



**FEASIBILITY STUDY WORK PLAN
FOR
WEST CENTRAL PHOENIX
WEST GRAND AVENUE WQARF SITE**

**Prepared for
ARIZONA DEPARTMENT OF
ENVIRONMENTAL QUALITY**

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LIST OF FIGURES

- 1 Boundaries of WCP WGA Site

LIST OF ACRONYMS	
AAC	Arizona Administrative Code
ADEQ	Arizona Department of Environmental Quality
ADWR	Arizona Department of Water Resources
ARS	Arizona Revised Statutes
AWQS	Aquifer Water Quality Standard
bgs	below ground surface
Btoc	below top of casing
CIP	Community Involvement Plan
COC	contaminant of concern
COP	City of Phoenix
1,1-DCE	1,1-dichloroethene
ERA	Early Response Action
FS	Feasibility Study
GPLs	Groundwater Protection Levels
Layke	Layke Incorporated
lbs	pounds
NFA	no further action
PCE	tetrachloroethene
PID	photoionization detector
RI	Remedial Investigation
RO	Remedial Objectives
Site	West Central Phoenix West Grand Avenue Study Area
SRL	soil remediation levels
SRP	Salt River Project
SVE	soil vapor extraction
TCA	1,1-trichloroethane
TCE	trichloroethene
UST	underground storage tank
URS	URS Corporation
VOCs	volatile organic compounds
WCP	West Central Phoenix
WGA	West Grand Avenue
WQARF	Water Quality Assurance Revolving Fund

1.0 INTRODUCTION

This Work Plan describes the overall scope of work to conduct a Feasibility Study (FS) for the West Grand Avenue (WGA) portion of the West Central Phoenix (WCP) Water Quality Assurance Revolving Fund (WQARF) study area (Site) in Phoenix, Arizona and was developed in accordance with the requirements of the Arizona Administrative Code (AAC) Title 18, Chapter 16, Section 407 (AAC R18-16-407). This work is being performed by URS Corporation (URS) on behalf of the Arizona Department of Environmental Quality (ADEQ).

According to the ADEQ Site Narrative, available on the ADEQ web site, the WCP WGA study area is bounded approximately by Osborn Road to the north, 31st Avenue to the east, Thomas Road to the south and 35th Avenue to the west in Phoenix, Arizona (ADEQ, 2012). However, the WCP WGA plume boundaries shown on the associated ADEQ site map do not reflect the study area boundaries described in the narrative but the estimated historic extent of the contaminant plume. The location of the plume boundaries presented on the ADEQ site map is presented in Figure 1 and may be adjusted accordingly as new data are acquired.

Groundwater contamination at the WCP WGA site has been identified to be emanating from the Layke Incorporated (Layke) facility, located at 3330 West Osborn Road in Phoenix, Arizona.

1.1 WORK PLAN TASKS

This Work Plan presents activities required to conduct the FS and to prepare an FS report pursuant to AAC R18-16-407. These activities will include:

- Development of alternatives and recommendation of a final remedy for the regional groundwater (Section 3.0);
- Description of community involvement activities required by AAC R18-16-404 (Section 4.0); and
- Outline of the proposed schedule for the implementation of the Work Plan (Section 5.0).

1.2 REMEDIAL OBJECTIVES

The ADEQ prepared a Proposed Remedial Objectives (RO) Report in 2005. The ROs were established for the reasonably foreseeable uses of land and groundwater within the WCP WGA Site. According to the Report (ADEQ, 2005) the following ROs will be used as basis in the performance of the FS.

1.2.1 Land Use

Land uses within the Site are expected to remain predominately industrial (A-2) or light industrial (A-1). Soil remediation at the Layke facility, through the use of a soil vapor extraction (SVE) system (see Section 2.4), resulted in soils meeting the established soil remediation standards. Therefore, ADEQ granted a No Further Action (NFA) status for soils in 2002. Based on this, no ROs were proposed for soils.

1.2.2 Groundwater Use

Current and potential groundwater uses identified within the WCP WGA site include: 1) the possible future use of groundwater for drinking water purposes by the City of Phoenix (COP); 2) the future use of Salt River Project (SRP) wells; 3) the future use of the Michigan Trailer Park drinking water well; and 4) the future use of the Danone Water (Danone) drinking water well.

Specifically, the proposed RO for the COP groundwater supply is “to restore or provide for the use of the COP groundwater supply if it becomes impacted by the trichloroethene (TCE) groundwater contamination emanating from the WCP WGA site. This action would be needed for as long as the level of contamination in the identified groundwater resource threatens or prohibits its use.”

The SRP wells in the area of the WCP WGA site are located either crossgradient or upgradient to the Site. The proposed RO for the SRP wells is “to protect for the use of the SRP threatened by the TCE contamination emanating from the WCP WGA site should the wells be lost due to changes in groundwater flow direction that would affect the concentration of TCE at the wells. This action would be needed for as long as the level of contamination in the identified groundwater resource threatens or prohibits its use.”

The Michigan Trailer Park well is located approximately 950 feet east of and crossgradient to the source of the contamination (Layke facility). The proposed RO for the Michigan Trailer Park well is “to protect for the use of the Michigan Trailer Park groundwater supply threatened by the TCE contamination emanating from the WCP WGA site should the wells be lost due to changes in groundwater flow direction that would affect the concentration of TCE at the well. This action would be needed immediately.”

The Danone well is located approximately 1,500 feet south of and downgradient to the Layke facility; however, water withdrawn from the well is obtained from a deeper, non-contaminated aquifer. The proposed RO for the Danone well is “to protect for the use of the Danone groundwater supply threatened by the TCE contamination emanating from the WCP WGA site

should the wells be lost due to changes in groundwater flow direction that would affect the concentration of TCE at the well. This action would be needed immediately.”

2.0 SITE BACKGROUND

Layke began operations at its facility in 1967. The operations included the manufacturing of metal parts. Layke used various chemical cutting oils, water-soluble cutting fluids, and solvents. The solvent used included tetrachloroethene (PCE) in 1982; TCE from 1969 to approximately 1985; and 1,1-trichloroethane (TCA) from 1983 to 1988. Reportedly, solvents and cutting oils were stored in 55-gallon drums at the facility. Water-soluble oils were stored in an underground storage tank (UST), which was removed in October 1990.

2.1 PREVIOUS INVESTIGATIONS

Previous investigations for the WCP WGA site are included in the Remedial Investigation (RI) report completed by ADEQ in 2004 and are briefly summarized below (ADEQ, 2004).

Field investigation activities for the RI were conducted between 1989 and 2002. The RI field activities have included: soil and soil-gas sampling, Hydropunch® sampling, groundwater monitoring well installations, and groundwater monitor well sampling. Several contaminants were detected in soil and groundwater samples collected during field investigations at the Site. The primary contaminants of concern are PCE, TCE, and 1,1-dichloroethene (1,1-DCE). These compounds have been detected in soil samples collected at the Layke facility and/or wells within the WCP WGA site.

The PCE and TCE contamination found in the soil beneath the Layke facility exceeded Soil Remediation Levels (SRLs) and Groundwater Protection Levels (GPLs). Layke implemented an early response action (ERA) to remediate the PCE and TCE contamination beneath the Layke facility (Section 2.4). The data collected indicated that the previous source of TCE and PCE contamination had been effectively remediated by the SVE system.

From 1992 to 2001, groundwater investigation activities were conducted in the WCP WGA site. Groundwater investigation activities also included the collection of Hydropunch® groundwater samples from the soil borings advanced at the Layke facility. To date, TCE is the only contaminant found in the groundwater within the Site at levels above the Arizona Aquifer Water Quality Standard (AWQS).

2.2 SITE HYDROGEOLOGY, GEOLOGY, AND TOPOGRAPHY

The following site hydrogeology and geology descriptions have been excerpted from the ADEQ Site Narrative (ADEQ, 2012):

“The Site is located within the West Salt River Valley sub-basin of the Phoenix Active Management Area. The Salt River Valley is an alluvial filled basin located in the Basin and Range physiographic province. The Site is underlain by primarily sandy silts and silty sands with interbedded clay layers and gravelly sand zones.

Due principally to the lining of the adjacent Grand Canal in 1999 and ongoing drought, groundwater elevation has declined considerably in the past several years. In 1992, the depth to groundwater was approximately 98 feet below ground surface (bgs), and by April 2002, it was approximately 124 feet bgs measured in monitor Well WCP-10. Groundwater levels in Well WCP-10 decreased below the well construction depth of 130 feet bgs before September 2002. As of December 2001 groundwater flowed to the south-southwest beneath the Site at a gradient of approximately 0.003 feet/foot.

The Grand Canal is located along the northern edge of the Site. The Grand Canal is generally lined on the bottom and both sides in the vicinity of the Site. However, some recharge to the aquifer occurs due to infiltration from the canal.”

2.3 CURRENT CONDITIONS

Groundwater samples were collected at a monitoring well WCP-235 (located approximately 23.5 feet east of MW-10) in 2008 and again in 2012. Well WCP-235 (ADWR registration number 55-908753) was installed in May 2008 and is screened in the interval of 128 to 173 feet bgs (Locus Technologies, 2008). At the time of installation, according to ADWR imaged records, water was encountered at about 138 feet bgs. A groundwater sample collected June 6, 2008 following well installation contained TCE at a concentration of 2.1 µg/L.

Depth-to-groundwater in WCP-235 was measured at 137.10 feet below top of casing (btoc) on October 10, 2012 and at 138.37 btoc on January 16, 2013. Well MW-10 was dry on both dates. During groundwater sampling conducted in October 2012, TCE, PCE and 1,1-DCE were not detected above the respective laboratory reporting limits of 1 µg/L, 1 µg/L and 2 µg/L in the collected field original sample or in the field duplicate sample. During groundwater sampling conducted in January 2013, TCE was detected at a concentration of 1.0 µg/L, the reporting limit, and PCE and 1,1-DCE were not detected above the respective laboratory reporting limits of 1 µg/L and 2 µg/L.

2.4 SUMMARY OF EARLY RESPONSE ACTIONS

As described in the RI Report for the WCP WGA Site, an ERA has been implemented at the Site. In anticipation that remediation of volatile organic compounds (VOCs) and hydrocarbon contamination would be necessary at the Layke facility, three soil borings were converted to SVE wells in 1995. An ERA consisting of a SVE system was implemented by Layke at its facility from March 1995 until 1998.

Installation of the SVE system was conducted from March 1 through May 26, 1995. On March 29, 1995, the SVE system was tested. Monitoring of the SVE system included collecting vapor samples of the system exhaust and screening the system exhaust vapors with a photoionization detector (PID). Although Layke's contractor estimated approximately 100 pounds (lbs) of TCE were extracted during the first six months of operation of the treatment system, ADEQ's contractor estimated that 250 to 300 lbs of TCE were extracted during this same time period. In November 1997, the rate of TCE removal was conservatively estimated to be less than 0.007 lbs/day (ADEQ, 2004).

The analytical data from soil and soil vapor samples collected between December 26, 2001 and January 14, 2002 indicated that the TCE contamination had been effectively remediated by the SVE system. Based on this information, ADEQ granted a No Further Action request for soils in December 2002, pursuant to Arizona Revised Statutes (A.R.S.) §49-287.01 (ADEQ, 2005).

3.0 DATA GAPS

As a component of development of this Work Plan, URS has performed a review of existing Site data to identify potential gaps in the characterization of the Site. Addressing the data gaps is considered essential for completing a WQARF-compliant FS. This included a review of the RI report (ADEQ, 2004). Potential data gaps noted in the RI report include: 1) lack of rebound test; and 2) vertical delineation of the plume.

3.1 REBOUND TEST

Based on the information provided in the RI report, in 1998, Layke shut down the SVE system due to financial reasons and due to the fact that VOC concentrations in the treatment system exhaust were no longer detectable. A rebound test was planned, but was never performed. As described in Section 2.4, soil and soil vapor samples were, however, collected in 2001-2002 to demonstrate that the SVE system had achieved soil remediation levels in the vadose zone. A decline in TCE concentrations in soil vapor samples collected in the area around the former UST was noted (from 910 µg/l in 1989 to less than 6.1 µg/L in 2001-2002). However, an assessment of soil vapor intrusion to indoor air was not performed. ADEQ has not yet formulated a policy or guidelines for the evaluation of potential vapor intrusion to indoor air. Therefore, this Work Plan does not propose activities for such an evaluation. It should be noted, however, that as documented in the RI Report (ADEQ, 2004), TCE, PCE, and 1,1-DCE were not detected in soil vapor at the Layke facility at a depth of 11 feet in any of the nine borings at laboratory reporting limits ranging from 0.5 µg/L to 1.0 µg/L.

3.2 VERTICAL DELINEATION

Based on information provided in the RI report, it appears only the upper portion of the aquifer at the West Grand Avenue site has been sampled. In addition, the RI report states that “further definitive characterization of the vertical extent of groundwater contamination is unknown at this time and will be addressed during the FS, if needed, based on the selected remedial alternative.” (ADEQ, 2004) The characterization of the vertical extent of groundwater contamination is not considered to be necessary at this time based on a comparison of TCE concentration data in wells WCP-10 and WCP-235 which are screened in different intervals. Well WCP-10 is screened from 86 to 126 feet bgs. WCP-235 is screened from 128 to 173 feet bgs. TCE concentrations in samples collected from WCP-10 ranged from 45 µg/L in 1995 to 5 µg/L in 2001 with a general decreasing trend. Concentrations in the adjacent deeper-screened well WCP-235 show a continuing decreasing trend from 2.1 µg/L in 2008 to less than 1.0 µg/L in 2012 and 1.0 µg/L in January 2013. Due to decreasing regional groundwater elevation in the area, a direct comparison

cannot be made between WCP-10 and WCP-235 concentrations. The decreasing TCE concentrations observed in WCP-235, however, are an indicator that there is not a vertical component to the TCE dissolved plume.

4.0 FEASIBILITY STUDY

Based on Site data, an FS will be performed with the purpose of developing a reference remedy and two alternative remedies for the regional groundwater. Each remedy will consist of a combination of a remedial strategy or strategies, and remedial measures that will achieve the ROs for the Site.

The FS will be conducted in accordance with AAC R18-16-407.

4.1 REMEDY DEVELOPMENT

In developing the reference remedy and two alternative remedies, the remedial strategies itemized in AAC R18-16-407(F) and remedial measures presented in AAC R18-16-407(F) will be considered. Each of these alternatives will consist of multiple components, as necessary, to address the affected hydrogeologic unit.

As stipulated by AAC R18-16-407(F), the following strategies will be considered in development of the reference remedy and alternative remedies:

- Plume remediation to achieve water quality standards for COCs throughout the Site;
- Containment within specific boundaries;
- Controlled migration;
- Source control;
- Monitoring; and
- No action.

For a remedial strategy involving plume remediation, various remedial technologies will be screened to determine whether such technologies are applicable to the Site and should be retained for further consideration. If necessary, a pilot test may be proposed to evaluate a specific technology.

As stipulated in AAC R18-16-407(G), should a remedial measure such as well replacement, well modifications, wellhead treatment, or replacement of water supplies be proposed as part of the considered remedy, such measures will be developed in consultation with the Arizona Department of Water Resources (ADWR) and the COP.

For each remedy, supporting documentation will be prepared to show that the remedy will meet the ROs, that the remedy is consistent with water management plans for the COP and other impacted or potentially impacted users, and that the remedy is consistent with general land use plans of the COP.

4.2 REMEDY COMPARISON

The practicability, protectiveness and benefit of each remedy will be evaluated as required by AAC R18-16-407(H). In addition, detailed cost estimates will be developed for each remedy to evaluate the cost considerations. Supporting documentation for the evaluation as well as the developed comparison criteria will be included in the FS report (Section 3.1.5).

4.3 PROPOSED REMEDY

Based on the evaluation and comparison of the reference and alternative remedies, a remedy will be proposed and the reasons for the selection will be documented in the FS report (Section 3.1.5).

4.4 PILOT TESTING

If, based on the development of a remedial strategy and evaluation of remedial technologies, additional bench scale testing or pilot testing is deemed necessary, the plan for such pilot testing will be developed and submitted for ADEQ approval.

4.5 FEASIBILITY STUDY REPORT

A FS report documenting the development and comparison of the remedies will be prepared. The FS report will also present the proposed remedy and the reasons for selecting the remedy. In addition, a discussion of how the proposed remedy meets the requirements will be included in the FS report.

The FS report will be presented as a Draft document to ADEQ to allow ADEQ to review and comment. Upon receipt of comments from ADEQ, a Final Draft will be prepared for community review and comment prior to submittal of a Final RS report.

5.0 COMMUNITY INVOLVEMENT APPROACH

ADEQ prepared a Community Involvement Plan (CIP) for the Site in accordance with the AAC R18-16-404. The CIP was prepared by ADEQ in August 2009. At this time, it is recommended that ADEQ retain responsibility for leading community involvement activities with support from the source facility (Layke). As required, ADEQ will provide the appropriate notifications to interested parties, including notification regarding the availability of this FS Work Plan.

6.0 SCHEDULE

The proposed schedule for the activities described in this Work Plan is summarized in the following table.

TASK NAME	DUE DATE
FS Work Plan	
Final FS Work Plan submittal	March 18, 2013
Feasibility Study	
Submit Draft FS Report to ADEQ	April 1, 2013
Receive ADEQ comments	April 15, 2013
Submit Final FS Report to ADEQ	April 22, 2013

7.0 RESOURCES

- Arizona Administrative Code (AAC), 2002. Title 18, Environmental Quality, Chapter 16, Water Quality Assurance Revolving Fund Program, Section 404, Community Involvement Requirements, March 31.
- AAC, 2002. Title 18, Environmental Quality, Chapter 16, Water Quality Assurance Revolving Fund Program, Section 407, Feasibility Study, March 31.
- Arizona Department of Environmental Quality (ADEQ), 2004. *Draft Remedial Investigation Report*, West Central Phoenix West Grand Avenue Site Phoenix, Arizona, January 2004.
- ADEQ, 2005. *Proposed Remedial Objectives Report*, West Central Phoenix, West Grand Avenue Site, Phoenix, Arizona, May, 2005.
- ADEQ, 2012. West Central Phoenix West Grand Avenue Site Information and Map. ADEQ Waste Programs Division: Superfund/Water Quality Assurance Revolving Fund. Accessed January 9, 2012. <http://www.azdeq.gov>
- Locus Technologies, 2008. Summary of Well Installation Activities, ADEQ Layke/West Central Phoenix Water Quality Assurance Revolving Fund (WQARF) Area, October 13, 2008.

FIGURE

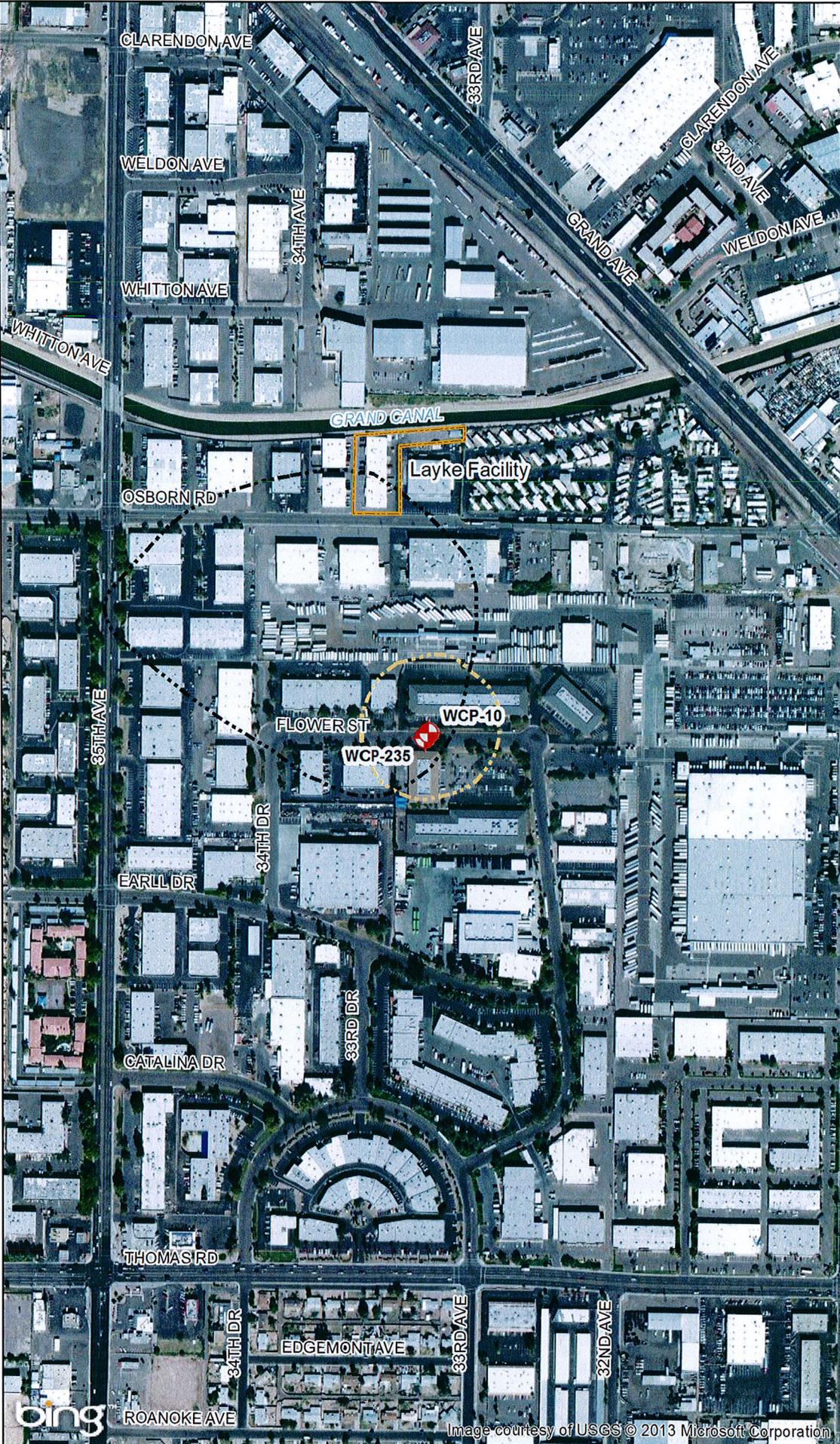


Figure 1
Boundaries of the WCP WGA Site

West Central Phoenix (WCP)
West Grand Avenue (WGA)
WQARF Site
Phoenix, AZ

Legend

-  Well
-  Current Estimated Plume Boundary
-  Former Estimated Plume Boundary
-  Layke Facility



Source:
Map Features: ADOT 2012,
ADEQ 2012, URS 2013
Imagery: Bing(c) 2010 Microsoft
Corporation

