMs) - Disinfection byproducts arising from the combination of chlorine with organic matter in the water.

Tertiary treatment - Post-secondary treatment of water designed to improve the quality of the water to the point where it can be put to a particular beneficial use.

Total dissolved solids (TDS) - A measure of the minerals dissolved in water. Up to 500 ppm is considered satisfactory and above that level increasingly unsuitable for domestic use. Tucson-area groundwater generally has TDS levels between 200 and 600 ppm; CAP water has TDS of about 700 ppm.

Transmissibility - The flow capacity of an aquifer measured in volume per unit time per unit width. Equal to the product of permeability times the saturated thickness of the aquifer.

Transmission line - A pipeline for transporting water.

Treated wastewater - The treated water that comes from a sewage treatment plant.

Treatment plant - A facility using various physical and chemical processes for treating water or wastewater. Treatment can include disinfection, filtration, adjusting the pH, adding corrosion inhibitors, and improving taste and odor.

Turbidity - The reduction of transparency in water due to the presence of suspended particles, or a cloudy appearance in the water. Increased turbidity raises the risk of water-borne pathogens growing and reproducing. Turbid water is therefore more difficult to disinfect.

Underground storage facility (USF) - A facility for artificial recharge of water supplies into an aquifer.

Underground Water Storage, Savings, and Replenishment Program (UWS) - A program administered by the ADWR to encourage the storage and/or use of renewable supplies. Rules governing permitting and operation of Underground Storage Facilities and Groundwater Savings Facilities are described under this program.

Vadose zone - The unsaturated zone lying between the earth's surface and groundwater table.

Volatile organic compounds (VOCs) - Solvents used as degreasers or cleaning agents. They evaporate easily producing odors typical of gasoline, kerosene, lighter fluid or dry cleaning fluid. Some may be cancer-causing.

Water main - A large pipeline which transports water to smaller distribution lines which take water to homes and businesses.

Water table - The upper boundary of a free groundwater body, at atmospheric pressure.

Wellfield - A group of wells in a particular geographic area, usually operated by one entity.

Wetlands - An area that always has water at or near the surface. A natural wetland receives its water from a groundwater source and is also called a "cienega". A constructed, or artificial, wetland usually receives its water from some wastewater source, either agricultural, industrial or municipal.

ACRONYMS

ACC - Arizona Corporation Commission

ADEQ - Arizona Department of Environmental Quality

ADWR - Arizona Department of Water Resources

AMA - Active Management Area

APP - Aquifer Protection Permit

AVID - Avra Valley Irrigation District

AWBA - Arizona Water Banking Authority

AWS - Assured Water Supply

BADCT - Best Available Demonstrated Control Technology

BMP - Best Management Practice

CAP - Central Arizona Project

CAGRD - Central Arizona Groundwater Replenishment District

CAVSARP - Central Avra Valley Storage and Recovery Project

CAWCD - Central Arizona Water Conservation District

CMID - Cortaro Marana Irrigation District

DES - Arizona Department of Economic Security

DDT - Dichloro-Diphenyl-Trichloroethane

EA - Environmental Assessment

EIS - Environmental Impact Statement

EPA - U.S. Environmental Protection Agency

ED - Electrodialysis

ESA - Endangered Species Act

FCD - Flood Control District

FEMA - Federal Emergency Management Agency

FICO - Farmers Investment Company

GMA - Arizona Groundwater Management Act of 1980

GPCD - Gallons Per Capita per Day

GPM - Gallons Per Minute

GSF - Groundwater Savings Facility

INA - Irrigation Non-Expansion Area

MF - Microfiltration

NF - Nanofiltration

NPDES - Non Point Discharge Elimination System

PAG - Pima Association of Governments

PCE - Perchloroethylene

PCHD - Pima County Health Department

PDEQ - Pima County Department of Environmental Quality

RO - Reverse Osmosis

SAT - Soil-Aquifer Treatment

SAWRSA - Southern Arizona Water Rights Settlement Act

TARP - Tucson Airport Remediation Project

TAMA - Tucson Active Management Area

TCE - Trichloroethylene

TDS - Total Dissolved Solids

THM - Trihalomethane

TSMP - Tucson Stormwater Management Plan

USF - Underground Storage Facility

USGS - United States Geological Survey

UWS - Underground Water Storage, Savings, and Replenishment Program

VOCs - Volatile Organic Compounds

Water CASA - Water Conservation Alliance of Southern Arizona

WCPA - Water Consumer Protection Act

WRRC - Water Resources Research Center

Appendix B
SUPPLEMENTARY INFORMATION

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WATER PROVIDERS IN PIMA COUNTY

Following is a list of water providers in Pima County registered with the Environmental Protection Agency in 1998. Note that some are schools or businesses providing water only during certain hours. If some of the following population numbers do not agree with those in the text, its because they may represent different years.

Water System	Population Served
A-A RV Campground	100
ADOC-Correction Training	3700
ADOT Canoa R/A	1375
Ajo Domestic Water Improvement	2190
Amity Circle Tree Ranch	150
Amphitheater School District	10,615
Arivaca Townsite Water Co	240
ASARCO Silver Bell Unit	930
Avra Water Coop, Inc	3,300
AZ Parks Board-Catalina St	400
AZ Portland Cement-plant	160
AZ Water Co-Ajo	2,000
Bermuda Gardens Trailer	93
Breakers Water Park	533
C & N Water Co	32
Cactus Country Tr Haven	250
Mt. Lemmon Camps	850
Campbell Estates	300
Canada Hills Water Co	5,012
Canyon Ranch	485
Carol Anne Dr Homeowners	52
Casa Motel & Camping	30
Casitas De Castilian	200
Catalina Country Mobile	130
Caterpillar Water	65
Colonial Mobile & Trailer	150
Community Water - Green Valley	12,320
Continental School	250
Coronado Forest Drive In	40
Cortaro Acres Home	30
Cortaro Water Users Assn	1,920
Cyprus Sierrita Corp	760
Decker Community Water Co	29
Deep Well Cooperative	40
Del Lago Water Co	990
Desert Hills School	107
Desert Shores MHP	405
Desert Water Well Coop S	45
Desert Willows MHP	320
Diamond Grove Mobile HE	208
Dome Well Association	27
DYTR-Catalina Mountain	450
E & T Water Co	800
Elkhorn Ranch	50
Emery Park Mobile Home Pk	240
Evergreen Cemetery	35
Exxon Corporation	200
Far Horizons East	1,500
Far Horizons Mobile Home	290
Farmers Water	2,389
Federal Corr Institute	750
Flowing Wells Irrigation District	16,160
Foothills Mobile Homes	95
Forty-Niners Water Company	790
Francesca Water Company	100
Fred's Arena Bar & Steak	40
Green Valley Water Company	8,125
Greenfields School	250
Gringo Pass Trailer Park	55
Halcyon Acres	400
Halfway Station MHP	64
High Chaparral Water Coop	35
Hohokam Mobile Home Park	60
Homeowners Coop	45
Hub Water Co	4,040
Hughes Missile Systems Co	4,000
IBM	3,100
I M Water Co Inc	340
King's Trailer Lodge	45
Kino Mobile Home Park	110
Kitt Peak National Observatory	300
La Casita Water Co	25
La Cholla Air Park Ed Pr	200
Lago Del Oro Water Co	4,500
Lakewood Estates Water C	750
Las Quintas Serenas WC	1,169
Manor Trailer CC	170
Marana Water Service Inc	1,715
Mesaland Water Co-op	350
MDWID - Metropolitan Domestic Water Improvement District	36,250
Midvale Farms Water Company	200
Mirabell Water Coop	210
Mission Palms Apartments	900
Mr G's Diner	50
Mt Lemmon Water Co	600

Water System	Population Served
North La Cholla MHP	100
Oracle Villa Apartments	822
Orchard Valley MHP	80
Organ Pipe NM-Headquarters	412
Pacific Fruit Express	50
Palm Vista Estates MHP	400
Pantano Water Coop	98
Pima County Parks	9,142
Pima Cnty Dot Avra Valle	106
Pima Ramada Mobile Home Park	35
Pita Water	38
Quail Creek Water	180
Quail Valley Tennis Club	40
Rabies Control Center	20
Rainbow Tavern	51
Raindance Water Coop	60
Rancho De La Osa	40
Rancho Del Conejo Water	522
Rancho Los Amigos MHP	200
Rancho Sierrita Well Assc	102
Rancho Tierra Blanca	40
Rancho Vistoso Water Co	4,300
Ranchwood Mobile Park	200
Ray Water Co Lansing Str	2,880
Regina Cleri Center	25
Rillito Water Users Assoc	200
Rincon Country East Rv re	920
Rincon Mesa Landowner's	65
Rincon Ranch Estates Water Co	905
Rincon Water Co	50
Rio Vista Mobile Home Pa	2000
Riverside Apts	10
Saguaro National Park	420
Saguaro Water Company	35
Sahuarita Heights Mobile	110
Sahuarita Sch, Dist 3,	1,800
Sahuarita Village Water	135
Sahurita Park Pcpr	40
Salpointe High School1	288
Samalayucca Improvement	150
Sandario Water Co	555
Santa Catalina Mission Church	100
Sasabe Border Water Co	68
Shae Water Company	28
Sierra Court Trailer Park	100
Sierra Tucson	100
Sierrita Foothills	50
Sierrita Mountain Water	80
Siete Casas Joint Venture	60
Silver Cholla Park	200
Sleepy Hollow MHP	1,110
Solana & Sombra MHP	200
Soldier Camp Permittees	50
Sopori Elementary School	300
Southern Pines Baptist Church	100
Spanish Trail Water Co	770
St Joseph's Hospital	1,400
Su Casa MHP	100
Summit Water Company	33
Summit Water Coop	78
Tanque Verde Guest Ranch	40
Terminal Stations	500
The Lazy Bone RV Resort	300
Thim Utility Company	828
Thunderhead Ranch	93
Town & Country MHP	640
Town of Oro Valley Water	10,850
Tra-tel Tucson RV Park	50
Tucson Electric Power Co	550
Tucson General Hospital	500
Tucson Meadows MHP	650
Tucson Medical Center	2,500
Tucson Racquet Club	400
Tucson Rock	40
Tucson Rock and Sand	40
Tucson Water Dept	55,3040
University of Arizona	1,5950
Universal Ranch Store	8
USAF-Davis Monthan AFB	8,900
United States Forest Service	950
Vail School	110
Val Verde Inc	45
Valle Verde Del Norte	300
Veterans Medical Center	900
Via Verde West MHP	100
Villa Capri Trailer Park	420
Vision Quest Annex	30
Vista Del Norte TP	750
Voyager Water Company	2,500
Webb's Steak House	60
Wells Fargo Well Assoc	80
White Stallion Guest Ran	45
Wildflower Water Co-op	84
Winter Haven Ranch	125
Winterhaven Water & Dev	765
Wycliffe Mountain Vista	26
Zimmerman Enterprises	200

Source: U.S. Environmental Protection Agency Web Site: www.epa.gov

EFFLUENT USE ALTERNATIVES

Following is a list of effluent projects and potential alternatives as of January 1999, compiled by the Regional Effluent Planning Partnership.

What happens to effluent today?

1. Santa Cruz River discharge. This represents the existing conditions and incidental recharge.
2. City of Tucson Reclaimed Water System. Direct use of tertiary effluent.
3. Agricultural irrigation. The reuse of treated secondary effluent for the irrigation of non-food agriculture.

ALTERNATIVES – IN PROGRESS

1. Santa Cruz River Managed Underground Storage Facility (Roger Road to Ina Road). Acquiring credits for existing discharge which is recharging the aquifer.
2. Santa Cruz River Managed Underground Storage Facility (Ina Road to Red Rock). Acquiring credits for existing discharge which is recharging the aquifer.
3. Rillito/Swan Effluent Wetland Recharge. This project involves additional treatment and constructed recharge.
4. Kino Effluent Wetland Recharge. This project combines the direct reuse of reclaimed water for turf irrigation with a constructed recharge operation.
5. Marana High Plains Effluent Recharge Project. Constructed recharge and vegetation enhancement.
6. Atturbury Wash Project. Wetlands treatment and dry well recharge at Lincoln Regional Park in the west tributary of Atturbury Wash.
7. Lower Santa Cruz Replenishment Project located north of Avra Valley Road. Direct recharge using basins and streambed.

FUTURE/PROPOSED ALTERNATIVES

1. Santa Cruz River Managed Underground Storage Facility, 100 percent credit accrual for SAWRSA effluent. Managed recharge Roger Road to Red Rock.
2. Wastewater reclamation in Oro Valley and Metro Water service areas. This project would include a wastewater reclamation facility and effluent lines to existing and planned golf courses or, possibly, to recharge basins.
3. Effluent Reuse in Green Valley. The project would involve the use of effluent for golf course turf irrigation and agricultural irrigation.
4. Avra Valley Wetlands Treatment and Effluent Recharge Project. Wetlands treatment and basin recharge.
5. Marana Santa Cruz River Park and Recharge Project. This project provides for a combination of facilities including constructed and managed recharge facilities and turf areas for irrigation reuse. Located at Cortaro Farms Road and the Santa Cruz River.
6. Tangerine Road Wastewater Pollution Control Facility.
7. Pascua Yaqui Golf Course and Pascua Yaqui Recharge Projects.
8. Harrison-Pantano water reclamation facility. Reclamation facility that will provide effluent suitable for reuse, recharge or discharge to Pantano Wash.
9. Kolb/Bilby water Reclamation Facility. Reclamation facility that will provide effluent suitable for reuse, recharge or discharge to a nearby watercourse. The proposed site is in the vicinity of Kolb and Bilby Road.
10. Santa Cruz River downtown enhancement.

RATE STRUCTURE FOR TUCSON WATER

Tucson Water's charges (as of summer 1999) for delivery of potable water are comprised of four basic components: Minimum Charge, Usage Charge, Isolated Area Service Charge, and CAP Charge. Each of the components and its specific rate schedules is discussed in the following section. Tucson Water bills its customers on a monthly basis; all charges shown are monthly charges.

Minimum Charge

The minimum charge for all metered accounts is based upon the meter size and is levied whether or not any water is used. The charge includes a 3 Ccf minimum usage allowance for all customer classes except for sub-metered mobile home parks which receive a minimum usage allowance based on the number of occupied units. The monthly minimum charges are as follows:

Service Charge	Meter Size (inches)	Service Charge ($)
	0.75	$ 5.30
	1.00	$ 6.40
	1.50	$ 9.50
	2.00	$ 14.00
	2.50	$ 20.00
	3.00	$ 25.00
	4.00	$ 42.00
	6.00	$ 82.00
	8.00	$ 123.00
	10.00	$ 185.00
	12.00	$ 305.00

Usage Charge

The usage charge for all metered accounts is based upon the actual water utilized by the customer between monthly meter readings in excess of the minimum water use allowance. Charges for non-residential customers are further divided between winter and summer rate schedules. Winter rates are applicable to water usage from November through April. Summer rates are applicable to water usage from May through October.

For customers in the Multifamily, Submetered Mobile Home Park, Commercial, and Industrial customer classes, a two-tiered summer surcharge is charged for water usage above the customer's average monthly water usage for the previous winter rate period (November - April). Tier 1 is charged on all water used during the month which exceeds the customer's monthly winter average usage. Tier 2 is an additional charge on all water used during the month which exceeds 150 percent of the customer's monthly winter average usage. All charges identified below are based upon water use in units of Ccf (100 cubic feet). One Ccf equals 748 gallons.

Customer Class/Charge	Amount (Ccf)	Winter ($/Ccf)	Summer ($/Ccf)
Residential - single family	0 - 3	0.00	0.00
	4 - 15	1.62	1.62
	16 - 30	2.61	2.61
	over 30	3.29	3.29
Duplex-Triplex	0 - 3	0.00	0.00
	4 - 20	1.62	1.62
	21 - 35	2.61	2.61
	over 35	3.29	3.29
Multi-family	0 - 3	0.00	0.00
	over 3	1.35	1.35
	summer surcharge - tier 1		0.95
	summer surcharge - tier 2		0.25
	maximum charge per Ccf		2.55
Submetered mobile home parks	0 - 3	0.00	0.00
	over 3	1.35	1.35
	summer surcharge - tier 1		0.95
	summer surcharge - tier 2		0.25
	maximum charge per Ccf		2.55
Commercial	0 - 3	0.00	0.00
	over 3	1.40	1.40
	summer surcharge - tier 1		0.95
	summer surcharge - tier 2		0.25
	maximum charge per Ccf		2.60
Industrial	0 - 3	0.00	0.00
	over 3	1.21	1.21
	summer surcharge - tier 1		0.95
	summer surcharge - tier 2		0.25
	maximum charge per Ccf		2.41
Construction	0 - 3	0.00	0.00
	over 3	1.89	1.89

Isolated Area Service Charge

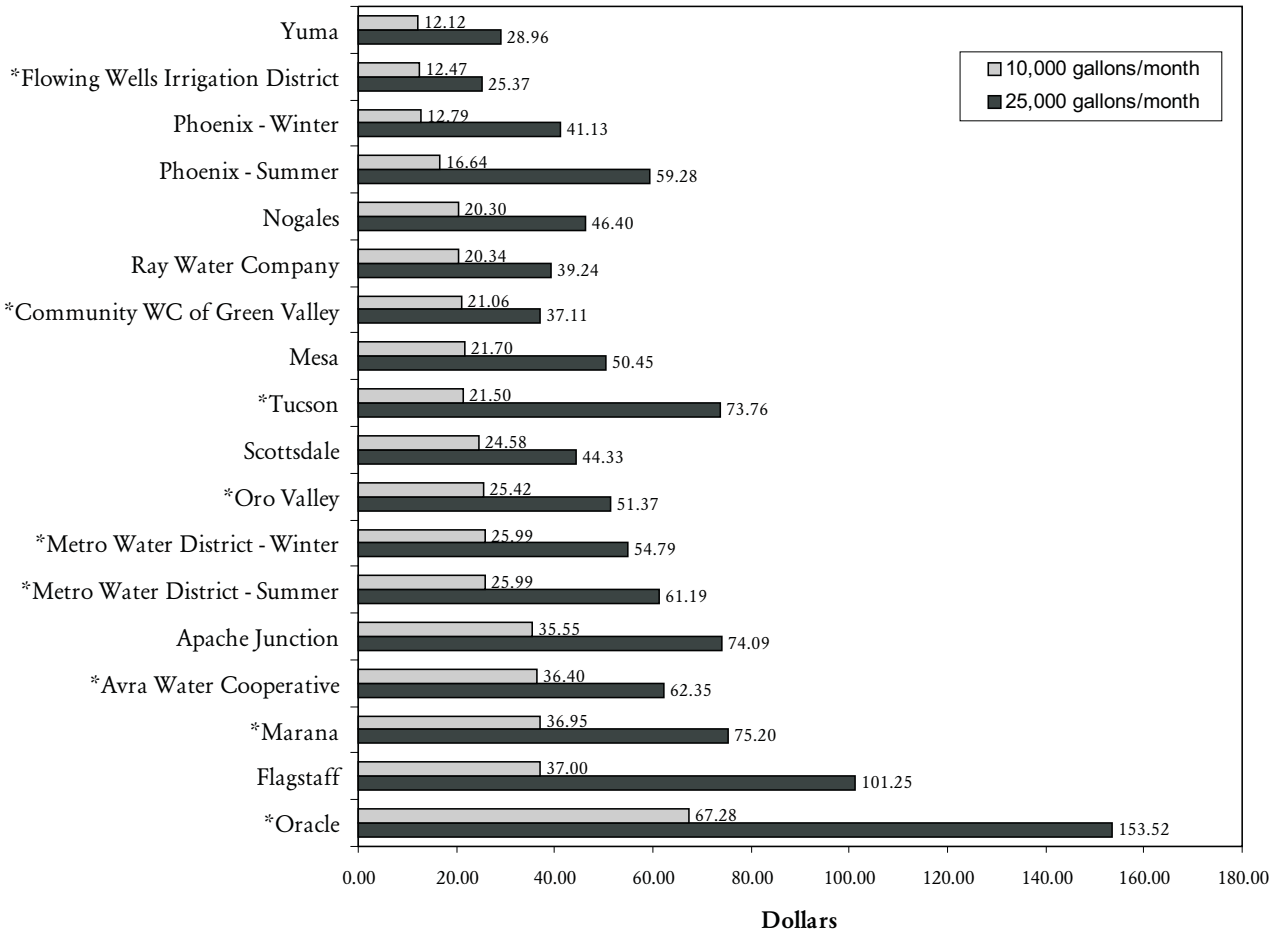
For water customers who are located in water delivery areas that are isolated and not connected to Tucson Water's central service area, an isolated area service charge is applied to each Ccf of monthly water usage to cover the higher costs of providing water to these isolated areas. The rates are $0.35/Ccf.

CAP Charge

All Tucson Water customers are charged a CAP fee applied to each Ccf of monthly water usage. This charge contributes to covering costs associated with the Central Arizona Project. The rates are $0.02/Ccf.

Source: Tucson Water Web Site: http://www.ci.tucson.az.us/water/tsnwtr/rates/rate99.htm

WATER BILLS FOR SELECTED ARIZONA WATER PROVIDERS



Monthly base charge plus commodity charges. Excludes taxes, surcharges, sewerage charges, etc.
* Denotes Tucson area water providers.

NATIONAL PRIMARY DRINKING WATER STANDARDS

National Primary Drinking Water Regulations (NPDWRs or primary standards) are legally enforceable standards that apply to public water systems. Primary standards protect drinking water quality by limiting the levels of specific contaminants that can adversely affect public health and are known or anticipated to occur in public water systems.

	MCLG[1] (MG/L)[4]	MCL[2] OR TT[3] (MG/L)[4]	POTENTIAL HEALTH EFFECTS	SOURCES OF CONTAMINANTS
INORGANIC CHEMICALS				
Antimony	0.006	0.006	Increase in blood cholesterol; decrease in blood glucose	Discharge from petroleum refineries; fire retardants; ceramics; electronics; solder
Arsenic	none[5]	0.05	Skin damage; circulatory system problems; increased risk of cancer	Discharge from semiconductor manufacturing; petroleum refining; wood preservatives; animal feed additives; herbicides; erosion of natural deposits
Asbestos	7 million (fiber >10 micrometers) fibers per Liter	7 MFL	Increased risk of developing benign intestinal polyps	Decay of asbestos cement in water mains; erosion of natural deposits
Barium	2	2	Increase in blood pressure	Discharge of drilling wastes; discharge from metal refineries; erosion of natural deposits
Beryllium	0.004	0.004	Intestinal lesions	Discharge from metal refineries and coal-burning factories; discharge from electrical, aerospace, and defense industries
Cadmium	0.005	0.005	Kidney damage	Corrosion of galvanized pipes; erosion of natural deposits; discharge from metal refineries; runoff from waste batteries and paints
Chromium (total)	0.1	0.1	Some people who use water containing chromium well in excess of the MCL over many years could experience allergic dermatitis	Discharge from steel and pulp mills; erosion of natural deposits
Copper	1.3	Action Level=1.3; TT[6]	Short term exposure: Gastrointestinal distress. Long term exposure: Liver or kidney damage. Those with Wilson's Disease should consult their personal doctor if their water systems exceed the copper action level.	Corrosion of household plumbing systems; erosion of natural deposits; leaching from wood preservatives
Cyanide (as free cyanide)	0.2	0.2	Nerve damage or thyroid problems	Discharge from steel/metal factories; discharge from plastic and fertilizer factories

	MCLG[1] (MG/L)[4]	MCL[2] OR TT[3] (MG/L)[4]	POTENTIAL HEALTH EFFECTS	SOURCES OF CONTAMINANTS
Fluoride	4.0	4.0	Bone disease (pain and tenderness of the bones); Children may get mottled teeth.	Water additive which promotes strong teeth; erosion of natural deposits; discharge from fertilizer and aluminum factories
Lead	zero Action Level=0.015	TT[6]	Infants and children: Delays in physical or mental development. Adults: Kidney problems; high blood pressure	Corrosion of household plumbing systems; erosion of natural deposits
Inorganic Mercury	0.002	0.002	Kidney damage	Erosion of natural deposits; discharge from refineries and factories; runoff from landfills and cropland
Nitrate (measured as Nitrogen)	10	10	"Blue baby syndrome" in infants under six months - life threatening without immediate medical attention. Symptoms: Infant looks blue and has shortness of breath.	Runoff from fertilizer use; leaching from septic tanks, sewage; erosion of natural deposits
Nitrite (measured as Nitrogen)	1	1	"Blue baby syndrome" in infants under six months - life threatening without immediate medical attention. Symptoms: Infant looks blue and has shortness of breath.	Runoff from fertilizer use; leaching from septic tanks, sewage; erosion of natural deposits
Selenium	0.05	0.05	Hair or fingernail loss; numbness in fingers or toes; circulatory problems	Discharge from petroleum refineries; erosion of natural deposits; discharge from mines;
Thallium	0.0005	0.002	Hair loss; changes in blood; kidney, intestine, or liver problems	Leaching from ore-processing sites; discharge from electronics, glass, and pharmaceutical companies
ORGANIC CHEMICALS				
Acrylamide	zero	TT[7]	Nervous system or blood problems; increased risk of cancer	Added to water during sewage/wastewater treatment
Alachlor	zero	0.002	Eye, liver, kidney or spleen problems; anemia; increased risk of cancer	Runoff from herbicide used on row crops
Atrazine	0.003	0.003	Cardiovascular system problems; reproductive difficulties	Runoff from herbicide used on row crops
Benzene	zero	0.005	Anemia; decrease in blood platelets; increased risk of from cancer	Discharge from factories; leaching gas storage tanks and landfills
Benzo(a)pyrene	zero	0.0002	Reproductive difficulties; increased risk of cancer	Leaching from linings of water storage tanks and distribution lines

	MCLG[1] (MG/L)[4]	MCL[2] OR TT[3] (MG/L)[4]	POTENTIAL HEALTH EFFECTS	SOURCES OF CONTAMINANTS
Carbofuran	0.04	0.04	Problems with blood or nervous system;	Leaching of soil fumigant used on rice and alfalfa reproductive difficulties.
Carbon tetrachloride	zero	.005	Liver problems; increased risk of cancer	Discharge from chemical plants and other industrial activities
Chlordane	zero	0.002	Liver or nervous; increased risk of cancer	Residue of banned industrial other industrial termiticide
Chlorobenzene	0.1	0.1	Liver or kidney problems	Discharge from chemical and agricultural chemical factories
2,4-D	0.07	0.07	Kidney, liver, or adrenal gland problems	Runoff from herbicide used on row crops
Dalapon	0.2	0.2	Minor kidney changes	Runoff from herbicide used on rights of way
1,2-Dibromo-3-chloropropane	zero	0.0002	Reproductive difficulties;	Runoff/leaching from (DBCP) soil fumigant used increased risk of cancer on soybeans, cotton, pineapples, and orchards
o-Dichlorobenzene	0.60.6		Liver, kidney, or circulatory system problems	Discharge from industrial chemical factories
p-Dichlorobenzene	0.075	0.075	Anemia; liver, kidney or spleen damage; changes in blood	Discharge from industrial chemical factories
1,2-Dichloroethane	zero	0.005	Increased risk of cancer	Discharge from industrial chemical factories
1-1-Dichloroethylene	0.007	0.007	Liver problems	Discharge from industrial chemical factories
cis-1, 2-Dichloroethylene	0.07	0.07	Liver problems	Discharge from industrial chemical factories
trans-1,2-Dichloroethylene0.1	0.1		Liver problems	Discharge from industrial chemical factories
Dichloromethane	zero	0.005	Liver problems; cancer	Discharge from increased risk of pharmaceutical and chemical factories
1-2-Dichloropropanezero	0.005		Increased risk of cancer	Discharge from industrial chemical factories
Di(2-ethylhexyl)adipate	0.40.4		General toxic effects or reproductive	Leaching from PVC plumbing systems; discharge difficulties
from chemical factories				
Di(2-ethylhexyl)phthalate zero	0.006		Reproductive difficulties; liver problems; increased risk of cancer	Discharge from rubber and chemical factories
Dinoseb	0.007	0.007	Reproductive difficulties	Runoff from herbicide used on soybeans and vegetables

	MCLG[1] (MG/L)[4]	MCL[2] OR TT[3] (MG/L)[4]	POTENTIAL HEALTH EFFECTS	SOURCES OF CONTAMINANTS
Dioxin (2,3,7,8-TCDD)	zero	0.00000003	Reproductive difficulties; increased risk of cancer	Emissions from waste incineration and other combustion; discharge from chemical factories
Diquat	0.02	0.02	Cataracts	Runoff from herbicide use
Endothall	0.1	0.1	Stomach and intestinal problems	Runoff from herbicide use
Endrin	0.002	0.002	Nervous system effects	Residue of banned insecticide
Epichlorohydrin	zero	TT[7]	Stomach problems; reproductive difficulties; increased risk of cancer	Discharge from industrial chemical factories; added to water during treatment process
Ethylbenzene	0.7	0.7	Liver or kidney problems	Discharge from petroleum refineries
Ethelyne dibromide	zero	0.00005	Stomach problems; reproductive difficulties; increased risk of cancer	Discharge from petroleum refineries
Glyphosate	0.7	0.7	Kidney problems; reproductive difficulties	Runoff from herbicide use
Heptachlor	zero	0.0004	Liver damage; increased risk of cancer	Residue of banned termiticide
Heptachlor epoxide	zero	0.0002	Liver damage; increased risk of cancer	Breakdown of hepatachlor
Hexachlorobenzene	zero	0.001	Liver or kidney problems; reproductive difficulties; increased risk of cancer	Discharge from metal refineries and agricultural chemical factories
Hexachlorocyclopentadiene	0.05	0.05	Kidney or stomach problems	Discharge from chemical factories
Lindane	0.0002	0.0002	Liver or kidney problems	Runoff/leaching from insecticide used on cattle, lumber, gardens
Methoxychlor	0.04	0.04	Reproductive difficulties	Runoff/leaching from insecticide used on fruits, vegetables, alfalfa, livestock
Oxamyl (Vydate)	0.2	0.2	Slight nervous system effects	Runoff/leaching from insecticide used on apples, potatoes, and tomatoes
Polychlorinated biphenyls (PCBs)	zero	0.0005	Skin changes; thymus gland problems; immune deficiencies; reproductive or nervous system difficulties; increased risk of cancer	Runoff from landfills; discharge of waste chemical
Pentachlorophenol	zero	0.001	Liver or kidney problems; increased risk of cancer	Discharge from woodpreserving factories
Picloram	0.5	0.5	Liver problems	Herbicide runoff
Simazine	0.004	0.004	Problems with blood	Herbicide runoff

	MCLG[1] (MG/L)[4]	MCL[2] OR TT[3] (MG/L)[4]	POTENTIAL HEALTH EFFECTS	SOURCES OF CONTAMINANTS
Styrene	0.1	0.1	Liver, kidney, and circulatory problems	Discharge from rubber and plastic factories; leaching from landfills
Tetrachloroethylene	zero	0.005	Liver problems; increased risk of cancer	Leaching from PVC pipes; discharge from factories and dry cleaners
Toluene	1	1	Nervous system, kidney, or liver problems	Discharge from petroleum factories
Total Trihalomethanes (TTHMs)	none[5]	0.10	Liver, kidney or central nervous	Byproduct of drinking water disinfection system problems; increased risk of cancer
Toxaphene	zero	0.003	Kidney, liver, or thyroid problems; increased risk of cancer	Runoff/leaching from insecticide used on cotton and cattle
2,4,5-TP (Silvex)	0.05	0.05	Liver problems	Residue of banned herbicide
1,2,4-Trichlorobenzene	0.07	0.07	Changes in adrenal glands	Discharge from textile finishing factories
1,1,1-Trichloroethane	0.2	0.20	Liver, nervous system, or circulatory problems	Discharge from metal degreasing sites and other factories
1,1,2-Trichloroethane	0.003	0.005	Liver, kidney, or immune system problems	Discharge from industrial chemical factories
Trichloroethylene	zero	0.005	Liver problems; increased risk of cancer	Discharge from petroleum refineries
Vinyl chloride	zero	0.002	Increased risk of cancer	Leaching from PVC pipes; discharge from plastic factories
Xylenes (total)	10	10	Nervous system damage	Discharge from petroleum factories; discharge from chemical factories
Beta particles and photon	none[5] per year	4 millirems	Increased risk of cancer	Decay of natural and man-made deposits
Gross alpha particle activity	none[5]	15 picocuries per Liter (pCi/L)		Increased risk of cancer Erosion of natural deposits
Radium 226 and Radium 228	none[5]	5 pCi/L		Increased risk of cancer Erosion of natural deposits
MICROORGANISMS				
Giardia lamblia	zero	TT[8]	Giardiasis, a gastroenteric disease	Human and animal fecal waste

	MCLG[1] (MG/L)[4]	MCL[2] OR TT[3] (MG/L)[4]	POTENTIAL HEALTH EFFECTS	SOURCES OF CONTAMINANTS
Heterotrophic plate count	N/A	TT[8]	HPC has no health effects, but can indicate how effective treatment is at controlling microorganisms.	
Legionella	zero	TT[8]	Legionnaire's Disease, commonly known as pneumonia	Found naturally in water; multiplies in heating systems
Total Coliforms (including zero fecal coliform and E. Coli)		5.0%[9]		Used as an indicator that other potentially harmful bacteria may be present[10] Human and animal fecal waste
Turbidity	N/A	TT[8]	Turbidity has no health effects but can interfere with disinfection and provide a medium for microbial growth. It may indicate the presence of microbes.	Soil runoff
Viruses (enteric)	zero	TT[8]	Gastroenteric disease	Human and animal fecal waste

National Secondary Drinking Water Regulations

National Secondary Drinking Water Regulations (NSDWRs or secondary standards) are non-enforceable guidelines regulating contaminants that may cause cosmetic effects (such as skin or tooth discoloration) or aesthetic effects (such as taste, odor, or color) in drinking water. EPA recommends secondary standards to water systems but does not require systems to comply. However, states may choose to adopt them as enforceable standards.

Contaminant	Secondary Standard	Contaminant	Secondary Standard
Aluminum	0.05 to 0.2 mg/L	Iron	0.3 mg/L
Chloride	250 mg/L	Manganese	0.05 mg/L
Color	15 (color units)	Odor	3 threshold odor number
Copper	1.0 mg/L	PH	6.5-8.5
Corrosivity	noncorrosive	Silver	0.10 mg/L
Fluoride	2.0 mg/L	Sulfate	250 mg/L
Foaming Agents	0.5 mg/L	Total Dissolved Solids	500 mg/L
		Zinc	5 mg/L

NOTES

1 Maximum Contaminant Level Goal (MCLG) - The maximum level of a contaminant in drinking water at which no known or anticipated adverse effect on the health effect of persons would occur, and which allows for an adequate margin of safety. MCLGs are non-enforceable public health goals.

2 Maximum Contaminant Level (MCL) - The maximum permissible level of a contaminant in water which is delivered to any user of a public water system. MCLs are enforceable standards. The margins of safety in MCLGs ensure that exceeding the MCL slightly does not pose significant risk to public health.

3 Treatment Technique - An enforceable procedure or level of technical performance which public water systems must follow to ensure control of a contaminant.

4 Units are in milligrams per Liter (mg/L) unless otherwise noted.

5 MCLGs were not established before the 1986 Amendments to the Safe Drinking Water Act. Therefore, there is no MCLG for this contaminant.

6 Lead and copper are regulated in a Treatment Technique which requires systems to take tap water samples at sites with lead pipes or copper pipes that have lead solder and/or are served by lead service lines. The action level, which triggers water systems into taking treatment steps if exceeded in more than 10% of tap water samples, for copper is 1.3 mg/L, and for lead is 0.015mg/L.

7 Each water system must certify, in writing, to the state (using third-party or manufacturer's certification) that when acrylamide and epichlorohydrin are used in drinking water systems, the combination (or product) of dose and monomer level does not exceed the levels specified, as follows: Acrylamide = 0.05% dosed at 1 mg/L (or equivalent)* Epichlorohydrin = 0.01% dosed at 20 mg/L (or equivalent).

8 The Surface Water Treatment Rule requires systems using surface water or groundwater under the direct influence of surface water to (1) disinfect their water, and (2) filter their water to meet criteria for avoiding filtration so that the following contaminants are controlled at the following levels: * Giardia lamblia: 99.9% killed/inactivated Viruses: 99.99% killed/inactivated; * Legionella: No limit, but EPA believes that if Giardia and viruses are inactivated, Legionella will also be controlled; * Turbidity: At no time can turbidity (cloudiness of water) go above 5 nephelolometric turbidity units (NTU); systems that filter must ensure that the turbidity goes no higher than 1 NTU (0.5 NTU for conventional or direct filtration) in at least 95% of the daily samples for any two consecutive months; * HPC: NO more than 500 bacterial colonies per milliliter.

9 No more than 5.0% samples total coliform-positive in a month. (For water systems that collect fewer than 40 routine samples per month, no more than one sample can be total coliform-positive). Every sample that has total coliforms must be analyzed for fecal coliforms. There cannot be any fecal coliforms.

10 Fecal coliform and E. coli are bacteria whose presence indicates that the water may be contaminated with human animal wastes. Microbes in these wastes can cause diarrhea, cramps, nausea, headaches, or other symptoms.

Source: Environmental Protection Agency Web Site: www.epa.gov

1999 WATER RATE SCHEDULE FOR THE CENTRAL ARIZONA PROJECT

Cost Component	**1999**	**2000**	**2001**	**2002**	**2003**
Municipal/Industrial Charges (1)	$48/af	$54/af	$54/af	$54/af	$54/af
Agricultural Charges (2)	2/af	2/af	2/af	2/af	2/af
Water Delivery Costs: Fixed OM&R (3)	31/af	Determined Annually			
Pumping Energy (4)	38/af	Determined Annually			
Total 1999 Delivery Costs	$69/af				
Delivery Rates	**1999**	**2000**	**2001**	**2002**	**2003**
Municipal and Industrial (A)	$69/af	$70/af	$72/af	$73/af	$75/af
Agricultural					
Pool 1 (200,000 af) (B)	32/af	33/af	34/af	35/af	36/af
Pool 2 (200,000 af) (C)	22/af	23/af	24/af	25/af	26/af
Pool 3 (5,D)	45/af	Determined Annually			
M&I Incentive Recharge (6,E)	43/af				
Federal (F)	69/af	70/af	72/af	73/af	75/af
AWBA (G)	43/af				
Miscellaneous Uses (7, H)	43/af	Determined Annually			

Notes:
1. Paid on full allocation regardless of water deliveries, not included in delivery rates.
2. Paid on actual deliveries and included in delivery rates.
3. $43.5 million fixed OM&R costs ÷ 1,416,000 af of projected deliveries = $31/af. This amount is collected on all ordered water whether delivered or not.
4. $53.6 million pumping energy costs ÷ 1,416,000 af of projected deliveries = $38/af. This amount is collected only for water actually delivered.
5. Rate is pumping energy component plus $5 contribution to fixed OM&R plus the $2 agriculture capital charge.
6. Rate is pumping energy component plus $5 contribution towards fixed OM&R. See reverse side for rules regarding eligibility for and use of M&I incentive recharge water.
7. Rate is pumping energy component plus $5 contribution towards fixed OM&R.

A. M&I – The delivery rate for M&I subcontractors. For M&I users who are not subcontractors, we add the capital charge and create an Excess M&I contractor rate for "as available" water.
B. Pool 1 – All agricultural entities who originally signed a subcontract.
C. Pool 2 – Those agricultural entities that waived their subcontract rights in two-party agreements with CAWCD; CAWCD waived the agricultural take-or-pay requirements. Excluded those agricultural entities that relinquished their subcontracts to others for the benefit of their district, i.e., Harquahala Valley Irrigation District, Roosevelt Water Conservation District, and HoHoKam Irrigation District.
D. Pool 3 – An agricultural customer who meets basic qualifications including those who want more than their allocated share of Pool 1 and Pool 2 water.
E. M&I Incentive Recharge – A special program offered to M&I subcontractors only. They must have valid Arizona Department of Water Resources permits and must gain recharge/storage credits from this activity. The Board has approved this program through 1999. CAP may participate with some agricultural entities in a limited fashion.
F. Federal – For federal purposes (Indians, USBR construction water, etc.)
G. AWBA – Water purchases by the Arizona Water Banking Authority. It is available for scheduling after all other schedules have been filled.
H. Miscellaneous Uses– Water for recreational and fish and wildlife purposes.

CAP WATER SUBCONTRACT AMOUNTS IN THE TUCSON AMA

Entity	Allocation (acre-feet)
City of Tucson	138,920
San Xavier District of Tohono O'odham Nation	27,000
State Land Department	14,000
Schuk Toak District of Tohono O'odham Nation	10,800
Metropolitan Domestic Water Improvement District	8,858
Flowing Wells Irrigation District	4,354
Spanish Trail Water Company	3,037
Town of Oro Valley	2,294
Green Valley Water Company	1,900
Midvale Farms	1,500
Community Water Company of Green Valley	1,337
Vail Water Company	786
Pascua Yaqui Tribe	500
Town of Marana	47

THE WATER CONSUMER PROTECTION ACT

THE PURPOSE OF THIS ARTICLE IS TO RESTORE FIRST CLASS DRINKING WATER TO THE PEOPLE OF TUCSON AND REPLENISH TUCSON'S GROUNDWATER SUPPLY BY AMENDING CHAPTER 27 OF THE TUCSON CODE AND ADDING A NEW ARTICLE VI PROVIDING FOR THE USE OF WATER RESOURCES.

Section 1. Chapter 27 of title Tucson code is amended by adding Artic1e VI to read:

ARTICLE VI
WATER CONSUMER PROTECTION ACT

SECTION 27-90. METHOD

1. THE CITY OF TUCSON SHALL USE ONLY GROUNDWATER FROM UNPOLLUTED SOURCES AS ITS POTABLE WATER SUPPLY FOR A FIVE YEAR INTERIM PERIOD BEGINNING ON THE EFFECTIVE DATE OF THIS ARTICLE, EXCEPT AS SPECIFICALLY PROVIDED IN SECTION 27-91.

2. THE CITY OF TUCSON SHALL TAKE THE NECESSARY ACTIONS TO ENSURE THAT IT IS IN TOTAL COMPLIANCE WITH ITS EXISTING CONTRACT FOR CENTRAL ARIZONA PROTECT (CAP) WATER.

3. FOR FIVE YEARS FROM THE EFFECTIVE DATE OF THIS ARTICLE, CAP WATER DELIVERED TO THE CITY OF TUCSON SHALL BE USED ONLY FOR ONE OR MORE OF THE FOLLOWING PURPOSES;

(a) FOR SELLING OR EXCHANGING WATER UNDER THE TERMS OF THE CITY'S EXISTING CAP SUBCONTRACT.

(b) TO PRESERVE TUCSON'S GROUNDWATER FOR DOMESTIC USE BY REPLACING GROUNDWATER WHICH WOULD OTHERWISE HAVE BEEN WITHDRAWN FOR USES OTHER THAN AS POTABLE WATER SUCH AS AGRICULTURE, MING AND OTHER INDUSTRY.

(c) TO PREVENT LAND SUBSIDENCE AND AUGMENT TUCSON'S GROUNDWATER SUPPLY BY BASIN AND STREAM BED RECHARGE.

(d) TO REPLACE OTHER WATER SUPPLIES CURRENTLY BEING EMPLOYED FOR INDUSTRIAL AND LANDSCAPE IRRIGATION USE INCLUDING PARKS, GOLF COURSES AND SCHOOLS.

(e) FOR DIRECT WELL INJECTION IF IT IS TREATED AS DESCRIBED IN SECTION 27-91 AND IS FREE FROM DISINFECTION BYPRODUCTS.

SECTION 27-91. EXCEPTION

NOT WITHSTANDING ANY OTHER PROVISION OF THIS ARTICLE, CAP WATER MAY BE DIRECTLY DELIVERED AS A POTABLE WATER SUPPLY ONLY IF IT IS TREATED IN A MANNER SUFFICIENT TO ENSURE THAT THE QUALITY OF THE DELIVERED WATER IS EQUAL TO OR BETTER IN SALINITY, HARDNESS AND DISSOLVED ORGANIC MATERIAL THAN THE QUALITY OF THE GROUNDWATER BEING DELIVERED FROM TUCSON'S AVRA VALLEY WELL FIELD ON THE EFFECTIVE DATE OF THIS ARTICLE.

SECTION 27-92 RECHARGE.

1. THE CITY OF TUCSON SHALL NOT RECHARGE WATER IN ANY AREA THAT CONTAINS OR IS ADVERSELY EFFECTED BY TOXIC LANDFILLS.

2. TO PREVENT LAND SUBSIDENCE WITHIN THE CITY OF TUCSON'S CENTRAL WELL FIELD, ALL GROUNDWATER WITHDRAWALS SHALL BE COMPLETELY REPLENISHED, AS MEASURED OVER ANY FIVE YEAR PERIOD, USING RECHARGE INCLUDING RECHARGE OF CAP WATER AS PROVIDED IN SECTION 27-90. 3.(e).

SECTION 27-93.

DEFINITIONS

IN THIS ARTICLE, UNLESS THE CONTEXT OTHERWISE REQUIRES:

1. "POLLUTION" MEANS THE PRESENCE OF AN AMOUNT OF ANY SUBSTANCE IN GROUNDWATER WHICH EXCEEDS ANY STANDARD PRESCRIBED BY THE LAWS OF THE STATE OF ARIZONA OR THE UNITED STATES FOR POTABLE WATER.

2. "DISINFECTION BYPRODUCTS" ARE THE CHEMICAL COMPOUNDS FORMED WHEN CHLORINE, OZONE OR CHLORAMINES ARE USED TO DISINFECT WATER CONTAINING DISSOLVED ORGANIC MATERIAL.

Section 2.

FIVE YEARS AFTER THE EFFECTIVE DATE OF THIS ORDINANCE, THE MAYOR AND COUNCIL OF THE CITY OF TUCSON MAY, UPON A MAJORITY VOTE, SUBMIT TO THE REGISTERED VOTERS OF THE CITY FOR APPROVAL AT A CITY OF TUCSON GENERAL ELECTION APROPOS AL TO REPEAL OR MODIFY ARTICLE VI OF CHAPTER 27 OF THE TUCSON CODE AS ADDED BY THIS ORDINANCE.

Section 3 SEVERABILITY

IF A PROVISION OF THIS ORDINANCE OR ITS APPLICATION TO ANY PERSON OR CIRCUMSTANCE IS HELD INVALID, THE INVALIDITY DOES NOT AFFECT OTHER PROVISIONS OR APPLICATIONS OF THE ORDINANCE THAT CAN BE GIVEN EFFECT WITHOUT THE INVALID PROVISION OR APPLICATION, AND TO THIS END THE PROVISIONS OF THIS ORDINANCE ARE SEVERABLE

Appendix C
Additional Information

GENERAL INFORMATION

An overview of water issues in the Sonoran Desert is found in Nancy Laney's *Desert Waters: From Ancient Aquifers to Modern Demands* published by the Arizona Sonora Desert Museum in 1998. A general introduction to water issues in Arizona can be found in *Ensuring Arizona's Water Quantity and Quality Into the 21st Century*, a background report prepared by the University of Arizona for the Seventy-first Arizona Town Hall, October 26-29, 1997. *A Water Issues Primer for the Tucson Active Management Area* published by the Southern Arizona Water Resources Association (SAWARA) in 1983 is a helpful, although somewhat outdated general introduction to the basics of water in the Tucson area. SAWARA has published a series of informative newsletters on a variety of Tucson area water topics, including recharge, CAP, constructed wetlands, water supplies and wastewater. These are available on a Web site. SAWARA also has a video presenting an overview of Tucson's water situation.

Where to Get Free (or Almost Free) Information about Water in Arizona (1998 edition) is a directory of sources of water information, including Web sites. *Where to Find Water Expertise at Arizona Universities* (1998 edition) is a directory of sources of water information at Arizona state universities. Both are by Barbara Tellman and are available free from the Water Resources Research Center (WRRC), The University of Arizona and are in searchable format at the WRRC Web site. This Web site also contains water information as well as links to water agencies.

Chapter 2: LOOKING TO THE PAST TO UNDERSTAND THE PRESENT

Much of the information about the history of Tucson Water came from Lynn Baker, unofficial Tucson Water historian. Much of the information about the history of wastewater in Pima County came from John Schladweiler, unofficial Pima County Wastewater Management Department historian. A valuable source of information about the history of water development and technology in Pima County is a 1986 Master's thesis (University of Arizona) by Doug Kupel titled *Diversity Through Adversity: Tucson Basin Water Control Since 1854*. C.L. Sonnichsen's *Tucson: The Life and Times of an American City*, published by the University of Oklahoma Press in 1982, is a detailed history of Tucson. The history of the Santa Cruz River is discussed in *Arizona's Changing Rivers: How People Have Impacted the Rivers* by Barbara Tellman, Richard Yarde and Mary Wallace, published by the WRRC, The University of Arizona in 1997. More detailed information is available in A*rizona Stream Navigability Study for the Santa Cruz River*, a report by SFC Engineering and others for the Arizona State Land Department in 1996. The history of the Central Arizona Project was documented by Rich Johnson in *The Central Arizona Project*, published by the University of Arizona Press in 1977. The history of opposition to the CAP was documented by Frank Welsh in *How to Create a Water Crisis*, published by Johnson Books (Boulder) in 1985.

Chapter 3: IN SEARCH OF ADEQUATE WATER SUPPLIES

General information about groundwater is available in a booklet from the American Institute of Professional Geologists titled *Ground Water Issues and Answers*, available from the Arizona Geological Survey office in Tucson. Edward Davidson's Geohydrology and Water Resources of the Tucson Basin, Arizona (USGS Water Supply Paper; 1939-E, 1973) has a description of the basics of local geohydrology.

Numerous government documents are available, some of which are listed below. Most of the local government documents and consultant reports done for local government are available in the Tucson Public Library's government reference section in the downtown library.

Tucson Water's Planning and Technical Services Division provides periodic reports on the aquifer and withdrawals, titled *Annual Groundwater Withdrawal and Use Report.* Tucson Water also provides an annual report, *Annual Static Water Level Basic Data Report: Tucson Basin and Avra Valley, Pima County, Arizona*. Tucson Water published a useful booklet in 1998, *Status of the Aquifer*, in conjunction with the U.S. Geological Survey and the Arizona Department of Water Resources. An example of a consultant's report with useful information is by Mark Cross, *Hydrogeologic Constraints on Continued Groundwater Withdrawals by the City of Tucson.* (Errol L. Montgomery and Associates, Inc. 1998). Tucson Water also produces long-term planning documents such as *Tucson Water Resources Plan: 1990 to 2100*.

(Produced by CH2M Hill for Tucson Water. July 3, 1989). and *Tucson Water 50-Year Operating Plan: Planning Assessment Report*. (Malcolm Pirnie, Inc. February 1994).

CAP, General

An overview of the CAP is available in the Arizona Department of Water Resources' Governor's Central Arizona Project Advisory Committee's report (prepared with assistance of the Central Arizona Water Conservation District and the U.S. Bureau of Reclamation), *Description of the Central Arizona Project*. (April 1993). The Central Arizona Water Conservation District has several brochures, maps and informative materials about CAP. The fall-winter 1993 WRRC. *Arroyo,* "Long-Awaited CAP Water Delivers Troubled Water to State" also provides information. Analysis of the possibility of extending the CAP canal to the Green Valley area can be found in Malcolm Pirnie, Inc., in association with Errol Montgomery and Associates, Inc., *Sahuarita-Green Valley Area Central Arizona Project Water Use Feasibility Analysis and Delivery System Optimization Study*, prepared for Arizona Department of Water Resources, TAMA, September 1998.

WEB SITES WITH WATER INFORMATION

Arizona Department of Environmental Quality — www.adeq.state.az.us
Arizona Department of Water Resources — www.adwr.state.az.us
Arizona Geological Survey — www.azgs.state.az.us
Arizona Water Banking Authority — www.awba.state.az.us
Central Arizona Project and Central Arizona Groundwater Replenishment District — www.cap.az.us
Cooperative Extension, The University of Arizona — ag.arizona.edu/extension
Department of Hydrology and Water Resources, The University of Arizona — www.hwr.arizona.edu
Metropolitan Domestic Water Improvement District — www.metrowater.com/
Oro Valley Water Utility — www.ci.oro-valley.az.us/dpw/water_utility_.htm
Pima County Department of Environmental Quality — www.deq.co.pima.az.us
Pima County Flood Control District — sss.dot.co.pima.az.us/flood
Southern Arizona Water Resources Association — www.scottnet.com/sawara/
Tucson Regional Water Council — www.azstarnet.com/~trwc/
Tucson Water — www.ci.tucson.az.us/water
U.S. Bureau of Reclamation — www.usbr.gov
U.S. Environmental Protection Agency — www.epa.gov
U.S. Geological Survey — www.daztcn.wr.usgs.gov/
Water Resources Research Center, The University of Arizona — ag.arizona.edu/AZWATER/
WaterWiser - www.waterwiser.org

Recharge

A discussion of issues related to recharge in the Tucson area and an assessment of current and potential projects using CAP water can be found in the *Regional Recharge Plan,* written by the Institutional Policy and Advisory Group as part of the Regional Recharge Planning Process coordinated by the Tucson AMA of the Arizona Department of Water Resources (Institutional Policy and Advisory Group, 1998). This planning process began with the technical and background work completed by the Regional Recharge Committee, *Technical Report*, Arizona Department of Water Resources Tucson Active Management Area, September 1996.

A series of biennial symposia on recharge have been held over the years and contain much useful information. Copies of the proceedings for past years are available from WRRC. Another conference document is *Proceedings of the Symposium on Effluent Use Management*, edited by Kenneth D. Schmidt and Mary G. Wallace (AWRA 29th Annual Conference August 29 - September 2, 1993).

Some other sources of information on recharge methods and recharge policy in the Tucson area include:

CH2M Hill. *Rillito Recharge Project: An Evaluation of Recharge Techniques*. Prepared for the Arizona Department of Water Resources in Cooperation With Tucson Water and Pima County Flood Control District, July 1992. Tucson water issued a series of reports on *City of Tucson Sweetwater Underground Storage and Recovery Facility* in 1991 and 1994. These are just a few of the many government documents on related topics.

Some theses and dissertations have provided useful information. A complete list of those from the University of Arizona's Hydrology and Water Resources Department is available on the Web site. Keith, S.J., *Stream Channel Recharge in the Tucson Basin and Its Implications for Groundwater Management*. The University of Arizona, Department of Hydrology and Water Resources. M.S. Thesis, 1980.

An analysis of the impacts of the Water Consumer Protection Act can be found in a paper by L.G. Wilson, W.G. Matlock and K.L. Jacobs, *Hydrologic Uncertainties and Policy Implications: The Water Consumer Protection Act of Tucson, Arizona, USA*. Hydrogeology Journal. Vol. 6, pp. 3-14. 1998.

Subsidence

A good general introduction to subsidence is in Steven Slaff's *Land Subsidence and Earth Fissures In Arizona* published by the Arizona Geological Survey, Down-to-Earth Series 3 in 1993. Another general

introduction can be found in the *Arroyo* published by the WRRC in Summer 1992 titled "Land Subsidence, Earth Fissures Are Changing Arizona's Landscape."

The following more technical studies were published by the U.S.G.S.:

Anderson, S.R. *Potential for Aquifer Compaction, Land Subsidence, and Earth Fissures in the Tucson Basin, Pima County, Arizona*. U.S. Geological Survey Hydrologic Investigations Atlas HA-713. 1988.

Hanson, R.T. *Aquifer-System Compaction, Tucson Basin and Avra Valley, Arizona*: U.S. Geological Survey Water Resources Investigations Report 88-4172. 1989.

Hanson, R.T., S.R. Anderson and D.R. Pool. *Simulation of Ground-Water Flow and Potential Land Subsidence, Avra Valley, Arizona*. U.S. Geological Survey. Water Resource Investigations Report. 1990.

Hanson, R.T. and J.F. Benedict. *Simulation of Ground-Water Flow and Potential Land Subsidence, Upper Santa Cruz Basin, Arizona*. U.S. Geological Survey. Water Resources Investigations Report 93-4196. 1994.

Frisch-Gleason, Robin, Steven Slaff and Richard A.Trapp. *Bibliography of Subsidence and Earth Fissures Within Arizona.* Arizona Geological Survey Open File Report 95-8. June 1995.

Hoffman, John P., Donald R. Pool, A.D. Konieczki and Michael C. Carpenter. *Investigation of the Causes of Sinks in the San Xavier District, Tohono O'odham Nation, Pima County, Arizona*. U.S. Geological Survey, Open File Report 97-19. 1997.

Schumann, Herbert H. and S.R. Anderson. *Land Subsidence Measurements and Aquifer-Compaction Monitoring in Tucson Basin and Avra Valley, Arizona.* U.S. Geological Survey. Water Resources Investigations Report 88-4167. December 1998.

Effluent

The Winter 1997 issue of SAWARA's Waterwords, *Wastewater, A Growing Resource?* and the Summer 1990 issue, *Special Issue on Effluent As A Water Supply* provide much valuable information.

Information on the supply-related aspects of effluent can be found in:

Galyean, Kenneth C. *Infiltration of Wastewater Effluent in the Santa Cruz River Channel, Pima County, Arizona*. Water Resources Investigations Reports; 96-4021, 1996.

Pima County Wastewater Management Department's *Tucson Water. Regional Effluent Utilization Plan. Phase A: Preliminary Regional Effluent Utilization Study*. Malcolm Pirnie, Inc. February 1991 and a final report in 1995.

Grey Wilson and others studied the water quality impacts of effluent recharge in *Water Quality Changes During Soil Aquifer Treatment of Tertiary Effluent*. Water Resources Research, Vol. 67, No. 3, pp. 371-376. 1995.

Alternative Supplies

Information about alternative water supply and conservation strategies can be found in several issues of *Arroyo,* a periodical series published by the WRRC, The University of Arizona. The spring 1992 issue, "Weather Modification, a Water Resource Strategy to be Researched, Tested Before Tried," the August, 1998 issue, "Managing Watersheds to Improve Land and Water".

Chapter 4: COPING WITH FLOODWATER

An historical, if somewhat dated summary of flooding issues and information in Pima County can be found in *Flooding and Erosion Hazards in Tucson*, published by Southwest Environmental Service in 1980. This is out of print, but available in libraries. Two issues of WRRC's *Arroyo* dealt with general urban wash and flooding issues. "Often Neglected, Urban Washes Now Seen as Attractive Resource" (June 1991) and "Flood Hazards, a Concern in Desert Areas of Arizona" (June 1990).

Numerous reports from the Pima County Flood Control District and the City of Tucson deal with specific flood-related issues. There are reports for each major watercourse in connection with proposed projects. *Flood Control Concept Report for the Lower Santa Cruz River*, for example, by the Pima County Department of Transportation and Flood Control District (July 1987) looks at alternative flood control measures in the Marana area. There are also reports for the non-structural flood control projects, such as the Cienega Creek Preserve. Reports dealing with streambed recharge projects are also available from the same sources. FEMA floodplain maps may be viewed at the flood control districts.

Floodwater and Recharge

Guzman, A.G., L.G. Wilson, S.P. Neuman and M.D. Osborn. *Simulating Effect of Channel Changes on Stream Infiltration*. Journal of Hydraulic Engineering. American Society of Civil Engineers, Vol. 115, No. 12, pp. 1631-1645. 1989.

The Regional Recharge Committee issued an informative Technical Report printed by the Arizona Department of Water Resources Tucson Active Management Area in September 1996.

Chapter 5: THE MANY USES OF WATER

Water Use

Much of the information on water use comes from the Arizona Department of Water Resources' Tucson Active Management Area Draft Third Management Plan 2000-2010 (1998) and from the first and second management plans. Also see the Arizona Department of Water Resources' Tucson Active Management Area 1996 report, *State of the AMA.*

Water Conservation

Every major water provider in the area has information for its customers on water conservation techniques. Water CASA and SAWARA also provide such information.

General studies of water conservation include B. Dziegielewski's *Evaluating Urban Water Conservation Programs: A Procedures Manual*, prepared

for California Urban Water Agencies by Planning and Management Consultants, Ltd. February 1992.

A study of the impact of water rates on conservation is in Ari Michelsen and others' *Effectiveness of Residential Water Conservation Price and Nonprice Programs* published by the Research Foundation of the American Water Works Association, Denver, 1998.

Residential lawns in Tucson were studied by David Mouat and Michael Parton, Assessing the Impact of Tucson Peak Water Demand Reduction Effort on Residential Lawn Use, 1976-79. Office of Arid Lands, University of Arizona, December 1979.

Martin Karpiscak and others discussed conservation in *Residential Water Conservation: Casa del Agua*. Water Resources Bulletin. Vol. 26. No. 6, December 1990. pp. 939-948.

Residential Water Demand: A Micro Analysis Using Survey Data. by Gary Woodard and Todd Rasmussen, (Hydrology and Water Resources in Arizona and the Southwest, 14, 1984) examines factors that influence conservation.

Other surveys of municipal water use include: and in Tucson Water's *Results from the Fall 1992 Residential Household Survey*. (Draft.1995) and Craft, Marti, "Draft Summary of Landscape Survey Results, for ADWR, TAMA, unpublished.

Water Harvesting, Xeriscape and Reuse

Harvesting Rainwater for Landscape Use, by Patricia Waterfall (University of Arizona Cooperative Extension and the Tucson Active Management Area. Sept. 1998) provides practical, how-to information for homeowners. Pima County Cooperative Extension has a variety of pamphlets dealing with xeriscaping and low water use plants. See their Web site. The Summer 1993 issue of WRRC's *Arroyo* " Home Use of Graywater, Rainwater Conserves Water and May Save Money" provides a good overview. The water quality aspects are discussed in Charles Gerba and others' *Water Quality Study of Graywater Treatment Systems* (Water Resources Bulletin. Vol. 31, No. 1, pp.109-116). An examination of large scale reuse can be found in numerous reports prepared for Tucson Water. One example is *Tucson Metropolitan Wastewater Reuse Assessment Update*. (Malcolm Pirnie, Inc. August 1994).

Riparian Water Use

Information about water use for local riparian and wetlands came from the City of Tucson Multiple Benefit Project and Pima County Flood Control District. Both agencies have brochures for the public describing various planned and completed projects. Riparian preservation and restoration issues were described in two issues of the *Arroyo*. The City of Tucson also has information on the Sweetwater Wetland. The December 1988 issue of *Arroyo* "Flow of Rivers and Streams Provides Rich Benefits, Raises Varied Concerns" and the Spring, 1993 issue "Managing the Flow to Better Use, Preserve Arizona's Rivers" discuss water for riparian areas. Information about the legal aspects of effluent use in riparian areas came from Barbara Tellman's *Arizona's Effluent Dominated Riparian Areas: Issues and Opportunities.* (WRRC, Issue Paper No. 12, 1992).

Agriculture

Studies concerning agriculture include Paul Wilson's *An Economic Assessment of Central Arizona Project Agriculture*, Department of Agricultural and Resource Economics, University of Arizona, A Report Submitted to the Office of the Governor and the Arizona Department of Water Resources, 1992; Arizona Academy, Tenth Arizona Town Hall, Do Agricultural Problems Threaten Arizona's Total Economy? April, 1967. Some statistical information on agriculture can be found in Arizona Agricultural Statistics Service. Arizona Agricultural Statistics. USDA, Phoenix.

Some theses and dissertations on Arizona agriculture include Esher, Joseph C., *The Economic Sustainability of Central Arizona Project Agriculture*. M.S. Thesis, Department of Agricultural and Resource Economics, 1994. Peacock, Bruce, *Complying With the Arizona Groundwater Management Act: Policy Implications,* PhD Dissertation, Department of Agricultural and Resource Economics, University of Arizona. 1994; and Mark Evans, *An Assessment of the Impact of the Arizona Groundwater Management Act in the Phoenix Active Management Area.* M.S. Thesis. Department of Agricultural and Resource Economics.

Metal Mining

Some useful information on metal mining in the Tucson area can be found in Southwest Groundwater Consultants, Inc., *Conservation and CAP Use Potential of Tucson AMA Mines*, Prepared for Arizona Department of Water Resources, TAMA, 1997. Pima Association of Governments, *Groundwater Monitoring in the Tucson Copper Mining District - Detailed Upper Santa Cruz Basin Mines Task Force Area Recommendations*, July 1983. Arizona Department of Mines and Mineral Resources, *Arizona's Mining Update*, 1998.

Chapter 6: ENSURING SAFE DRINKING WATER

Information about water quality in Arizona is available from the EPA Web site. ADEQ also has a Web site with Arizona information. ADEQ's biennial reports (published in even-numbered years) on water quality in Arizona contain valuable information about surface and groundwater quality, including contamination sites of special concern. See Arizona Department of Environmental Quality. *Arizona Water Quality Assessment 1996.* The USGS is collecting a large amount of water quality information under its NAWQA Project (National Water Quality Assessment) some of which is available from the Tucson office. Pima County, City of Tucson, Dames and Moore. A summary of the TCE cleanup project is in *TARP In-Channel Recharge Pilot Proposal, Abbreviated Report* (Pima County, City of Tucson and Dames and Moore. January 1997).

Water Quality

Some general introductions to water quality issues can be found in several issues of the WRRC

Arroyo by Joe Gelt. These include"Water Quality, a Complex Issue" (Summer 1987), "Nonpoint Source Pollution: Unfinished Business on the Water Quality Agenda" (April 1990), "Constructed Wetlands: Using Human Ingenuity, Natural Processes to Treat Water, Build Habitat," (March, 1997) and "Microbes Increasingly Viewed as Water Quality Threat" (March, 1998).

The Pima Association of Governments has published a series of reports on regional water quality matters. Topics include *A Regional Plan for Water, Sewerage and Solid Waste Management*; *An Assessment of Groundwater Quality Near the Sahuarita Landfills, Sahuarita, Arizona; Phase I Report. Final, Avra Valley Recharge Project Stable Isotope Study Year-End Progress Report Fiscal Year 1996-1997; CAP Water Salinity Impacts on Water Resources of the Tucson Basin; Central Avra Valley Storage and Recovery Project Pilot Phase and Expanded Pilot Phase Stable Isotope Study; Fiscal Year 1997-1998 Progress Report; Groundwater Monitoring in the Tucson Copper Mining District - Detailed Upper Santa Cruz Basin Mines Task Force Area Recommendations; Landfills Along the Santa Cruz River in Tucson and Avra Valley; Arizona and the Water Quality State of the Region Report.*

Public attitudes toward CAP water were surveyed by Gary Woodard and other in *Impacts of Changes in Water Quality and Consumer Responses in Tucson, Arizona*. (WRRC 1993). Malcolm Pirnie Environmental Engineers looked at another similar community's experience with a change in water source in *Investigation of Potable Water Complaints in Dickinson, Texas* (Malcolm Pirnie, Inc., Special Study Report, May, 1986).

Water Treatment

Dames and Moore produced a series of papers for Tucson Water on CAP Use Study for Quality Water in 1994 and 1995.

Corrosivity

A study was done for Tucson Water by M. McGuire and others, *Review of Corrosion-Related Water Quality Problems in the City of Tucson* (McGuire Environmental Consultants 30 September, 1993).

More general discussions of corrosivity are by R. Lane, *Control of Scale and Corrosion in Building Water Systems* (McGraw Hill, New York, 1993) and I. Wagner, *Internal Corrosion in Domestic Drinking-Water Installations*. Aqua, 41(4), 219-223, 1992. The effects of corrosion on steel were studied by R.J. Pisigan and J. Singley, *Effects of Water Quality Parameters on the Corrosion of Galvanized Steel* (Journal American Water Works Association, 76-82, November, 1985).

Disinfection and Disinfection Byproducts

These are just a few of many studies of disinfection treatment methods and disinfection byproducts. White, G., *The Handbook of Chlorination*, Van Nostrand Reinhold Company, New York; McGuire, M., S. Reiber, R. Sierka, J. Singley, and C. Steelink, *Disinfectants for Drinking Water Treatment– A White Paper* (Prepared for Tucson Water by Central Arizona Project Water Quality Expert Panel), 25 April, 1995.

Disinfection byproducts are discussed in R.J. Bull's *Toxicology of Drinking Water Disinfection*, (Washington State University, Pullman, WA); G. Cline and J. Russell's *An Evaluation of Treatment Strategies for the Control of Disinfection By-Products: Water Quality vs. Cost* and W.H. Glaze's *Reaction Products of Ozone: A Review*. Environmental Health Perspectives, 69, 151-157, 1986. A great deal of information on this subject is available from the EPA Web site.

Salinity

Studies of salinity in the Colorado River include the Colorado River Basin Salinity Control Forum's *Water Quality Standards for Salinity, Colorado River System, 1993*; the U.S. Department of the Interior's *Quality of Water - Colorado River Basin* (Progress Report No. 18, 1997); and T.G. Miller and others *The Salty Colorado*, The Conservation Foundation, Washington D.C., 1986.

The impacts of salinity are examined in Garrett, Charles K. *Long Range Salinity Impacts in the Tucson Basin* (Prepared for Tucson Water. December 1992); Kleinman, A. and F. Brown, *Colorado River Salinity: Economic Impacts on Agricultural, Municipal and Industrial Users* (U.S. Department of Interior, Denver, 1980); Lohman, L., et al., *Estimating the Economic Impacts of Salinity of the Colorado River* (prepared for the U.S. Bureau of Reclamation. Final Report, 1988); R. d'Arge and L. Eubanks, *Municipal and Industrial Consequences of Salinity in the Colorado River Service Area of California, Salinity Management Options for the Colorado River*, 1978; G.C. Ragan and others, *Improved Estimates of Economic Damages from Residential Use of Mineralized Water* (Completion Report No. 183 Colorado Water Resources Research Institute, Colorado State University, August, 1993); Black and Veatch Consulting Engineers, *Economic Effects of Mineral Content in Municipal Water Supplies* (Research and Development Progress Report No. 260, U.S. Department of Interior, Office of Saline Water, 1967); the California Department of Water Resources, *Consumer Costs of Water Quality in Domestic Water Use – Lompoc Area*, Los Angeles, 1978; and Farnham, D., *Water Quality: Its Effects on Ornamental Plants* (Leaflet 2995), University of California Cooperative Extension, 1985.

Treating water to reduce salinity is discussed in Thompson, M., M.R. Wiesner, G. P. Westerhoff and M. P. Robinson, *Manual on Membrane Processes for Drinking Water Treatment*, Malcolm Pirnie Technical Publication, November, 1991 and in M.S. McGuire and others *Membrane Processing of Surface and Ground Waters for Human Consumption* (by Central Arizona Project Water Quality Expert Panel), 16 January, 1995.

Taste

The following are just a few of many studies of taste in water. Bruvold, W., H. Ongerth and R. Dillehay, *Consumer Assessment of Mineral Taste in Domestic Water*. Journal American Water Works Association, 575-580, November, 1969 and Bruvold, W., and J. Daniels, *Standards for Mineral Content in Drinking Water*. Journal AWWA, February, 1990.

Home water treatment alternatives are discussed in WRRC *Arroyo*, "Consumers Increasingly Use Bottled Water, Home Water Treatment Systems to Avoid Direct Tap Water" (March 1996) and a pamphlet by SAWARA and the League of Women Voters, *Home Water Treatment* . Information on this

subject is also available from the Arizona Water Quality Association (602) 947-9850.

Chapter 7: ROLES OF CITIZENS AND GOVERNMENT IN WATER POLICY

William E. Martin, Helen Ingram and others described the development of Tucson's water policies and problems in *Saving Water In A Desert City*, published in Washington, D.C. by Resources for the Future in 1984. A more recent analysis can be found in an article by Wilson, L.G., W.G. Matlock and K.L. Jacobs, *Hydrologic Uncertainties and Policy Implications: The Water Consumer Protection Act of Tucson, Arizona, USA*. (Hydrogeology Journal. Vol. 6, pp. 3-14. 1998). A summary of the City of Tucson's current water policies can be found in the City of Tucson's Mayor and Council Water Policies. Resolution No. 17929. Adopted January 26, 1998. For information about views of the Citizens Alliance for Water Security, email them at caws@techstar-online.com. Philip C. Metzger analyzed Tucson's water management in *To Master A Thirsty Future: An Analysis of Water Management Efforts in Tucson, Arizona*. (A Case Study Report from the Water Resources Program, The Conservation Foundation, May 1984.)

Ensuring Arizona's Water Quantity and Quality into the 21st Century contains a summary of laws pertaining to water quantity and water quality. This background report prepared by The University of Arizona for the 1997 Arizona Town Hall is available from the Arizona Town Hall office in Phoenix.

Discussions of the Groundwater Management Act and its implementation are discussed in "ADWR Developing Second Management Plan" (WRRC *Arroyo* Spring, 1987) and "The Groundwater Management Act: Saving Water and Developing Water Policy" (WRRC *Arroyo* Spring 1988). "Debate, Discussion Mark Ten-Year Anniversary of Arizona's Groundwater Management Act" (WRRC *Arroyo* October 1990); Robert J. Glennon's *Because That's Where the Water Is': Retiring Current Water Uses to Achieve the Safe-Yield Objective of the Arizona Groundwater Management Act*. Arizona Law Review 33:89 1991; State of Arizona Office of the Auditor General, Performance Audit of Arizona Department of Water Resources, Report No. 99-8, April 1999.

General information about the Colorado River Compact is in WRRC's August 1997 *Arroyo*, "Sharing Colorado River Water: History, Public Policy and the Colorado River Compact."

Some problems confronting small water systems are discussed in "Arizona's Small Water Systems Confront Questions, Uncertainties" (WRRC. *Arroyo.* October, 1991).

Regional water management is examined in "Regional Water Supply Agency, A New Arizona Water Policy Concept" (WRRC Arroyo, April, 1991).

Information about the Arizona Water Banking Authority is available from the AWBA Web site. The Central Arizona Water Conservation District (Central Arizona Project) and Central Arizona Groundwater Replenishment District also have a Web site with current information.

A thorough discussion of Indian water rights issues can be found in *Indian Water Rights: Negotiating the Future* published in 1983 by Elizabeth Checchio and Bonnie Colby, available from the Department of Agricultural Economics, The University of Arizona. A shorter explanation can be found in "Settlement of Indian Water Rights, a Priority Issue" (December 1989 WRRC *Arroyo*).

STATUTES DEALING WITH WATER

Water Quantity

ARS (Arizona Revised Statutes) Title 45: Chapter 1 deals with surface water laws; Chapter 2 contains the Groundwater Code, including laws dealing with water rights, transportation of groundwater, wells and artificial recharge; Chapter 3 contains provisions for underground water storage; Chapter 8 contains flood control statutes and the remaining chapters deal with dams, irrigation districts and other matters.

Water Quality

The federal Clean Water Act is contained in 33 USC (United States Code) Chapter 26. This includes laws controlling NPDES permits, wastewater treatment discharges, and related activities.

43 USC contains the Safe Drinking Water Act. The National Environmental Policy Act of 1969 is in 42 U.S.C.4321-4347. CERCLA (or Superfund) is contained in 42 USC - 9601 et seq.

Information about EPA regulations and water quality standards is available from the EPA Web site www.epa.gov. This site also has a list of water providers in Pima County.

ARS Title 49 deals with environmental management, including water quality matters, with emphasis on groundwater protection. The Arizona Administrative Code, Title 18 Chapters 9 and 11 contains specific regulations under the statutes.

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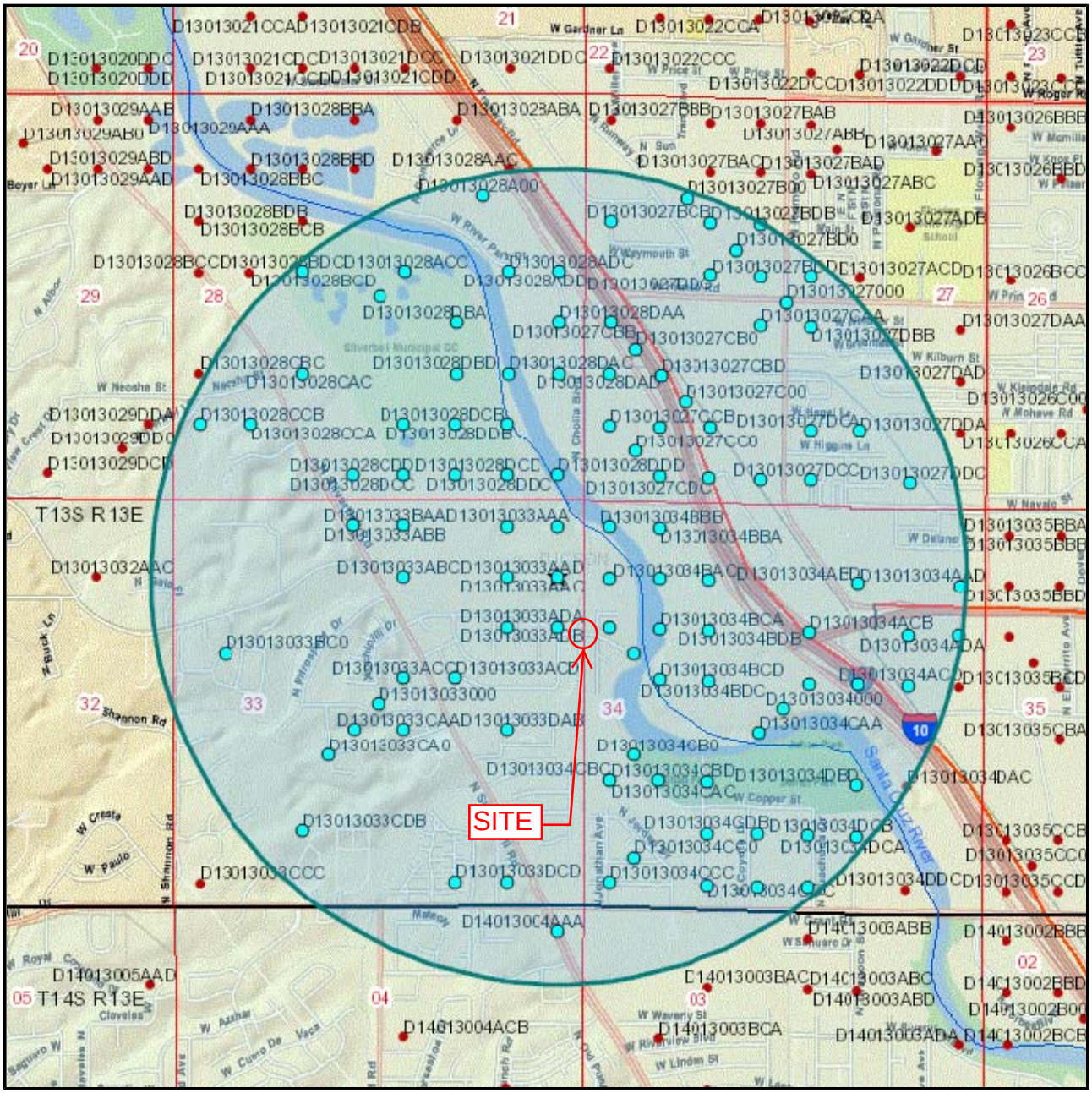
Wells within 1 Mile Radius of Silvercroft Wash Release Site



- Registered Well(s)*
- Selected Well
- Selection Area
- CAP Aqueduct
- River
- Interstate
- State Route
- US Route

*Locations are approximate and based on the well's legal description

N
W E
S

0.15 0.7 0 0.15 Miles

ARIZONA DEPARTMENT OF WATER RESOURCES

For more information about this map contact:
Arizona Department of Water Resources
3550 N Central Avenue
Phoenix, AZ 85012
Phone: (602)771-8500 or 1-800-352-8488

Map created on 1/30/2012

From: Forsberg, Bob
To: Hickman, Chris; Rogoff, Eric
Subject: FW: Silvercroft Sampling Reduction Request
Date: Friday, January 30, 2015 11:07:23 AM
Importance: High

From: Joey Pace [mailto:Pace.Joey@azdeq.gov]
Sent: Friday, September 26, 2014 7:37 AM
To: Forsberg, Bob
Cc: Julie Hoskin; Paul_Salcido@kindermorgan.com; Nesky, Michael
Subject: RE: Silvercroft Sampling Reduction Request
Importance: High

Bob:
The VRP **approves** of your request to remove **MW-3, MW-7, MW-8, MW-9, MW-10, MW-11, MW-12, MW-15, and MW-23** from the upgradient monitoring schedule. However, please note that the VRP will request that *MW-10* be returned to the monitoring schedule immediately, if at any time the concentrations in MW-05 rise above the AWQS (including the MDLs in non-detect samples from this well).

The VRP also **approves** of your request to **discontinue the three volume purge comparison sampling of MW-27, MW-28, MW-29S, MW-29M, MW-29D, and MW-30** as of the fourth quarter 2014 sampling event.

Please accept this electronic correspondence as formal approval of the above-referenced items. No hard copy letter will follow. You may begin incorporating these changes as of the fourth quarter 2014 event, scheduled for October 1, 2014.

Regards,

Joey Pace, Project Manager
Arizona Department of Environmental Quality
Remedial Projects Section, Voluntary Remediation Program
1110 West Washington Street, Mailcode 4415B-1
Phoenix, AZ 85007
Phone: 602-771-4818
Fax: 602-771-4138

From: Forsberg, Bob [mailto:Bob.Forsberg@arcadis-us.com]
Sent: Thursday, September 25, 2014 1:01 PM
To: Joey Pace
Cc: Julie Hoskin; Paul_Salcido@kindermorgan.com; Nesky, Michael
Subject: Silvercroft Sampling Reduction Request

Hi Joey-

It was great to see you again yesterday. Per our discussion at the meeting on September 24, 2014, KMEP is requesting to reduce the number of wells monitored during the quarterly sampling event. The monitor wells we are requesting to be removed from the quarterly sampling events are the following: MW-3, MW-7, MW-8, MW-9, MW-10, MW-11, MW-12, MW-15, and MW-23. I have attached a figure showing the locations of these wells and historical data. These monitor wells are located upgradient of the source area and have been non-detect below laboratory reporting limits or below Arizona aquifer water quality standards for several consecutive years now. Monitor wells MW-1, MW-20, MW-4, MW-5, and MW-13 will continue to be sampled to provide data regarding the upgradient conditions.

In addition, as agreed to in the meeting, KMEP will discontinue the three volume purge comparison sampling of MW-27, MW-28, MW-29S, MW-29M, MW-29D, and MW-30 during the fourth quarter 2014 sampling event. ADEQ approved the switch to low flow purge at a meeting on September 23, 2013 but requested that the new wells be sampled using both techniques to compare the methodologies. The new monitor wells have been sampled using both low flow purge technique and three volume purge technique for three consecutive quarters beginning in the first quarter 2014. I have attached is the data associated with the sampling comparisons. The comparison generally demonstrates that there are no major differences in concentrations between the two purge methods. Differences in the concentrations between the two sampling techniques is likely the result of various factors including anisotropy in the subsurface, fate and transport of dissolved-phase hydrocarbon mass, lingering effects of well development activities (e.g., development of MW-30 produced over 4,300 gallons of water, and concluded with a pumping rate of more than 40 gpm for approximately 30 minutes), and attenuation.

As discussed in the meeting, we will be starting our fourth quarter 2014 sampling event on October 1 and would like to incorporate these changes into this event. Please let me know if you need additional information or would like to discuss the data further.

Thanks,
Bob

Bob Forsberg, R.G. | Principal Geologist | bob.forsberg@arcadis-us.com
ARCADIS U.S., Inc. | 14201 N. 87th Street, Suite 135 | Scottsdale, AZ 85260
T. 480.905.9311 | M. 602.363.8729 | F. 480.905.9353
www.arcadis-us.com
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