MONTGOMERY
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Water Resource Consultants

Work Plan

February 3, 2010

Prepared for:
Gallagher & Kennedy, P.A. and
Roosevelt Irrigation District

Roosevelt Irrigation District Early Response Action

West Van Buren Water Quality Assurance Revolving Fund Site

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February 4, 2010

Ms. Jennifer Edwards Thies, Project Manager
Remedial Projects Section, Office of Waste Programs
ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY
1110 West Washington Street
Phoenix, Arizona 85007

Re: **REVISED RID EARLY RESPONSE ACTION WORK PLAN**
WEST VAN BUREN AREA WQARF REGISTRY SITE

Dear Ms. Thies:

On behalf of the Roosevelt Irrigation District (RID) and its Board of Directors, I am submitting the revised RID Early Response Action (ERA) Work Plan in response to the request for additional information from the Arizona Department of Environmental Quality (ADEQ). This additional information was requested by ADEQ during the December 23, 2009 conference call between you, our technical consultants, Montgomery & Associates (M&A), and Ms. Julie Riemenschneider. During this conference call, ADEQ provided comments after its review of the ERA Work Plan (WP) we submitted to ADEQ on October 5, 2009. A summary of ADEQ's comments is provided with a brief statement of RID's responses in italics:

1. **Justification for an ERA**: ADEQ requested that RID expand on the rationale for the ERA and to provide more detailed information demonstrating why the proposed ERA is necessary and consistent with Arizona rule and statute.

   RID has provided additional input on ERA justification in the revised WP and in RID's December 23, 2009 and January 20, 2010 letters to the ADEQ Director.

2. **Preliminary Remedial Objectives (ROs)**: ADEQ commented that ROs are not required or appropriate for an ERA and that ROs are developed by ADEQ through the public participation process.

   RID has removed the reference to preliminary ROs from the revised WP.

3. **ERA Objectives**: In lieu of the proposed ROs, ADEQ suggested providing ERA goals that specifically address the intended outcome of the early response actions being proposed in the Work Plan.

   RID has provided additional discussions regarding ERA objectives in the revised WP.

4. **Identification of permits needed for ERA**: ADEQ requested that RID identify reasonably foreseeable permits required to design, construct and operate the ERA.

   RID has provided a list of reasonably foreseeable permits in the revised WP.

5. **Additional detail regarding hydrologic implications of the proposed ERA**: ADEQ expressed concerns that continuous extraction of 20,000 gpm of groundwater for the ERA could result in unanticipated impacts such as aquifer dewatering and questioned whether this pumping rate would be sustainable in the long-term.

   RID is not proposing to implement additional pumping but rather to reprioritize existing pumping to improve plume containment, enhance VOC mass removal, and reduce the potential for impacting peripheral wells that are currently not contaminated. There will be no net increase in pumping from the aquifer system as a result of the ERA. RID has been pumping wells in this area for over 50 years with minimal water level decline, which provides a strong empirical demonstration that the proposed future pumping regime will be sustainable. This clarification has been included in the revised ERA WP.

   ADEQ also suggested that RID look at means to reduce the proposed pumping rate including targeted pumping in impacted subzones within the aquifer. ADEQ also asked RID to consider additional aquifer tests to evaluate well capture and optimize the remedy.

   RID agrees with ADEQ that additional study will likely be required to develop and optimize a final regional groundwater remedy. This work will be considered and conducted as part of the feasibility study (FS) phase of the WQARF final remedy selection process. However, RID's immediate interests, and the focus of the ERA, are to protect RID's wells that currently are not impacted, to provide an unimpaired supply of groundwater, in both quantity and quality, to meet the needs of RID's customer base and to take expedient action to protect public health, welfare, and the environment.

   While RID believes that this ERA will eventually become an integral part of the final regional groundwater remedy at the WVBA WQARF site, we understand that the formal process of conducting an FS and developing the proposed remedial action plan will continue in parallel with the ERA.

6. **Need to incorporate QAPP/SAP/HASP**: ADEQ requested that RID incorporate these plans to address quality assurance, proper sampling and analysis, and worker health and safety.

   RID has incorporated these plans by reference into the revised ERA WP. RID will utilize, to the extent possible, existing plans approved by ADEQ and coordinate all exceptions to these plans with ADEQ prior to commencement of field activities.

7. **Need for compound-specific water quality data**: ADEQ requested that individual compounds of concern be provided for each of the contaminated wells included in the WP in lieu of the total VOC concentrations currently provided.

   RID has included these compound-specific concentration data in the revised ERA WP.

8. **Provide for alternate end use**: ADEQ suggested that RID include in the WP an alternative end use for treated groundwater such as reinjection or discharge to the Agua Fria River bed.

   RID believes that the RID Main Canal is a highly reliable conveyance for end use. The ERA is predicated on using existing infrastructure and supporting existing and future water needs of RID customers; therefore, alternate end uses have not been considered. It is anticipated that, during the short periods of canal maintenance (approximately 3 weeks per year) or emergency repairs, operation of the groundwater extraction and treatment systems will be temporarily suspended until the maintenance/repair work is completed.

9. **Provide more detail regarding conceptual design details**: ADEQ requested that additional details regarding the ERA design be provided.

   HDR Engineering, Inc. (HDR) has been contracted to provide review and refinement of the ERA conceptual design and to provide associated cost estimating services. RID has included additional information regarding the conceptual design, provided by HDR, in the revised ERA WP as Appendix A (Technical Memo - RID Early Response Action Conceptual Design Summary). RID also understands that ADEQ will conduct detailed design review and approval at several stages of completion during the ERA (e.g. 30% and 90% design completion).

We respectfully request that this additional information incorporated into the revised ERA WP be reviewed and approved by ADEQ as soon as possible so we can begin implementation of the proposed response action to restore our ability to deliver unimpaired water to our customers.

Very truly yours,

Stanley H. Ashby

Stanley H. Ashby

Cc: Ben Grumbles, ADEQ
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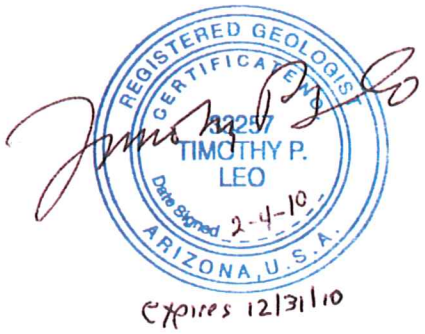
February 3, 2010

ROOSEVELT IRRIGATION DISTRICT
EARLY RESPONSE ACTION WORK PLAN
WEST VAN BUREN AREA
WATER QUALITY ASSURANCE REVOLVING FUND SITE



MONTGOMERY & ASSOCIATES

CONTENTS

Page

1.0 INTRODUCTION 1
2.0 EARLY RESPONSE ACTION RATIONALE 5
2.1 OVERVIEW OF EARLY RESPONSE ACTION 5
2.2 ATTAINMENT OF ADMINISTRATIVE CODE GOALS 8
2.3 CONSISTENCY WITH STATUTE 10
2.4 INFORMATION USED TO DEVELOP EARLY RESPONSE ACTION 12
3.0 SUMMARY OF SITE CONDITIONS 13
3.1 WEST VAN BUREN AREA SITE 14
3.2 PHYSICAL SETTING 15
3.2.1 Land Uses 15
3.2.2 Water Uses 16
3.2.3 Surface Water 16
3.3 HYDROGEOLOGIC CONDITIONS 18
3.4 GROUNDWATER CONDITIONS 19
3.5 NATURE AND EXTENT OF GROUNDWATER CONTAMINATION 21
3.6 SOURCES OF CONTAMINATION 22
3.7 IMPACT OF GROUNDWATER CONTAMINATION ON ROOSEVELT IRRIGATION DISTRICT WELLS AND OPERATIONS 23
3.8 SUMMARY OF SITE STATUS 24
4.0 DESCRIPTION OF EARLY RESPONSE ACTION 26
4.1 EARLY RESPONSE ACTION CONCEPTUAL DESIGN 26
4.1.1 Potential Remedial Alternatives 26
4.1.2 Alternatives Evaluation 27
4.2 EARLY RESPONSE ACTION CONCEPTUAL DESIGN ELEMENTS 31
4.2.1 Central Groundwater Treatment Facility 32
4.2.2 Salt Canal Improvements 32
4.2.3 Well Modifications 32
4.2.4 New Pipelines 33
4.3 EARLY RESPONSE ACTION IMPLEMENTATION 34
4.3.1 Phase 1 34
4.3.2 Phase 2 35
5.0 EARLY RESPONSE ACTION TASKS 38
5.1 TASK 1 – MEETINGS 38
5.2 TASK 2 – COMMUNITY INVOLVEMENT 39
5.3 TASK 3 – DATA COLLECTION AND ANALYSIS 39
5.4 TASK 4 – PERMITS AND PROPERTY ACCESS 40
5.5 TASK 5 – DESIGN 41
5.6 TASK 6 – CONSTRUCTION 41
5.7 TASK 7 – SYSTEM TESTING AND START-UP 42
5.8 TASK 8 – OPERATION AND MAINTENANCE PLAN 42
6.0 SCHEDULE 44
7.0 REFERENCES CITED 45

MONTGOMERY & ASSOCIATES

CONTENTS - continued

TABLES

Table

1 SUMMARY OF WATER QUALITY DATA, WEST VAN BUREN AREA WATER QUALITY ASSURANCE REVOLVING FUND SITE

2 SUMMARY OF EARLY RESPONSE ACTION, ROOSEVELT IRRIGATION DISTRICT EARLY RESPONSE ACTION WORK PLAN, WEST VAN BUREN AREA WATER QUALITY ASSURANCE REVOLVING FUND SITE

ILLUSTRATIONS

Figure

1 STUDY AREA

2 REGIONAL CONDITIONS

3 CONCEPTUAL SITE MODEL

4 TETRACHLOROETHENE CONCENTRATIONS, UPPER ALLUVIAL UNIT 1, FIRST QUARTER 2008

5 TRICHLOROETHENE CONCENTRATIONS, UPPER ALLUVIAL UNIT 1, FIRST QUARTER 2008

6 1,1-DICHLOROETHENE CONCENTRATIONS, UPPER ALLUVIAL UNIT 1, FIRST QUARTER 2008

7 TETRACHLOROETHENE CONCENTRATIONS, UPPER ALLUVIAL UNIT 2, FIRST QUARTER 2008

MONTGOMERY & ASSOCIATES

CONTENTS – continued

8	TRICHLOROETHENE CONCENTRATIONS, UPPER ALLUVIAL UNIT 2, FIRST QUARTER 2008
9	1,1-DICHLOROETHENE CONCENTRATIONS, UPPER ALLUVIAL UNIT 2, FIRST QUARTER 2008
10	TETRACHLOROETHENE CONCENTRATIONS, MIDDLE ALLUVIAL UNIT, FIRST QUARTER 2008
11	TRICHLOROETHENE CONCENTRATIONS, MIDDLE ALLUVIAL UNIT, FIRST QUARTER 2008
12	1,1-DICHLOROETHENE CONCENTRATIONS, MIDDLE ALLUVIAL UNIT, FIRST QUARTER 2008
13	PCE, TCE, AND 1,1-DCE CONCENTRATIONS IN RID WELLS, SEPTEMBER 2008
14	EARLY RESPONSE ACTION
15	PROPOSED SCHEDULE

APPENDICES

Appendix

A	EARLY RESPONSE ACTION CONCEPTUAL DESIGN TECHNICAL MEMO PREPARED BY HDR ENGINEERING, INC.

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& ASSOCIATES

February 3, 2010

ROOSEVELT IRRIGATION DISTRICT
EARLY RESPONSE ACTION WORK PLAN
WEST VAN BUREN AREA
WATER QUALITY ASSURANCE REVOLVING FUND SITE

1.0 INTRODUCTION

This Work Plan provides the rationale for and outlines the tasks associated with an **Early Response Action (ERA)** to reduce the adverse impact and threat of extensive groundwater contamination in the West Van Buren Area (WVBA) Water Quality Assurance Revolving Fund (WQARF) Site (the WVBA Site) on public health, welfare and the environment and on Roosevelt Irrigation District's (RID's) wells, operations and water supply. This Work Plan was prepared in accordance with the provisions specified in Arizona Administrative Code (A.A.C.) R18-16-405. The proposed ERA is also consistent with the goals established for the federal Superfund program under the federal National Contingency Plan (NCP)[1].

The proposed ERA is designed to achieve the following remediation goals described in A.A.C. R18-16-405:

1. Mitigate the risk to public health from potential exposures to contaminants in groundwater pumped by RID from the WVBA Site;
2. Mitigate the adverse impact of the groundwater contamination in the WVBA Site on RID's operations by removing hazardous volatile organic compounds (VOCs) from a

[1] See 40 CFR, Chapter 1, §300.430

portion of the groundwater pumped by RID from the WVBA Site and restoring RID's right to unrestricted use of this water supply;

3. Protect RID's wells that are threatened (but not currently impacted) by the groundwater contamination; and.
4. Maintain hydraulic control the groundwater contamination to reduce the scope and costs of the final remedy.

The proposed ERA will achieve other important goals including minimizing further degradation of groundwater and maximizing the beneficial use of groundwater. RID believes that these goals should be considered by the Arizona Department of Environmental Quality (ADEQ) when developing the remedial objectives (ROs) for the WVBA Site.

Figure 1 depicts the approximate boundaries of, relevant features within, and the composite extent of groundwater contamination in the WVBA Site. Groundwater within the WVBA Site is impacted by organic and inorganic compounds as a result of historical releases from numerous industrial facilities located in the WVBA Site, the Motorola 52nd Superfund Street Site (52nd Street Site), and the West Central Phoenix WQARF Site (WCP Site) (**Figure 2**). The primary contaminants of concern (COCs) in groundwater in the WVBA Site are VOCs. The primary VOCs of concern are tetrachloroethene (PCE), trichloroethene (TCE) and 1,1-dichloroethene (1,1-DCE) because these compounds are detected in groundwater at concentrations exceeding the Arizona Aquifer Water Quality Standards (AWQS)[2]. Chromium also is considered a COC in the WVBA Site. Methyl tertiary butyl ether (MTBE) also is detected in groundwater in the WVBA Site.

RID has in excess of 190,000 acre-feet per year (AFY), or more than 120,000 gallons per minute (gpm), of permitted[3] groundwater pumping capacity in the WVBA Site from 32 wells (31 operational; RID-111 is currently inoperable). Groundwater pumped by RID is

[2] Other hazardous substances detected in groundwater in the WVBA Site, 52nd Street Site, WCP Site include benzene, toluene, ethylbenzene, xylenes, nitrate, vinyl chloride, 1,1,1-trichloroethane, 1,1-dichloroethane, cis-1,2-dichloroethene, and chloroform.

[3] Arizona Department of Water Resources 55-Series database

conveyed to its service area west of the Agua Fria River for irrigation and domestic uses (**Figure 2**). The groundwater contamination in the WVBA Site has impacted or threatens to impact all of the RID production wells located within the Site boundary. In September 2008, 20 RID wells were impacted by the groundwater contamination in the WVBA Site. These impacted wells have a permitted pumping capacity of approximately 110,000 AFY (about 70,000 gpm). There are 11 other RID wells in the WVBA Site that are threatened by groundwater contamination, which have a permitted pumping capacity of in excess of 80,000 AFY (in excess of 50,000 gpm).

According to A.A.C. R18-16-405.I, the proposed ERA is deemed legally "necessary" because "[i]n considering whether an early response action is necessary to protect or provide a supply of water because a well is threatened by contamination, a well located in the area within ¼ mile upgradient, ½ mile cross-gradient and 1 mile downgradient of the areal extent of contamination at the site shall be presumed to be threatened by the contamination." RID's impacted and threatened wells in the WVBA Site meet the "necessary" condition in A.A.C. R18-16-405.I, which authorizes the proposed ERA under A.A.C. R18-16-405.A and A.R.S. 49-282.06.A.

The proposed ERA also is necessary to mitigate impacts to RID wells, its operations and water uses; to mitigate current risks to public health from exposures to contaminants in the groundwater and to contaminants that may volatilize into the air; to reduce the scope and costs of the final remedy; and, ultimately, to provide RID with unrestricted use of the treated water for all beneficial uses.

This ERA Work Plan has been subdivided into the following sections:

- Early Response Action Rationale (Section 2.0)
- Summary of Site Conditions (Section 3.0)
- Description of Early Response Action (Section 4.0)

- Early Response Action Tasks (Section 5.0)
- Schedule (Section 6.0)
- References Cited (Section 7.0)

2.0 EARLY RESPONSE ACTION RATIONALE

This section provides the rationale for the ERA in accordance with Subsection C of A.A.C. R18-16-405. In particular, this section identifies the information used to develop the ERA and explains why the ERA is necessary, how the ERA will attain the applicable remedial goals specified in the administrative code, and how the ERA is consistent with the Arizona Revised Statutes (A.R.S.) §49-282.06(A).

2.1 OVERVIEW OF EARLY RESPONSE ACTION

Subsequent sections of this Work Plan provide a detailed description of the proposed ERA. This section includes a conceptual overview of the ERA to provide the basis of and context for the rationale behind the ERA.

The proposed ERA includes four conceptual components: 1) a new priority pumping regimen for the RID wellfield to maximize removal of hazardous substances from the groundwater while maintaining current annual groundwater withdrawal rates and meeting the seasonally variable demand of RID's customers; 2) construction of a new centralized treatment facility to reliably remove VOCs and reduce their concentrations to meet standards acceptable for all beneficial uses; 3) physical improvements to selected RID wells and canals to reduce emission of VOCs from water to air and to reduce exposure to VOCs; and 4) discharge of treated water to the RID Main Canal for irrigation use or to a new pipeline for potable use. The proposed ERA predominantly uses existing RID pipelines and canals to convey a nominal 20,000 gpm (approximately 32,000 AFY) of contaminated groundwater pumped from the 10 most highly contaminated RID wells to the new treatment facility. The new treatment facility will remove thousands of pounds VOCs from the groundwater

annually and discharge water of sufficient quality for all beneficial uses. Under state law[4], no remedial or response action can reduce the quantity of RID's water supply or restrict the quality of RID's water supply from its maximum beneficial use.

Since its inception in 1927, RID has exercised its long-standing right under state law to pump groundwater from the WVBA Site and will continue this operation in perpetuity under the same water right. Under the ERA, there will be no net change in annual groundwater pumping volumes by RID in the WVBA Site. Consequently, future groundwater levels will be unaffected by the ERA.

The proposed ERA is necessary to mitigate the adverse impact of the extensive groundwater contamination in the WVBA Site on RID's wells, operations and water uses, to mitigate current risk to public health from exposure to contaminants present in the groundwater, to protect RID wells that are threatened by the groundwater contamination, and to control the groundwater contamination to reduce both the scope and cost of the final remedy. As discussed before, the proposed ERA is deemed legally "necessary" under A.A.C. R18-16-405.I. RID also has the right under state law to pump unimpaired groundwater into the future from the WVBA Site for all beneficial uses. For decades, RID's use of groundwater from the WVBA Site has been compromised due to the groundwater contamination. Under WQARF statutes and rules, RID is legally entitled to mitigation of all adverse impacts from the groundwater contamination on its operations, and the cost of this mitigation effort is the responsibility of the parties that contributed to or threaten to contribute to the groundwater contamination that has impacted or threatens to impact RID wells[5].

The proposed ERA has been designed to address RID's impacted water supply and is not considered the final groundwater remedy for the WVBA Site. The final groundwater remedy for the WVBA Site will be developed by ADEQ in accordance with the process

[4] See A.R.S. 49-282.06.A.2 and B.4(b)
[5] See A.A.C., Title 18, Chapter 16; A.R.S., Title 49; and 40 CFR, Chapter 1, §300.430.

outlined in WQARF statutes and rules. This process is underway, and ADEQ is currently developing ROs for the WVBA Site with public participation from the community and interested stakeholders. However, because the proposed ERA uses a United States Environmental Protection Agency (EPA) presumptive response strategy that is economical, efficient and consistent with similar groundwater remedies adopted by ADEQ and EPA at other Superfund and WQARF sites, it is reasonable to expect that the ERA infrastructure and operation would become part of the final groundwater remedy for the WVBA Site.

The remedial approach and degree of treatment in the proposed ERA are conceptually similar to regional groundwater remedies adopted by ADEQ and EPA at other federal Superfund Sites in the Phoenix area including the Phoenix-Goodyear Airport (PGA-N), North Indian Bend Wash (NIBW), and 52nd Street sites. Specifically, contaminated groundwater is extracted to restore groundwater to meet applicable AWQS and is treated to be equivalent to the maximum contaminant levels (MCLs) under the federal Safe Drinking Water Act at the PGA-N, NIBW, and 52nd Street Superfund Sites where the end use of the treated water is irrigation. This is consistent with state law that requires groundwater to meet AWQS[6] and water treatment under the ERA to be conducted to a degree that "...allows for the maximum beneficial use of the waters of the state."[7]

The proposed ERA is not subject to the same degree of analysis or agency approval as the final groundwater remedy[8]. The development and approval processes for ERAs were intentionally streamlined to facilitate rapid implementation of response actions to mitigate impacts or threatened impacts on potentially affected parties within or near WQARF sites. In this case, the proposed ERA is necessary to mitigate existing adverse impacts on RID's wells, operations and water supply, to protect other RID wells that are threatened by groundwater contamination, to mitigate current risk to public health, and to control the groundwater contamination so as to reduce both the scope and cost of the final remedy.

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[6] See A.R.S. 49-224.B.
[7] See A.R.S. 49-282.06(A)
[8] See A.A.C. R18-16-405(C).

2.2 ATTAINMENT OF ADMINISTRATIVE CODE GOALS

Subsection A of A.A.C. R18-16-405 authorizes an ERA if the ERA is necessary to address any one of the following goals:

- Goal A1: Address current risk to public health, welfare, and the environment;
- Goal A2: Protect or provide a supply of water;
- Goal A3: Address sources of contamination; or
- Goal A4: Control or contain contamination where such actions are expected to reduce the scope or cost of the remedy needed at the site.

With respect to RID's operations, the proposed ERA is necessary to provide RID with an unimpaired and unencumbered water supply, which is directly consistent with Goal A2. In fact, RID's impacted and threatened wells in the WVBA Site meet the "necessary" condition in A.A.C. R18-16-405.I, which authorizes the proposed ERA under A.A.C. R18-16-405.A and A.R.S. 49-282.06.A. However, the proposed ERA will also achieve goals A1 and A4. The proposed ERA is not specifically designed to address sources of contamination (Goal A3) because source control is the responsibility of facility owners whose releases have impacted or threaten to impact groundwater. However, the proposed ERA would be effective at controlling the migration of contaminated groundwater from source areas through the hydraulic containment that results from wellfield operations (Goal A4). The following sections summarize how the proposed ERA will achieve goals A1, A2, and A4.

Goal A1: Address current risk to public health, welfare, and the environment

The ERA will accomplish this goal by initiating remediation of the widespread groundwater contamination in the WVBA Site. Specifically, the ERA will pump impacted groundwater, treat it to remove VOCs, and discharge the treated water at a quality sufficient

for all beneficial uses. In addition, the ERA will include physical improvements to selected RID wells and conversion of open sections of RID canals to below-grade pipeline in order to control and, thereby, reduce public access and exposure to contaminants and volatilization of VOCs at the highest VOC-contaminated wells. After implementation, the ERA will have the immediate benefit of eliminating the emission of thousands of pounds of VOCs from groundwater to air that would otherwise occur every year[9]. Over time, the ERA, combined with supplemental response actions developed during the Feasibility Study (FS), will further diminish potential public exposure pathways to the groundwater contamination by reducing the concentration, toxicity, mass/volume, and mobility of COCs in the groundwater and their release to the environment.

Goal A2: Protect or provide a supply of water

The ERA will: 1) provide unrestricted use of the treated groundwater to RID and enable it to be used for all beneficial uses; 2) protect against further degradation of groundwater and impact to uncontaminated RID wells by maintaining and enhancing hydraulic containment of the contaminated groundwater through continued operation of the wells; 3) remove thousands of pounds of VOCs from the water per year and prevent transfer of these VOCs to other areas or to the air through more continuous operation of the most highly contaminated RID wells; and 4) maintain the current annual rate of groundwater pumping by RID in the WVBA Site to eliminate the potential for groundwater level decline resulting from the ERA.

[9] At other Phoenix Superfund Sites, EPA, ADEQ, and Maricopa County have clearly articulated that VOC contaminants should be removed from the environment and treated or disposed of properly rather than transferred from one media (contaminated groundwater) to another media (air).

Goal A4: Control or contain contamination where such actions are expected to reduce the scope or cost of the remedy needed at the site

The ERA will maintain hydraulic containment of the groundwater contamination through the operation of an efficient and economical regional pump and treat system that primarily uses existing wells and conveyances owned by RID. If operation of the impacted RID wells ceased due to the contamination, the extent of hydraulic containment provided by the existing wellfield operations would decrease and the extent of impacted groundwater would expand. Use of existing RID wells and conveyances will reduce the overall cost of the final groundwater remedy. Initiation of the pump and treat system as an ERA will facilitate final remedy implementation and provide data on capture effectiveness and rate of VOC mass removal that would be used to design an optimized final groundwater remedy for the WVBA Site.

2.3 CONSISTENCY WITH STATUTE

The ERA also is consistent with the following remedial action criteria set forth in A.R.S. § 49-282-06(A):

1. Assure the protection of public health and welfare and the environment;
2. To the extent practicable, provide for the control, management or cleanup of the hazardous substances in order to allow the maximum beneficial use of the waters of the state; and
3. Be reasonable, necessary, cost-effective and technically feasible.

The proposed ERA is consistent with remedial action criteria 1 for the reasons cited under Goal A1. The ERA will protect public health and the environment through groundwater extraction and treatment to reduce the concentration, toxicity, mobility, and

mass/volume of COCs in groundwater and, through infrastructure improvements, to reduce public access and exposure to VOCs in groundwater and to VOCs volatilized into air from the highest VOC-contaminated wells.

The ERA is consistent with remedial action criteria 2 for the reasons cited under Goal A2. The ERA will enhance hydraulic control of the contaminated groundwater and eventually reduce VOC concentrations in groundwater to meet applicable AWQS, which are required to protect and restore the groundwater resources in the WVBA Site for all beneficial uses. The ERA also will treat the contaminated water to below MCLs to ensure maximum beneficial use of the extracted groundwater.

The ERA is consistent with remedial action criteria 3 for the reasons cited under Goal A4. The ERA is reasonable because it represents the first phase of the regional groundwater remedy required for the WVBA Site and the scale of the proposed response action is modest compared to the scale of groundwater contamination that must be addressed by the final remedy; it is necessary to minimize current and future public exposure to contaminated groundwater, to maintain hydraulic containment, to protect certain RID wells from contamination, to restore groundwater quality, and to mitigate impact to RID's operations[10]; it is cost-effective because it predominantly uses existing RID wells, conveyances, and easements; and, it is technically feasible because it uses presumptive remedial technologies that have been demonstrated to be effective at numerous similar contamination sites and the necessary professional expertise is available locally to design, construct and operate this response action.

[10] As previously discussed, the proposed ERA meets the "necessary" condition in A.A.C. R18-16-405.I, which authorizes the proposed ERA under A.A.C. R18-16-405.A and A.R.S. 49-282.06.A.

2.4 INFORMATION USED TO DEVELOP EARLY RESPONSE ACTION

The proposed ERA was developed from extensive geologic, hydrogeologic and engineering experience and judgment in accordance with the associated standards of practice for each of these disciplines. The available data on the hydrogeologic conditions and nature and extent of contamination in the WVBA Site were reviewed during development of the ERA. Montgomery & Associates (M&A) is the lead technical consultant on the ERA. The M&A project team has broad-based experience in providing strategic direction and decision making on groundwater contamination projects, developing and managing regional groundwater remedies, conducting contaminated groundwater assessments, and characterizing hydrogeologic conditions. To support the ERA design effort, HDR Engineering, Inc. (HDR), a locally and nationally recognized leader in water resource engineering, has been contracted to conduct conceptual engineering design work for the ERA. The key M&A and HDR team members are registered professional geologists or engineers in Arizona.

The proposed ERA was developed based on the following specific information: 1) the Draft Remedial Investigation (RI) Report for the WVBA Site (Terranext, 2008a), 2) the Land and Water Use Report (Terranext, 2007), 3) Article 4 of Title 18, Chapter 16 of the A.A.C. that addresses remedy evaluation and selection, 4) the goals of the federal NCP and associated applicable federal guidance documents on conducting feasibility studies and presumptive groundwater remediation technologies developed by the EPA for the federal Superfund Program (EPA, 1988 and 1996), and 5) information provided by RID regarding their wells, conveyances and current irrigation operations.

3.0 SUMMARY OF SITE CONDITIONS

Extensive regional groundwater contamination exists in the City of Phoenix (COP) from approximately 52nd Street to beyond 75th Avenue between Lower Buckeye Road and Campbell Avenue (**Figure 2**). The groundwater in this area is impacted primarily by VOCs resulting from historical and current releases and threatened releases to the subsurface from numerous industrial facilities. Impacted groundwater east of 7th Avenue within the 52nd Street Site is being managed by the EPA under the federal Superfund program. The 52nd Street Site is subdivided into three operable units (OUs) (**Figure 2**).

Interim groundwater pump and treat systems are currently operating in OU1 and OU2 to address impacted groundwater within these OUs. To date, an OU-wide groundwater remedy has not been implemented in OU3; therefore, impacted groundwater continues to migrate from OU3 to the WVBA Site. Numerous industrial facilities have been identified in OU1, OU2 and OU3 where historical and current releases, threatened releases, and documented subsurface contamination are suspected to represent past and ongoing sources of groundwater contamination in the 52nd Street Site OUs and downgradient in the WVBA Site (ADEQ, 2008a).

Impacted groundwater north of McDowell Road between 27th and 51st Avenues is associated with the WCP Site and is being managed by ADEQ. The WCP Site is subdivided into 5 OUs: 1) East Grand Avenue, 2) West Grand Avenue, 3) North Plume, 4) North Canal Plume, and 5) West Osborn Complex. Impacted groundwater in the West Osborn Complex exists immediately north and nominally upgradient of the WVBA Site. Numerous industrial facilities have been identified in the WCP Site where historical and current releases, threatened releases, and documented subsurface contamination are suspected to represent past and ongoing sources of groundwater contamination in the WCP Site and downgradient

in the WVBA Site (ADEQ, 2008c)[11]. To date, a site-wide remedy to mitigate the impacted groundwater in the WCP Site has not been implemented.

The WVBA Site is located immediately west of the 52nd Street Site and south of the WCP Site (**Figure 2**). The groundwater contaminant plume that extends west from the Motorola 52nd Street facility to beyond 75th Avenue is one of the largest plumes in the United States.

3.1 WEST VAN BUREN AREA SITE

The WVBA Site was informally established in 1987 and then formally registered as a WQARF site in 1998 (ADEQ, 2008b). The WVBA Site is approximately 8.5 miles long and 3 miles wide. The site comprises approximately 25 square miles within the western portion of the COP. The extent of groundwater contamination associated with the WVBA Site is generally bounded on the north by Interstate 10, on the east by 7th Avenue, on the south by Lower Buckeye Road, and on the west beyond 75th Avenue. The City of Tolleson is located immediately west of the WVBA Site.

The Draft RI Report was published by ADEQ in October 2008 (Terranext, 2008a). The Draft RI Report included summaries of the following information:

- Methodologies and scope of groundwater investigations conducted in the WVBA Site from 1987 through 2008;
- Results of approximately 50 facility-specific soil and/or groundwater investigations, and remedial actions at some sites, conducted by owners and operators at suspected source areas within the WVBA Site;

[11] ADEQ reported at its January 18, 2008 WQARF Board meeting that the West Osborn Complex is currently in the FS stage and that impacted groundwater from this operable unit was more extensive than originally thought and probably has merged with the WVBA Site. Also, the results of the draft RI for the WVBA Site indicated that volatile organic compounds appear to be migrating from the WCP Site to the WVBA Site (Terranext, 2008a).

- Surface water, geologic, hydrogeologic and ecologic conditions;
- Nature and extent of contamination;
- Impacts to RID's wells and fate and transport of COCs in their conveyance system; and
- COC fate and transport in groundwater.

The public comment period for the Draft RI Report ended on December 31, 2008. ADEQ currently is in the process of responding to comments on the Draft RI Report, and developing ROs with input from the community. RID understands that ADEQ plans to complete the final RI report by mid-2010. However, recent budget constraints may delay this process.

A summary of the physical setting, hydrogeologic conditions, groundwater conditions, sources of contamination and impact on RID wells and operations are provided in the following sections based on the results of the RI.

3.2 PHYSICAL SETTING

The relevant aspects of the physical setting in the WVBA Site include current and future land and water uses and surface water conditions.

3.2.1 Land Uses

The WVBA Site is located in the western portion of the COP. The area within the WVBA Site is largely urbanized. The urban density currently is highest in the east near the city center and lowest in the west where active and retired agricultural lands exist. New industrial and commercial complexes are being developed in the western portion of the WVBA Site. The primary current land uses in the WVBA Site identified in the Land and

Water Use Report include agricultural/vacant, industrial, warehouse, transportation, residential, and mixed commercial/public (Terranext, 2007). The population in the WVBA Site is expected to increase in the future with the largest increases occurring in the west; therefore, residential land use is expected to increase proportionately compared to the other land uses. The land uses reported by the respondents to the land use questionnaires, who were largely industrial in nature, are not expected to change significantly in the future.

3.2.2 Water Uses

As noted in Section 2.2.2.1 of the Draft RI Report, water uses for production wells located in the WVBA include domestic, industrial, irrigation, utility, commercial, stock, test and municipal. RID, COP and the Salt River Project (SRP) all have wells within or proximal to the WVBA. RID and SRP wells have historically been used for irrigation; however, all three entities have indicated plans or intentions to develop this groundwater for use as a drinking water supply, as indicated in the latest Land and Water Use Study Questionnaires.

3.2.3 Surface Water

The Salt River is located south of the WVBA Site. Localized flow occurs in the Salt River south of the WVBA Site as a result of treated wastewater releases from the COP's 23rd Avenue Waste Water Treatment Plant (WWTP). More extensive flow in the Salt River in the area south of the WVBA Site can occur periodically as a result of runoff from heavy precipitation events and releases from upstream reservoirs on the Salt and Verde River systems. A portion of this flow in the Salt River recharges the groundwater in the area south of the WVBA Site. This recharge can affect groundwater levels, hydraulic gradients, and groundwater flow directions in the WVBA Site.

RID operates its primary canal, designated as the "RID Main Canal", in the southern portion of the WVBA Site to convey irrigation water to its service area west of the Agua Fria

River (**Figure 2**). The RID Main Canal extends from approximately 19th Avenue and Interstate 17, through the cities of Phoenix, Tolleson, Avondale and Goodyear to its terminus west of Buckeye (approximately 32 miles west of the WVBA Site). The RID Main Canal conveys a mixture of treated wastewater from the COP 23rd Avenue WWTP and groundwater pumped from the WVBA Site and adjacent areas to the agricultural land in Goodyear and Buckeye. The RID Main Canal currently receives a nominally continuous flow of approximately 20,000 to 30,000 AFY of treated wastewater. In addition, based on Arizona Department of Water Resources records, the RID Main Canal receives approximately 42,000 AFY of impacted groundwater from RID wells within the WVBA Site, and approximately 33,000 AFY of groundwater from RID wells within the WVBA Site that are currently not impacted by the groundwater contamination. The majority of this groundwater pumping occurs during the peak irrigation demand season that extends from early March through the end of September.

Approximately 15,000 of the 42,000 AFY of the impacted groundwater conveyed to the RID Main Canal are pumped from RID wells along Van Buren Street during the peak irrigation season. This impacted groundwater is conveyed to the RID Main Canal in the RID "Salt Canal" (**Figure 1**). The Salt Canal extends from approximately Interstate 17 to 83rd Avenue. The Salt Canal is predominantly a below-grade pipe with a few short sections of open canal that exist adjacent to Van Buren Street. Flow from the Salt Canal discharges to the RID Main Canal near 83rd Avenue between Van Buren Street and Washington Street. RID also operates several smaller pipelines and open canals within the WVBA Site to convey groundwater from RID wells to the RID Main Canal.

SRP also operates water conveyance systems in the WVBA Site. North-south oriented lateral canals transport water from SRP's Grand Canal southward, under gravity flow, for irrigation use in the WVBA Site and surrounding area. The lateral canals also are supplied by a number of SRP production wells located in areas surrounding the WVBA Site. SRP does not operate wells within the WVBA Site.

3.3 HYDROGEOLOGIC CONDITIONS

The WVBA Site is located within the West Salt River Valley (SRV). The SRV is an alluvial basin consisting of unconsolidated to semi-consolidated sediments typical of basin and range physiography. These sediments are up to several thousand feet thick in the center of the basin, ranging in size from clay to cobbles, with some evaporite deposits (Terranext, 2008a). In general, the SRV is subdivided into three hydrogeologic units from shallowest to deepest: 1) Upper Alluvial Unit (UAU), 2) Middle Alluvial Unit (MAU), and 3) Lower Alluvial Unit (LAU) (**Figure 3**). The units of primary interest in the WVBA Site are the UAU and MAU. It is reported in the Draft RI Report that the LAU does not currently appear to be impacted in the WVBA Site, although limited data exist to characterize the LAU (Terranext, 2008a). The LAU is not discussed in detail in this report.

An analysis of lithologic logs from approximately 200 monitor wells and other types of wells was conducted by ADEQ for the WVBA Site during the RI (Terranext, 2008a). Based on this analysis, the UAU within the WVBA Site was further divided into two subunits designated as the UAU1 and UAU2. The UAU1 is generally composed of loose surface soil grading downward into interfingered sand, gravel, and thin clayey sand lenses. The UAU1 ranges in thickness from approximately 170 to 310 feet. In general, the UAU1 exhibits higher percentages of fine-grained sediments west of 75th Avenue and in the northern portion of the WVBA Site.

The UAU2 is generally composed of fine grained sediments with large percentages of clay. The top of the UAU2 is encountered at depths ranging from approximately 170 to 310 feet below land surface (bls). The UAU2 ranges in thickness from approximately 30 to 260 feet, with the thickest portion existing in the western portion of the WVBA Site. In general, the UAU2 is more fine-grained west of 67th Avenue and in the southern portion of the WVBA Site.

The MAU is identified below the UAU2 based on a lithologic sequence characterized by at least approximately 40 feet of hard brown clay or sticky brown clay. Below this sequence, the MAU is composed predominantly of fine-grained sediments. The MAU is encountered at depths ranging from approximately 260 to 500 feet bls. The total thickness of the MAU was not reported in the Draft RI Report.

The LAU consists mainly of conglomerate and gravel grading into finer-grained mudstones toward the center of the basin. The LAU reaches thicknesses of up to 10,000 feet in the center of the basin. There are no monitor wells completed in the LAU and only two RID production wells are completed in the upper portion of the LAU. Consequently, there is little information regarding the LAU hydrogeologic conditions at the WVBA Site.

3.4 GROUNDWATER CONDITIONS

Groundwater conditions in the WVBA Site have been monitored periodically since 1993 as part of the RI. Groundwater within the WVBA Site generally occurs under unconfined conditions in the UAU and under semi-confined to confined conditions in the MAU. Groundwater levels in the UAU have declined approximately 35 feet in the monitor wells within the WVBA Site based on groundwater monitoring conducted during the RI from 1993 to the present. The rate of groundwater level decline was estimated to be approximately 3 feet per year and corresponds to drier than normal precipitation conditions that have prevailed since 1995. On an annual basis, groundwater levels in the WVBA Site vary seasonally with the highest water levels observed in the winter and lowest water levels observed in the summer. These fluctuations are due primarily to seasonal variations in groundwater pumping from the RID wells and are most prevalent in the central and western portions of the WVBA Site.

The prevailing lateral groundwater flow direction in UAU1, UAU2, and MAU is generally to the west, although groundwater flow directions can vary locally and seasonally due to recharge and groundwater pumping from the RID wells. The largest deviations from the prevailing westerly groundwater flow direction are observed in the central and western portions of the WVBA Site in close proximity to the RID wells. In general, a downward vertical gradient exists over large portions of the WVBA Site, which causes a downward component of groundwater flow over most of the WVBA Site.

Recharge in the WVBA Site occurs from infiltration of excess irrigation water from agricultural land, leakage from irrigation canals, and infiltration of treated wastewater and surface water runoff in the Salt River.

Groundwater pumping by RID represents the primary discharge from the WVBA Site (Terranext, 2008a). RID currently operates approximately 50 large capacity wells east of the Agua Fria River. Thirty-two of these wells are located within the WVBA Site. The RID wells located within the WVBA Site are variably screened in the UAU, MAU and LAU. On average, RID pumps approximately 75,000 AFY of groundwater from wells located in the WVBA Site. Based on the reported hydrogeologic conditions in the WVBA Site in the Draft RI Report, the RID wells probably derive most of their water from the UAU. While groundwater levels declined approximately 35 feet in the last 16 years, coinciding with onset of drought conditions in the mid 1990s, significant mining of groundwater has not occurred in the WVBA Site as a result of the long-term RID pumping. Other potential and current groundwater users in or near the WVBA Site include Salt River Project, COP, and the City of Tolleson (Terranext, 2007).

3.5 NATURE AND EXTENT OF GROUNDWATER CONTAMINATION

Groundwater contamination in the WVBA Site was first discovered in 1984 during routine groundwater sampling at the Phoenix Fuel Terminal (PFT; also known as the Van Buren Tank Farm) (Terranext, 2008a). Since that time, a substantial effort has been undertaken to characterize the nature and extent of groundwater contamination, as well as identify potential contamination sources. Based on the RI and other supplemental characterization work, the primary COCs detected at concentrations above regulatory standards in the groundwater within the WVBA Site are VOCs. Specifically, the primary VOCs detected are PCE, TCE, and 1,1-dichloroethene[12]. To a lesser extent, chromium is also considered a COC. MTBE also has been detected in the WVBA Site groundwater in the vicinity of the PFT (Terranext, 2008b and c).

The Draft RI Report includes a detailed narrative, as well as tabular and graphical summaries, of the areal extent and temporal changes in COC concentrations in the UAU1, UAU2, and MAU over the period 1993 to 2008. PCE and TCE concentrations in groundwater as high as 95,000 micrograms per liter (µg/L) and 1,800 µg/L, respectively, have been reported in the UAU1 (Terranext, 2008a). As reported in the Draft RI Report, the LAU does not appear to be impacted in the WVBA Site, although limited data are available to characterize the LAU water quality (Terranext, 2008a).

Figures 4 through 12 depict the extent and spatial variation in PCE, TCE and 1,1-DCE concentrations in the UAU1, UAU2 and MAU, respectively, and the concentrations of these compounds detected in the RID wells during the first quarter 2008. These maps were prepared based on first quarter 2008 water quality data included in the Draft RI Report (Terranext, 2008a). **Table 1,** adapted from Table 4-5 of the Draft RI Report (Terranext, 2008a), summarizes selected first quarter 2008 VOC concentration data.

[12] Other hazardous substances detected in groundwater in the WVBA Site, WCP Site, and 52nd Street Site include benzene, toluene, ethylbenzene, xylenes, nitrate, vinyl chloride, 1,1,1-trichloroethane, cis-1,2-dichloroethene, 1,1-dichloroethane and chloroform.

As depicted on the figures, the most extensive groundwater contamination exists in the UAU1 and UAU2, with a substantially smaller area of impact existing in the MAU. Based on the similarity between PCE and TCE concentrations in the RID and monitor wells, it appears that the RID wells derive most of their water from the UAU. The water quality data collected during the RI indicate elevated VOC concentrations in the north-central and eastern portion of the WVBA Site, which indicate that VOC-impacted groundwater is currently migrating into the WVBA Site from the WCP and 52nd Street Sites. These observations are consistent with information reported in the Draft RI Report published by ADEQ. Specifically, ADEQ reported that water quality data developed during the RI indicated that VOCs were migrating from the 52nd Street and WCP Sites to the WVBA Site.

3.6 SOURCES OF CONTAMINATION

A substantial effort was undertaken by ADEQ during the RI to identify potential sources that may have contributed to the groundwater contamination within the WVBA Site (Terranext, 2008a). Over 60 potential sources have been identified in the WVBA Site based on information included in the Draft RI Report and other available records. Vadose zone investigations were conducted at approximately 50 of these potential sources areas; groundwater investigations were conducted at 11 of these potential sources areas (Terranext, 2008a). Over 25 potential sources have been identified in the 52nd Street Site (Terranext, 2008a; ADEQ, 2008a). Over 20 potential sources have been identified in the WCP Site (ADEQ, 2008b). The search for potential sources within the 52nd Street, WCP, and WVBA Sites has not been completed and, therefore, additional potential sources may be identified in the future.

3.7 IMPACT OF GROUNDWATER CONTAMINATION ON ROOSEVELT IRRIGATION DISTRICT WELLS AND OPERATIONS

Thirty-two (31 operational; RID-111 is currently inoperable) RID production wells are located within the WVBA Site (Figure 13). In September 2008, 20 RID wells had detectable concentrations of VOCs and 16 RID wells were impacted by at least one VOC at a concentration exceeding AWQS (Terranext, 2008c). The COCs detected above AWQS in September 2008 included PCE, TCE and 1,1-DCE. Of these COCs, PCE and TCE were the most prevalent and TCE was detected at the highest concentration of 85 µg/L in RID wells 92 and 114. The AWQS for both PCE and TCE is 5 µg/L. In September 2008, RID wells 107 and 108 also contained MTBE at concentrations of 20 and 45 µg/L, respectively (Terranext, 2008a and c). These two RID wells are located near the PFT. An AWQS has not been established for MTBE. Groundwater pumped from RID wells 102 and 105 in 2008 also contained total chromium at concentrations of 21 and 12 µg/L, respectively. These concentrations are less than the AWQS for total chromium of 100 µg/L.

Over 110,000 AFY (over 70,000 gpm) of annual pumping capacity exists in the currently impacted RID wells within the WVBA Site. The impacted groundwater pumped from the RID wells, along with wastewater and groundwater pumped from unimpacted RID wells, is currently conveyed to the RID Main Canal and then to RID's service area west of the Agua Fria River. Groundwater pumping from the RID wells comprises the primary groundwater discharge from the WVBA Site (Terranext, 2008a). Historical operation of RID wells appears to have limited the downgradient migration of contaminated groundwater within the WVBA Site.

The contaminated groundwater in the WVBA Site impairs RID's wells and its operations, restricts the use of this water supply, and represents an ongoing liability to RID, as previously stated in RID's comment letter on the Draft RI Report submitted to ADEQ on December 23, 2008 (RID, 2008). A comprehensive groundwater response action conducted

under state and federal authority in the WVBA Site is required to mitigate the impairment and eliminate the associated liability to RID.

3.8 SUMMARY OF SITE STATUS

A substantial effort was undertaken by ADEQ and other parties over the past 20 years to characterize the hydrogeologic conditions, nature and extent of groundwater contamination, and potential sources of contamination of the groundwater in the WVBA Site. Based on that effort, the following are key findings and milestones for the WVBA Site:

- The Draft RI Report was published by ADEQ in October 2008. The Draft RI Report summarizes the regional groundwater and contaminant assessment conducted by ADEQ and other private parties at facilities within the WVBA Site.
- The Land and Water Use Study has been completed. This study identified RID as the largest current groundwater user in the WVBA Site.
- Impacted groundwater exists over a large area and to depths greater than 300 feet bls.
- Numerous potential sources located in the WVBA, WCP and 52nd Street Sites have contributed, are suspected to have contributed, or threaten to contribute to the groundwater contamination in the WVBA.
- The community has been routinely informed on the project status and has actively participated in the administrative process.
- RID operates 32 production wells in the WVBA Site and 18 of these wells are currently impacted by the groundwater contamination.
- The impairment to RID's wells, operations and water supply constitutes the primary driver for the groundwater remedy in the WVBA Site.
- The existing RID wells, conveyance systems and easements are well-positioned to become the basis for an effective and economical regional groundwater remedy for

the WVBA Site, as well as for COCs migrating to the WVBA Site from the 52nd Street and WCP Sites.

4.0 DESCRIPTION OF EARLY RESPONSE ACTION

The proposed ERA is depicted on **Figure 14** and summarized in **Table 2**. The ERA was developed based on an evaluation of site conditions, the documented impact on RID wells and operations, a preliminary analysis of potential response actions, and the extensive experience of RID's technical consultant on similar groundwater contamination sites. The proposed ERA includes actions and technologies that are proven, reliable and effective. The conceptual design and phased implementation of the proposed ERA are summarized below.

4.1 EARLY RESPONSE ACTION CONCEPTUAL DESIGN

The ERA is necessary to protect and restore the quality of a portion of RID's groundwater supply, to eliminate restrictions on its use and enable RID to convey this water for all beneficial uses, to mitigate current risk to public health from exposure to contaminants in the groundwater, and to control the contamination to reduce the scope and cost of the final remedy. The specific response action described in this Work Plan was selected using best available site information, best available scientific information concerning available remedial methods and technologies, and best engineering judgment.

4.1.1 Potential Remedial Alternatives

The following potential remedial alternatives were considered to achieve the ERA goals:

- Drilling of new extraction wells outside of the WVBA Site to replace the impacted water supply;
- Modifying existing impacted wells to exclude contaminated zones;

- Modifying existing impacted wells to only pump from contaminated zones;
- Acquiring a surface water supply and abandoning existing impacted RID wells;
- Implementing wellhead treatment using air stripping (AS);
- Implementing wellhead treatment using liquid-phase granular activated carbon (GAC);
- Implementing centralized treatment using AS; and,
- Implementing centralized treatment using GAC.

4.1.2 Alternatives Evaluation

These alternatives were conceptually evaluated for effectiveness in contaminant removal and control, practicability and ease of near-term implementation, regulatory acceptance, capital cost, and ongoing operation and maintenance (O&M) costs. The conclusions from this conceptual evaluation are as follows:

Drilling new extraction wells: This alternative is infeasible due to lack of available sites in reasonable proximity to the existing RID water conveyance system that could be developed for replacement wells. It is believed that well impact analysis associated with the permitted pumping capacity for all existing wells in the area would confirm that there are only a few locations within one mile of the RID canals that may meet ADWR criteria for permitting a new large capacity production well. Moreover, if a sufficient number of suitable sites could be identified for the replacement wells, this alternative would be excessively expensive due to the large number of new large capacity wells needed to replace RID's current pumping capacity and the extensive network of transmission pipelines that would be needed to connect these wells to the RID Main Canal. In addition, this alternative would be difficult to implement in a reasonable time-frame because of the protracted effort that would be required to obtain land access and pipeline easement agreements for the replacement water supply system. This alternative would not maintain containment

or remove contamination from the WVBA Site. Cessation of pumping of the impacted RID wells would result in expansion of the WVBA plume and potentially result in impact to wells owned by RID and other water providers that are not presently contaminated. For these reasons, this alternative is not considered feasible to meet the ERA goals.

Modifying existing impacted wells to exclude contaminated zones: The objective of this alternative would be to modify the RID wells to eliminate the pumping of contaminated groundwater, thereby eliminating the need for groundwater treatment. As depicted in the Conceptual Site Model shown in **Figure 3**, most of RID wells located within the contaminant plume are relatively shallow and completed within the UAU and upper MAU. The majority of groundwater contamination exists in the UAU. With the exception of RID wells 89 and 95, these wells are expected to largely produce water from contaminated zones in the UAU because the UAU is significantly more transmissive than the MAU. Modification of the wells to exclude contaminated zones (i.e., the UAU) would substantially diminish RID's available water supply. RID customer demand requires that all of the existing wells be available for use during peak demand periods, and RID is legally entitled under state law to a response action that maintains the capacity of the water supply. In addition, this approach would leave contaminants in the groundwater and reduce hydraulic control of the plume. For these reasons, this alternative is not considered feasible to meet the ERA goals.

Modifying existing impacted wells to only pump from contaminated zones: The objective of this alternative would be to focus the ERA pumping to only contaminated zones, thereby reducing the volume of contaminated groundwater that requires treatment. This alternative has some potential to increase the effectiveness of contaminant removal and control because seven RID wells within the contaminant plume are believed to be screened below the extent of impacted groundwater (see

Figure 3). Consequently, data will be acquired during the ERA to evaluate groundwater yield with depth and the vertical extent of groundwater contamination at RID wells 89 and 95 (deep wells completed into the LAU) and RID wells 92, 106, 107, 112, and 113 (completed into the MAU). Based on this analysis, well modifications would be implemented where it is determined feasible to isolate a significant portion of the flow into the well from deep, "clean" screened intervals. As previously mentioned, however, RID customer demand and state law requires that any response action restore the full pumping capacity that RID relies upon to meet peak demand periods and any lost water capacity from well modifications will need to be addressed in supplemental response actions developed during the FS.

Replacement surface water supplies: This alternative would be highly problematic to implement due to the large water supply required to replace the available production and peak capacity from impacted RID wells and limitations in existing infrastructure to deliver the replacement water to the RID distribution system. Furthermore, the availability of a replacement surface water supply is questionable and, if it were available, the cost of acquiring long-term rights to this water would be excessive. Similar to the first two alternatives, this approach would reduce the existing hydraulic plume control, which would result in plume expansion that would threaten other clean RID wells and possibly wells owned by other water providers. For these reasons, this alternative is not considered feasible to meet the ERA goals.

Wellhead treatment using Air Stripping: This alternative would be impractical because of the limited space available at many of the RID well sites, particularly in the central plume area where expansion of Van Buren Street and the major north-south roadways over the past 50 years has severely encroached upon the existing RID wells. Construction, operation and maintenance of numerous satellite treatment systems would be considerably more expensive, complex and problematic than one

central treatment system. For these reasons, this alternative is not considered feasible to meet the ERA goals.

Wellhead treatment using GAC: This alternative is equally impractical as the wellhead AS alternative for the same reasons, and therefore, is not considered feasible to meet the ERA goals.

Centralized treatment using AS: This alternative would be problematic from both an operational and a regulatory acceptance standpoint. Recent discussions with ADEQ confirm the agency position that single-stage AS is not suitable for a reasonably foreseeable drinking water end use because failure of the AS treatment system could result in a direct discharge of untreated groundwater into a public water supply. The selection of AS for any future remedial actions leading to a reasonably foreseeable drinking water end use would require secondary treatment or blending within the potable system. Secondary treatment using a second pass through an AS tower would result in significant maintenance issues due to scale formation in the tower packing. This problem is persistent in single-pass AS systems operated in the Phoenix area due to the high level of hardness in groundwater and would be substantially more problematic if a two-pass AS configuration were employed. Additionally, AS would require subsequent air treatment by vapor-phase GAC which would substantially add to capital and O&M costs. For these reasons, this alternative is not considered feasible to meet the ERA goals.

Centralized treatment using GAC: This alternative is considered to be the most practicable alternative to meet the ERA goals. GAC treatment is known to be reliable, fail-safe and readily accepted by the regulatory agencies. Centralized GAC treatment is easier to implement than a network of wellhead GAC systems. Under state law, treated water from the ERA must, to the extent practicable, be treated to a

degree acceptable for all beneficial uses.[13] GAC treatment can achieve this requirement. GAC treatment systems are effectively operating at the PGA-N and 52nd Street OU2 Superfund Sites. At these sites, dual pass (lead-lag) GAC treatment is used to treat groundwater contaminated with TCE and PCE to regulatory agency mandated clean-up standards equivalent to MCLs. Treated water is currently discharged to the RID Main Canal at PGA-N and the SRP Grand Canal at the 52nd Street OU2 Site.

4.2 EARLY RESPONSE ACTION CONCEPTUAL DESIGN ELEMENTS

The core engineering design elements of the proposed ERA include: 1) a centralized groundwater treatment facility (CGTF); 2) physical improvements to existing pipelines and canals; 3) modifications to existing extraction wells; and 4) new pipelines. Conceptual design of these elements has been completed. The conceptual design will serve as the basis for detailed design of discrete and integrated system elements. This design process will occur as the proposed ERA progresses and periodic design reviews will be conducted, with agency participation, to assure conformance with relevant standards and practices and protection of public health.

The conceptual design of the proposed ERA was prepared by M&A and reviewed and refined by HDR under the direction of M&A. A Technical Memorandum, prepared by HDR to summarize the conceptual design, is included in **Appendix A**. Each of the discrete components that comprise the proposed ERA is discussed in conceptual detail in this Attachment as well as summarized in the following sections.

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13 See A.R.S. § 49-282.06.A.2.

4.2.1 Central Groundwater Treatment Facility

The CGTF will be designed and constructed to treat 20,000 gpm of contaminated water using GAC. The CGTF will include the following major system components: wet well, pump station, prefilters, GAC contactors, flush and backwash support systems, and instrumentation and controls. A preliminary site plan, a process schematic, and a process hydraulic profile are included in Section 2 of the Conceptual Design Summary Technical Memorandum in Appendix A.

4.2.2 Salt Canal Improvements

The RID Salt Canal, which runs from 23rd to 83rd Avenues along the south side of West Van Buren Street, will serve as the primary conveyance of untreated groundwater to the CGTF. The Salt Canal is a gravity conveyance that consists primarily of reinforced concrete or vitrified clay pipe ranging in diameter from 21 inches to 48 inches in diameter, with the diameter increasing in the direction of flow (east to west).

Several reaches of open canal exist in the western portion of the Salt Canal including approximately 220 feet near 68th Avenue, approximately 220 feet east of 77th Avenue, and approximately 1150 feet west of 79th Avenue. These open canal sections will be replaced with below-grade pipe during Phase 1 of the ERA to prevent volatilization of VOCs to the atmosphere and public access to contaminated water.

4.2.3 Well Modifications

Several modifications will be made to the 13 existing impacted RID wells used in the ERA. These changes will enable remote operation and monitoring of the extraction wells and minimize point source release of VOCs from the well discharge structures. In addition, RID wells 89, 92, 95, 106, 107, 112 and 113 will be evaluated to determine whether sealing

the bottom portion of these wells is needed to isolate the pumping to the upper contaminated groundwater zones.

Each impacted RID well will be equipped with instrumentation and controls to enable remote operation and to collect and transmit data to the operations center to be located at the CGTF. At a minimum, the operating status, water level and flow rate will be provided through instruments at the well and transmitted to the CGTF operations center. Currently, these wells are controlled manually at the wellhead, the flow rate is estimated based on electric use information, and only periodic water level monitoring is conducted.

Each of the impacted RID wells has unique discharge structure and piping and will require individual modifications to implement volatilization controls. Conceptually, the existing air gap present at each well will be enclosed to eliminate VOC volatilization to the atmosphere. It is conceived that a passive GAC filter will be installed to vent this sealed enclosure to accommodate pressure differentials, allowing the enclosure to breath as discharge and atmospheric conditions change while preventing release of VOCs from the enclosure head-space to the atmosphere.

4.2.4 New Pipelines

A new pipeline will be constructed from the terminus of the Salt Canal at 83rd Avenue to the CGTF at 84th Avenue (**Figure 14**). This new pipeline will cross beneath the Main Canal, 83rd Avenue and West Van Buren Street, and be installed in the RID easement on the west side of the Main Canal. Consistent with the existing Salt Canal, the new pipeline is conceptually designed to be a below-grade, 48-inch, gravity flow conveyance that will be constructed early in the phased implementation of the ERA.

Separate new pipelines will be installed later in the ERA to convey groundwater with lower VOC concentrations from RID wells 105, 109, and 110 south to the Main Canal and to

convey groundwater with higher VOC concentrations from RID wells 89, 92, 95, and 100 north to the Salt Canal and then to the CGTF for treatment (**Figure 14**). Installation of these pipelines will enable treatment of impacted groundwater from RID wells with the highest VOC concentrations, which will maximize the VOC mass removal during the ERA and eliminate public access and risk to the highest VOC concentrations. The pipelines will be sized to accommodate the flow rate from each well. Detailed alignment surveys along these proposed pipelines will be conducted during subsequent design work.

4.3 EARLY RESPONSE ACTION IMPLEMENTATION

The proposed ERA will employ a Design-Build (DB) approach. A DB approach enables execution of one contract for both architectural/engineering design and construction services. The DB approach also expedites project implementation, provides opportunities for value engineering, and controls cost more effectively than other project delivery methods. The DB approach is particularly well suited for the ERA because it will involve a series of sequential tasks that will likely require a "field-fit" approach for certain tasks.

The proposed ERA will be implemented in the two phases as described below.

4.3.1 Phase 1

The objectives of Phase 1 are to protect RID wells along the RID Main Canal that are not currently impacted and to begin groundwater treatment in an efficient, economical, effective and timely manner in order to provide RID with a water supply that can be conveyed for all beneficial end uses. To meet this objective, Phase 1 operations would convey impacted groundwater from RID wells 105, 106, 107, 108, 109, 110, 112, 113 and 114 located along Van Buren Street and adjacent to the existing RID Salt Canal to the new CGTF (**Figure 14**). These wells would be operated continuously to protect the RID wells

along the RID Main Canal, to enhance hydraulic capture and to maximize VOC mass removal except for a brief period during annual RID Main Canal maintenance. The impacted groundwater would be conveyed in the improved Salt Canal and new extension to the new CGTF. The treated water from Phase 1 would be used for its highest beneficial use, which could include irrigation, industrial supply, and/or potable supply. A Poor Quality Groundwater Withdrawal Permit may be obtained in coordination with the Arizona Department of Water Resources during Phase 1.

Based on current VOC concentrations in the Phase 1 RID wells, the estimated total annual VOC mass removal during Phase 1 would be approximately 3,700 pounds (**Table 2**). System performance monitoring would be conducted during Phase 1 to assess wellfield capture and treatment effectiveness.

RID wells 107 and 108 have been included in Phase 1 for planning purposes. Historical and recent water quality data from these wells indicate the presence of MTBE in addition to chlorinated VOCs. MTBE has been used as a gasoline additive since the late 1970s. The probable source of MTBE to the groundwater in the vicinity of RID wells 107 and 108 is the PFT, which is located immediately east and upgradient of these wells. If incorporated into Phase 1, these wells may require a different treatment technology than liquid-phase GAC to remove the MTBE because MTBE is not readily removed using liquid-phase GAC (EPA, 1998). Phase 1 may include treatability studies to determine the best treatment technology for groundwater pumped from RID wells 107 and 108, or to determine whether blending and restricted use of these wells can reduce MTBE concentrations in the treated water to an acceptable level.

4.3.2 Phase 2

The objectives of Phase 2 would be to enhance wellfield capture and increase VOC mass removal by treating impacted groundwater from the RID wells that have the highest

total COC concentrations. The planning, design, permitting and property access elements of Phase 2 would be conducted during Phase 1. It is envisioned that these activities will take up to 1 year to complete. Therefore, it is expected that Phase 2 construction activities would begin approximately one year after the initiation of Phase 1.

To meet the Phase 2 objectives, RID wells 89, 92, 95, and 100 would be incorporated into the ERA operation and pumped on a continuous basis (**Table 2; Figure 14**). This would be accomplished using the new below-grade pipelines from these wells to the Salt Canal. To maintain the total flow rate in the Salt Canal at approximately 20,000 gpm, extracted groundwater from RID wells 105, 109, and 110 (i.e., wells with lowest VOC concentrations along Van Buren Street) would be conveyed to the RID Main Canal in the new below-grade pipelines and the RID pipelines that currently exist between RID wells 89, 92, and 95 and the RID Main Canal. After redirecting the extracted groundwater from these RID wells, they would be operated on a seasonal demand basis. However, if additional capture near the leading edge of the plume is required, RID well 105 would be pumped as continuously as possible to maximize capture.

The Phase 2 wellfield is expected to effectively control the migration of the western plume leading edge, to extract groundwater with high COC concentrations from the center of the plume, and to minimize the southerly migration of the impacted water towards the unimpacted RID wells located along the RID Main Canal. Based on current VOC concentrations in the Phase 2 wells, the estimated total annual VOC mass removal following implementation of Phase 2 would be approximately 5,700 pounds (**Table 2**). The treated water from Phase 2 would be used for its highest beneficial use, which could include irrigation, industrial supply, and/or potable supply.

The total annual volume of groundwater pumped during the ERA would be nominally equivalent to the current annual volume pumped by RID from this area. The ERA would included a priority pumping regimen that operates the Phase 1 and 2 wells as continuously as

possible (except for periods of well and canal maintenance) and operates the remaining RID wells in the WVBA Site on a seasonal demand basis. The new ERA priority pumping regimen will result in the same changes in groundwater levels that would otherwise occur if RID were to continue its current operation without the ERA.

5.0 EARLY RESPONSE ACTION TASKS

The following tasks comprise the ERA:

- Task 1 – Meetings
- Task 2 – Community Involvement
- Task 3 – Data Collection and Analysis
- Task 4 – Permits and Property Access
- Task 5 – Design
- Task 6 – Construction
- Task 7 – System Testing and Start-up
- Task 8 – Operation and Maintenance Plan

Brief summaries of the activities anticipated for each task are provided below in the following sections.

5.1 TASK 1 – MEETINGS

Meetings will be scheduled with interested and affected stakeholders such as City of Phoenix, City of Tolleson, local residents and the business community that may be impacted by site activities to coordinate and obtain feedback and input on significant aspects of the ERA. Coordination meetings will be held with ADEQ throughout the entire ERA.

5.2 TASK 2 – COMMUNITY INVOLVEMENT

Community involvement during the ERA planning and implementation will be facilitated in accordance with A.A.C. R18-16-404 and the existing Community Involvement Plan (CIP) developed by ADEQ for the WVBA Site. Periodic public meetings would be held to communicate progress on the ERA and obtain feedback from the community.

5.3 TASK 3 – DATA COLLECTION AND ANALYSIS

Additional groundwater quality data will be obtained during the ERA to the extent required for ERA design and implementation. Groundwater samples were collected and analyzed for VOCs and chromium from 24 RID wells in September 2008 (Terranext, 2008c). These data have been reviewed, and a supplementary sampling program may be developed to fill data gaps if needed. The supplementary sampling program may include sampling from selected RID wells, ADEQ monitor wells and RID canals. All samples will be analyzed for COCs. All water quality analytical work will be conducted at an Arizona-certified laboratory.

To the extent possible, the field activities, sampling methods, laboratory analyses and quality assurance procedures will adhere to protocols developed by ADEQ in the WVBA Field Sampling and Analysis Plan (FSAP), Quality Assurance Project Plan (QAPP) and Site-Specific Health and Safety Plan (HASP) (BE&K/Terranext, 2000a, b and c). RID will coordinate with ADEQ to define any exceptions or other modifications to these Plans prior to the initiation of field work and formally adopt the approved plans to guide future data acquisition. RID will provide ADEQ with advance notice of any sampling or data collection activities and the results of these activities.

Groundwater levels in the WVBA Site will be measured to the extent required for ERA design and implementation. If approved by ADEQ, pressure transducers may be installed in selected WVBA Site monitor wells to monitor water levels. In addition, manual groundwater levels may be measured with an electronic sounder to supplement the transducer measurements. The water level data will be used to support groundwater modeling efforts conducted by RID during the ERA and/or in supplemental response actions as part of the FS.

After startup of the ERA pump and treat system, RID would conduct groundwater level measurement and sampling in RID wells and select monitor wells, as agreed upon by ADEQ, in general accordance with the adopted FSAP, QAPP and HASP. Initially, samples of extraction wells will be collected and analyzed for all COCs on a quarterly frequency. Samples of CGTF influent groundwater and treated groundwater will be collected according to the approved O&M Plan.

5.4 TASK 4 – PERMITS AND PROPERTY ACCESS

A substantial portion of the construction work associated with the proposed ERA will take place in existing RID easements. However, it is anticipated that some new permits, property access agreements and/or easements will be required to construct the ERA components, which will include converting the open sections of the Salt Canal to below-grade pipeline, installing new below-grade pipelines, constructing the treatment facility, improving well sites and constructing the remediated water discharge pipeline.

The following permits, approvals and access agreements are anticipated to be required in conducting the work described in this ERA. Additional permits and agreements may be required as the project progresses. The anticipated permits or approvals/agreements are listed below:

COP - Transportation Department:	Right-of-Way Permits
	Traffic Control Permits
COP - Development Services:	Building Permits
City of Tolleson - Development Services:	Building Permit
Maricopa County Environmental Services:	Approval to Construct
Maricopa County Air Quality Department:	Dust Control
ADEQ:	General Permit for Construction
Burlington Northern Santa Fe (BNSF)	Pipeline Access Agreement

5.5 TASK 5 – DESIGN

A detailed engineering design will be conducted for the ERA. The detailed design will refine the conceptual design included in Appendix A. All components of the ERA pump and treat system will be subject to detailed design including the CGTF, control system, Salt Canal improvements, well modifications and new pipelines. RID will prepare 30%, 90% and final designs for review and approval by ADEQ in accordance with the provisions of A.A.C. R18-16-411.

5.6 TASK 6 – CONSTRUCTION

Construction will commence on each of the discrete system elements described previously upon completion of detailed design documents, receipt of required approvals, receipt of necessary funding and acquisition of all required permits and access agreements.

5.7 TASK 7 – SYSTEM TESTING AND START-UP

Start-up and commissioning of each of the discrete system elements will be conducted following completion of construction and prior to final acceptance of the facilities. The CGTF, including the interconnected RID wells, will be operated to verify proper function of all controls and alarm functions and to document conformance with all significant design specifications. The lateral feeder pipelines to the Salt Canal will be pressure tested to demonstrate pipeline integrity prior to being placed in service.

During start-up operations, the treated water will be discharged to the RID Main Canal. The treated water will be sampled and analyzed in accordance with the O&M Plan and discharge permit, if required, to verify proper system operation and to ensure compliance with water discharge quality standards.

5.8 TASK 8 – OPERATION AND MAINTENANCE PLAN

An operation and maintenance (O&M) plan will be prepared in accordance with A.A.C. R18-16-411 and approved by ADEQ before full-scale operations begin. The WVBA Site Community Advisory Board will be provided the opportunity to comment on the O&M plan before it is considered final.

The O&M plan will generally include:

- Certification by ADEQ that the elements of the O&M plan adequately protect public health against treatment system failure;
- A schedule and plan for water quality monitoring; and
- A process for the treatment system operator to promptly notify the potentially affected water providers of failure of a key treatment system component that

could affect the quality of the treated water conveyed through the distribution pipeline.

Discharge of treated water to waters of the United States is not anticipated for the ERA; therefore, an Arizona Pollutant Discharge Elimination System permit will not be required. The RID Main Canal is not designated as waters of the United States.

6.0 SCHEDULE

Figure 15 outlines the proposed schedule for conducting the tasks described in the work plan. The timeframes anticipated for completing each task are approximate and based on the current site conditions and understanding.

7.0 REFERENCES CITED

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TABLES

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TABLES

TABLE 1
SUMMARY OF WATER QUALITY DATA
WEST VAN BUREN AREA
WATER QUALITY ASSURANCE REVOLVING FUND SITE

CURRENT WELL IDENTIFIER			AVB10-01	AVB10-02	AVB10-02	AVB10-02	AVB10-02	AVB12-01	AVB12-01	AVB12-01
DATE SAMPLED			3/26/2008	3/26/2008	3/26/2008	3/26/2008	3/26/2008	3/10/2008	3/10/2008	3/10/2008
OWNER/LOCATION			ESTRELLA BUSINESS PARK	ESTRELLA BUSINESS PARK	ESTRELLA BUSINESS PARK	ESTRELLA BUSINESS PARK	ESTRELLA BUSINESS PARK	ADEQ 7TH AVE	ADEQ 7TH AVE	ADEQ 7TH AVE
ALTERNATE WELL IDENTIFIER			MW-1	MW-2	MW-2	MW-2	MW-2	MW-4	MW-4	MW-4
SAMPLE TYPE			ORIGINAL	ORIGINAL	DUPLICATE	EQUIPMENT	TRIP	ORIGINAL	DUPLICATE	EQUIPMENT
ALLUVIAL UNIT			UAU1	UAU2	UAU2	UAU2	UAU2	UAU1	UAU1	UAU1
	Units	AWQS								
1,1,1-Trichloroethane	ug/l	200	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,1-Dichloroethane	ug/l	NE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethene	ug/l	7	**1.5**	**1.7**	**1.6**	<0.50	<0.50	<0.50	<0.50	<0.50
1,2-Dichloroethane	ug/l	5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
cis-1,2-Dichloroethene	ug/l	70	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
trans-1,2-Dichloroethene	ug/l	100	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Tetrachloroethene	ug/l	5	**32**	**8.4**	**7.2**	<0.50	<0.50	**6.7**	**5.8**	<0.50
Trichloroethene	ug/l	5	**3**	**3.2**	**3**	<0.50	<0.50	**7.8**	**6.8**	<0.50

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CURRENT WELL IDENTIFIER			AVB12-01	AVB14-01	AVB15-01	AVB18-01	AVB20-03	AVB26-01	AVB38-04	AVB40-06
DATE SAMPLED			3/10/2008	3/10/2008	3/13/2008	3/18/2008	3/13/2008	3/18/2008	3/19/2008	3/19/2008
OWNER/LOCATION			ADEQ 7TH AVE	ADEQ 7TH AVE	ROGERS SHELL	ADEQ 7TH AVE	APS WEST PHOENIX	ADOT 15TH/BUCKEYE	ADEQ	ADEQ - ALSCO
ALTERNATE WELL IDENTIFIER			MW-4	MW-2	MW-2	MW-1	RB-3	DW-2	AVB38-04	MW-1
SAMPLE TYPE			TRIP	ORIGINAL	ORIGINAL	ORIGINAL	ORIGINAL	ORIGINAL	ORIGINAL	ORIGINAL
ALLUVIAL UNIT			UAU1	UAU1	UAU1	UAU1	UAU1	UAU1	UAU1	UAU1
	Units	AWQS								
1,1,1-Trichloroethane	ug/l	200	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,1-Dichloroethane	ug/l	NE	<1.0	**9.3**	<1.0	<1.0	**1.4**	**1.1**	<1.0	<1.0
1,1-Dichloroethene	ug/l	7	<0.50	**7.9**	**0.79**	<0.50	**3.1**	**0.95**	<0.50	<0.50
1,2-Dichloroethane	ug/l	5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
cis-1,2-Dichloroethene	ug/l	70	<0.50	**14**	**9.1**	<0.50	**7.4**	**2.5**	<0.50	<0.50
trans-1,2-Dichloroethene	ug/l	100	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Tetrachloroethene	ug/l	5	<0.50	**2**	**2.9**	**1.5**	**10**	**5.8**	**8.3**	**2.8**
Trichloroethene	ug/l	5	<0.50	**48**	**54**	**1.7**	**54**	**3.2**	**1.9**	**3.5**

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TABLE 1
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WATER QUALITY ASSURANCE REVOLVING FUND SITE

CURRENT WELL IDENTIFIER			AVB40-07	AVB40-08	AVB47-01	AVB53-01	AVB57-01	AVB60-01	AVB61-01	AVB68-02
DATE SAMPLED			3/19/2008	3/10/2008	3/12/2008	3/10/2008	3/10/2008	3/19/2008	3/28/2008	3/19/2008
OWNER/LOCATION			ADEQ - ALSCO	ADEQ - ALSCO	HILTON (ADEQ)	BUCK BROWN	ADEQ	ADEQ NSW	ADEQ SSW	ADEQ
ALTERNATE WELL IDENTIFIER			MW-2	MW-4	WVB-4	MW-1	APS-1	AVB60-01	AVB61-01	MW-2A
SAMPLE TYPE			ORIGINAL	ORIGINAL	ORIGINAL	ORIGINAL	ORIGINAL	ORIGINAL	ORIGINAL	ORIGINAL
ALLUVIAL UNIT			UAU1	UAU1	UAU1	UAU1	UAU1	MAU	MAU	UAU1
	Units	AWQS								
1,1,1-Trichloroethane	ug/l	200	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,1-Dichloroethane	ug/l	NE	<1.0	<1.0	<1.0	**5.7**	<1.0	<1.0	<0.50	**2.9**
1,1-Dichloroethene	ug/l	7	<0.50	<0.50	<0.50	**7.7**	<0.50	<0.50	<0.50	**3.9**
1,2-Dichloroethane	ug/l	5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<0.50	<1.0
cis-1,2-Dichloroethene	ug/l	70	<0.50	<0.50	<0.50	**19**	<0.50	<0.50	<0.50	**2**
trans-1,2-Dichloroethene	ug/l	100	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Tetrachloroethene	ug/l	5	**19**	**6.5**	**49**	**5.5**	**1.3**	**1.3**	<0.50	**2.2**
Trichloroethene	ug/l	5	**6.4**	**19**	<0.50	**110**	<0.50	<0.50	<0.50	**8.9**

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TABLE 1
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CURRENT WELL IDENTIFIER			AVB68-04	AVB69-01	AVB69-02	AVB69-02	AVB69-02	AVB69-02	AVB70-01	AVB71-01
DATE SAMPLED			3/18/2008	3/18/2008	3/11/2008	3/11/2008	3/11/2008	3/11/2008	3/12/2008	3/13/2008
OWNER/LOCATION			ADEQ	ADEQ	ADEQ	ADEQ	ADEQ	ADEQ	ADEQ	ADEQ
ALTERNATE WELL IDENTIFIER			MW-3	MW-2	MW-1	MW-1	MW-1	MW-1	MW-1	MW-2
SAMPLE TYPE			ORIGINAL	ORIGINAL	ORIGINAL	DUPLICATE	EQUIPMENT	TRIP	ORIGINAL	ORIGINAL
ALLUVIAL UNIT			MAU	UAU2/MAU	UAU1	UAU1	UAU1	UAU1	UAU1	UAU1
	Units	AWQS								
1,1,1-Trichloroethane	ug/l	200	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,1-Dichloroethane	ug/l	NE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.1**	<1.0
1,1-Dichloroethene	ug/l	7	<0.50	<0.50	**0.61**	**0.67**	<0.50	<0.50	**1**	<0.50
1,2-Dichloroethane	ug/l	5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
cis-1,2-Dichloroethene	ug/l	70	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	**12**	<0.50
trans-1,2-Dichloroethene	ug/l	100	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Tetrachloroethene	ug/l	5	<0.50	<0.50	**15**	**16**	<0.50	<0.50	**20**	<0.50
Trichloroethene	ug/l	5	<0.50	<0.50	**0.87**	**0.88**	<0.50	<0.50	**13**	<0.50

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TABLE 1
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WEST VAN BUREN AREA
WATER QUALITY ASSURANCE REVOLVING FUND SITE

CURRENT WELL IDENTIFIER			AVB72-01	AVB73-01	AVB74-01	AVB75-01	AVB76-01	AVB77-01	AVB77-02	AVB77-03
DATE SAMPLED			3/11/2008	3/13/2008	3/12/2008	3/11/2008	3/13/2008	3/19/2008	3/19/2008	3/19/2008
OWNER/LOCATION			ADEQ	ADEQ	ADEQ	ADEQ	ADEQ	ADEQ	ADEQ	ADEQ
ALTERNATE WELL IDENTIFIER			MW-3	MW-4	MW-5	MW-6	MW-7	MW-5S	MW-5D	MW-5M
SAMPLE TYPE			ORIGINAL	ORIGINAL	ORIGINAL	ORIGINAL	ORIGINAL	ORIGINAL	ORIGINAL	ORIGINAL
ALLUVIAL UNIT			UAU1	UAU1	UAU1	UAU1	UAU1	UAU1	UAU2	UAU1
	Units	AWQS								
1,1,1-Trichloroethane	ug/l	200	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,1-Dichloroethane	ug/l	NE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethene	ug/l	7	**0.73**	<0.50	<0.50	**2.2**	<0.50	<0.50	<0.50	<0.50
1,2-Dichloroethane	ug/l	5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
cis-1,2-Dichloroethene	ug/l	70	**3.5**	<0.50	<0.50	**2.5**	<0.50	<0.50	<0.50	<0.50
trans-1,2-Dichloroethene	ug/l	100	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Tetrachloroethene	ug/l	5	**8.9**	**5.9**	<0.50	**22**	<0.50	**3.6**	<0.50	**1.4**
Trichloroethene	ug/l	5	**19**	<0.50	<0.50	**4.9**	<0.50	**6.3**	<0.50	**1.3**

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TABLE 1
SUMMARY OF WATER QUALITY DATA
WEST VAN BUREN AREA
WATER QUALITY ASSURANCE REVOLVING FUND SITE

CURRENT WELL IDENTIFIER			AVB81-01	AVB81-02	AVB81-02	AVB82-01	AVB82-01	AVB82-01	AVB82-02	AVB83-01
DATE SAMPLED			3/19/2008	3/19/2008	3/19/2008	3/19/2008	4/3/2008	4/3/2008	3/26/2008	3/18/2008
OWNER/LOCATION			ADEQ	ADEQ	ADEQ	ADEQ	ADEQ	ADEQ	ADEQ	ADEQ
ALTERNATE WELL IDENTIFIER			AVB81-01	AVB81-02	AVB81-02	AVB82-01	AVB82-01	AVB82-01	AVB82-02	AVB83-01
SAMPLE TYPE			ORIGINAL	ORIGINAL	TRIP	ORIGINAL	ORIGINAL	ORIGINAL	ORIGINAL	ORIGINAL
ALLUVIAL UNIT			UAU2	UAU1	UAU1	MAU	MAU	MAU	MAU	UAU1
	Units	AWQS								
1,1,1-Trichloroethane	ug/l	200	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,1-Dichloroethane	ug/l	NE	<1.0	<1.0	<1.0	<1.0	<0.50	<0.50	<1.0	<1.0
1,1-Dichloroethene	ug/l	7	<0.50	<0.50	<0.50	**22**	**2.3**	**3.9**	**0.55**	<0.50
1,2-Dichloroethane	ug/l	5	<1.0	<1.0	<1.0	<1.0	<0.50	<0.50	<1.0	<1.0
cis-1,2-Dichloroethene	ug/l	70	<0.50	<0.50	<0.50	**1.9**	<0.50	<0.50	<0.50	<0.50
trans-1,2-Dichloroethene	ug/l	100	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Tetrachloroethene	ug/l	5	<0.50	<0.50	<0.50	**60**	**5.3**	**9.1**	**4.9**	**3.3**
Trichloroethene	ug/l	5	<0.50	<0.50	<0.50	**16**	**1.7**	**2.8**	<0.50	**3.3**

MONTGOMERY & ASSOCIATES

TABLE 1
SUMMARY OF WATER QUALITY DATA
WEST VAN BUREN AREA
WATER QUALITY ASSURANCE REVOLVING FUND SITE

CURRENT WELL IDENTIFIER			AVB84-01	AVB85-01	AVB87-01	AVB88-01	AVB91-01	AVB91-01	AVB91-01	AVB91-01
DATE SAMPLED			3/19/2008	3/18/2008	3/17/2008	3/11/2008	3/13/2008	3/13/2008	3/13/2008	3/13/2008
OWNER/LOCATION			ADEQ	ADEQ	ADEQ	ADEQ	ADEQ	ADEQ	ADEQ	ADEQ
ALTERNATE WELL IDENTIFIER			AVB84-01	AVB85-01	AVB87-01	AVB88-01	AVB91-01	AVB91-01	AVB91-01	AVB91-01
SAMPLE TYPE			ORIGINAL	ORIGINAL	ORIGINAL	ORIGINAL	ORIGINAL	DUPLICATE	EQUIPMENT	TRIP
ALLUVIAL UNIT			UAU1	UAU1	UAU1	UAU1	UAU1	UAU1	UAU1	UAU1
	Units	AWQS								
1,1,1-Trichloroethane	ug/l	200	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,1-Dichloroethane	ug/l	NE	<1.0	**3.3**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethene	ug/l	7	<0.50	**2.3**	**3.3**	<0.50	<0.50	<0.50	<0.50	<0.50
1,2-Dichloroethane	ug/l	5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
cis-1,2-Dichloroethene	ug/l	70	<0.50	**28**	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
trans-1,2-Dichloroethene	ug/l	100	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Tetrachloroethene	ug/l	5	<0.50	**76**	**32**	**44**	<0.50	<0.50	<0.50	<0.50
Trichloroethene	ug/l	5	**0.85**	**32**	**5.8**	**0.57**	<0.50	<0.50	<0.50	<0.50

MONTGOMERY & ASSOCIATES

TABLE 1
SUMMARY OF WATER QUALITY DATA
WEST VAN BUREN AREA
WATER QUALITY ASSURANCE REVOLVING FUND SITE

CURRENT WELL IDENTIFIER			AVB91-02	AVB91-02	AVB91-03	AVB92-01	AVB92-02	AVB93-01	AVB94-01	AVB94-02
DATE SAMPLED			3/19/2008	3/19/2008	3/28/2008	3/11/2008	3/17/2008	3/11/2008	3/17/2008	3/17/2008
OWNER/LOCATION			ADEQ	ADEQ	ADEQ	ADEQ	ADEQ	ADEQ	ADEQ	ADEQ
ALTERNATE WELL IDENTIFIER			AVB91-02	AVB91-02	AVB91-03	AVB92-01	AVB92-02	AVB93-01	AVB94-01	AVB94-02
SAMPLE TYPE			ORIGINAL	DUPLICATE	ORIGINAL	ORIGINAL	ORIGINAL	ORIGINAL	ORIGINAL	ORIGINAL
ALLUVIAL UNIT			UAU2	UAU2	MAU	UAU1	UAU1	UAU1	UAU1	UAU1
	Units	AWQS								
1,1,1-Trichloroethane	ug/l	200	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,1-Dichloroethane	ug/l	NE	<1.0	<1.0	<0.50	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethene	ug/l	7	**1.2**	**1.2**	<0.50	<0.50	**1.1**	**0.81**	**5.8**	**2**
1,2-Dichloroethane	ug/l	5	<1.0	<1.0	<0.50	<1.0	<1.0	<1.0	<1.0	<1.0
cis-1,2-Dichloroethene	ug/l	70	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	**0.66**	<0.50
trans-1,2-Dichloroethene	ug/l	100	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Tetrachloroethene	ug/l	5	**5.1**	**5**	<0.50	**2.1**	**1**	**72**	**1.7**	**2.3**
Trichloroethene	ug/l	5	**1.3**	**1.2**	<0.50	<0.50	**14**	**2.3**	**64**	**3.1**

MONTGOMERY & ASSOCIATES

TABLE 1
SUMMARY OF WATER QUALITY DATA
WEST VAN BUREN AREA
WATER QUALITY ASSURANCE REVOLVING FUND SITE

CURRENT WELL IDENTIFIER			AVB95-01	AVB95-02	AVB95-02	AVB96-01	AVB96-02	AVB97-01	AVB98-01	AVB98-01
DATE SAMPLED			3/18/2008	3/18/2008	3/18/2008	3/19/2008	3/19/2008	3/10/2008	3/19/2008	3/19/2008
OWNER/LOCATION			ADEQ	34TH AVE & ROOSEVELT	34TH AVE & ROOSEVELT	ADEQ	ADEQ	ADEQ	ADEQ	ADEQ
ALTERNATE WELL IDENTIFIER			AVB95-01	AVB95-02	AVB95-02	AVB96-01	AVB96-02	AVB97-01	AVB98-01	AVB98-01
SAMPLE TYPE			ORIGINAL	ORIGINAL	TRIP BLANK	ORIGINAL	ORIGINAL	ORIGINAL	ORIGINAL	DUPLICATE
ALLUVIAL UNIT			UAU1	UAU2	UAU2	UAU1	UAU2	UAU1	UAU2	UAU2
	Units	AWQS								
1,1,1-Trichloroethane	ug/l	200	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,1-Dichloroethane	ug/l	NE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethene	ug/l	7	<0.50	<0.50	<0.50	<0.50	**0.55**	<0.50	<0.50	<0.50
1,2-Dichloroethane	ug/l	5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
cis-1,2-Dichloroethene	ug/l	70	<0.50	<0.50	<0.50	<0.50	<0.50	**0.5**	<0.50	<0.50
trans-1,2-Dichloroethene	ug/l	100	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Tetrachloroethene	ug/l	5	**1.8**	**1.4**	<0.50	<0.50	**1**	**2.4**	**1.5**	**1.4**
Trichloroethene	ug/l	5	**0.5**	<0.50	<0.50	<0.50	**1.3**	**0.7**	<0.50	<0.50

MONTGOMERY & ASSOCIATES

TABLE 1
SUMMARY OF WATER QUALITY DATA
WEST VAN BUREN AREA
WATER QUALITY ASSURANCE REVOLVING FUND SITE

CURRENT WELL IDENTIFIER			AVB99-01	AVB100-01	AVB101-01	AVB103-02	AVB106-01	AVB106-02	AVB106-03	AVB106-03
DATE SAMPLED			3/18/2008	3/11/2008	3/19/2008	3/12/2008	3/10/2008	3/18/2008	3/18/2008	3/18/2008
OWNER/LOCATION			ADEQ	ADEQ	DOE	TRISTAR	MARICOPA COUNTY	MARICOPA COUNTY	MARICOPA COUNTY	MARICOPA COUNTY
ALTERNATE WELL IDENTIFIER			AVB99-01	AVB100-01	AVB101-01	MW-2	MC-05	MC-N06 #2	MC-N06 #3	MC-N06 #3
SAMPLE TYPE			ORIGINAL	ORIGINAL	ORIGINAL	ORIGINAL	ORIGINAL	ORIGINAL	ORIGINAL	DUPLICATE
ALLUVIAL UNIT			UAU1	UAU1	UAU1	UAU1	UAU1	UAU1	UAU2	UAU2
	Units	AWQS								
1,1,1-Trichloroethane	ug/l	200	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,1-Dichloroethane	ug/l	NE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethene	ug/l	7	**1.2**	<0.50	**0.7**	**1.1**	<0.50	<0.50	<0.50	<0.50
1,2-Dichloroethane	ug/l	5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
cis-1,2-Dichloroethene	ug/l	70	<0.50	<0.50	**2**	<0.50	<0.50	<0.50	<0.50	<0.50
trans-1,2-Dichloroethene	ug/l	100	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Tetrachloroethene	ug/l	5	<0.50	**170**	**14**	**0.71**	**5.9**	**3.6**	<0.50	<0.50
Trichloroethene	ug/l	5	**1.6**	**5.4**	**38**	**1.7**	**20**	**2.8**	<0.50	<0.50

MONTGOMERY & ASSOCIATES

TABLE 1
SUMMARY OF WATER QUALITY DATA
WEST VAN BUREN AREA
WATER QUALITY ASSURANCE REVOLVING FUND SITE

CURRENT WELL IDENTIFIER			AVB107-01	AVB108-01	AVB108-02	AVB111-01	AVB112-05	AVB113-01	AVB115-01	AVB 116-01
DATE SAMPLED			3/18/2008	3/12/2008	3/12/2008	3/19/2008	3/26/2008	3/18/2008	3/18/2008	3/18/2008
OWNER/LOCATION			TRANSCON (TRANS03-01)	VOPAK	VOPAK	ULTRAMAR	ADEQ	LA/YUMA	ADEQ	ADEQ
ALTERNATE WELL IDENTIFIER			MW-2	MW-6	MW-11	MW-3	MW-5	MW-1	AVB115-01	AVB 116-01
SAMPLE TYPE			ORIGINAL	ORIGINAL	ORIGINAL	ORIGINAL	ORIGINAL	ORIGINAL	ORIGINAL	ORIGINAL
ALLUVIAL UNIT			UAU1	UAU1	UAU1	UAU1	UAU1	UAU1	UAU1	UAU1
	Units	AWQS								
1,1,1-Trichloroethane	ug/l	200	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,1-Dichloroethane	ug/l	NE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**3.5**	**6.3**
1,1-Dichloroethene	ug/l	7	**2**	**1.5**	<0.50	<0.50	<0.50	<0.50	**5.3**	**8.3**
1,2-Dichloroethane	ug/l	5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
cis-1,2-Dichloroethene	ug/l	70	**2.8**	<0.50	<0.50	<0.50	<0.50	<0.50	**24**	**6.2**
trans-1,2-Dichloroethene	ug/l	100	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Tetrachloroethene	ug/l	5	**5.4**	**12**	**6.9**	**1.3**	<0.50	**0.86**	**5.7**	**3.1**
Trichloroethene	ug/l	5	**11**	**13**	**4.2**	**4.2**	<0.50	<0.50	**120**	**27**

MONTGOMERY & ASSOCIATES

TABLE 1
SUMMARY OF WATER QUALITY DATA
WEST VAN BUREN AREA
WATER QUALITY ASSURANCE REVOLVING FUND SITE

CURRENT WELL IDENTIFIER			AVB 116-02	AVB117-01	AVB118-01	AVB119-01	AVB120-01	AVB120-01	AVB120-02	AVB120-02
DATE SAMPLED			3/18/2008	3/18/2008	3/19/2008	3/17/2008	3/17/2008	3/17/2008	3/17/2008	3/17/2008
OWNER/LOCATION			ADEQ	ADEQ	ADEQ	ADEQ	ADEQ	ADEQ	ADEQ	ADEQ
ALTERNATE WELL IDENTIFIER			AVB 116-02	AVB117-01	AVB118-01	AVB119-01	AVB120-01	AVB120-01	AVB120-02	AVB120-02
SAMPLE TYPE			ORIGINAL	ORIGINAL	ORIGINAL	ORIGINAL	ORIGINAL	DUPLICATE	ORIGINAL	DUPLICATE
ALLUVIAL UNIT			UAU2	UAU1	UAU1	UAU1	UAU1	UAU1	UAU2	UAU2
	Units	AWQS								
1,1,1-Trichloroethane	ug/l	200	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,1-Dichloroethane	ug/l	NE	**13**	<1.0	**9.1**	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethene	ug/l	7	**23**	<0.50	**9.9**	<0.50	**2.5**	**2.4**	**0.87**	**0.86**
1,2-Dichloroethane	ug/l	5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
cis-1,2-Dichloroethene	ug/l	70	**15**	<0.50	**9.1**	<0.50	**5.1**	**5.1**	<0.50	<0.50
trans-1,2-Dichloroethene	ug/l	100	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Tetrachloroethene	ug/l	5	**4.2**	**3.9**	**2.5**	**15**	**15**	**15**	**37**	**37**
Trichloroethene	ug/l	5	**70**	**1.9**	**40**	<0.50	**59**	**61**	**160**	**150**

MONTGOMERY & ASSOCIATES

TABLE 1
SUMMARY OF WATER QUALITY DATA
WEST VAN BUREN AREA
WATER QUALITY ASSURANCE REVOLVING FUND SITE

CURRENT WELL IDENTIFIER			AVB121-01	AVB121-01	AVB121-02	AVB122-01	AVB122-01	AVB122-02	AVB122-02	AVB 122-03
DATE SAMPLED			3/17/2008	3/17/2008	3/27/2008	3/17/2008	3/17/2008	3/17/2008	3/17/2008	3/26/2008
OWNER/LOCATION			ADEQ	ADEQ	ADEQ	ADEQ	ADEQ	ADEQ	ADEQ	ADEQ
ALTERNATE WELL IDENTIFIER			AVB121-01	AVB121-01	AVB121-02	AVB122-01	AVB122-01	AVB122-02	AVB122-02	AVB 122-03
SAMPLE TYPE			ORIGINAL	TRIP	ORIGINAL	ORIGINAL	DUPLICATE	ORIGINAL	DUPLICATE	ORIGINAL
ALLUVIAL UNIT			UAU1	UAU1	UAU2	UAU1	UAU1	UAU1	UAU1	UAU2
	Units	AWQS								
1,1,1-Trichloroethane	ug/l	200	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,1-Dichloroethane	ug/l	NE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethene	ug/l	7	<0.50	<0.50	<0.50	**2.3**	**2.2**	**2.8**	**3**	<0.50
1,2-Dichloroethane	ug/l	5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
cis-1,2-Dichloroethene	ug/l	70	<0.50	<0.50	<0.50	**0.5**	<1.0	<0.50	<0.50	<0.50
trans-1,2-Dichloroethene	ug/l	100	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Tetrachloroethene	ug/l	5	<0.50	<0.50	<0.50	**18**	**19**	**17**	**17**	**0.76**
Trichloroethene	ug/l	5	<0.50	<0.50	<0.50	**7.4**	**7.8**	**8.5**	**8.3**	**0.81**

MONTGOMERY & ASSOCIATES

TABLE 1
SUMMARY OF WATER QUALITY DATA
WEST VAN BUREN AREA
WATER QUALITY ASSURANCE REVOLVING FUND SITE

CURRENT WELL IDENTIFIER			AVB 123-01	AVB 124-01	AVB 124-02	AVB 125-01	AVB126-01	AVB126-02	AVB126-03	AVB127-01
DATE SAMPLED			3/18/2008	3/18/2008	3/25/2008	3/18/2008	3/11/2008	3/24/2008	3/24/2008	3/10/2008
OWNER/LOCATION			ADEQ	ADEQ	ADEQ	ADEQ	ADEQ	ADEQ	ADEQ	ADEQ
ALTERNATE WELL IDENTIFIER			AVB 123-01	AVB 124-01	AVB 124-02	AVB 125-01	AVB126-01	AVB126-02	AVB126-03	AVB127-01
SAMPLE TYPE			ORIGINAL	ORIGINAL	ORIGINAL	ORIGINAL	ORIGINAL	ORIGINAL	ORIGINAL	ORIGINAL
ALLUVIAL UNIT			UAU1	UAU2	UAU2	UAU1	UAU1	UAU2	MAU	UAU1
	Units	AWQS								
1,1,1-Trichloroethane	ug/l	200	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,1-Dichloroethane	ug/l	NE	<1.0	**2.3**	<1.0	<1.0	**2.7**	**3.9**	<0.50	**2.8**
1,1-Dichloroethene	ug/l	7	<0.50	**10**	<0.50	<0.50	**4.3**	**8.7**	<0.50	**5.2**
1,2-Dichloroethane	ug/l	5	<1.0	<1.0	<1.0	<1.0	<1.0	<0.50	<0.50	<1.0
cis-1,2-Dichloroethene	ug/l	70	<0.50	**14**	<0.50	<0.50	**5.9**	**3.9**	<0.50	**15**
trans-1,2-Dichloroethene	ug/l	100	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Tetrachloroethene	ug/l	5	**2.2**	**6.9**	<0.50	**27**	**10**	**1.5**	<0.50	**7.1**
Trichloroethene	ug/l	5	**4.6**	**100**	<0.50	<0.50	**15**	**16**	<0.50	**85**

MONTGOMERY & ASSOCIATES

TABLE 1
SUMMARY OF WATER QUALITY DATA
WEST VAN BUREN AREA
WATER QUALITY ASSURANCE REVOLVING FUND SITE

CURRENT WELL IDENTIFIER			AVB 128-01	AVB 129-01	AVB 129-02	AVB 130-01	AVB 130-01	AVB 131-01	AVB 131-01	AVB 131-01
DATE SAMPLED			3/17/2008	3/19/2008	3/19/2008	3/17/2008	3/17/2008	3/25/2008	3/25/2008	3/25/2008
OWNER/LOCATION			ADEQ	ADEQ	ADEQ	ADEQ	ADEQ	ADEQ	ADEQ	ADEQ
ALTERNATE WELL IDENTIFIER			AVB 128-01	AVB 129-01	AVB 129-02	AVB 130-01	AVB 130-01	AVB 131-01	AVB 131-01	AVB 131-01
SAMPLE TYPE			ORIGINAL	ORIGINAL	ORIGINAL	ORIGINAL	DUPLICATE	ORIGINAL	DUPLICATE	TRIP
ALLUVIAL UNIT			UAU2	UAU1	UAU2	UAU1	UAU1	UAU2	UAU2	UAU2
	Units	AWQS								
1,1,1-Trichloroethane	ug/l	200	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,1-Dichloroethane	ug/l	NE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethene	ug/l	7	<0.50	<0.50	<0.50	**0.65**	**0.67**	<0.50	<0.50	<0.50
1,2-Dichloroethane	ug/l	5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
cis-1,2-Dichloroethene	ug/l	70	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
trans-1,2-Dichloroethene	ug/l	100	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Tetrachloroethene	ug/l	5	**3.9**	<0.50	<0.50	**1.8**	**1.9**	**1**	**0.78**	<0.50
Trichloroethene	ug/l	5	**1.4**	<0.50	<0.50	**14**	**15**	<0.50	<0.50	<0.50

MONTGOMERY & ASSOCIATES

TABLE 1
SUMMARY OF WATER QUALITY DATA
WEST VAN BUREN AREA
WATER QUALITY ASSURANCE REVOLVING FUND SITE

CURRENT WELL IDENTIFIER			AVB 131-01	AVB132-01	AVB132-02	AVB132-02	AVB132-02	AVB 133-01	AVB134-01	AVB134-01
DATE SAMPLED			3/25/2008	3/24/2008	3/24/2008	3/24/2008	3/24/2008	3/25/2008	3/12/2008	3/12/2008
OWNER/LOCATION			ADEQ	ADEQ	ADEQ	ADEQ	ADEQ	ADEQ	ADEQ	ADEQ
ALTERNATE WELL IDENTIFIER			AVB 131-01	AVB132-01	AVB132-02	AVB132-02	AVB132-02	AVB 133-01	AVB134-01	AVB134-01
SAMPLE TYPE			EQUIPMENT	ORIGINAL	ORIGINAL	EQUIPMENT	TRIP	ORIGINAL	ORIGINAL	DUPLICATE
ALLUVIAL UNIT			UAU2	UAU2	UAU2	UAU2	UAU2	UAU1	UAU1	UAU1
	Units	AWQS								
1,1,1-Trichloroethane	ug/l	200	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,1-Dichloroethane	ug/l	NE	<1.0	**4.4**	<0.50	<0.50	<0.50	<1.0	**12**	**12**
1,1-Dichloroethene	ug/l	7	<0.50	**7.9**	<0.50	<0.50	<0.50	<0.50	**15**	**13**
1,2-Dichloroethane	ug/l	5	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<1.0	<1.0
cis-1,2-Dichloroethene	ug/l	70	<0.50	**11**	<0.50	<0.50	<0.50	<0.50	**28**	**28**
trans-1,2-Dichloroethene	ug/l	100	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.59	0.77
Tetrachloroethene	ug/l	5	<0.50	**2.5**	<0.50	<0.50	<0.50	<0.50	**8**	**8**
Trichloroethene	ug/l	5	<0.50	**55**	**0.90**	<0.50	<0.50	**0.95**	**150**	**150**

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TABLE 1
SUMMARY OF WATER QUALITY DATA
WEST VAN BUREN AREA
WATER QUALITY ASSURANCE REVOLVING FUND SITE

CURRENT WELL IDENTIFIER			AVB134-01	AVB134-01	AVB134-02	AVB135-01	AVB136-01	AVB137-01	AVB137-01	AVB137-01
DATE SAMPLED			3/12/2008	3/12/2008	3/25/2008	3/12/2008	3/27/2008	3/27/2008	3/27/2008	3/27/2008
OWNER/LOCATION			ADEQ	ADEQ	ADEQ	ADEQ	ADEQ	ADEQ	ADEQ	ADEQ
ALTERNATE WELL IDENTIFIER			AVB134-01	AVB134-01	AVB134-02	AVB135-01	AVB136-01	AVB137-01	AVB137-01	AVB137-01
SAMPLE TYPE			EQUIPMENT	TRIP	ORIGINAL	ORIGINAL	ORIGINAL	ORIGINAL	DUPLICATE	EQUIPMENT
ALLUVIAL UNIT			UAU1	UAU1	UAU2	UAU1	UAU2	UAU2	UAU2	UAU2
	Units	AWQS								
1,1,1-Trichloroethane	ug/l	200	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,1-Dichloroethane	ug/l	NE	<1.0	<1.0	<10	<1.0	**1.1**	<1.0	<1.0	<1.0
1,1-Dichloroethene	ug/l	7	<0.50	<0.50	**7.1**	<0.50	**3.3**	<0.50	<0.50	<0.50
1,2-Dichloroethane	ug/l	5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
cis-1,2-Dichloroethene	ug/l	70	<0.50	<0.50	**17**	<0.50	**3.3**	<0.50	<0.50	<0.50
trans-1,2-Dichloroethene	ug/l	100	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Tetrachloroethene	ug/l	5	<0.50	<0.50	**8.2**	**1.3**	**8.5**	<0.50	<0.50	<0.50
Trichloroethene	ug/l	5	<0.50	<0.50	**110**	<0.50	**18**	<0.50	<0.50	<0.50

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TABLE 1
SUMMARY OF WATER QUALITY DATA
WEST VAN BUREN AREA
WATER QUALITY ASSURANCE REVOLVING FUND SITE

CURRENT WELL IDENTIFIER			AVB137-01	AVB139-01	AVB139-01	AVB139-01	AVB139-01	AVB141-01	PS-1	PS-4
DATE SAMPLED			3/27/2008	3/28/2008	3/28/2008	3/28/2008	3/28/2008	3/27/2008	3/13/2008	3/13/2008
OWNER/LOCATION			ADEQ	ADEQ	ADEQ	ADEQ	ADEQ	ADEQ	REYNOLDS	REYNOLDS
ALTERNATE WELL IDENTIFIER			AVB137-01	AVB139-01	AVB139-01	AVB139-01	AVB139-01	AVB141-01	PS-1	PS-4
SAMPLE TYPE			TRIP	ORIGINAL	DUPLICATE	TRIP	EQUIPMENT	ORIGINAL	ORIGINAL	ORIGINAL
ALLUVIAL UNIT			UAU2	UAU2	UAU2	UAU2	UAU2	UAU2	UAU1	UAU1
	Units	AWQS								
1,1,1-Trichloroethane	ug/l	200	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	**0.96**	<5.0
1,1-Dichloroethane	ug/l	NE	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	**13**	<1.0
1,1-Dichloroethene	ug/l	7	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	**1.1**
1,2-Dichloroethane	ug/l	5	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<1.0	<1.0
cis-1,2-Dichloroethene	ug/l	70	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	**2.1**
trans-1,2-Dichloroethene	ug/l	100	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Tetrachloroethene	ug/l	5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	**2.4**	**8.6**
Trichloroethene	ug/l	5	<0.50	<0.50	<0.50	<0.50	<0.50	**3**	**2.9**	**35**

TABLE 1
SUMMARY OF WATER QUALITY DATA
WEST VAN BUREN AREA
WATER QUALITY ASSURANCE REVOLVING FUND SITE

CURRENT WELL IDENTIFIER			PS-6	PS-7	PS-9	PTG-1A	PTG-1B	PTG-2B	PTG-3A	PTG-3B
DATE SAMPLED			3/13/2008	3/13/2008	3/13/2008	4/9/2008	4/3/2008	4/3/2008	4/3/2008	4/3/2008
OWNER/LOCATION			REYNOLDS	REYNOLDS	REYNOLDS	KINDER MORGAN	KINDER MORGAN	KINDER MORGAN	KINDER MORGAN	KINDER MORGAN
ALTERNATE WELL IDENTIFIER			PS-6	PS-7	PS-9	PTG-1A	PTG-1B	PTG-2B	PTG-3A	PTG-3B
SAMPLE TYPE			ORIGINAL	ORIGINAL	ORIGINAL	ORIGINAL	ORIGINAL	ORIGINAL	ORIGINAL	ORIGINAL
ALLUVIAL UNIT			UAU1	UAU1	UAU1	UAU1	UAU2	UAU2	UAU1	UAU2
	Units	AWQS								
1,1,1-Trichloroethane	ug/l	200	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,1-Dichloroethane	ug/l	NE	**1.6**	<1.0	<1.0	<0.50	<0.50	<0.50	<0.50	<0.50
1,1-Dichloroethene	ug/l	7	**1.6**	**1.6**	<0.50	**0.91**	**2.7**	**0.7**	<0.50	**0.6**
1,2-Dichloroethane	ug/l	5	<1.0	<1.0	<1.0	<0.50	<0.50	<0.50	<0.50	<0.50
cis-1,2-Dichloroethene	ug/l	70	**0.6**	<0.50	<0.50	<0.50	**1.4**	**0.8**	<0.50	<0.50
trans-1,2-Dichloroethene	ug/l	100	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Tetrachloroethene	ug/l	5	**6.4**	**2.5**	**4.2**	**4.7**	**1.1**	**1**	<0.50	**1.6**
Trichloroethene	ug/l	5	**16**	**1.8**	**8.6**	**1.1**	**0.9**	**1.2**	<0.50	**1.1**

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TABLE 1
SUMMARY OF WATER QUALITY DATA
WEST VAN BUREN AREA
WATER QUALITY ASSURANCE REVOLVING FUND SITE

CURRENT WELL IDENTIFIER			CMW-1	CMW-4	DIMW-1	DIMW-1	DIMW-1	DIMW-2	DIMW-2	DIMW-2
DATE SAMPLED			1/14/2008	1/14/2008	03/20/08	03/20/08	03/20/08	03/19/08	03/19/08	03/19/08
OWNER/LOCATION			CRC	CRC	Dolphin	Dolphin	Dolphin	Dolphin	Dolphin	Dolphin
ALTERNATE WELL IDENTIFIER			CMW-1	CMW-4	DIMW-1	DIMW-1	DIMW-1	DIMW-2	DIMW-2	DIMW-2
SAMPLE TYPE			ORIGINAL	ORIGINAL	ORIGINAL	ORIGINAL	ORIGINAL	ORIGINAL	DUPLICATE	NR
ALLUVIAL UNIT			UAU1	UAU1	UAU1	UAU2	MAU1	UAU1	UAU1	UAU2
	Units	AWQS								
1,1,1-Trichloroethane	ug/l	200	<5.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,1-Dichloroethane	ug/l	NE	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethene	ug/l	7	<5.0	<0.50	<0.50	<0.50	<0.50	**3.4**	**3.4**	<0.50
1,2-Dichloroethane	ug/l	5	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
cis-1,2-Dichloroethene	ug/l	70	<5.0	<0.50	<0.50	**5.0**	**2.8**	**1.0**	**1.0**	<1.0
trans-1,2-Dichloroethene	ug/l	100	<5.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Tetrachloroethene	ug/l	5	**390**	**27**	**10**	**51**	**4.0**	**22**	**21**	<0.50
Trichloroethene	ug/l	5	<5.0	<0.50	**0.77**	**4.9**	<0.50	**7.7**	**7.7**	<0.50

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TABLE 1
SUMMARY OF WATER QUALITY DATA
WEST VAN BUREN AREA
WATER QUALITY ASSURANCE REVOLVING FUND SITE

CURRENT WELL IDENTIFIER			DIMW-2	DIMW-3	DIMW-3	DIMW-3	DIMW-4A	DIMW-5A	DIMW-6A	DIMW-7A
DATE SAMPLED			03/19/08	03/20/08	03/20/08	03/20/08	03/20/08	03/20/08	03/20/08	03/20/08
OWNER/LOCATION			Dolphin	Dolphin	Dolphin	Dolphin	Dolphin	Dolphin	Dolphin	Dolphin
ALTERNATE WELL IDENTIFIER			DIMW-2	DIMW-3	DIMW-3	DIMW-3	DIMW-4A	DIMW-5A	DIMW-6A	DIMW-7A
SAMPLE TYPE			NR	NR	NR	NR	NR	NR	NR	NR
ALLUVIAL UNIT			MAU1	UAU1	UAU2	MAU1	UAU1	UAU1	UAU1	UAU1
	Units	AWQS								
1,1,1-Trichloroethane	ug/l	200	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,1-Dichloroethane	ug/l	NE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethene	ug/l	7	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	**1.0**	**1.7**
1,2-Dichloroethane	ug/l	5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
cis-1,2-Dichloroethene	ug/l	70	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	**0.55**
trans-1,2-Dichloroethene	ug/l	100	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Tetrachloroethene	ug/l	5	**0.79**	**1.3**	<0.50	**0.66**	**3.8**	**3.1**	**9.2**	**12**
Trichloroethene	ug/l	5	<0.50	<0.50	<0.50	<0.50	**0.86**	<0.50	**2.2**	**3.7**

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TABLE 1
SUMMARY OF WATER QUALITY DATA
WEST VAN BUREN AREA
WATER QUALITY ASSURANCE REVOLVING FUND SITE

CURRENT WELL IDENTIFIER			DIMW-7A	DIMW-8D	DIMW-9D	RID-84	RID-84	RID-85	RID-89	RID-92
DATE SAMPLED			03/20/08	03/20/08	03/20/08	09/05/08	09/05/08	09/04/08	09/04/08	09/04/08
OWNER/LOCATION			Dolphin	Dolphin	Dolphin	RID [1]	RID	RID	RID	RID
ALTERNATE WELL IDENTIFIER			DIMW-7A	DIMW-8D	DIMW-9D	RID-84	RID-84D	RID-85	RID-89	RID-92
SAMPLE TYPE			DUPLICATE	NR	NR	ORIGINAL	DUPLICATE	ORIGINAL	ORIGINAL	ORIGINAL
ALLUVIAL UNIT			UAU1	MAU1	MAU1	UAU	UAU	UAU	UAU/MAU/LAU	UAU/MAU
	Units	AWQS								
1,1,1-Trichloroethane	ug/l	200	<0.50	<0.50	<0.50	**1.3**	**1.4**	<0.50	**32**	**85**
1,1-Dichloroethane	ug/l	NE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.3**
1,1-Dichloroethene	ug/l	7	**1.7**	<0.50	<0.50	**0.85**	**0.99**	<0.50	**3.2**	**4.4**
1,2-Dichloroethane	ug/l	5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
cis-1,2-Dichloroethene	ug/l	70	**0.60**	<0.50	<0.50	<0.50	<0.50	<0.50	**2.1**	**5.6**
trans-1,2-Dichloroethene	ug/l	100	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Tetrachloroethene	ug/l	5	**12**	<0.50	<0.50	**9.4**	**10**	<0.50	**11**	**19**
Trichloroethene	ug/l	5	**3.8**	<0.50	<0.50	**1.3**	**1.4**	<0.50	**32**	**85**

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TABLE 1
SUMMARY OF WATER QUALITY DATA
WEST VAN BUREN AREA
WATER QUALITY ASSURANCE REVOLVING FUND SITE

CURRENT WELL IDENTIFIER			RID-94	RID-95	RID-99	RID-100	RID-101	RID-102	RID-103	RID-104
DATE SAMPLED			09/04/08	09/05/08	09/05/08	09/05/08	09/04/08	09/04/08	09/04/08	09/04/08
OWNER/LOCATION			RID	RID	RID	RID	RID	RID	RID	RID
ALTERNATE WELL IDENTIFIER			RID-94	RID-95	RID-99	RID-100	RID-101	RID-102	RID-103	RID-104
SAMPLE TYPE			ORIGINAL	ORIGINAL	ORIGINAL	ORIGINAL	ORIGINAL	ORIGINAL	ORIGINAL	ORIGINAL
ALLUVIAL UNIT			UAU	UAU/MAU/LAU	UAU	UAU	UAU	UAU	UAU	UAU
	Units	AWQS								
1,1,1-Trichloroethane	ug/l	200	**0.81**	**56**	**0.71**	**34**	<0.50	<0.50	<0.50	**1.3**
1,1-Dichloroethane	ug/l	NE	<1.0	**3.2**	<1.0	**5.0**	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethene	ug/l	7	**0.98**	**6.9**	**2**	**9.3**	**2.0**	<0.50	**1.6**	**1.0**
1,2-Dichloroethane	ug/l	5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
cis-1,2-Dichloroethene	ug/l	70	<0.50	**7.2**	<0.50	**7.6**	<0.50	<0.50	<0.50	<0.50
trans-1,2-Dichloroethene	ug/l	100	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Tetrachloroethene	ug/l	5	**1.2**	**5.2**	**7.9**	**7.8**	<0.50	**12**	<0.50	**7.5**
Trichloroethene	ug/l	5	**0.81**	**56**	**0.71**	**34**	<0.50	<0.50	<0.50	**1.2**

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TABLE 1
SUMMARY OF WATER QUALITY DATA
WEST VAN BUREN AREA
WATER QUALITY ASSURANCE REVOLVING FUND SITE

CURRENT WELL IDENTIFIER			RID-104	RID-105	RID-106	RID-107	RID-108	RID-109	RID-110	RID-111
DATE SAMPLED			09/04/08	09/05/08	03/21/08	09/05/08	09/05/08	09/05/08	09/05/08	Inoperable
OWNER/LOCATION			RID	RID	RID	RID	RID	RID	RID	RID
ALTERNATE WELL IDENTIFIER			RID-104d	RID-105	RID-106	RID-107	RID-108	RID-109	RID-110	RID-111
SAMPLE TYPE			DUPLICATE	ORIGINAL	ORIGINAL	ORIGINAL	ORIGINAL	ORIGINAL	ORIGINAL	ORIGINAL
ALLUVIAL UNIT			UAU	UAU	UAU/MAU	UAU/MAU	UAU	UAU	UAU	UAU
	Units	AWQS								
1,1,1-Trichloroethane	ug/l	200	**1.4**	**0.58**	<0.50	**11**	**3.2**	**7.7**	**1.8**	NA
1,1-Dichloroethane	ug/l	NE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	NA
1,1-Dichloroethene	ug/l	7	**1.0**	**0.78**	**7.4**	**4.7**	**0.98**	**3.2**	<0.50	NA
1,2-Dichloroethane	ug/l	5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	NA
cis-1,2-Dichloroethene	ug/l	70	<0.50	<0.50	**2.2**	<0.50	<0.50	<0.50	<0.50	NA
trans-1,2-Dichloroethene	ug/l	100	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	NA
Tetrachloroethene	ug/l	5	**8.0**	**3.9**	**39**	**13**	**10**	**8.5**	**7.7**	NA
Trichloroethene	ug/l	5	**1.2**	**0.58**	***13***	**11**	**3.2**	**7.7**	**1.8**	NA

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TABLE 1
SUMMARY OF WATER QUALITY DATA
WEST VAN BUREN AREA
WATER QUALITY ASSURANCE REVOLVING FUND SITE

CURRENT WELL IDENTIFIER			RID-112	RID-113	RID-114
DATE SAMPLED			09/05/08	03/24/08	09/05/08
OWNER/LOCATION			RID	RID	RID
ALTERNATE WELL IDENTIFIER			RID-112	RID-113	RID-114
SAMPLE TYPE			ORIGINAL	ORIGINAL	ORIGINAL
ALLUVIAL UNIT			UAU/MAU	UAU/MAU	UAU
	Units	AWQS			
1,1,1-Trichloroethane	ug/l	200	**19**	<0.50	**85**
1,1-Dichloroethane	ug/l	NE	<1.0	<1.0	**2.0**
1,1-Dichloroethene	ug/l	7	**0.91**	<0.50	**3.7**
1,2-Dichloroethane	ug/l	5	<1.0	<1.0	<1.0
cis-1,2-Dichloroethene	ug/l	70	**2.2**	**2.6**	**12**
trans-1,2-Dichloroethene	ug/l	100	<0.50	<0.50	<0.50
Tetrachloroethene	ug/l	5	**4.5**	**4.2**	**4.6**
Trichloroethene	ug/l	5	**19**	**18**	**85**

NOTES:

* Table modified from Table 4-5 of Draft Remedial Investigation Report (Terranext, 2008a)

1 Data for RID wells obtained from Terranext, 2008b and 2008c

NA Not Analyzed

< Indicates concentration less than laboratory reporting limit

ug/l Micrograms per liter

AWQS Aquifer Water Quality Standard

NE Not Established

ADWR Arizona Department of Water Resources

UAU Upper Alluvial Unit

MAU Middle Alluvial Unit

ADEQ Arizona Department of Environmental Quality

NR Not reported

Shading indicates concentration equals or exceeds AWQS

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TABLE 2
SUMMARY OF EARLY RESPONSE ACTION

ROOSEVELT IRRIGATION DISTRICT
EARLY RESPONSE ACTION WORK PLAN
WEST VAN BUREN AREA WATER QUALITY ASSURANCE REVOLVING FUND SITE

PHASE	WELL NAME	ESTIMATED PUMPING RATE (gallons per minute) [1]	TOTAL VOC CONCENTRATION (micrograms per liter) [2]		ESTIMATED MASS OF TOTAL VOCs REMOVED (pounds per year)[3]
1 Pump and treat impacted groundwater from RID wells located along Van Buren Street	RID-105	1,900		5	44
	RID-106	1,500		61	397
	RID-107	2,100		51	464
	RID-108	1,900		63	526
	RID-109	2,400		22	234
	RID-110	2,900		14	180
	RID-112	1,700		31	231
	RID-113	2,300		44	443
	RID-114	2,500		110	1,202
	SUBTOTAL	**19,200**	**AVG [4]**	**44**	**3,722**
2 Pump and treat impacted groundwater from RID wells with highest VOC concentrations	RID-89 [5]	2,900		51	652
	RID-92	1,200		119	624
	RID-95 [5]	1,700		80	593
	RID-100	2,100		65	599
	RID-106	1,500		61	397
	RID-107	2,100		51	464
	RID-108	1,900		63	526
	RID-112	1,700		31	231
	RID-113	2,300		44	443
	RID-114	2,500		110	1,202
	SUBTOTAL	**19,900**	**AVG [4]**	**66**	**5,732**

Footnotes:

1 - Pumping rates based on data provided by RID for 2008 and 2009.

2 - Sum of all detected VOCs; concentrations based on most recent analytical data available for each well.

3 - Total VOC removal in early years of remedy assuming all impacted wells from Phase 1 and 2 are pumped continously and all water is treated; actual mass removal may vary depending on demand for treated water.

4 - Pumping rate weighted average concentration in micrograms per liter assuming no loss due to volatilization or degradation.

5 - Pumping rates shown are 75% of reported rates; well testing and modification may be conducted to seal off lower portion of wells to optimize pumping of impacted groundwater.

Abbreviations:

RID - Roosevelt Irrigation District

VOC - Volatile organic compounds

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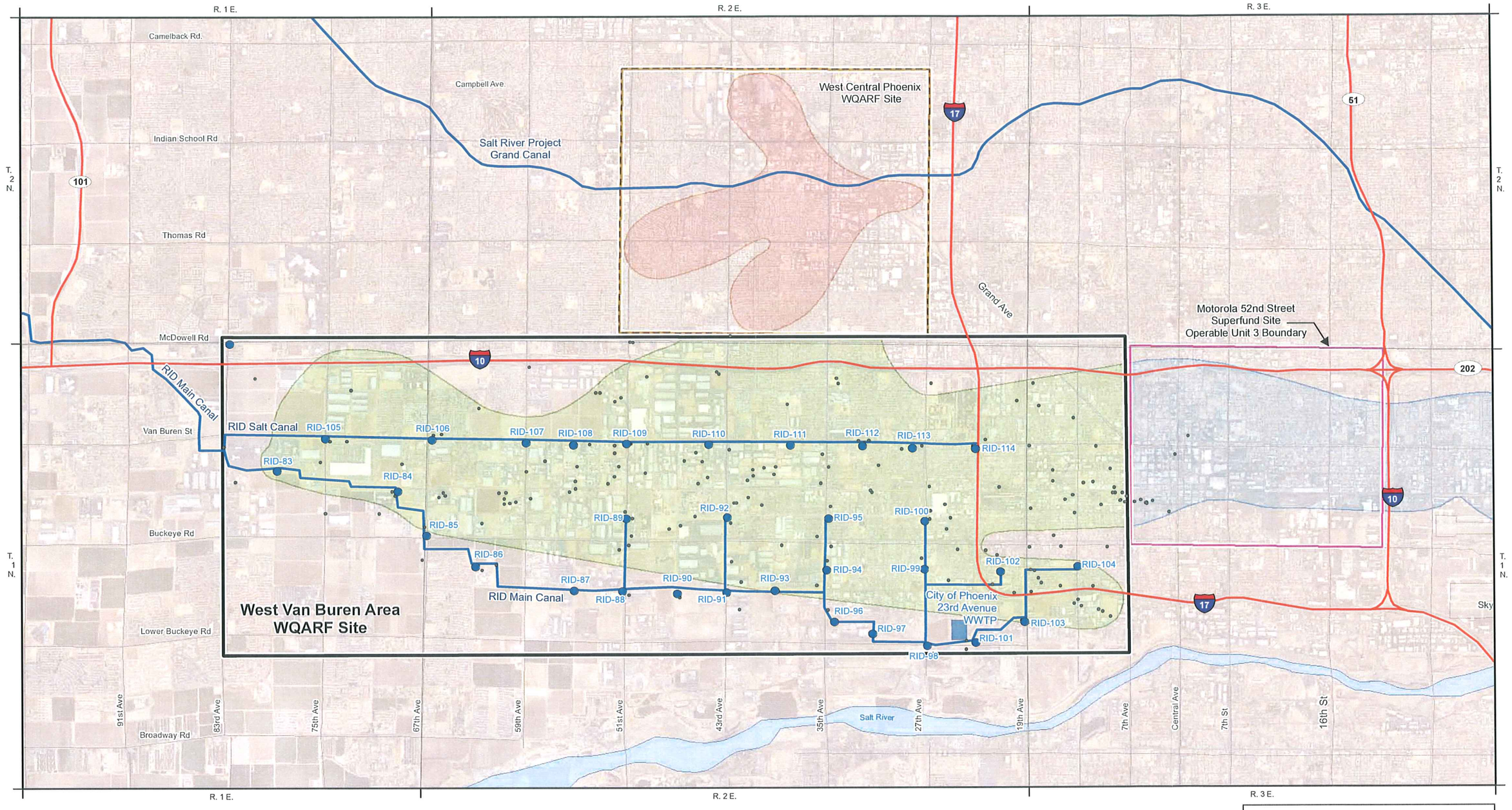
ILLUSTRATIONS



EXPLANATION

- Roosevelt Irrigation District Well
- Monitor Well
- Existing Canal or Pipeline
- Interstates
- Local Streets
- Estimated Extent of Impacted Groundwater in WVBA WQARF Site Based on 1st Quarter 2008 Data (Terranext, 2008a)
- Estimated Extent of Impacted Groundwater in West Central Phoenix WQARF Site
- Estimated Extent of Impacted Groundwater in Motorola 52nd Street Superfund Site

Abbreviations

WVBA - West Van Buren Area
WQARF - Water Quality Assurance Revolving Fund
WWTP - Waste Water Treatment Plant
RID - Roosevelt Irrigation District

N

0 5,000

Feet

Roosevelt Irrigation District
Early Response Action Work Plan
West Van Buren Area WQARF Site

STUDY AREA

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FIGURE 1

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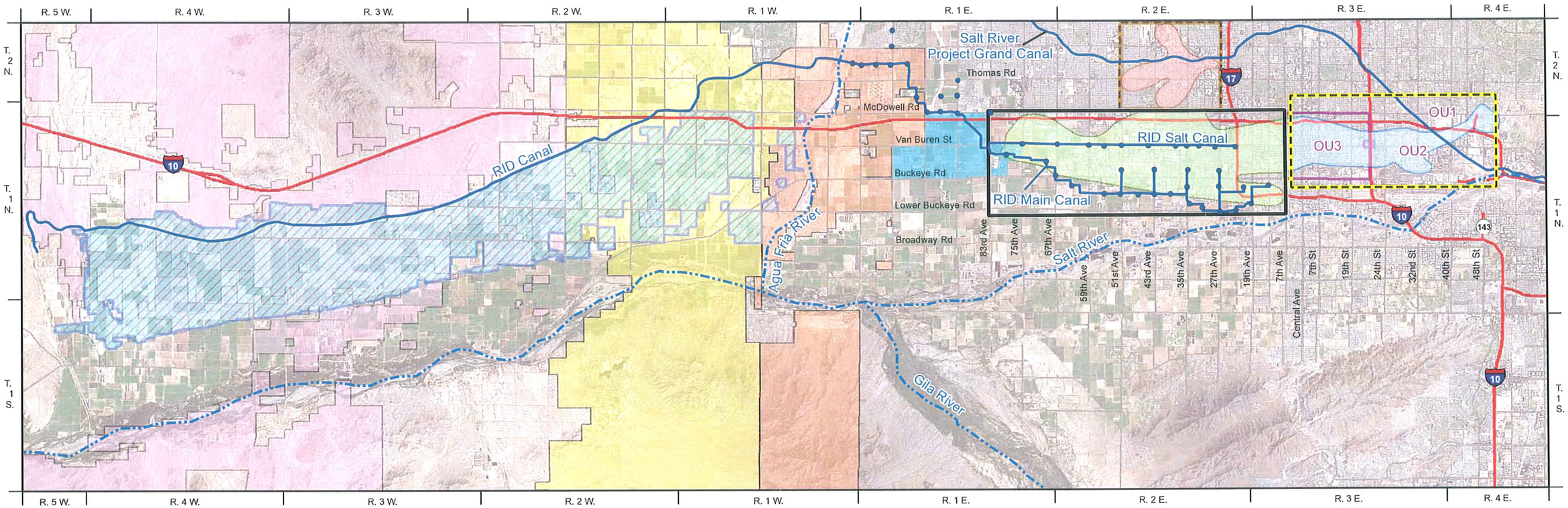

EXPLANATION

- Roosevelt Irrigation District
- City of Goodyear Boundary
- City of Avondale Boundary
- Town of Buckeye Boundary
- City of Tolleson Boundary
- Interstates
- Local Streets
- Roosevelt Irrigation District Well
- West Van Buren WQARF Site
- Motorola 52nd Street Superfund Site
- West Central Phoenix WQARF SIte
- Estimated Extent of Impacted Groundwater in WVBA WQARF Site Based on 1st Quarter 2008 Data (Terranext, 2008a)
- Estimated Extent of Impacted Groundwater in West Central Phoenix WQARF Site
- Estimated Extent of Impacted Groundwater in Motorola 52nd Street Superfund Site

Abbreviations

WQARF - Water Quality Assurance Revolving Fund
OU - Operable Unit
RID - Roosevelt Irrigation District

N

0 3

Miles

Roosevelt Irrigation District
Early Response Action Work Plan
West Van Buren Area WQARF Site

REGIONAL CONDITIONS

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FIGURE 2

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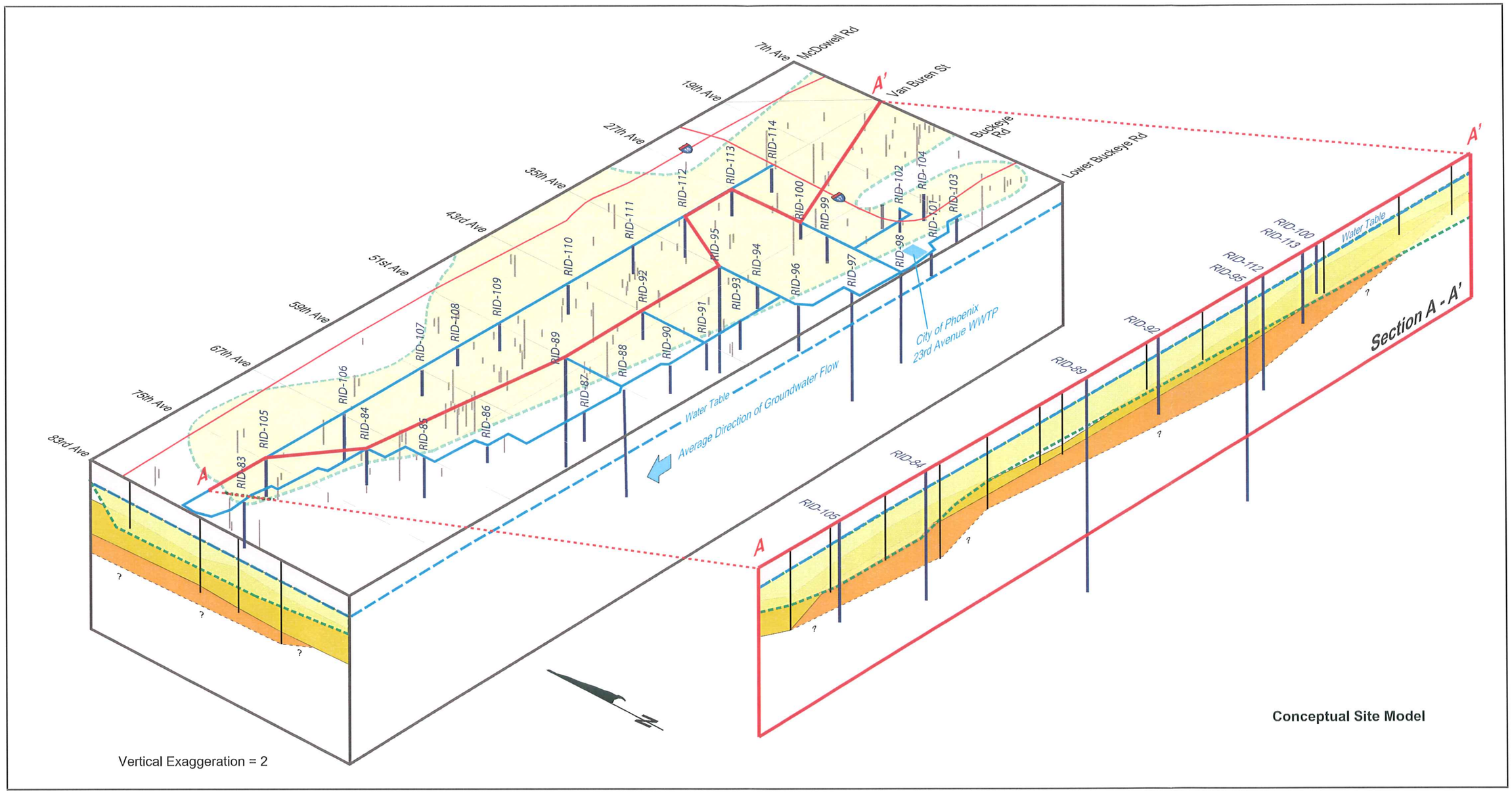

Conceptual Site Model

EXPLANATION

- Upper Alluvial Unit 1 (UAU1)
- Upper Alluvial Unit 2 (UAU2)
- Middle Alluvial Unit (MAU)
- Estimated Extent of Impacted Groundwater In WVBA WQARF Site Based on 1st Quarter 2008 Data (Terranext, 2008a)

- Existing Canal or Pipeline
- Interstates
- Local Streets
- Roosevelt Irrigation District Well
- Monitor Well

Abbreviations
WWTP - Waste Water Treatment Plant
RID - Roosevelt Irrigation District

Roosevelt Irrigation District
Early Response Action Work Plan
West Van Buren Area WQARF Site

CONCEPTUAL SITE MODEL

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FIGURE 3

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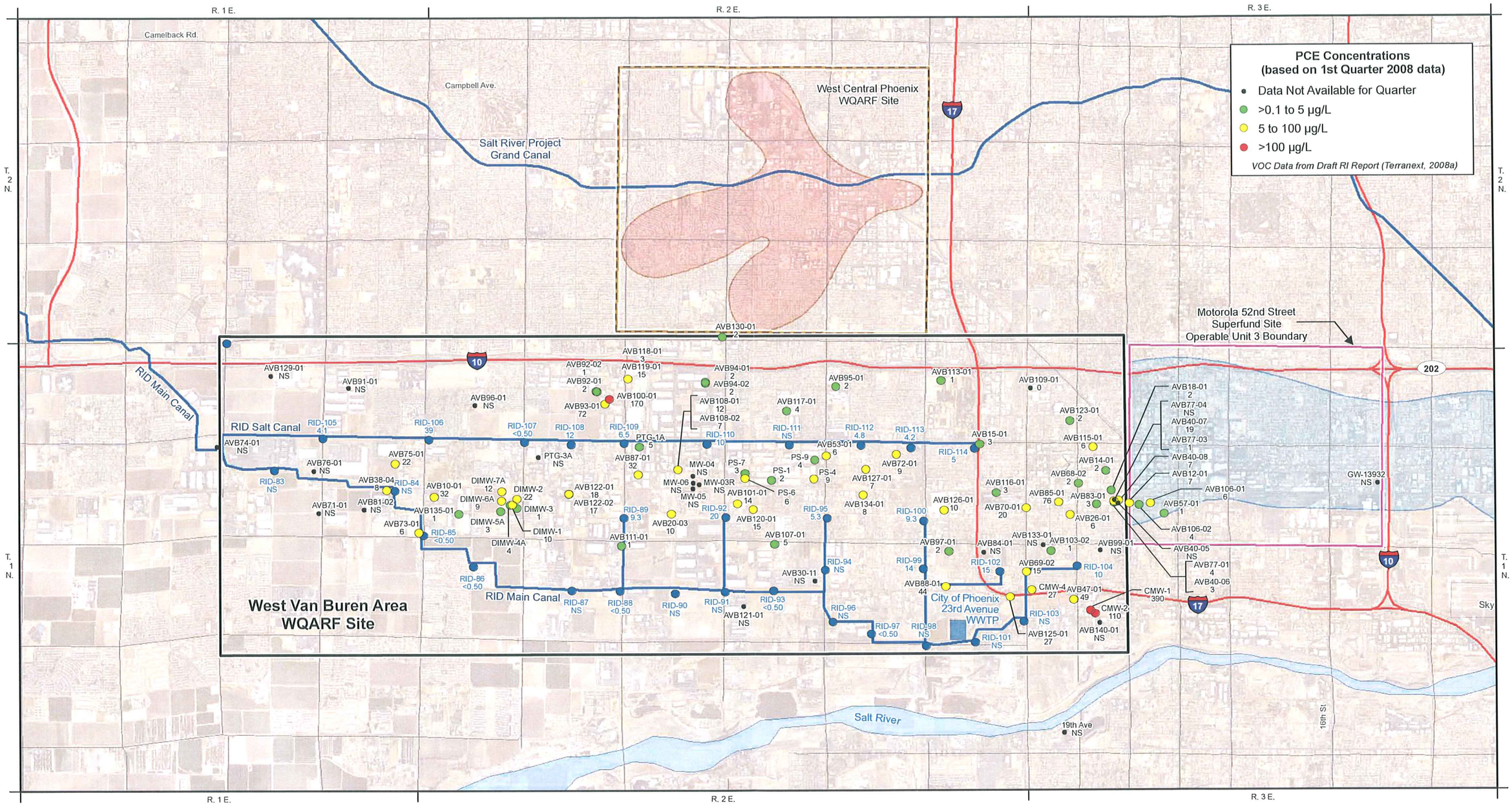

EXPLANATION

- Roosevelt Irrigation District Well
  - RID-89 - Well ID
  - 9.3 - PCE Concentration (µg/L) (NS = Not Sampled)
- Monitor Well
  - DIMW-3 - Well ID
  - 1 - PCE Concentration (µg/L) (NS = Not Sampled)

- Estimated Extent of Impacted Groundwater in West Central Phoenix WQARF Site
- Estimated Extent of Impacted Groundwater in Motorola 52nd Street Superfund Site
- Existing Canal or Pipeline
- Interstates
- Local Streets

Abbreviations

- WQARF - Water Quality Assurance Revolving Fund
- WWTP - Waste Water Treatment Plant
- RID - Roosevelt Irrigation District
- µg/L - Micrograms Per Liter
- VOC - Volatile Organic Compound
- RI - Remedial Investigation
- PCE - Tetrachloroethene

N

0 5,000 Feet

Roosevelt Irrigation District
Early Response Action Work Plan
West Van Buren Area WQARF Site

TETRACHLOROETHENE CONCENTRATIONS UPPER ALLUVIAL UNIT 1 FIRST QUARTER 2008

2010

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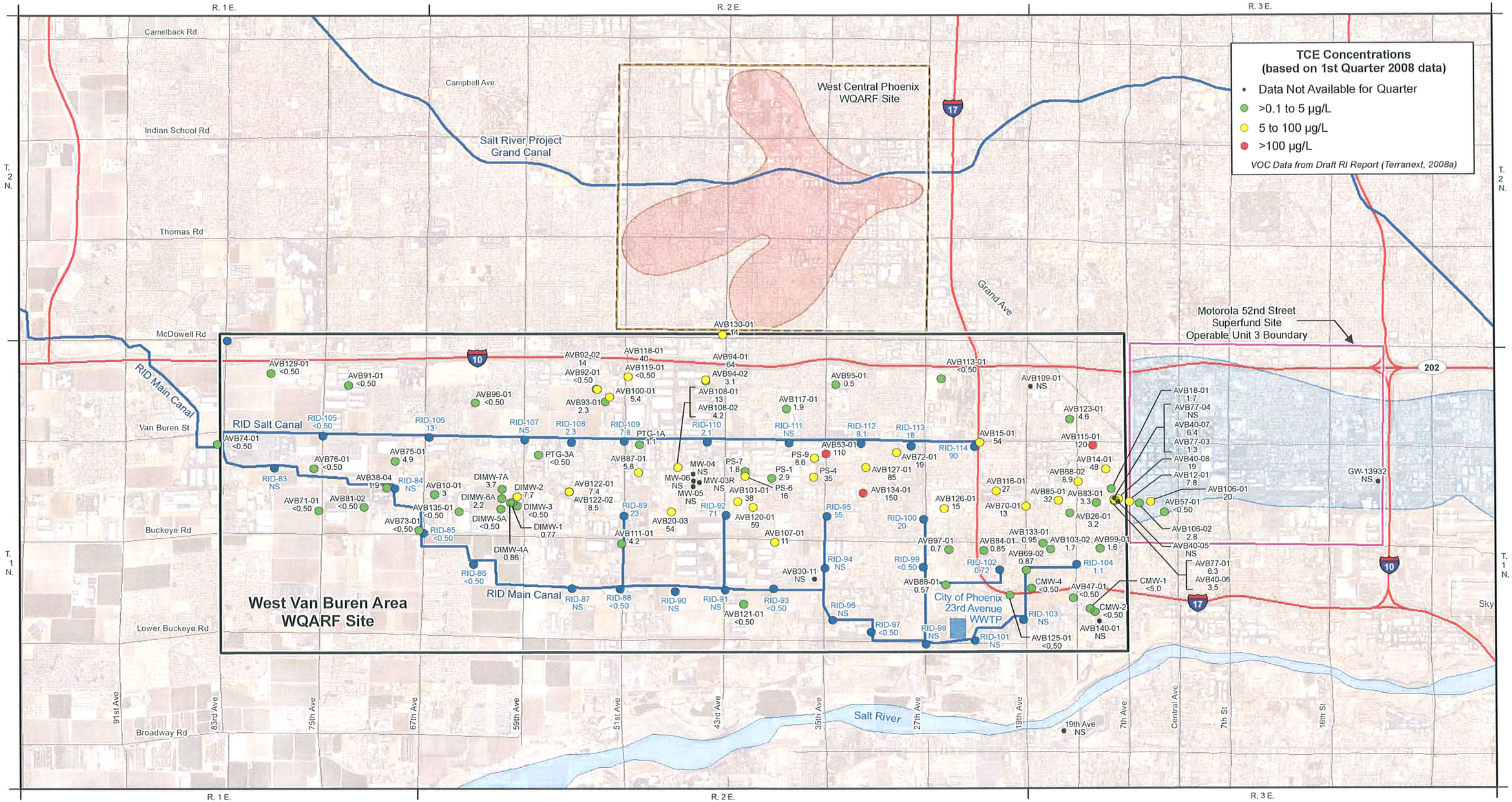
FIGURE 4

G:\GIS-Tuc\Projects\802\03\UAU1_PCE_Qrtr1_2008.mxd\29Jan2010



EXPLANATION

- Roosevelt Irrigation District Well
  - RID-89 - Well ID
  - 23 - TCE Concentration (µg/L)
  - (NS = Not Sampled)
- Monitor Well
  - DIMW-1 - Well ID
  - 0.77 - TCE Concentration (µg/L)
  - (NS = Not Sampled)

- Estimated Extent of Impacted Groundwater in West Central Phoenix WQARF Site
- Estimated Extent of Impacted Groundwater in Motorola 52nd Street Superfund Site
- Existing Canal or Pipeline
- Interstates
- Local Streets

Abbreviations

- WQARF - Water Quality Assurance Revolving Fund
- WWTP - Waste Water Treatment Plant
- RID - Roosevelt Irrigation District
- µg/L - Micrograms Per Liter
- VOC - Volatile Organic Compound
- RI - Remedial Investigation
- TCE - Trichloroethene

N

0 5,000 Feet

Roosevelt Irrigation District
Early Response Action Work Plan
West Van Buren Area WQARF Site

TRICHLOROETHENE CONCENTRATIONS UPPER ALLUVIAL UNIT 1 FIRST QUARTER 2008

2010

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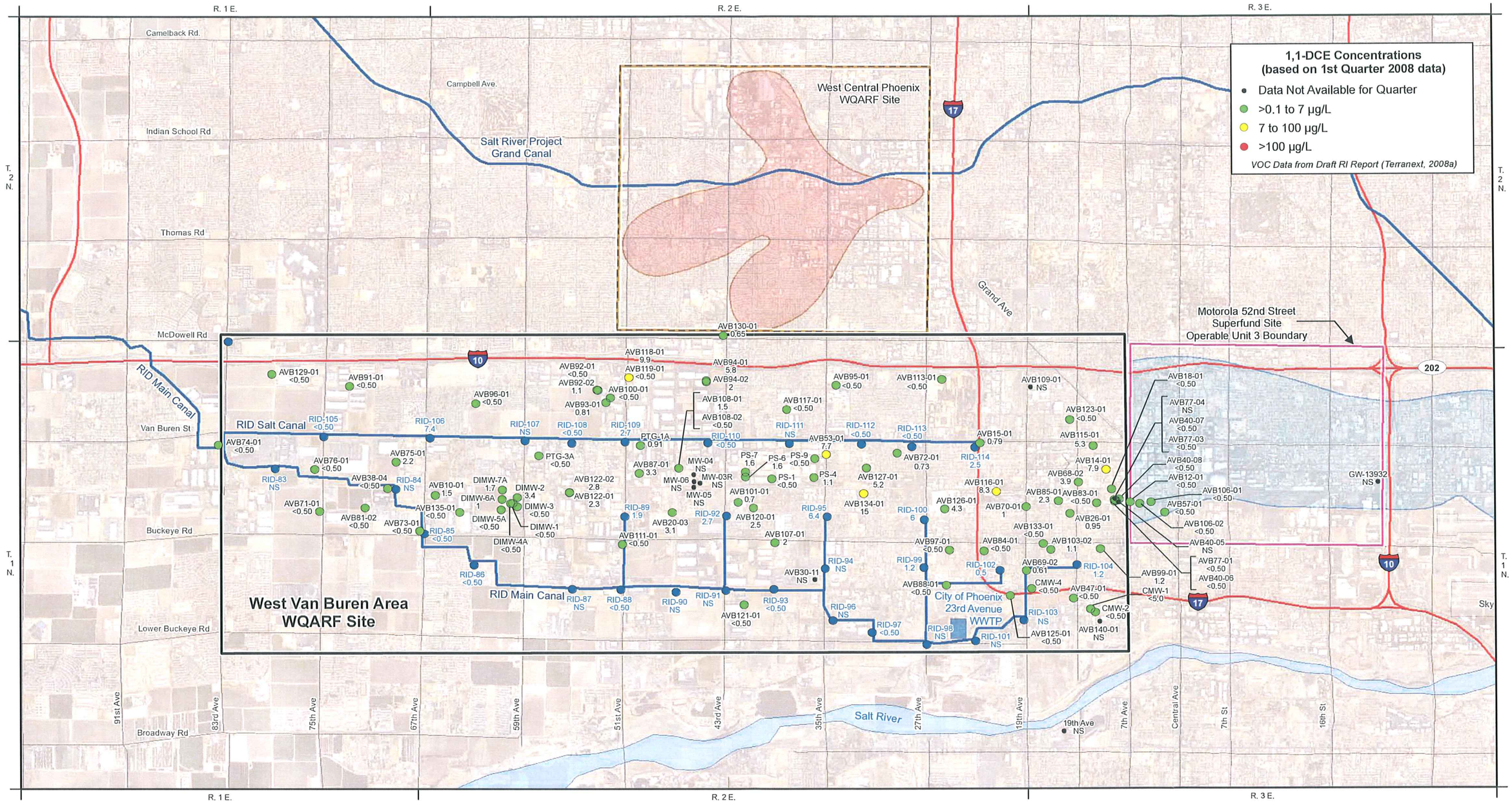
FIGURE 5

G:\GIS-Tuc\Projects\802\03\UAU1_TCE_Qrtr1_2008.mxd\03Feb2010



EXPLANATION

- Roosevelt Irrigation District Well
  - RID-89 - Well ID
  - 1.9 - 1,1- DCE Concentration (µg/L) (NS = Not Sampled)
- Monitor Well
  - DIMW-6A - Well ID
  - 1 - 1,1- DCE Concentration (µg/L) (NS = Not Sampled)

- Estimated Extent of Impacted Groundwater in West Central Phoenix WQARF Site
- Estimated Extent of Impacted Groundwater in Motorola 52nd Street Superfund Site
- Existing Canal or Pipeline
- Interstates
- Local Streets

Abbreviations

- WQARF - Water Quality Assurance Revolving Fund
- WWTP - Waste Water Treatment Plant
- RID - Roosevelt Irrigation District
- µg/L - Micrograms Per Liter
- VOC - Volatile Organic Compound
- RI - Remedial Investigation
- 1,1-DCE - 1,1-Dichloroethene

N

0 5,000 Feet

Roosevelt Irrigation District
Early Response Action Work Plan
West Van Buren Area WQARF Site

1,1- DICHLOROETHENE CONCENTRATIONS UPPER ALLUVIAL UNIT 1 FIRST QUARTER 2008

2010

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FIGURE 6

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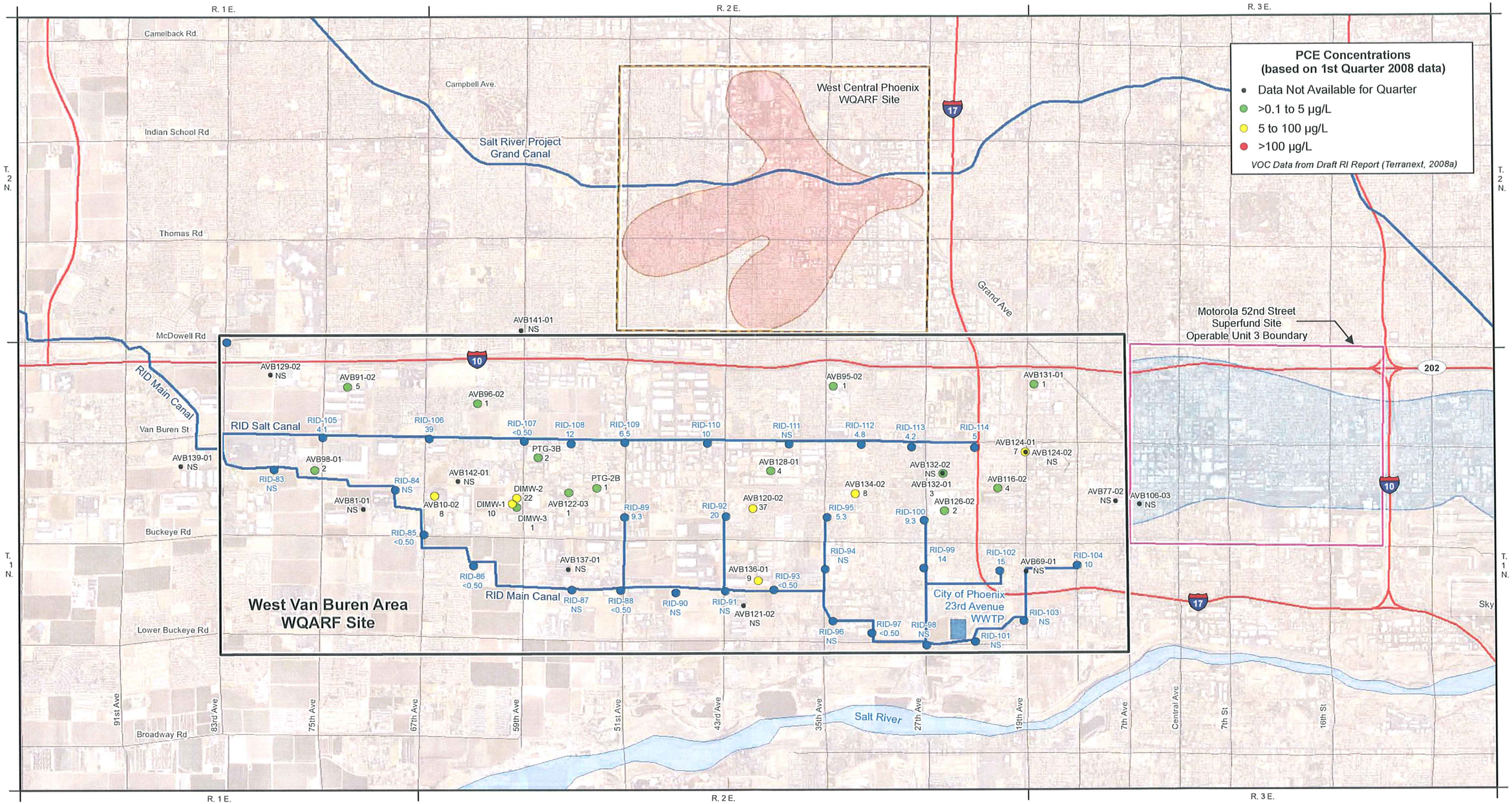

EXPLANATION

- Roosevelt Irrigation District Well
  - RID-89 - Well ID
  - 9.3 - PCE Concentration (µg/L) (NS = Not Sampled)
- Monitor Well
  - DIMW-3 - Well ID
  - 1 - PCE Concentration (µg/L) (NS = Not Sampled)

- Estimated Extent of Impacted Groundwater in West Central Phoenix WQARF Site
- Estimated Extent of Impacted Groundwater in Motorola 52nd Street Superfund Site
- Existing Canal or Pipeline
- Interstates
- Local Streets

Abbreviations

- WQARF - Water Quality Assurance Revolving Fund
- WWTP - Waste Water Treatment Plant
- RID - Roosevelt Irrigation District
- µg/L - Micrograms Per Liter
- VOC - Volatile Organic Compound
- RI - Remedial Investigation
- PCE - Tetrachloroethene

N

0 5,000 Feet

Roosevelt Irrigation District
Early Response Action Work Plan
West Van Buren Area WQARF Site

TETRACHLOROETHENE CONCENTRATIONS UPPER ALLUVIAL UNIT 2 FIRST QUARTER 2008

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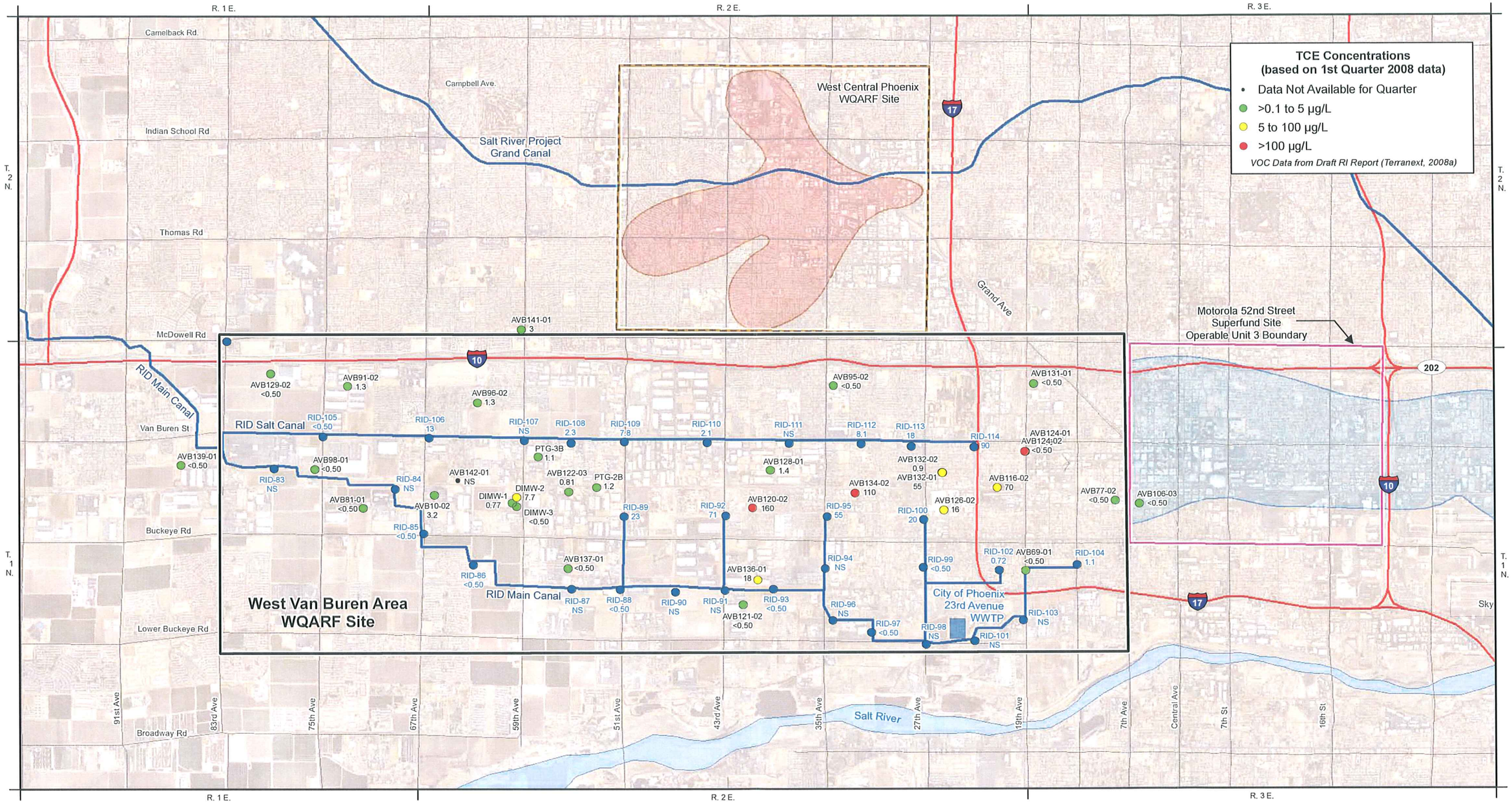
FIGURE 7

G:\GIS-Tuc\Projects\802\03\UAU2_PCE_Qrtr1_2008.mxd\29Jan2010



EXPLANATION

- Roosevelt Irrigation District Well
  - RID-89 - Well ID
  - 23 - TCE Concentration (µg/L)
  - (NS = Not Sampled)
- Monitor Well
  - DIMW-1 - Well ID
  - 0.77 - TCE Concentration (µg/L)
  - (NS = Not Sampled)
- Estimated Extent of Impacted Groundwater in West Central Phoenix WQARF Site
- Estimated Extent of Impacted Groundwater in Motorola 52nd Street Superfund Site
- Existing Canal or Pipeline
- Interstates
- Local Streets

Abbreviations

- WQARF - Water Quality Assurance Revolving Fund
- WWTP - Waste Water Treatment Plant
- RID - Roosevelt Irrigation District
- µg/L - Micrograms Per Liter
- VOC - Volatile Organic Compound
- RI - Remedial Investigation
- TCE - Trichloroethene

N

0 5,000 Feet

Roosevelt Irrigation District
Early Response Action Work Plan
West Van Buren Area WQARF Site

TRICHLOROETHENE CONCENTRATIONS UPPER ALLUVIAL UNIT 2 FIRST QUARTER 2008

2010

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FIGURE 8

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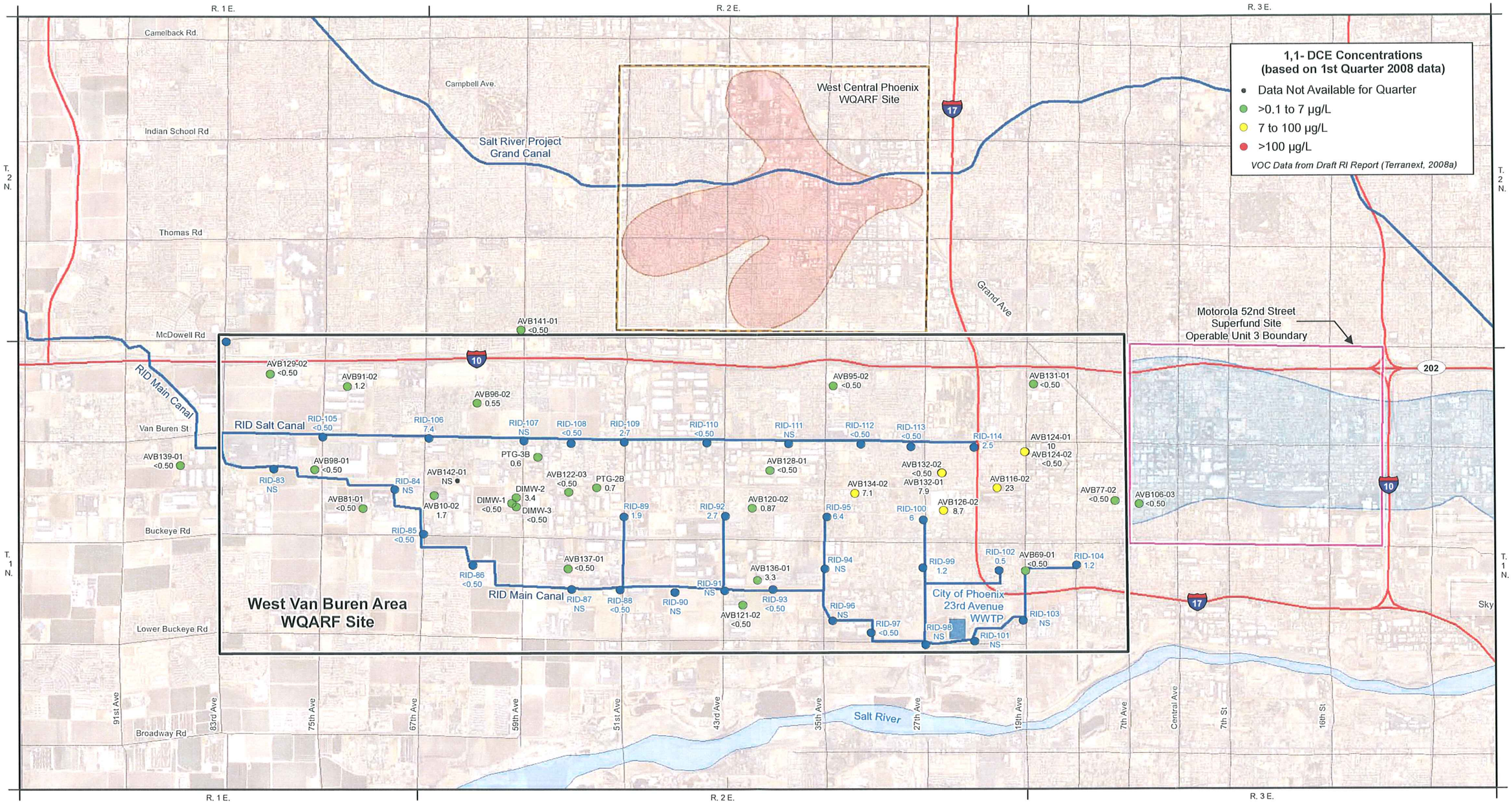

EXPLANATION

- Roosevelt Irrigation District Well
  - RID-89 - Well ID
  - 1.9 - 1,1- DCE Concentration (µg/L) (NS = Not Sampled)
- Monitor Well
  - DIMW-2 - Well ID
  - 3.4 - 1,1- DCE Concentration (µg/L) (NS = Not Sampled)

- Estimated Extent of Impacted Groundwater in West Central Phoenix WQARF Site
- Estimated Extent of Impacted Groundwater in Motorola 52nd Street Superfund Site
- Existing Canal or Pipeline
- Interstates
- Local Streets

Abbreviations

WQARF - Water Quality Assurance Revolving Fund
WWTP - Waste Water Treatment Plant
RID - Roosevelt Irrigation District
µg/L - Micrograms Per Liter
VOC - Volatile Organic Compound
RI - Remedial Investigation
1,1-DCE - 1,1-Dichloroethene

N

0 5,000 Feet

Roosevelt Irrigation District
Early Response Action Work Plan
West Van Buren Area WQARF Site

1,1- DICHLOROETHENE CONCENTRATIONS UPPER ALLUVIAL UNIT 2 FIRST QUARTER 2008

2010

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FIGURE 9

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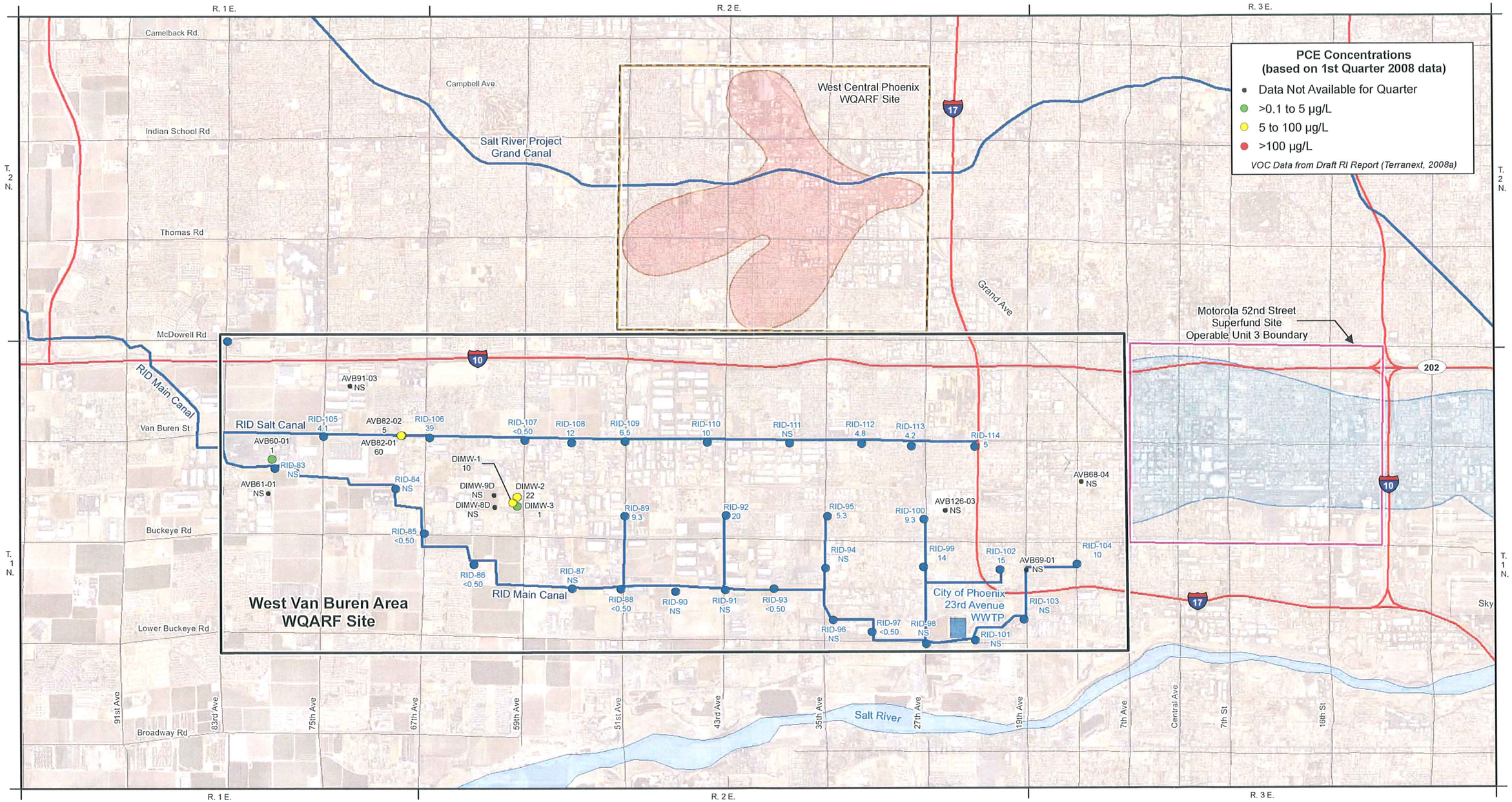

EXPLANATION

- Roosevelt Irrigation District Well
  - RID-89 - Well ID
  - 9.3 - PCE Concentration (µg/L) (NS = Not Sampled)
- Monitor Well
  - DIMW-3 - Well ID
  - 1 - PCE Concentration (µg/L) (NS = Not Sampled)

- Estimated Extent of Impacted Groundwater in West Central Phoenix WQARF Site
- Estimated Extent of Impacted Groundwater in Motorola 52nd Street Superfund Site
- Existing Canal or Pipeline
- Interstates
- Local Streets

Abbreviations

- WQARF - Water Quality Assurance Revolving Fund
- WWTP - Waste Water Treatment Plant
- RID - Roosevelt Irrigation District
- µg/L - Micrograms Per Liter
- VOC - Volatile Organic Compound
- RI - Remedial Investigation
- PCE - Tetrachloroethene

N

0 5,000 Feet

Roosevelt Irrigation District
Early Response Action Work Plan
West Van Buren Area WQARF Site

TETRACHLOROETHENE CONCENTRATIONS MIDDLE ALLUVIAL UNIT FIRST QUARTER 2008

2010

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FIGURE 10

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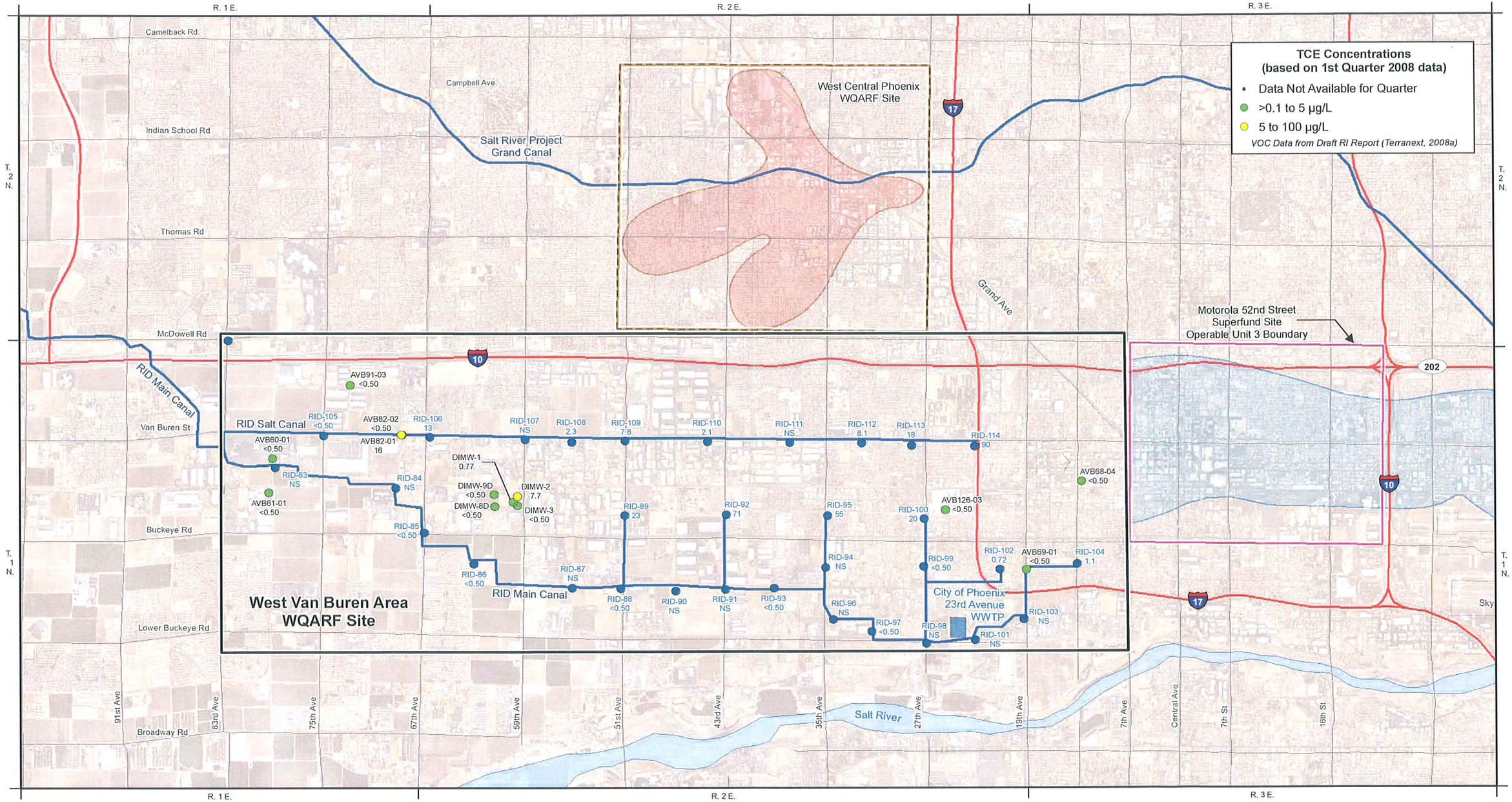

TCE Concentrations (based on 1st Quarter 2008 data)

- Data Not Available for Quarter
- >0.1 to 5 µg/L
- 5 to 100 µg/L

VOC Data from Draft RI Report (Terranext, 2008a)

EXPLANATION

- Roosevelt Irrigation District Well
  - RID-89 - Well ID
  - 23 - TCE Concentration (µg/L)
  - (NS = Not Sampled)
- Monitor Well
  - DIMW-1 - Well ID
  - 0.77 - TCE Concentration (µg/L)
  - (NS = Not Sampled)
- Estimated Extent of Impacted Groundwater in West Central Phoenix WQARF Site
- Estimated Extent of Impacted Groundwater in Motorola 52nd Street Superfund Site
- Existing Canal or Pipeline
- Interstates
- Local Streets

Abbreviations

- WQARF - Water Quality Assurance Revolving Fund
- WWTP - Waste Water Treatment Plant
- RID - Roosevelt Irrigation District
- µg/L - Micrograms Per Liter
- VOC - Volatile Organic Compound
- RI - Remedial Investigation
- TCE - Trichloroethene

N

0 5,000 Feet

Roosevelt Irrigation District
Early Response Action Work Plan
West Van Buren Area WQARF Site

TRICHLOROETHENE CONCENTRATIONS MIDDLE ALLUVIAL UNIT FIRST QUARTER 2008

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FIGURE 11

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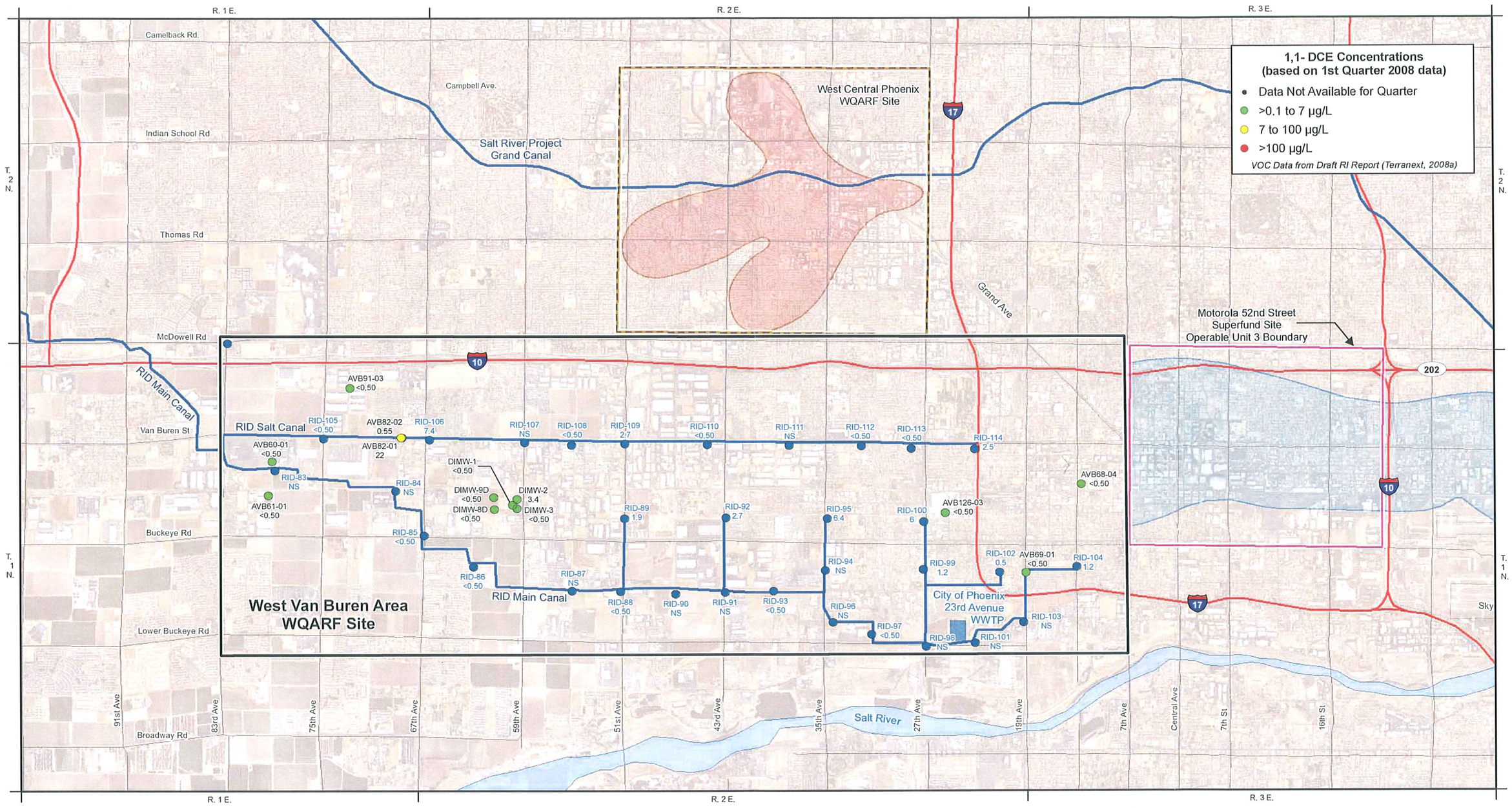

EXPLANATION

- Roosevelt Irrigation District Well
  - RID-89 - Well ID
  - 1.9 - 1,1- DCE Concentration (µg/L) (NS = Not Sampled)
- Monitor Well
  - DIMW-2 - Well ID
  - 3.4 - 1,1- DCE Concentration (µg/L) (NS = Not Sampled)

- Estimated Extent of Impacted Groundwater in West Central Phoenix WQARF Site
- Estimated Extent of Impacted Groundwater in Motorola 52nd Street Superfund Site
- Existing Canal or Pipeline
- Interstates
- Local Streets

Abbreviations

- WQARF - Water Quality Assurance Revolving Fund
- WWTP - Waste Water Treatment Plant
- RID - Roosevelt Irrigation District
- µg/L - Micrograms Per Liter
- VOC - Volatile Organic Compound
- RI - Remedial Investigation
- 1,1-DCE 1,1-Dichloroethene

N

0 5,000 Feet

Roosevelt Irrigation District
Early Response Action Work Plan
West Van Buren Area WQARF Site

1,1- DICHLOROETHENE CONCENTRATIONS MIDDLE ALLUVIAL UNIT FIRST QUARTER 2008

2010

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FIGURE 12

G:\GIS-Tuc\Projects\802\03\MAU_DCE_Qrtr1_2008.mxd\29Jan2010

R. 1 E. R. 2 E. R. 3 E.

T. 2 N. T. 1 N.

Camelback Rd.
Campbell Ave.
Indian School Rd
Thomas Rd
McDowell Rd
Van Buren St
Buckeye Rd
Lower Buckeye Rd
Broadway Rd

Salt River Project Grand Canal
RID Main Canal
RID Salt Canal
RID Main Canal

West Central Phoenix WQARF Site

West Van Buren Area WQARF Site

Wells Contained MTBE in 2008
RID-107 = 20 ug/L
RID-108 = 45 ug/L

Motorola 52nd Street Superfund Site
Operable Unit 3 Boundary

City of Phoenix 23rd Avenue WWTP

Grand Ave

Salt River

Sky

101 10 17 51 202

Well	Tetrachloroethene (µg/L)	Trichloroethene (µg/L)	1,1- Dichloroethene (µg/L)
RID-83	NS		
RID-84	10	1.4	0.99
RID-85	<0.50	<0.50	<0.50
RID-86	<0.50	<0.50	<0.50
RID-87	NS		
RID-88	<0.50	<0.50	<0.50
RID-89	11	32	3.2
RID-90	NS		
RID-91	NS		
RID-92	19	85	4.4
RID-93	<0.50	<0.50	<0.50
RID-94	1.2	0.81	0.98
RID-95	5.2	56	6.9
RID-96	NS		
RID-97	<0.50	<0.50	<0.50
RID-98	NS		
RID-99	7.9	0.71	2
RID-100	7.8	34	9.3
RID-101	<0.50	<0.50	2
RID-102	12	<0.50	<0.50
RID-103	<0.50	<0.50	1.6
RID-104	7.5	1.2	1
RID-105	3.9	0.58	0.78
RID-106	39	13	7.4
RID-107	13	11	4.7
RID-108	10	3.2	0.98
RID-109	8.5	7.7	3.2
RID-110	7.7	1.8	ND
RID-111	NS		
RID-112	4.5	19	0.91
RID-113	4.2	18	<0.50
RID-114	4.6	85	3.7

EXPLANATION

- Roosevelt Irrigation District Well
- RID-84 / 10 / 1.4 / 0.99 — Well ID; Tetrachloroethene (µg/L); Trichloroethene (µg/L); 1,1- Dichloroethene (µg/L)
  (NS = Not Sampled)
  (Values in Red Exceed Aquifer Water Quality Standard)
- Existing Canal or Pipeline
- Interstates
- Local Streets
- Estimated Extent of Impacted Groundwater in WVBA WQARF Site Based on 1st Quarter 2008 Data (Terranext, 2008a)
- Estimated Extent of Impacted Groundwater in West Central Phoenix WQARF Site
- Estimated Extent of Impacted Groundwater in Motorola 52nd Street Superfund Site
- Monitor Well

Abbreviations

WQARF - Water Quality Assurance Revolving Fund
WWTP - Waste Water Treatment Plant
RID - Roosevelt Irrigation District
µg/L - Micrograms Per Liter
MTBE - Methyl Tertiary Butyl Ether
PCE - Tetratchloroethene
TCE - Trichloroethene
1,1-DCE - 1,1-Dichloroethene

N

0 5,000
Feet

Roosevelt Irrigation District
Early Response Action Work Plan
West Van Buren Area WQARF Site

PCE, TCE, AND 1,1-DCE CONCENTRATIONS IN RID WELLS SEPTEMBER 2008

2010

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FIGURE 13

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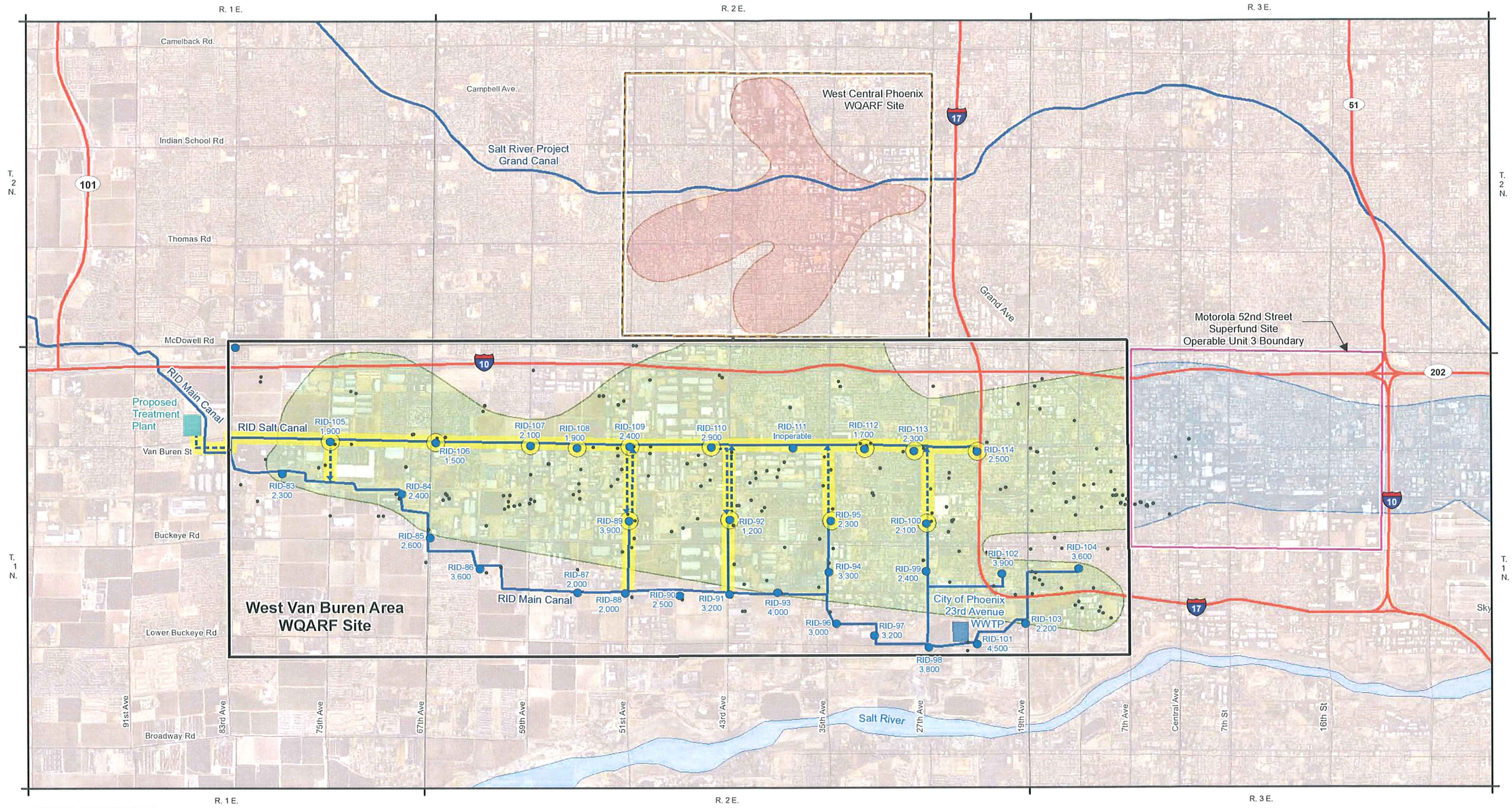

EXPLANATION

- Roosevelt Irrigation District Well
- RID-89 / 3,900 — Well ID / Estimated Pumping Rate (gpm)
- Monitor Well
- Existing Canal or Pipeline
- Proposed New Below-Grade Pipeline
- Interstates
- Local Streets

- Estimated Extent of Impacted Groundwater in WVBA WQARF Site Based on 1st Quarter 2008 Data (Terranext, 2008a)
- Estimated Extent of Impacted Groundwater in West Central Phoenix WQARF Site
- Estimated Extent of Impacted Groundwater in Motorola 52nd Street Superfund Site
- Early Response Action (see Table 2 for a summary of phased implementation)

Abbreviations

WVBA - West Van Buren Area
WQARF - Water Quality Assurance Revolving Fund
WWTP - Waste Water Treatment Plant
RID - Roosevelt Irrigation District
gpm - Gallons Per Minute

N

0 5,000
Feet

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Roosevelt Irrigation District
Early Response Action Work Plan
West Van Buren Area WQARF Site

EARLY RESPONSE ACTION

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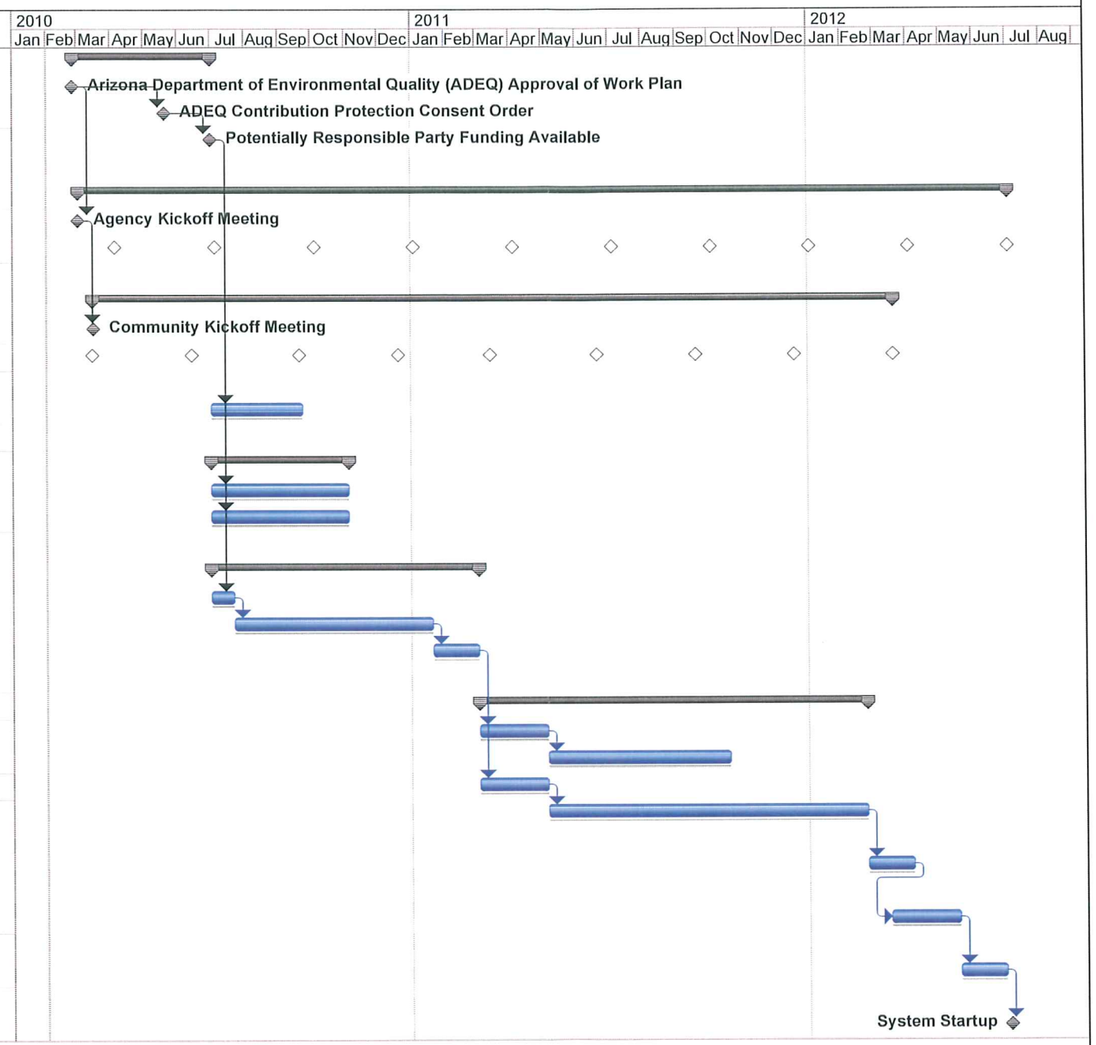
FIGURE 14

FIGURE 15. PROPOSED SCHEDULE

ROOSEVELT IRRIGATION DISTRICT EARLY RESPONSE ACTION
WEST VAN BUREN AREA WATER QUALITY ASSURANCE REVOLVING FUND SITE

ID	Task Name	Duration	Start	Finish	Predecessors
1	**Early Response Action Administration and Funding**	**90 days**	**Fri 2/26/10**	**Thu 7/1/10**	
2	Arizona Department of Environmental Quality (ADEQ) Approval of Work Plan	0 days	Fri 2/26/10	Fri 2/26/10	
3	ADEQ Contribution Protection Consent Order	0 days	Thu 5/20/10	Thu 5/20/10	2FS+60 days
4	Potentially Responsible Party Funding Available	0 days	Thu 7/1/10	Thu 7/1/10	3FS+30 days
5					
6	**Task 1 - Meetings**	**609 days**	**Tue 3/2/10**	**Tue 7/3/12**	
7	Agency Kickoff Meeting	0 days	Tue 3/2/10	Tue 3/2/10	2FS+3 days
8	**Quarterly Agency Meeting**	**585 days**	**Tue 4/6/10**	**Tue 7/3/12**	
19					
20	**Task 2 - Community Involvement**	**525 days**	**Tue 3/16/10**	**Tue 3/20/12**	
21	Community Kickoff Meeting	0 days	Tue 3/16/10	Tue 3/16/10	7FS+10 days
22	**Quarterly Community Meeting**	**525 days**	**Tue 3/16/10**	**Tue 3/20/12**	
32					
33	Task 3 - Data Collection and Analysis (if needed)	60 days	Fri 7/2/10	Thu 9/23/10	4
34					
35	**Task 4 - Permits and Property Access**	**90 days**	**Fri 7/2/10**	**Thu 11/4/10**	
36	Obtain Construction Permits and Access Agreements	90 days	Fri 7/2/10	Thu 11/4/10	4
37	Obtain Poor Quality Groundwater Withdrawal Permit	90 days	Fri 7/2/10	Thu 11/4/10	4
38					
39	**Task 5 - Design (Wells, Impacted Water Conveyance, and Treatment)**	**175 days**	**Fri 7/2/10**	**Thu 3/3/11**	
40	Refine Conceptual Design	15 days	Fri 7/2/10	Thu 7/22/10	4
41	Detailed Design	130 days	Fri 7/23/10	Thu 1/20/11	40
42	Final ADEQ Design Approval	30 days	Fri 1/21/11	Thu 3/3/11	41
43					
44	**Task 6 - Construction (Wells, Impacted Water Conveyance, and Treatment)**	**255 days**	**Fri 3/4/11**	**Thu 2/23/12**	
45	Procurement (Wells and Pipelines)	45 days	Fri 3/4/11	Thu 5/5/11	42
46	Construction (Wells and Pipelines)	120 days	Fri 5/6/11	Thu 10/20/11	45
47	Procurement (Treatment Facility)	45 days	Fri 3/4/11	Thu 5/5/11	42
48	Construction (Treatment Facility)	210 days	Fri 5/6/11	Thu 2/23/12	47
49					
50	Task 7 - System Startup and Testing	30 days	Fri 2/24/12	Thu 4/5/12	48
51					
52	Task 8 - Operations and Maintenance Manual	45 days	Fri 3/16/12	Thu 5/17/12	50FS-15 days
53					
54	Final ADEQ Approval	30 days	Fri 5/18/12	Thu 6/28/12	52
55					
56	System Startup	0 days	Mon 7/2/12	Mon 7/2/12	54FS+2 days



Project: Draft ERA Schedule rev2
Date: Mon 2/1/10

Task | Progress | Summary | External Tasks | Deadline
Split | Milestone | Project Summary | External Milestone

MONTGOMERY & ASSOCIATES

APPENDIX A

MONTGOMERY
& ASSOCIATES

APPENDIX A

HDR | ONE COMPANY *Many Solutions℠*

Technical Memo

To:	Montgomery and Associates, Inc.		
From:	HDR Engineering, Inc.	Project:	
CC:	Gallagher & Kennedy, Inc.	HDR Job No:	
Date:	February 2, 2010	File Number	
RE:	RID Groundwater Remediation Early Response Action Conceptual Design Summary		

Expires: 9/30/2010

Exp 6/30/2011

1. Introduction

The purpose of this technical memorandum is to provide a basic description of the various features that will make up the Early Response Action (ERA) being proposed by Montgomery and Associates (M&A) to remediate the contaminated groundwater supplies of the Roosevelt Irrigation District (RID) within the West Van Buren Area WQARF Site. The primary feature of the ERA is a 20,000 gallon per minute (gpm) capacity central groundwater treatment facility (CGTF) located along the RID Main Canal near 84th Avenue and Van Buren Street in Phoenix, AZ. The ERA will also include improvements to the existing Salt Canal, which runs along the south side of Van Buren Street from approximately Interstate 17 west to 83rd Avenue, and will serve as the primary groundwater delivery conduit to the CGTF; extension of the Salt Canal from its current terminus at 83rd Avenue to the CGTF; improvements to 13 existing wells (nine along the Salt Canal and four north of Buckeye Road); installation of pipelines from the four wells north of Buckeye Road to the Salt Canal; and the installation of pipelines from three of the Salt Canal wells to the RID Main Canal. A brief description of each of these components follows below.

2. CGTF

The CGTF will be located northwest of the intersection of 83rd Avenue and Van Buren Street on a parcel owned by RID, adjacent to the RID Main Canal. It will treat groundwater delivered through the Salt Canal and have a maximum treatment capacity of 20,000 gpm. The CGTF will be comprised of the following main elements, which are described in more detail below:

3200 E Camelback Road
Suite 350
Phoenix, AZ 85018-2311
Phone (602) 522-7700
Fax (602) 522-7707
www.hdrinc.com

- Wet well
- Pump station
- Prefilters
- GAC contactors
- Backwash system
- Electrical room/Operations building

A schematic layout of the CGTF and a preliminary site plan of the RID parcel proposed for the CGTF are shown in Exhibit 2.1. A process flow diagram for the CGTF is indicated in Exhibit 2.2 and a preliminary hydraulic profile is presented in Exhibit 2.3.

2.1 Wet Well/Grit Removal

Raw water from the Salt Canal enters a wet well with two separate tanks below grade with sloped bottoms. This arrangement allows one tank or side to be drained for cleaning or repair while still allowing the plant to remain operational. The tanks will be drained by submersible pumps. The design criteria for the wet well are as follow:

- Number of tanks: 2
- Width of tank: 10 feet
- Length of tank: 60 feet
- Water depth: 12 feet to overflow
- Volume per tank: 54,000 gallons
- Retention time: 5.4 minutes @ 20,000 gpm

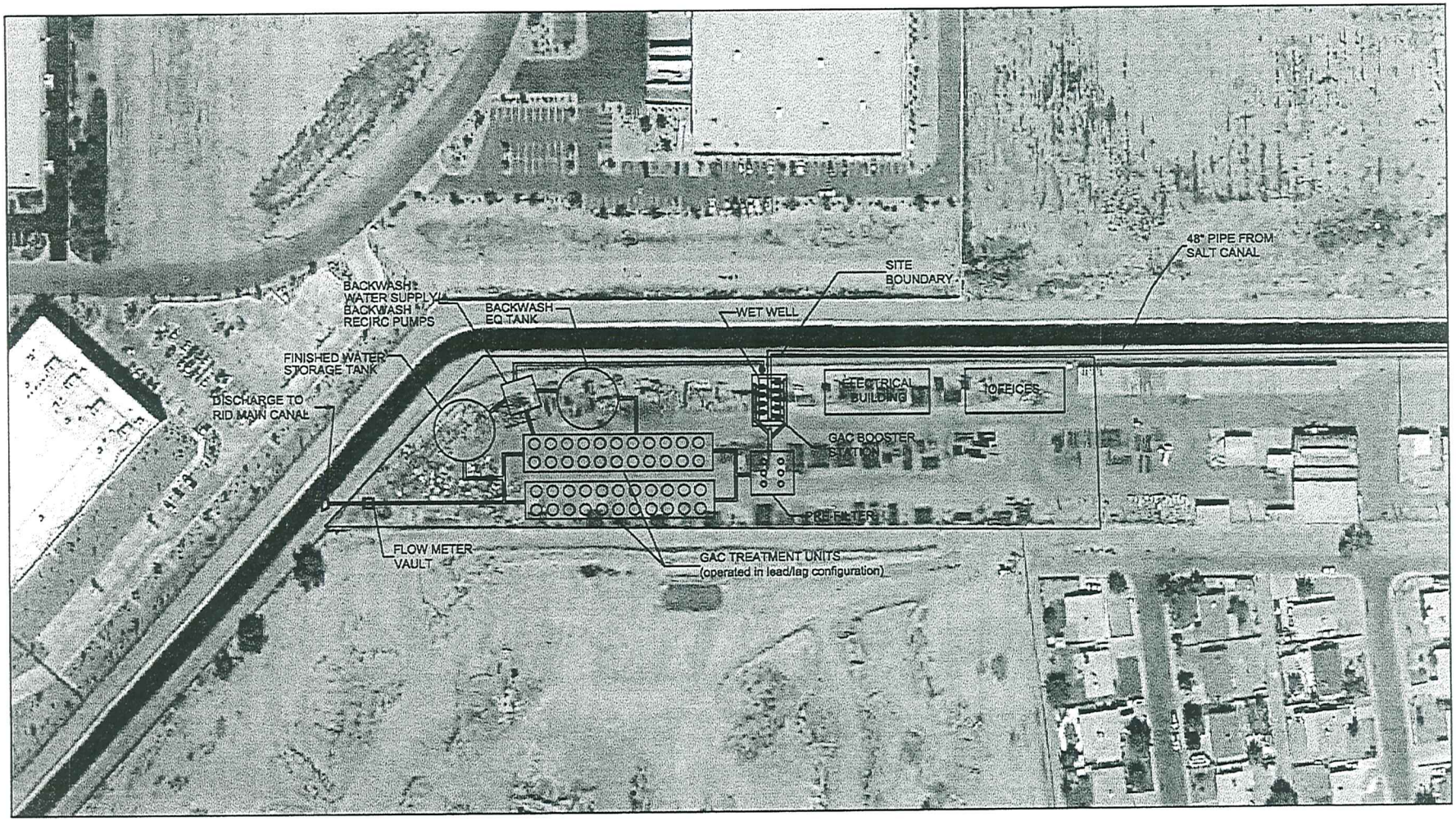
2.2 Pump Station

The influent pumps are vertical turbine type pumps with the following design criteria:

- Number of pumps: 5 (4 + 1 standby)
- Flow per pump: 5,500 gpm
- Pump motor horsepower: 350 HP
- Pump total head: 200 feet
- Mode of control: undefined at this date

2.3 Prefilters

Pretreatment of the raw water is accomplished using self-cleaning mechanical filters or prefilters. The prefilter removes particles from the water, which over time would accumulate in the GAC contactors, increasing the head loss and decreasing the treatment efficiency through the contactors. Prefiltration also reduces the backwashing frequency of the GAC contactors. The prefilter periodically performs a flushing cycle that cleans the filter and removes the accumulated particles while continuing to provide forward filtration of the bulk feed water. The prefilter backwash is triggered by the differential pressure switch, a 0-24 hour adjustable timer, or a manual start button. The design criteria are as follows:



N

NOT TO SCALE

EXHIBIT 2-1

HDR Engineering, Inc.

RID GROUNDWATER REMEDIATION
EARLY RESPONSE ACTION
83RD AVENUE GROUNDWATER TREATMENT FACILITY - PRELIMINARY SITE PLAN

Date

Figure

Exhibit 2.2
Process Schematic

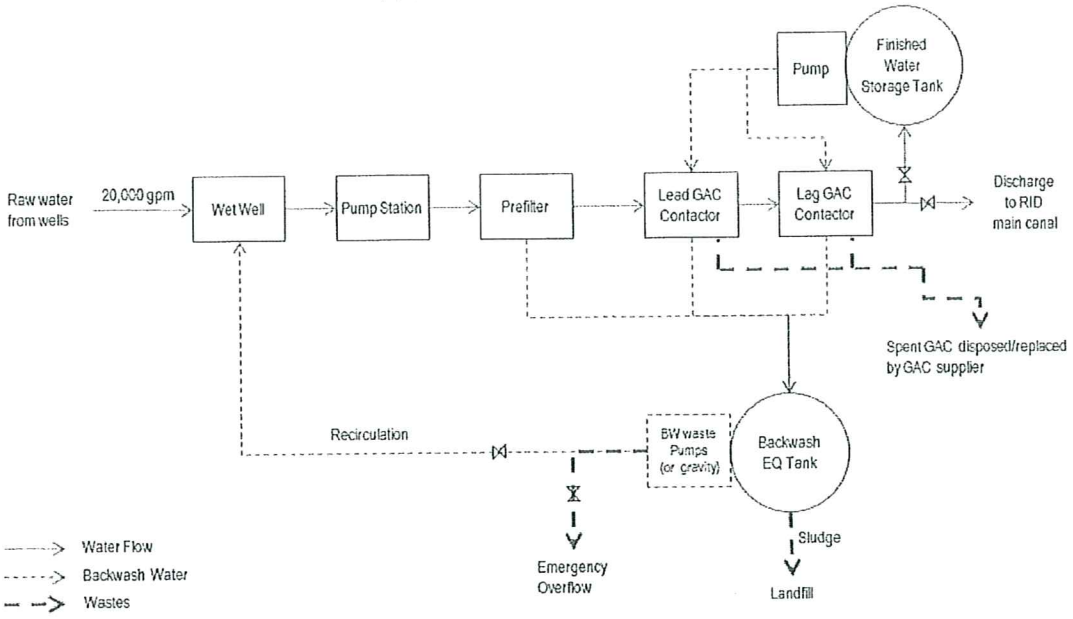
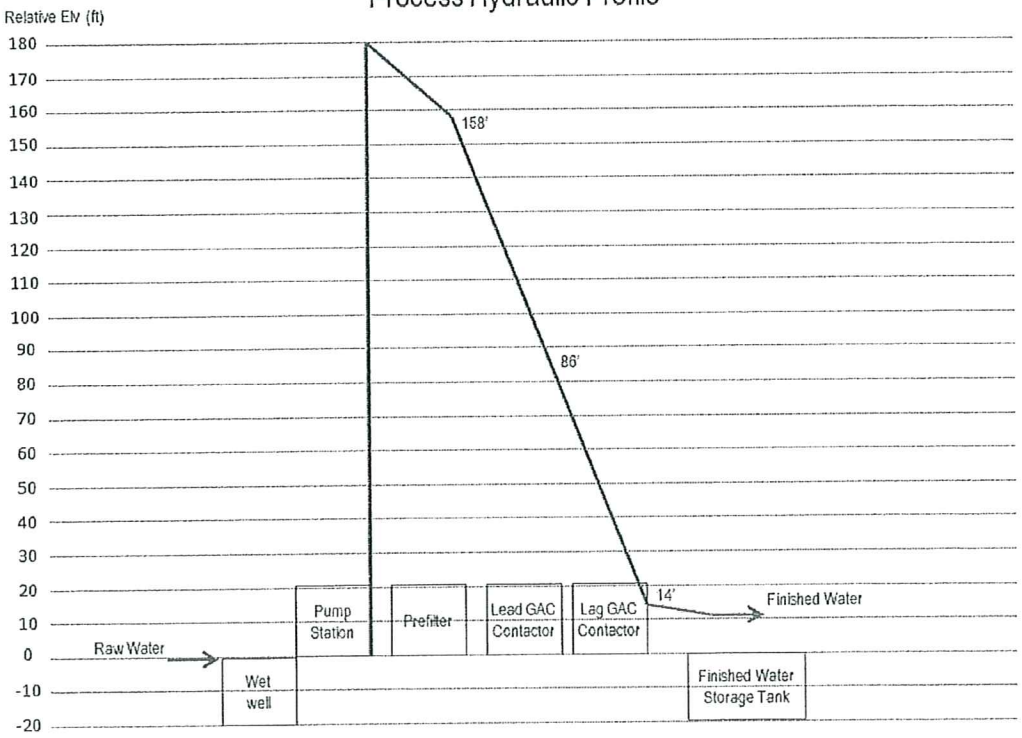


Exhibit 2.3
Process Hydraulic Profile



- Filtration screen size: 50 micron
- Number of filters: Six (6) Amiad 20" MEGA EBS filters (5 + 1 standby)
- System operating pressure: 50 PSI (Maximum 150 PSI, Minimum 40 PSI)
- Maximum pressure drop through filter (ready for flushing): 7 PSI
- Flush cycle duration: 40-140 seconds

2.4 GAC Contactors

The site plans have been developed per dimensions of the Calgon Model 12 system with two 10,000 gpm trains, each train arranged in a lead/lag (in-series) configuration, for a total of 20,000 gpm capacity. The GAC media requires backwash when the pressure drop reaches 15-25 PSI. The backwash frequency mainly depends on water quality. The system is designed for use with Calgon Carbon's closed loop carbon exchange service. Using specially designed trailers, spent GAC is removed from the contactors and returned to Calgon Carbon for reactivation. The trailers also recharge the contactors with fresh GAC. Other design criteria are as follows:

- Number of GAC systems: 22 (20 + 2 standby) Calgon Model 12 systems
- Number of contactors: 44
- Contactor diameter: 12 feet
- GAC per contactor: 20,000 lbs
- Empty bed contact time (EBCT): 10 min
- Pressure rating: 75 PSI or 125 PSI (based on vessel pressure rating)
- Capacity per system: 1,000 gpm
- Backwash rate: typical 1,350 gpm (30% expansion)
- Backwash duration 15 – 30 minutes
- Process and backwash pipe: 8 feet

2.5 Backwash System

GAC contactors require clean water to flush/backwash. Backwash system consists of finished water tank, backwash supply pumps, backwash waste equalization tank, and backwash supernatant recirculation pumps. Flush/backwash wastes from both prefilter and GAC contactors are decanted in a backwash equalization tank. The supernatant can be recirculated to the wet well or to the sanitary sewer, and the sludge can be disposed to a landfill. The design criteria are as follows:

- Finished water tank:
  - Diameter: 48 feet
  - Depth of water: 19 feet
  - Capacity: 252,000 gallons
  - Type: Below grade
- Backwash supply pumps:
  - Number of pumps: 2 (1 + 1 standby)
  - Type: Vertical turbine

- Backwash waste equalization tank:
  - Diameter: 48 feet
  - Depth of water: 19 feet
  - Capacity: 252,000 gal

3. Salt Canal Improvements

The Salt Canal is located on the south side of Van Buren Street and runs from approximately Interstate 17 (23rd Avenue) west about 7.5 miles to 83th Avenue. When it was initially constructed, it was an open canal for its entire length. Over the years it has slowly been converted to a gravity pipeline ranging from 21 inches to 48 inches in diameter (increasing from east to west) and now only three segments remain that are still open, totaling about 1,700 feet. These remaining three segments will be converted to a pipeline during the ERA.

The Salt Canal is currently supplied with groundwater from 10 existing wells located adjacent to the canal along its alignment. Nine of these wells will be improved as part of the ERA and modified to provide VOC volatilization control. The tenth well is currently inoperable (Well No. 111) and will not be included in the ERA. Proposed improvements to these wells are discussed in other sections of this report. The maximum capacity of the Salt Canal is approximately 20,000 gpm, which has been demonstrated during its operation. Since this canal will be the only water supply source for the CGTF, the capacity of the CGTF was set to match the capacity of the canal. Upsizing the 48-inch pipe to increase its capacity has not been considered due to the high cost of this alternative.

When the Salt Canal reaches 83rd Avenue, it turns and runs south approximately 680 feet, where it discharges into the RID Main Canal. This discharge point is approximately 2,800 feet upstream of the CGTF site measured along the Main Canal. It will thus be necessary to extend the 48-inch pipeline from the end of the Salt Canal to the CGTF as part of the ERA. This extension will be installed within the RID Main Canal right-of-way to the CGTF site.

The following challenges have been identified for improving the Salt Canal as described above:

- Perpendicular road crossings of 83rd Avenue and Van Buren Street will be required to install the 48-inch pipeline extension from the end of the Salt Canal to the CGTF site.
- Perpendicular crossing of the RID Main Canal will be necessary to extend the Salt Canal pipeline to the CGTF. This crossing will need to be accomplished via jack and bore, per RID requirements. Since this will be a gravity line, this could create hydraulic challenges.

The following assumptions have been made for improving the Salt Canal:

- The existing piped sections are in good condition and no repairs to or replacement of these sections will be required.
- The Salt Canal will be able to provide a firm flow of 20,000 gpm to the CGTF.

- The existing connection to the RID Main Canal at 83rd Avenue will remain in place. This connection will only be used to discharge raw Salt Canal water into the Main Canal if this water cannot be sent to the CGTF.

The Salt Canal, wells, and other features mentioned in this section are depicted in Figure 8 of this ERA Work Plan.

4. Well Improvements

During the ERA, improvements will be made to 13 existing wells that will supply groundwater to the CGTF for treatment. Nine of these wells are located along the Salt Canal (Nos. 105, 106, 107, 108, 109, 110, 112, 113, and 114), and four are located approximately ¼ mile north of Buckeye Road (Nos. 89, 92, 95, and 100). These wells are identified on Figure 8 of this ERA Work Plan.

Anticipated improvements to all 13 wells will include replacement of the existing motors (if/when necessary), VOC volatilization control, installation of new well liners, and the installation of flow meters. Existing electrical equipment will also be evaluated and repaired, replaced, or upgraded as necessary. A comprehensive evaluation of each well still needs to be performed to determine their specific improvement needs. The general approach to VOC volatilization control is discussed in Section 4.2.3 of this ERA Work Plan.

The following assumptions have been made for well improvements:

- Existing well pumps have sufficient head to discharge water to the Salt Canal.
- All well discharges will be hard piped and under pressure. No open air discharges will be allowed. This will be part of the VOC volatilization control methodology.
- Existing pump motors will be replaced as each approaches the end of its useful life based on maintenance/field observations.

5. Well Pipelines

In addition to the anticipated improvements discussed above, new pipelines will be installed from the four wells north of Buckeye Road to the Salt Canal. This includes Well Nos. 89, 92, 95, and 100. These wells currently discharge to the RID Main Canal via gravity pipelines, which is located approximately 3,900 feet south of the wells. The new pipelines will enable this water to also be discharged to the Salt Canal, which is located approximately 3,900 feet north of the wells. These pipelines will most likely be constructed of ductile iron, and will be sized to provide a velocity of approximately 5 feet per second at the average well production rates. Average well production rates for all wells in the ERA are shown in Table 5.1 of this Appendix.

In addition to new pipelines from these four wells to the Salt Canal, pipelines will also be installed to connect Well Nos. 109 and 110 along the Salt Canal to existing gravity flow laterals adjacent to Well Nos. 89 and 92, respectively, north of Buckeye Road. These pipelines will

enable flows from Well Nos. 109 and 110 to be sent to the RID Main Canal if desired. Lastly, a new pipeline will also be installed from Well No. 105 along the Salt Canal to the RID Main Canal. This distance is approximately 1,200 feet. Well No. 105 is the westernmost well on the Salt Canal.

Table 5.1
Well Production Rates[1]

Well No.	Average Production Rate (gpm)
89	3,900
92	1,200
95	2,300
100	2,100
105	1,900
106	1,500
107	2,100
108	1,900
109	2,400
110	2,900
112	1,700
113	2,300
114	2,500

[1]Source: Roosevelt Irrigation District

With all 13 wells capable of discharging their flows into the Salt Canal, a total potential flow of approximately 34,700 gpm could be sent to the canal, based on historic well flow rates provided by RID. Since the maximum demonstrated capacity of the Salt Canal is only 20,000 gpm, the wells will need to be rotated such that only 20,000 gpm is sent to the canal at any given time for ultimate treatment at the CGTF. The balance of the flows could be sent to the Main Canal, or certain wells not operated for a period of time. It is anticipated that this could be accomplished by shunting Well Nos. 105, 109 and 110, wells with relatively lower concentrations of contaminants, to the Main Canal through the new interconnecting pipelines.

The following challenges are anticipated for construction of the well pipelines:

- There is a BNSF rail corridor midway between Van Buren Street and Buckeye Road (at Harrison Street alignment) along the entire length of the Salt Canal. This corridor will need to be crossed by all the pipeline connections from the wells north of Buckeye Road to the Salt Canal. These crossings must be done via jack and bore, and it can take a very long time (6-9 months or more) to acquire a license from BNSF's agent to cross.
- Pipelines will be installed in busy urban streets in predominately industrial areas. Construction will be challenging due to heavy traffic, large vehicles, and many existing buried utilities in the streets. Very close coordination with the City of Phoenix Street Transportation Department will be essential.

The following assumptions have been made for the well pipelines:

- All pipelines will be ductile iron.
- Pipelines will be sized using a target flow velocity of 5 feet per second at average well production rates.
- Pipelines will be installed at a minimum burial depth of 4 feet.