

**RECORD OF DECISION
WEST CENTRAL PHOENIX
WEST GRAND AVENUE WQARF SITE
PHOENIX, ARIZONA**

**Prepared by
ADEQ and URS Corporation**



May 2016



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WEST GRAND AVENUE WQARF SITE
PHOENIX, ARIZONA**

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| LIST OF ACRONYMS | |
|------------------|---------------------------------------------|
| A.A.C. | Arizona Administrative Code |
| ADEQ | Arizona Department of Environmental Quality |
| ADHS | Arizona Department of Health Services |
| ADWR | Arizona Department of Water Resources |
| A.R.S. | Arizona Revised Statute |
| AWQS | Aquifer Water Quality Standards |
| bgs | below ground surface |
| BTEX | benzene, toluene, ethylbenzene, and xylenes |
| CAB | Community Advisory Board |
| CIA | Community Involvement Area |
| CIP | Community Involvement Plan |
| COC | Chemical of Concern |
| COP | City of Phoenix |
| 1,1-DCE | 1,1-dichloroethene |
| EPA | Environmental Protection Agency |
| ERA | Early Response Action |
| FS | Feasibility Study |
| GPLs | Groundwater Protection Levels |
| NFA | No Further Action |
| PCE | tetrachloroethene |
| PRAP | Proposed Remedial Action Plan |
| RI | Remedial Investigation |
| RO | Remedial Objective |
| ROD | Record of Decision |
| SRL | Soil Remediation Level |
| SRP | Salt River Project |
| SVE | soil vapor extraction |
| TCA | 1,1,1-trichloroethane |
| TCE | trichloroethene |
| µg/L | micrograms per liter |
| UST | underground storage tank |
| VOC | volatile organic compound |
| WCP | West Central Phoenix |
| WGA | West Grand Avenue |
| WOC | West Osborn Complex |
| WQARF | Water Quality Assurance Revolving Fund |



1.0 DECLARATION

1.1 SITE NAME AND LOCATION

This Record of Decision (ROD) is for the West Central Phoenix (WCP) West Grand Avenue (WGA) Water Quality Assurance Revolving Fund (WQARF) Registry Site (Site), located in Maricopa County, Phoenix, Arizona. The Site contaminant plume has been remediated however the area of current investigation is bounded by Osborn Road to the north, 33rd Avenue to the east, Earl Drive to the south, and 34th Drive to the west in Phoenix, Arizona. Figure 1 presents the Site boundary originally established in 1998, as well as the currently designated WQARF boundary, as redefined in June 2003. The Site was placed on the WQARF Registry by the Arizona Department of Environmental Quality (ADEQ) in April 1998 with a score of 17 out of a possible 120. The Site score was re-evaluated in 2000 with a revised score of 22.

The contaminated media associated with this ROD is groundwater, specifically the Site plume. The primary chemical of concern (COC) associated with the Site plume is trichloroethene (TCE).

1.2 PURPOSE

This ROD presents the selected remedy for the Site, chosen in accordance with applicable requirements of Title 18, Chapter 16 of the Arizona Administrative Code (A.A.C.) and with Arizona Revised Statute (A.R.S.) Title 49, Chapter 2, Article 5. This ROD describes the basis for the selected remedy and addresses all elements of A.A.C. R18-16-410 under the WQARF Program. The decision in this ROD is based upon previous activities and investigations conducted and performed for this Site documented and placed in ADEQ's Administrative Record file. The State of Arizona, acting by and through the ADEQ, has selected the remedy described in this document.

1.3 ASSESSMENT OF THE SITE

Several contaminants were detected in soil and groundwater samples collected during field investigations at the Site including tetrachloroethene (PCE), TCE, and 1,1-dichloroethene (1,1-DCE). These compounds have been detected in soil samples collected at the Layke Incorporated facility (Layke), and/or in groundwater samples collected from wells at the Layke facility and the Site. The PCE and TCE contamination found in the soil beneath the Layke facility exceeded Soil Remediation Levels (SRLs) and minimum Groundwater Protection Levels. An Early Response



Action (ERA) completed at the Site has addressed contamination in vadose zone soils. TCE is the only contaminant that was found at levels above the Arizona Aquifer Water Quality Standard (AWQS) of 5 micrograms per liter ($\mu\text{g/L}$) in the groundwater at the Site. PCE was not detected in groundwater samples collected from the Site groundwater monitoring wells at concentrations greater than the method reporting limit. 1,1-DCE was not detected in groundwater samples collected from the Site groundwater monitoring wells at concentrations greater than the AWQS of 7 $\mu\text{g/L}$. The lateral extent of TCE contamination at the Site was defined to determine the appropriate cleanup actions needed.

Following completion of the ERA, TCE concentrations in groundwater steadily decreased. Since 2008, TCE concentrations have been less than the AWQS of 5 $\mu\text{g/L}$.

1.4 DESCRIPTION OF SELECTED REMEDY

The selected remedy at the Site is groundwater monitoring and sampling for volatile organic compounds (VOCs) for two additional events. Specifically, this is to confirm that TCE concentrations remain less than the AWQS of 5 $\mu\text{g/L}$. Provided that the TCE concentrations obtained during these two rounds meet this criterion, all wells associated with the Site will be abandoned in accordance with applicable Arizona Department of Water Resources (ADWR) requirements. After completion of the above actions, ADEQ anticipates that no further remedial actions will be necessary to protect human health and the environment and the Site will be delisted.

1.5 STATUTORY DETERMINATION

In January 2004, ADEQ completed the Remedial Investigation (RI) report (ADEQ, 2004) and in June 2013 the Feasibility Study (FS) report (URS, 2013b) was completed pursuant to A.R.S. §49-287.03. The RI report:

- Established the nature and extent of the contamination and the sources thereof;
- Identified current and potential impacts to public health, welfare and the environment;
- Identified current and reasonable foreseeable uses of land and waters of the state;
- Obtained and evaluated information necessary for identification and comparison of alternative remedial actions;
- Based on this information, the FS evaluated three different remedial options and identified the selected remedy for use at the Site.



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Pursuant to A.R.S. §49-287.04(H), this ROD is the final administrative decision as defined under A.R.S. §41-1092. Groundwater monitoring and sampling and monitor well abandonment were selected as the remedy for the Site because it met the following criteria:

- Adequately assures the protection of public health and welfare of the environment;
- To the extent practicable, verifies the control, management and cleanup of the TCE maximizing beneficial use of the groundwater; and
- Is reasonable, necessary, cost-effective and technically feasible.



2.0 SITE BACKGROUND

2.1 WEST GRAND AVENUE WQARF SITE

The Site is located in Phoenix, Arizona, and consisted of the groundwater plume associated with a former underground storage tank (UST) located at the Layke facility (Figure 1). The Layke facility is located at 3330 West Osborn Road in Phoenix, Arizona. The Site was originally designated as part of the WCP Priority Site in 1987. Data obtained indicated three primary areas of VOC contamination, which were known as the “Main Plume Area,” the “WCP North Plume Site,” and the “Southeast Area.” Subsequent investigations indicated that the “Main Plume Area” consisted of multiple separate plumes of contamination, including the Site. The area surrounding the Site is predominantly comprised of mixed industrial and commercial properties with a low-density residential area located east of the Layke facility.

2.2 SITE DESCRIPTION

The Site consisted of the groundwater plume associated with a former UST located at the Layke facility.

Layke began operations at the facility in 1967. The operations included the manufacturing of metal parts that utilized various chemical cutting oils, water-soluble cutting fluids, and solvents. The solvents used included PCE in 1982; TCE from 1969 to approximately 1985; and TCA from 1983 to 1988. Reportedly, solvents and cutting oils were stored in 55-gallon drums at the facility and the water-soluble oils were stored in an UST prior to being shipped off-Site for disposal.

Layke used the UST for waste chemical storage from 1967 to 1989. During the years the UST was used, it appears that the UST was periodically overfilled and leaked between the lid and main structure. The amount of waste lost to the environment is unknown. The UST was removed in October 1990 and although the UST was found to be intact (at the time of removal), evidence of leakage was observed around the entrance to the tank and tank cover.

2.3 ASSESSMENT OF THE SITE

The following sections summarize information pertaining to the source of the contamination, contaminants in soil, and contaminants in groundwater.



2.3.1 Source of Release

The Layke facility, located at 3330 West Osborn Road in Phoenix, Arizona was identified as the source of groundwater contamination at the Site. Field investigation activities for the Site RI were conducted between 1989 and 2002. The field activities included soil and soil-gas sampling, groundwater monitoring well installations, groundwater monitoring well sampling, and Hydropunch® sampling. The distribution of contaminant concentrations in soil gas, soil, and groundwater that was identified during the Site RI indicated that the source of soil and groundwater contamination at the Site was the former UST located at the Layke facility. When the UST was removed in October 1990, it appeared structurally intact. However, evidence of leakage existed around the entrance to the tank and the tank cover, leading to the conclusion that the UST had overflowed at various times.

2.3.2 Soil Contamination

Contaminants in soils beneath the Layke facility included TCE from approximately 3 feet to 95 feet below ground surface (bgs) in the area underlying the former UST basin and associated piping. In addition, PCE was found in the same area approximately 3 feet to 20 feet bgs. Layke implemented an ERA to remediate the PCE and TCE contamination in soils beneath the facility through UST removal and the use of a soil vapor extraction (SVE) system. This action resulted in soils meeting the established SRLs. A decline in TCE concentrations in soil vapor samples collected in the area around the former UST basin was noted ranging from 910 µg/L in 1989 to less than 6.1 µg/L (at a depth of 126 feet bgs) in 2001/2002. Neither TCE, PCE, nor 1,1-DCE were detected above the laboratory detection limits (0.5 µg/L to 1.0 µg/L) in soil vapor at the Layke facility at a depth of 11 feet bgs.

ADEQ granted a No Further Action (NFA) status in 2002, pursuant to A.R.S. §49-287.01. Based on the information provided in the *Remedial Investigation Report* (ADEQ, 2004), no further remediation of soils within the Layke facility was required; therefore, no remedial objectives (ROs) specific to soils were provided in the *Proposed Remedial Objectives Report, West Central Phoenix, West Grand Avenue Site, Phoenix, Arizona* (ADEQ, 2005).

2.3.3 Groundwater Contamination

The contaminant of concern associated with the Site groundwater plume is TCE. The following summarizes the extent of groundwater contamination at the Site.



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Historically, TCE concentrations greater than the AWQS of 5 µg/L have been detected in wells WCP-4 and WCP-10 (Figure 2). Concentrations of TCE in well WCP-4 ranged from 420 µg/L in May 1992 to below the laboratory detection limit starting in 1999. TCE concentrations in well WCP-10 ranged from 45 µg/L in March 1995 to 5 µg/L in June 2001. Monitoring well WCP-10 is located hydraulically downgradient from the Layke facility. Groundwater elevation in the area has since decreased leaving these two wells dry. Concentrations of 1,1-DCE in groundwater were detected in wells WCP-4 and WCP-10 below the AWQS of 7 µg/L.

Subsequently, monitoring well WCP-235 was installed in May 2008 approximately 23.5 feet east of WCP-10 (Figure 2). The TCE concentrations in samples collected from this well ranged from less than 1.0 µg/L to 2.1 µg/L, which are less than the AWQS of 5 µg/L. No PCE or 1,1-DCE were detected at concentrations above their respective reporting limits in well WCP-235. A map depicting the historic and current Site plume boundaries is provided in Figure 1.

2.4 CHRONOLOGY OF SITE ACTIVITIES

The detailed history of Site investigations and ERAs completed at the Site was summarized in the RI (ADEQ, 2004) and the FS (URS, 2013b) reports. The following provides brief summaries of the main events and investigative/ERA milestones for the Site:

- **1982:** The City of Phoenix (COP) detected TCE in four municipal public supply wells, including COP wells #70, #71, #151, and #152. Since the TCE concentrations exceeded the U.S. Environmental Protection Agency (EPA) Maximum Contaminant Level of 5 µg/L in COP wells #70 and #71, these two wells were immediately shut down. These wells are located cross-gradient to the Layke facility.
- **1983 – 1989:** The Arizona Department of Health Services (ADHS), Salt River Project, and the COP confirmed the presence of VOCs in the groundwater with sampling in 1983, 1985, and 1986. COP wells #151 and #152 were taken off-line on March 7, 1989. ADHS also identified dissolved-phase VOCs in the on-site West Osborn Complex Irrigation Well (Pincus Well).
- **1987:** The WCP area was designated a Priority List site.
- **1989 – 2002:** Field investigation activities at the Site were conducted. The investigation indicated that the source of soil and groundwater contamination at the Site is the Layke facility.



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- **1990 – 1997:** An ERA was conducted by Layke, the current operator at the Layke facility. In 1990, Layke excavated a waste oil UST that also contained solvents and was the source of surrounding TCE soil contamination. Soil samples and a sludge sample from the tank were collected and analyzed for VOCs and benzene, toluene, ethylbenzene, and xylenes (BTEX). Analytical results indicated the presence of TCE, PCE, and low levels of BTEX in the underlying soils. The sludge contained TCE, 1,1-DCE, PCE, and low levels of BTEX. Additional soil borings were installed and sampled ranging from 10 to 90 feet bgs with TCE, PCE, and BTEX detected at various depths. A SVE remediation system was installed and operated from 1995 to 1998.
- **1995 – 2002:** Layke operated the SVE system from March 1995 through June 1998 to remediate the contamination underlying the former UST location. Between 2001 and 2002, soil samples were collected by ADEQ in the vicinity of the UST to determine the effectiveness of the SVE system in remediating the soils. The soil data indicated that the contamination had been effectively remediated by the SVE system. Based on these data, ADEQ granted a NFA request in December 2002, pursuant to A.R.S. §49-287.01.
- **2004:** ADEQ received a request from Layke in April to permanently shut down the SVE system. ADEQ granted the request in a letter dated April 21, 2004.
- **2004:** The Draft RI Report was issued for public comment to meet the requirements under A.R.S. § 49-287.03 and A.A.C. § 18-16-406. No comments were received during the 30-day comment period. Since no comments were received on the Draft RI Report, the report was accepted as the Final RI Report for the Site.
- **2005:** ADEQ issued the Proposed Remedial Objectives Report for public comment to meet the requirements established under A.A.C. R18-16-406. No comments were received during the 30-day comment period.
- **2008:** A new groundwater monitoring well, WCP-235, was installed at the Site and sampled.
- **2012 – 2013:** Groundwater monitoring and sampling were conducted at the Site.
- **2013:** The ADEQ issued the public notice of the FS Work Plan availability to meet the requirements under A.A.C. R18-16-407. The ADEQ received one comment letter and believed the comments in the letter were addressed in the FS Report.
- **2013:** The ADEQ issued the Final FS Report which was developed in accordance with A.A.C. R18-16-407.
- **2014 – 2015:** Groundwater monitoring and sampling were conducted at the Site.



- **2016:** The Proposed Remedial Action Plan (PRAP) for the Site was issued for public comment on January 21, 2016.



3.0 SELECTED REMEDY

The *Final Feasibility Study for West Central Phoenix, West Grand Avenue WQARF Site* (URS, 2013b) provided the evaluation of three Alternative Remedies and the reference remedy was carried forward as the selected remedy to the PRAP (URS, 2014).

3.1 SELECTED REMEDY

ADEQ prepared the *Proposed Remedial Objectives Report, West Central Phoenix, West Grand Avenue Site, Phoenix, Arizona* (ADEQ, 2005) that established ROs for the current and reasonably foreseeable uses of land and waters of the State of Arizona that have been or are threatened to be affected by a release of a hazardous substance.

The remedial strategy and measures of the selected remedy includes two additional groundwater monitoring and sampling events. During each sampling event, the depth to groundwater will be measured at wells WCP-10 and WCP-235. If sufficient groundwater is present in well WCP-10, a groundwater sample will be collected. A groundwater sample and corresponding duplicate will be collected from well WCP-235 following low-flow purging of the well. In addition, each sampling event will include collection of an equipment blank sample. The groundwater samples will be submitted to an ADHS licensed laboratory for analysis of VOCs in accordance with EPA Method SW-846 8260B. A monitoring results report will be completed at the conclusion of the two sampling events. This report will include a description of the sampling methodologies, a summary of field measurements, a summary of analytical results, a comparison of analytical results to historical data, conclusions, and additional recommendations (if any). A map depicting the groundwater monitoring well locations is included in Figure 2.

If, at the conclusion of the two sampling events, the TCE concentrations remain less than the AWQS of 5 µg/L, all wells associated with the Site will be abandoned in accordance with the applicable ADWR requirements promulgated in A.A.C. R12-15-816. A “Notice of Intent to Abandon a Well” will be filed with the ADWR and a Well Abandonment Completion Report will be filed within 30 days of completion of abandonment activities. It is anticipated that a COP closure permit will be required for well abandonment activities.



3.2 BASIS OF SELECTED REMEDY

The Site is located in a commercial area of the COP and is projected to remain as such for the foreseeable future. There is no indication that the current land use of the Layke facility will be changed from the current commercial use, specifically changing the current land use to one that is residential. The ERA conducted at the Layke facility removed soil contamination to below applicable remedial standards and the facility was awarded NFA for soils. For this reason, no soil remedy is required and is not part of this ROD.

Based on groundwater analytical data collected from the Site well in June 2008, October 2012, January 2013, December 2014, and March and April 2015, groundwater concentrations already achieve the ROs (Locus Technologies, 2008) (URS, 2013a, & 2015). The TCE concentrations currently meet regulatory requirements for drinking water. Therefore, the Selected Remedy meets groundwater remediation requirements for the aquifer at the Site and achieves the remedial action criteria pursuant to A.R.S. § 49-282.06(A) including the following:

- Assures the protection of public health, welfare and the environment.
- Provides for the beneficial use of the groundwater resource by the COP, the Salt River Project, the Michigan Trailer Park, and the Danone Well(s).
- Is reasonable, necessary, cost-effective, and technically feasible.

3.3 COMMUNITY INVOLVEMENT AND ACCEPTANCE

A WCP Community Advisory Board (CAB) was formed that has previously met on a regular basis to discuss issues and status of investigation and cleanup activities conducted at the WCP WQARF Sites. These meetings are open to the public and the last meeting was held on March 30, 2016. A Community Involvement Plan (CIP) (last updated in April 2015 [ADEQ, 2015]) was also developed for the WCP Sites. The following provides specific public participation activities that have been completed for the Site:



**Table 1
Community Involvement Activities
WCP WGA WQARF Registry Site**

| Community Involvement Activities | Regulatory Citation/Rule | Date |
|--------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|-----------------------------|
| Establish Community Involvement Area (CIA) | A.R.S. § 49-289.02(A) | April/May 1998 |
| Notice of the Site listing on the Registry | A.R.S. § 49-287.01 A.R.S. § 49-289.03(A) | April/May 1998 |
| Hazardous substance contamination notice and fact sheet | A.R.S. § 49-289.02(B) A.R.S. § 49-287.03(B) A.A.C. R18-16-404(C)(1)(i) | April 2000 |
| CIP | A.R.S. § 49-287.03(D) A.R.S. § 49-289.03(C) A.A.C. R18-16-403(E) A.A.C. R18-16-404(C) | June 2000 |
| Establish CAB selection committee | A.R.S. § 49-289.03(D) | April 2000 |
| Establish CAB | A.R.S. § 49-289.03(C) A.R.S. § 49-289.03(F)(1) | June 2000 |
| Notice of RI scope of work, fact sheet, and outline of CIP | A.R.S. § 49-287.03(B) A.R.S. § 49-287.03(C) A.A.C. R18-16-403(F) A.A.C. R18-16-403(G) | 1998 |
| Establish information repository | A.R.S. § 49-289.03(B) | 2000 |
| Questionnaires mailed for draft Land and Water Use Study | A.A.C. R18-16-404 | March, April, and June 2001 |
| Notice of opportunity to comment on draft RI report | A.A.C. R18-16-404(C)(1)(b) A.A.C. R18-16-406(F) | February 2004 |
| Public meeting to establish ROs | A.A.C. R18-16-404(C)(1)(b) A.A.C. R18-16-406(I)(1) | November 2004 |
| Notice of opportunity to comment on proposed RO report and availability of final RO report | A.A.C. R18-16-404(C)(1)(c) A.A.C. R18-16-406(I)(5) | October 2005 |



| | | |
|---------------------------------------------------------------------|------------------------------------------------------|--------------|
| Public meeting(s) to discuss proposed/revised RO report if needed | A.A.C. R18-16-406(I)(5) | NA |
| Notice of availability of final RI and RO reports | A.A.C. R18-16-406 | 2005 |
| Notice of availability of the (FS) work plan | A.A.C. R18-16-404(C)(1)(d) | April 2013 |
| Re-Establish CAB selection committee | A.R.S. § 49-289.03(D) | August 2014 |
| Re-Establish CAB | A.R.S. § 49-289.03(C) A.R.S. § 49-289.03(F)(1) | October 2014 |
| Issue notice of availability and opportunity to comment on the PRAP | A.R.S. § 49-287.04(B) A.A.C. R18-16-404(C)(1)(e) | January 2016 |
| Notice of ROD & Responsiveness Summary Availability | A.R.S. § 49-287.04 (G) A.A.C. R18-16-404(C)(1)(f) | June 2016 |

- February 2004:** The RI Report was issued for public comment to meet the requirements under A.A.C. R18-16-404(C)(1)(b) and A.A.C. R18-16-406 (F). No comments were received during the 30-day comment period. Since no comments were received on the Draft RI report, the report was accepted as the Final RI report for the Site.
- November 2004:** A WCP CAB meeting was conducted in November, pursuant to A.A.C. A.A.C. R18-16-404(C)(1)(b) and R18-16-406(I)(1), to discuss the RI Report, and to obtain input on ROs for the Site.
- October 2005:** ADEQ issued the Proposed RO Report for public comment to meet the requirements established under A.A.C. R18-16-404(C)(1)(c) and A.A.C. R18-16-406(I)(5). No comments were received during the 30-day comment period.
- April 2013:** The ADEQ issued the public notice for the FS Work Plan to meet the requirements of A.A.C. R18-16-404(C)(1)(d). The ADEQ received one comment letter and believes the comments in the letter were addressed in the FS Report, which was issued in 2013.
- January 2016:** The ADEQ issued the PRAP for 90-day public comment period to meet the requirements of A.A.C. R18-16-404(C)(1)(e) and A.R.S. § 49-287.04(B). Notices on



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the availability of the PRAP were published in the Phoenix Business Gazette on January 21 and 28, 2016. The notice requested that public comments on the PRAP be provided to the ADEQ Remedial Project Manager on or before April 20, 2016. A CAB meeting was also held on March 30, 2016 to discuss the PRAP.

- **April 20, 2016:** The end of the PRAP public comment period, two comment letters were received.

3.4 SCHEDULE

The selected remedy was implemented following public notice of the PRAP availability. All PRAP activities will be completed within six months of ROD signature including abandonment of all wells associated with the Site in accordance with applicable ADWR requirements as promulgated in A.A.C. R12-15-816, and filing of a Well Abandonment Completion Report within 30 days of completion of abandonment activities.



4.0 RESPONSIVENESS SUMMARY

As per A.A.C. R18-16-410(B)(2) and A.R.S. 49-287.04(F), a comprehensive responsiveness summary shall be prepared by the director regarding all comments received on the PRAP after the conclusion of all public comment periods. A 90-day comment period for the PRAP was held starting on January 21, 2016 and ending on April 20, 2016. Two letters containing written comments were received during the comment period; one from Julie Riemenschneider on behalf of the City of Phoenix and one from Joseph A. Drazek on behalf of Layke Incorporated and Doris J. Canfield. Copies of the letters and ADEQ responses to the comments are provided in Appendix A. No other comments were received on the PRAP.



5.0 COST

The estimated costs of the remedy shall include recoverable remedial action costs incurred by the State and projected future remedial action costs. As required in A.A.C. R18-16-410(C), the following is a breakdown of costs during the Site characterization and ERAs excluding non-recoverable costs incurred by ADEQ and projected future remedial action costs.

5.1 HISTORIC COSTS

Groundwater contamination was discovered in COP wells in 1983. Investigation of the WCP Site by ADEQ began in 1987 and will continue as the proposed remedy is implemented. An ERA was conducted at the Site from March 1995 through June 1998 and was instrumental in reducing contaminant concentrations and risk of exposure. Significant costs have been incurred by ADEQ during characterization of the Site and oversight of the ERA. These activities to date have cost ADEQ \$656,955.45.

5.2 FUTURE COSTS

The cost for implementing the selected remedy for the Site as described above will be \$18,058. The following is a breakdown of the costs:

| | |
|------------------|----------|
| Well abandonment | \$17,413 |
| Delisting | \$645 |



6.0 CONCLUSIONS

The remedial strategy chosen consists of continued groundwater monitoring and sampling for two additional events. Based on historical and recent data and the assumption that the analytical data from these events continue to demonstrate that TCE concentrations remain below the AWQS of 5 µg/L, monitoring will cease, the Site will be delisted from the WQARF Registry, and all monitoring wells associated with the Site will be abandoned in accordance with the ADWR requirements promulgated in A.A.C. R12-15-816.



7.0 REFERENCES

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- URS, 2014. *Final Proposed Remedial Action Plan for the West Central Phoenix West Grand Avenue WQARF Site – Phoenix, Arizona*. Arizona Department of Environmental Quality. February.
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FIGURES

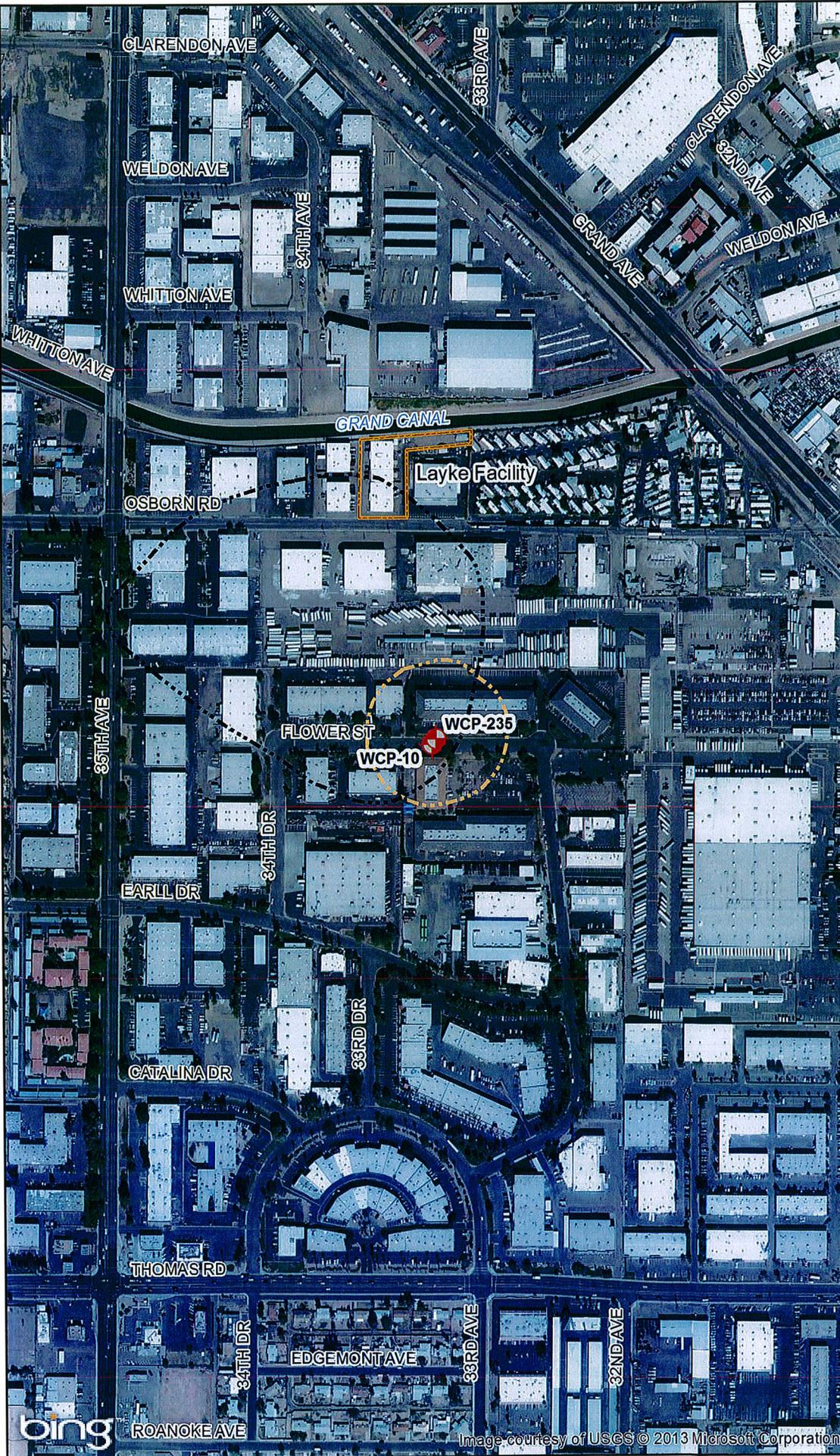


Figure 1
Boundaries of the WCP WGA Site

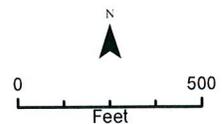
West Central Phoenix (WCP)
West Grand Avenue (WGA)
WQARF Site
Phoenix, AZ

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



APPENDIX A
RESPONSIVENESS SUMMARY
PROPOSED REMEDIAL ACTION PLAN WRITTEN COMMENTS

RESPONSIVENESS SUMMARY

In accordance with A.A.C. R18-16-410(B)(2) and A.R.S. 49-287.04(F), this comprehensive responsiveness summary has been prepared to identify and respond to all comments received on the PRAP after the conclusion of the public comment period. A 90-day comment period for the PRAP was held starting on January 21, 2016 and ending on April 20, 2016. Two letters containing written comments were received during the comment period; one from Julie Riemenschneider on behalf of the City of Phoenix and one from Joseph A. Drazek on behalf of Layke Incorporated and Doris J. Canfield. No other comments were received on the PRAP. The letters are summarized below with ADEQ responses. Copies of the letters follow the summaries and responses.

1) City of Phoenix

Julie Riemenschneider with the City of Phoenix wrote:

The City of Phoenix (COP) Office of Environmental Programs has reviewed the above referenced report which recommends performing two additional groundwater sampling investigations, and, if the TCE levels continue to remain below aquifer water quality standards (AWQS), abandoning the monitoring wells and closing the site.

The COP agrees that if the additional monitoring events indicate that the water meets AWQS, the remedial objective of protecting the future water supply for COP citizens has been met and no further action is needed. The COP appreciates the ADEQ's efforts to ensure protection of this important natural resource.

ADEQ Response: Comment noted. No change is needed.

2) Quarles & Brady LLP

Joseph A. Drazek with Quarles & Brady LLP on behalf of Layke Incorporated and Doris J. Canfield

I am writing on behalf of our clients Layke Incorporated and Doris J. Canfield in response to your January 21, 2016 Notice Letter issued pursuant to A.R.S. § 49-287.04 and to provide the following comments on the Proposed

Remedial Action Plan for the West Grand Avenue (WGA) WQARF Site and the allocation of costs.

Layke Incorporated and Doris J. Canfield (hereinafter collectively referred to as "Layke") each dispute their designation as responsible parties for costs incurred in connection with WGA. The data from the numerous investigations conducted on the Layke property do not demonstrate that any releases from the former underground storage tank (UST) at Layke impacted or threatened to impact groundwater. Indeed, the fact that releases from Layke's UST did not impact groundwater was a determination made by ADEQ. Specifically, ADEQ's UST Corrective Action Section/Site Investigation Unit (UST Section) concluded in its May 29, 1998 letter to Layke (Exhibit A) the Interim Soil Remediation Levels, therefore, no additional remediation is required. Low levels of trichloroethane (TCE) [sic] were identified in soil borings within a clayey silt layer at approximately 60 to 70 feet bgs; however, the reported levels are below the Interim and Final Soil Remediation Levels. Since the depth to water level is reported to be approximately 95 feet bgs, **the release does not appear to be a threat to contamination of the groundwater. The ADEQ is not requiring further investigation or remediation of the reported release at this time (emphasis added).**

ADEQ's UST Section thereafter issued a closure letter to Layke dated June 11, 1998 (Exhibit B) confirming ADEQ's determination that the extent of the Layke UST release was defined and that groundwater was not impacted. The UST Section's determination that the Layke UST release did not impact or threaten groundwater, in fact, was and is correct. None of ADEQ's investigations have conclusively demonstrated that the Layke UST release impacted groundwater. As a result, ADEQ's determination that Layke and Canfield are responsible parties under WQARF is unsupported and is arbitrary and capricious.

The arbitrary and capricious nature of ADEQ's position is highlighted by its failure to properly consider data and analyses of groundwater movement in the vicinity of Layke. In particular, Layke submitted to ADEQ a WQARF Site Evaluation of Layke Inc. prepared by Smith Consultants dated December 7, 2000 (attached as Exhibit C), (the "Smith Report") in support of Layke's December 12, 2000 request for a No Further Action (NFA) Determination. The Smith Report, among other things, presents a thorough and compelling evaluation of groundwater movement near Layke demonstrating that groundwater movement prior to 2000 varied significantly and was strongly influenced by pumping from

the nearby Salt River Project (SRP) irrigation well designated as 10.5E-7.5N. Significantly, the Smith Report conclusively demonstrates that when the SRP well was pumping in 1999 it created a drawdown cone that extended approximately 1/2 mile to the west and included both Layke and the east end of the West Osborn Complex (WOC) WQARF site where TCE concentrations had historically been much higher than at Layke. Thus, groundwater from the WOC was being drawn toward Layke and the SRP well. That evaluation was based on more limited supplemental pumping by SRP during the 1999 irrigation season. As the Smith Report notes, under more prolonged pumping conditions, as had been the case in prior years, the drawdown cone would have become deeper and larger. By the time of the March 2000 water level measurements, after the SRP well had not been pumped for 11 months, the influence of the pumping on groundwater movement had dissipated. At Layke, the cessation of pumping caused the direction of the groundwater gradient to change by more than 90 degrees. Not surprisingly, TCE in WCP-4 was below the laboratory detection limit starting in 1999. TCE that had been present at WCP-10, south of Layke and within the zone of influence of the SRP well, undoubtedly was from the WOC.

Further, the Smith Report discusses the VOC detections in soil at Layke and the application of Groundwater Protection Levels (GPLs) and concludes that, with the exception of TCE in the shallow soil, the VOC in soils at Layke did not present a threat to groundwater. When VOCs were detected below a depth of 20 feet, the VOC concentrations were a fraction of the GPLs. When ADEQ collected soil samples for laboratory analysis during the 1992 installation of WCP-4, VOCs were detected only in the 94.5 foot sample. As the Smith Report notes, the depth to groundwater at Layke was about 94.5 feet so that sample was collected from the top of the saturated zone. As a result, the Smith Report concludes that groundwater transport, rather than the vadose zone, was the likely origin for the TCE in the soil sample. That conclusion is supported by the Smith Report's evaluation of groundwater movement as discussed above.

Significantly, ADEQ and its contractors have never refuted the Smith Report evaluation of groundwater movement and the obvious effect of the SRP irrigation well on TCE detections in the vicinity of the Layke property. Indeed, the 2004 Remedial Investigation Report acknowledges that groundwater data from the April 1999 monitoring event indicated groundwater flow to the east beneath the Layke facility as a result of the influence of the SRP pumping but fails to address the strong likelihood that historic TCE concentrations detected at wells in the vicinity of Layke was from the WOC and not the result of the minimal UST release at Layke that never impacted groundwater. Instead, ADEQ ignores that analysis and incorrectly concludes that a "slug" of TCE contamination from Layke had impacted groundwater and moved downgradient.

ADEQ's tenuous and unsupported conclusion is now the basis for its arbitrary and capricious determination that Layke and Canfield are responsible parties. That conclusion, coupled with the failure to properly and thoroughly consider the effect of SRP pumping, also has grossly skewed ADEQ's proposed cost allocation as it pertains to WGA. In particular, ADEQ proposes to apportion costs based on the relative sizes of the West Central Phoenix plumes that supposedly existed in April 1998. Significantly, that time period was when groundwater conditions in the area were influenced by the SRP irrigation well pumping, as

discussed above, and the TCE concentration that has been attributed to Layke and, therefore, WGA was unquestionably from the WOC, not Layke. Thus, ADEQ's failure to properly take the effect of the SRP irrigation well pumping into account has resulted in a gross overestimate of the size of the plume attributed to WGA. While Layke continues to insist that it should not be a responsible party at all since groundwater never was impacted or threatened by releases at Layke, it certainly is a gross injustice to inflate the percentage of costs attributable to WGA based on TCE that undoubtedly came from the WOC. Accordingly, the Smith Report evaluation must now be addressed and thoroughly taken into account in the cost allocation process.

Further, had ADEQ properly and thoroughly considered the Smith Report evaluation together with the other information presented by Layke in its December 12, 2000 NFA request, it would have and should have concluded that the information presented was more than sufficient to support an NFA determination. Thus, ADEQ's determination that more investigation was required was arbitrary and capricious and the costs incurred conducting those additional investigations were unnecessary and should not be included in any costs allocated to Layke.

Regarding Layke's comments to the Proposed Remedial Action Plan, continued sampling of wells that for several years have been below the TCE Aquifer Water Quality Standard is unnecessary. No further action is warranted at WGA.

Because Layke's operations never impacted groundwater, a fact that was evident to ADEQ by at least 1992 when WCP-4 was installed, Layke and Canfield are not responsible for costs incurred at WGA. Those costs should be allocated to those persons determined to be responsible parties at WOC, who clearly are the parties responsible for the TCE detected and investigated in the vicinity of the Layke property in the area designated as WGA.

ADEQ Response: Because sufficient information regarding other potentially responsible parties was not specifically provided within the WGA Site, no additional investigation of other parties is required. Data indicate that the WCP WOC WQARF Site is a separate WQARF site and is being investigated by ADEQ separately from WCP WGA. Based on data collected at the WCP WGA Site, the WCP WOC WQARF Site is not considered to be the cause of the WCP WGA WQARF Site groundwater contamination. This information was brought to the attention of the parties representing Layke in the ADEQ response letter and enclosures dated July 25, 2001 in regard to the Layke request for a no further action (NFA). Based on the comments no change is needed to the PRAP or ROD.



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E-Mail: joe.drazek@quarles.com

April 20, 2016

VIA E-MAIL: KCS@AZDEQ.GOV

Kevin Snyder
ADEQ Project Manager
Waste Programs Division
Arizona Department of Environmental Quality
1110 W. Washington Street
Phoenix, AZ 85007

RE: West Central Phoenix West Grand Avenue WQARF Registry Site, Phoenix,
Arizona

Dear Mr. Snyder:

I am writing on behalf of our clients Layke Incorporated and Doris J. Canfield in response to your January 21, 2016 Notice Letter issued pursuant to A.R.S. § 49-287.04 and to provide the following comments on the Proposed Remedial Action Plan for the West Grand Avenue (WGA) WQARF Site and the allocation of costs.

Layke Incorporated and Doris J. Canfield (hereinafter collectively referred to as "Layke") each dispute their designation as responsible parties for costs incurred in connection with WGA. The data from the numerous investigations conducted on the Layke property do not demonstrate that any releases from the former underground storage tank (UST) at Layke impacted or threatened to impact groundwater. Indeed, the fact that releases from Layke's UST did not impact groundwater was a determination made by ADEQ. Specifically, ADEQ's UST Corrective Action Section/Site Investigation Unit (UST Section) concluded in its May 29, 1998 letter to Layke (Exhibit A) that:

. . . the vertical and horizontal extent of petroleum hydrocarbon contamination (PHC) in the soils resulting from the reference release, have been adequately defined. The maximum vertical extent of BTEX contamination in the soil is defined at a depth of approximately 30 feet below ground surface (bgs). The BTEX levels reported in soil borings at the release site are below the

Interim Soil Remediation Levels, therefore, no additional remediation is required. Low levels of trichloroethane (TCE) were identified in soil borings within a clayey silt layer at approximately 60 to 70 feet bgs; however, the reported levels are below the Interim and Final Soil Remediation Levels. Since the depth to water level is reported to be approximately 95 feet bgs, **the release does not appear to be a threat to contamination of the groundwater. The ADEQ is not requiring further investigation or remediation of the reported release at this time (emphasis added).**

ADEQ's UST Section thereafter issued a closure letter to Layke dated June 11, 1998 (Exhibit B) confirming ADEQ's determination that the extent of the Layke UST release was defined and that groundwater was not impacted. The UST Section's determination that the Layke UST release did not impact or threaten groundwater, in fact, was and is correct. None of ADEQ's investigations have conclusively demonstrated that the Layke UST release impacted groundwater. As a result, ADEQ's determination that Layke and Canfield are responsible parties under WQARF is unsupported and is arbitrary and capricious.

The arbitrary and capricious nature of ADEQ's position is highlighted by its failure to properly consider data and analyses of groundwater movement in the vicinity of Layke. In particular, Layke submitted to ADEQ a WQARF Site Evaluation of Layke Inc. prepared by Smith Consultants dated December 7, 2000 (attached as Exhibit C), (the "Smith Report") in support of Layke's December 12, 2000 request for a No Further Action (NFA) Determination. The Smith Report, among other things, presents a thorough and compelling evaluation of groundwater movement near Layke demonstrating that groundwater movement prior to 2000 varied significantly and was strongly influenced by pumping from the nearby Salt River Project (SRP) irrigation well designated as 10.5E-7.5N. Significantly, the Smith Report conclusively demonstrates that when the SRP well was pumping in 1999 it created a drawdown cone that extended approximately 1/2 mile to the west and included both Layke and the east end of the West Osborn Complex (WOC) WQARF site where TCE concentrations had historically been much higher than at Layke. Thus, groundwater from the WOC was being drawn toward Layke and the SRP well. That evaluation was based on more limited supplemental pumping by SRP during the 1999 irrigation season. As the Smith Report notes, under more prolonged pumping conditions, as had been the case in prior years, the drawdown cone would have become deeper and larger. By the time of the March 2000 water level measurements, after the SRP well had not been pumped for 11 months, the influence of the pumping on groundwater movement had dissipated. At Layke, the cessation of pumping caused the direction of the groundwater gradient to change by more than 90 degrees. Not surprisingly, TCE in WCP-4 was below the laboratory detection limit starting in 1999. TCE that had been present at WCP-10, south of Layke and within the zone of influence of the SRP well, undoubtedly was from the WOC.

Further, the Smith Report discusses the VOC detections in soil at Layke and the application of Groundwater Protection Levels (GPLs) and concludes that, with the exception of TCE in the shallow soil, the VOC in soils at Layke did not present a threat to groundwater. When VOCs were detected below a depth of 20 feet, the VOC concentrations were a fraction of the GPLs. When ADEQ collected soil samples for laboratory analysis during the 1992 installation of WCP-4, VOCs were detected only in the 94.5 foot sample. As the Smith Report notes, the depth to groundwater at Layke was about 94.5 feet so that sample was collected from the top of the saturated zone. As a result, the Smith Report concludes that groundwater transport, rather than the vadose zone, was the likely origin for the TCE in the soil sample. That conclusion is supported by the Smith Report's evaluation of groundwater movement as discussed above.

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Further, had ADEQ properly and thoroughly considered the Smith Report evaluation together with the other information presented by Layke in its December 12, 2000 NFA request, it would have and should have concluded that the information presented was more than sufficient

Kevin Snyder
April 20, 2016
Page 4

to support an NFA determination. Thus, ADEQ's determination that more investigation was required was arbitrary and capricious and the costs incurred conducting those additional investigations were unnecessary and should not be included in any costs allocated to Layke.

Regarding Layke's comments to the Proposed Remedial Action Plan, continued sampling of wells that for several years have been below the TCE Aquifer Water Quality Standard is unnecessary. No further action is warranted at WGA.

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Sincerely,

QUARLES & BRADY LLP



Joseph A. Drazek

JDRAZEK:psm

cc: Ernest Apodaca (via email w/encls.)
Doris J. Canfield, c/o Bonnie Hirschberg (via email w/encls.)



ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY

Governor Jane Dee Hull

Russell F. Rhoades, Director

CERTIFIED LETTER

Return Receipt Requested

UST Ref. No. 98-0009034

May 29, 1998

Mr. Ernest Apodaca
Layke, Inc.
P.O. Box 11069
Phoenix, Arizona 85061

RE: REVIEW OF SITE CHARACTERIZATION INVESTIGATION

LUST File #0922.01
Facility ID #0-002943
Maricopa County

Layke Incorporated
3330 W. Osborn
Phoenix, Arizona 85017

Dear Mr. Apodaca:

The Arizona Department of Environmental Quality (ADEQ), UST Corrective Action Section/Site Investigation Unit (SIU), has reviewed the referenced open leaking underground storage tank (LUST) file and associated reports. The most recent document in this file is a May 1997 report titled "*Phase III Site Restoration Soil Vapor Extraction System Evaluation Quarterly Status Report, First Quarter 1997*" prepared by Verde.

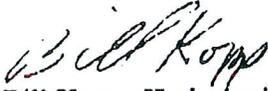
Based on this review, it appears that the vertical and horizontal extent of petroleum hydrocarbon contamination (PHC) in the soils resulting from the reference release, have been adequately defined. The maximum vertical extent of BTEX contamination in the soil is defined at a depth of approximately 30 feet below ground surface (bgs). The BTEX levels reported in soil borings at the release site are below the Interim Soil Remediation Levels, therefore, no additional remediation is required. Low levels of trichloroethane (TCE) were identified in soil borings within a clayey silt layer at approximately 60 to 70 feet bgs; however, the reported levels are below the Interim and Final Soil Remediation Levels. Since the depth to water level is reported to be approximately 95 feet bgs, the release does not appear to be a threat to contamination of the ground water. The ADEQ is not requiring further investigation or remediation of the reported release at this time. The SIU will now refer the referenced case to the Section's Case Evaluation and Ranking Team for consideration for case closure.

The ADEQ reserves the right to request additional investigations and corrective actions at sites where the work was not properly conducted according to normal industry standards. It is solely the responsibility of the owner and/or operator to ensure that all proper procedures are followed and adequately documented.

Mr. Ernest Apodaca
UST Ref. No. 98-0009034
May 29, 1998
Page 2

The ADEQ appreciates your cooperation in this matter. Please call me at (602) 207-4296 if you have any questions about this correspondence or if further clarification is needed.

Sincerely,



Bill Kopp, Hydrologist
UST Corrective Action Section/Site Investigation Unit

WPK/alr

UST Corrective Action Section/Site Investigation Unit



ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY

Governor Jane Dee Hull

Russell F. Rhoades, Director

CERTIFIED MAIL

Return Receipt Request

UST Ref. #98-0009784

June 11, 1998

Mr. Ernest Apodaca
Layke, Inc.
Post Office Box 11069
Phoenix, Arizona 85061

RE: CASE CLOSURE
LUST File #0922.01
Facility ID #0-002943
Maricopa County

Petroleum distillate UST system
Layke UST Facility
3330 West Osborn Road
Phoenix, Arizona 85017

Dear Mr. Apodaca:

The Arizona Department of Environmental Quality (ADEQ), Underground Storage Tank (UST) Corrective Action Section (UST Section) staff have reviewed the referenced case file. Based upon a file review, it has been determined that: 1) it appears this case is under UST jurisdiction, and 2) UST Section's investigative and remedial requirements have been satisfied. The UST release discovered on or about October 17, 1990 at this facility does not appear to be a significant threat to groundwater quality. This letter concerns the referenced release reported to the ADEQ on October 17, 1990. Further response concerning the referenced release is, therefore, not required at this time.

This LUST case file has been closed for the following reasons:

1. The referenced UST system release area was adequately investigated.
2. The vertical extent of laboratory detectable soil contamination was defined to less than 30 feet below the ground surface (bgs).
3. The lateral extent of laboratory detectable soil contamination was defined to a radius of approximately 15 feet around the release location.
4. Depth to groundwater beneath this facility has been estimated or measured to be 95 feet bgs. The source of this information is the Department of Water Resources, 1991.
5. Ex-situ soil containing contaminant concentration(s) above ADEQ's cleanup standard(s) were remediated to at or below ADEQ cleanup standard(s) using excavation to what appears to be about 12 feet bgs followed by soil disposal at the Butterfield facility.
6. Based upon a review of the case file(s) associated with the referenced UST release area(s) and on the laboratory analysis date information, the ADEQ has determined that the extent of contamination appears to have been adequately defined as of May 30, 1991. The documented results, to date, for the referenced UST release(s) indicate that contaminant concentration remaining in the vadose zone is at or below the remediation standard(s) specified in R18-7-205.

3033 North Central Avenue, Phoenix, Arizona 85012, (602) 207-2300

Layke, Inc.
UST Ref. #98-0009784
June 11, 1998
Page 2

7. The maximum residual soil contaminant concentration left in the vadose zone included 3.9 mg/kg benzene, 76 mg/kg toluene, 16 mg/kg ethylbenzene, and 61 mg/kg xylenes at or about 10 feet bgs; and 3.7 mg/kg tetrachloroethylene at or about 20 feet bgs.

The ADEQ is not requiring additional work for the referenced UST release(s) at this facility at this time. However, if, in the future, evidence of previously undocumented contamination is discovered at, or emanating from, this facility, the ADEQ will require additional investigation including any necessary additional remediation.

If you anticipate or desire SAF coverage for costs associated with decommissioning any well(s), you should decommission any soil vapor and/or groundwater wells, in accordance with Arizona Department of Water Resources' requirements. For these costs to be eligible for SAF, they must meet reasonable and necessary criteria and you must conduct any such work within a time frame to submit the final report and invoices concerning this work so as to comply with the one year deadline for submitting any SAF claims, if eligible or as applicable.

The ADEQ informs you that, pursuant to A.R.S. §49-1052 (M), you have one year from the date of receiving this case closure letter to submit final applications to the State Assurance Fund (SAF). Failure to submit a claim by this deadline will forfeit your rights, if release(s) and/or tank(s) are eligible, for SAF reimbursement.

Informal and Formal Appeal Rights

Pursuant to A.R.S. §49-1091, you have 30 days after receipt of this letter to request an informal appeal to this interim decision. Any informal appeal should contain specific portions of this interim decision with which you disagree. The informal appeal process also allows you to request a meeting with ADEQ. **Because ADEQ staff have completed its review of all available data relating to the referenced UST release(s) and unless you disagree by filing an informal appeal, the ADEQ will adopt this interim decision as a final decision 31 calendar days after you receive this letter.** When this decision becomes final, you have the right to appeal this decision in accordance with R18-12-610 and A.R.S. §41-1092.02 et. seq.

The ADEQ appreciates your efforts to protect human health and Arizona's environment. This letter does not affect the status of any other ADEQ program or ADEQ UST Section case file for this facility. Please contact me with questions at (602) 207-4292.

Sincerely,



Quinn Thacker, RES
Environmental Program Specialist
Closure & Ranking Team Supervisor
UST Corrective Action Section Technical Support Unit
QRT:lsr
cc: ADEQ SAF Claims Contractor

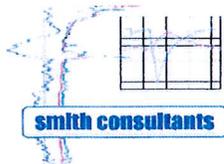
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WQARF SITE EVALUATION OF LAYKE, INC.

3330 WEST OSBORN ROAD, PHOENIX, ARIZONA

prepared for
LAYKE, INC.

c/o Mr. Dan Muchow
Quarles & Brady Streich Lang LLP
Renaissance One
Two North Central Avenue
Phoenix, Arizona 85004-2391



Smith Consultants

1050 East Southern Avenue, Suite B7
Tempe, Arizona 85282
voice: 480-829-6861
fax: 480-517-0509

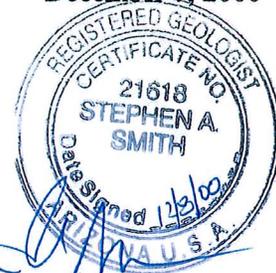
December 7, 2000

WQARF Site Evaluation of Layke, Inc.
3330 West Osborn Road, Phoenix, Arizona

**WQARF SITE EVALUATION OF
LAYKE, INC., 3330 WEST OSBORN ROAD
PHOENIX, ARIZONA**

prepared for
LAYKE, INC.
c/o Mr. Dan Muchow
Quarles & Brady
One East Camelback Road, Suite 400
Phoenix, Arizona 85012

December 7, 2000



Stephen A. Smith, RG

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1.0 INTRODUCTION

1.1 PURPOSE

This report has been prepared by Smith Consultants on behalf of Layke, Inc. in support of an application for a decision of no further action (NFA) from the Arizona Department of Environmental Quality (ADEQ). Layke, Inc. is presently listed on the ADEQ's registry of Water Quality Assurance Revolving Fund (WQARF) sites. However, the site has been remediated, and there is no present evidence of soil or groundwater contamination. Therefore, it is eligible for a decision of NFA.

1.2 BACKGROUND

Layke operates a precision machine shop that manufactures components for the aircraft and aerospace industries and has been located at 3330 West Osborn Road since 1967. Layke was named as a potential responsible party (PRP) in the former West Central Phoenix (WCP) WQARF site, an approximately 8-square-mile area of regional groundwater contamination due to trichloroethylene (TCE) and other halogenated solvents.

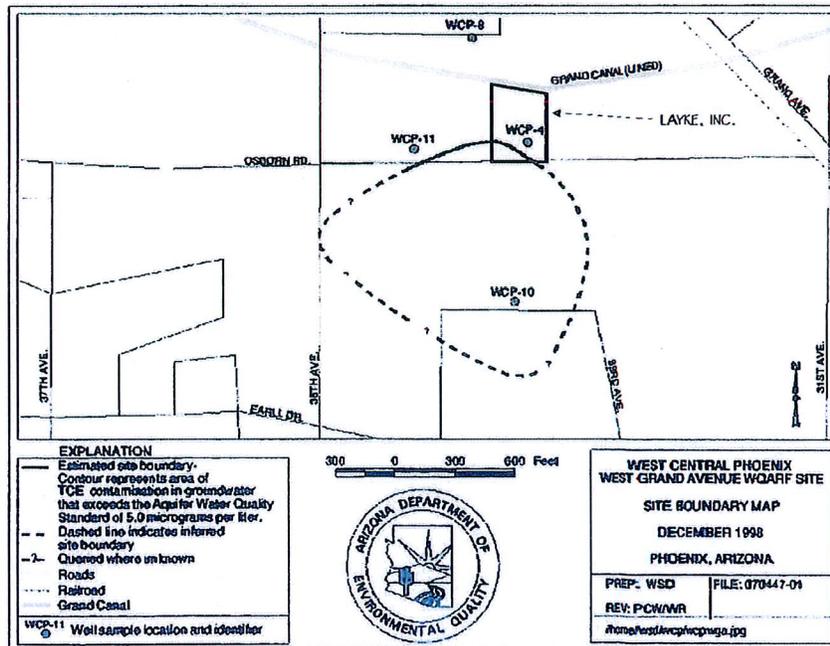


Figure 1. WCP West Grand Avenue WQARF Registry Site

December 7, 2000

*WQARF Site Evaluation of Layke, Inc.
3330 West Osborn Road, Phoenix, Arizona*

In 1998, the former WCP WQARF site was subdivided into five smaller WQARF registry sites. Layke was included in the WCP West Grand Avenue Registry Site (Figure 1), an irregularly-shaped area of about 25 acres. Significantly, the WCP West Grand Avenue Site encompasses only the extreme southwest corner of the Layke, Inc. property and does not include either: (1) the only on-site well at Layke, WCP-4, or (2) the only suspected source of contamination at Layke, a former underground storage tank (UST) that held waste cutting oil. The former UST was located about 8 feet north of WCP-4.

2.0 UST INVESTIGATION AND REMEDIATION

2.1 INITIAL INVESTIGATION BY ADEQ

The first investigation at Layke was carried out by the ADEQ, which conducted a site inspection at Layke in April 1989 (*Site Inspection Report, August 8, 1989*). During the site inspection, the ADEQ gave particular attention to two areas (Figure 2):

- A concrete underground storage tank (UST) that stored used water-soluble cutting oil, and
- A drum storage area.

Layke had contracts with waste haulers to regularly pump out the UST and pick up drums. Contents were recycled or disposed of off-site.

On July 19, 1989, the ADEQ undertook a field investigation at Layke. Using a cone penetrometer, it sampled soil gas at depths of 10.5 and 10.2 feet at LAY-1 and LAY-2, respectively (Figure 2), and it collected a soil sample at a depth between 15 and 16 feet at LAY-2. Soil-gas

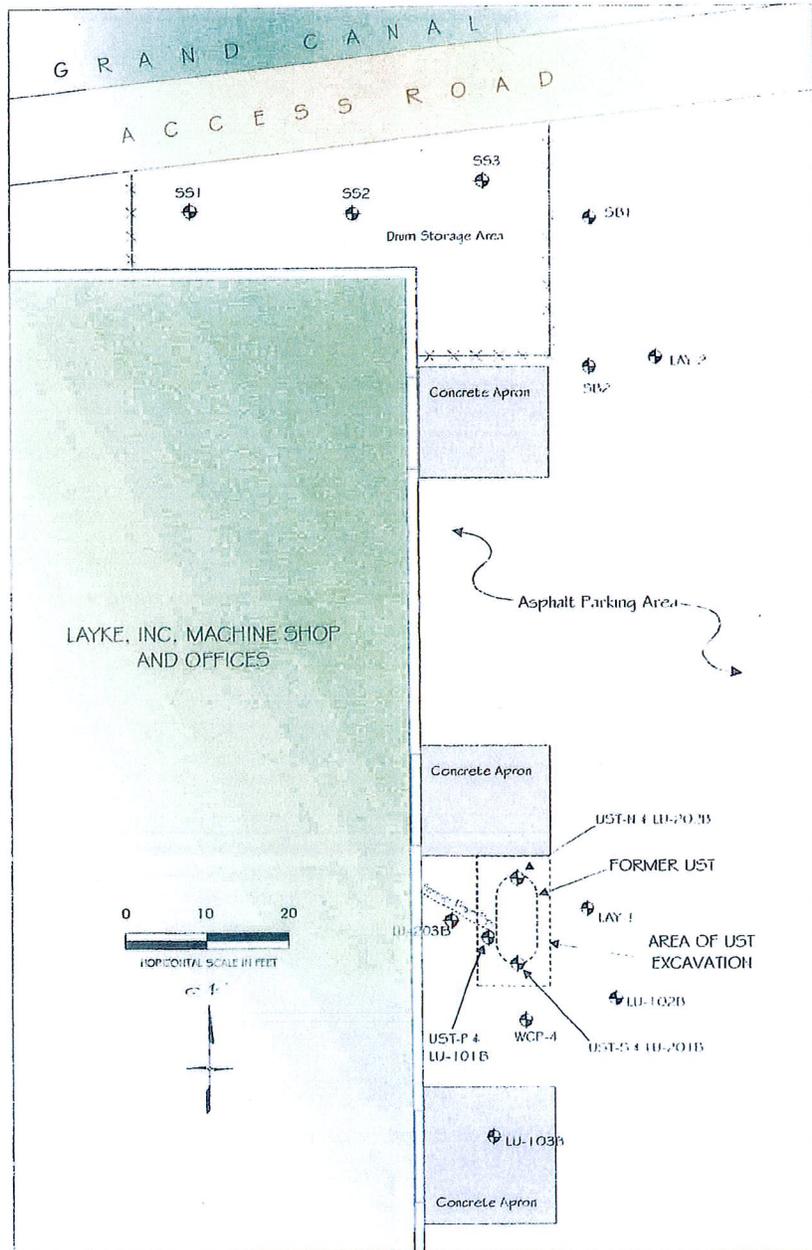


Figure 2. Site Map.

results are summarized on Table 1. Results of soil analyses were not reported by the ADEQ.

In soil gas, trichloroethylene (TCE) occurred in the highest concentration. Trichloroethane, perchloroethylene, and total hydrocarbons (TCA, PCE, and THC) were also detected, but concentrations were lower. Highest concentrations of all the volatile compounds (VOCs) that were detected occurred at LAY-1, near the UST.

Based on these results, the ADEQ referred the site for further investigation and remedial action, and in a January 19, 1990 letter, it requested a workplan from Layke for such activities. The workplan and the results of the subsequent investigations are described in the following section.

| Analyte | LAY-1 (ug/L) | LAY-2 (ug/L) |
|---------------|-----------------|-----------------|
| 1,1-DCE | <0.6 | <1 |
| trans-1,2-DCE | <8 | <19 |
| 1,1,1-TCA | 46 | 3 |
| TCE | 910 | 56 |
| PCE | 0.4 | <0.05 |
| THC | 390 | 55 |

Table 1. Soil-Gas Results

2.2 INVESTIGATION BY LAYKE

On behalf of Layke, Applied Environmental Consultants (AEC) prepared a March 7, 1990 work plan for additional investigation at Layke, *Workplan for a Remedial Investigation/Feasibility Study of the Layke, Inc. Facility*. The workplan provided for:

- An evaluation of existing and current operations at Layke and
- The preparation and implementation of phased sampling plans for soil and, if necessary, groundwater.

2.2.1 Phase 1 Soil Investigation

AEC submitted an approved Phase 1 workplan to the ADEQ on June 15, 1990, and it implemented Phase 1 sampling in September and October 1990. Results were reported in the December 6, 1990 report, *Summary of Phase I Testing at Layke, Inc. and Proposed Phase II Testing*. For Phase 1, AEC collected and analyzed:

- One sample of sludge from the UST (UST-VOC),
- Five soil samples at the storage area (SS1, SS2, SS3, SB1, and SB2), and
- Three soil samples from beneath the UST, after it was removed (UST-N, UST-S, and UST-P).

Locations of the soil samples are shown on Figure 2.

All Phase 1 samples were analyzed for VOCs, and the sludge from the UST was also analyzed for heavy metals. With the exception of trace levels in a few samples, no VOCs were detected in samples collected from the storage area, and the concentrations of metals in the sludge were also low.¹

VOCs were detected in the sample of sludge and in soil samples collected from the UST excavation. Results are summarized on Table 2, along with the non-residential soil remediation levels (NRSRLs) of the ADEQ.

Highest concentrations of most compounds were measured in sample UST-VOC, which was collected from the sludge in the UST prior to its removal. This sludge was removed and disposed of off-site, along with the UST itself.

A sample that was collected from soil below the drain

| Analyte | UST-VOC (mg/kg) | UST-N (mg/kg) | UST-S (mg/kg) | UST-P (mg/kg) | NRSRL (mg/kg) |
|--------------------------------------|-----------------|---------------|---------------|---------------|---------------|
| Benzene | 4 | ND | ND | ND | 1.4 |
| Chloroform | ND | 0.01 | ND | 1.3 | 5.3 |
| Chloromethane | 1 | ND | ND | ND | 26.0 |
| 1,3-Dichlorobenzene | ND | 0.26 | 0.09 | 6.2 | 2000 |
| 1,2- and 1,4-Dichlorobenzene | ND | 0.33 | 0.07 | 6.7 | 3900, 7900 |
| 1,1-Dichloroethane | 8 | ND | ND | 0.6 | 1700 |
| 1,1-Dichloroethylene | 2 | ND | ND | ND | 0.8 |
| 1,2-Dichloroethylene | 50 | ND | ND | ND | 120 |
| Ethylbenzene | 10 | 0.03 | 0.65 | 8.7 | 2700 |
| Tetrachloroethylene (PCE) | 24 | 0.20 | 0.60 | 4.9 | 170 |
| Toluene | 200 | 0.50 | 1.90 | 10 | 1E6 |
| 1,1,1-Trichloroethane (TCA) | ND | 0.05 | ND | 6.2 | 4800 |
| Trichloroethylene (TCE) | 1400 | ND | 20.8 | 230 | 70 |
| Total Xylenes | 52 | 0.08 | 0.95 | 7.7 | 2800 |
| Ethyl Ether | 0.85 | ND | ND | ND | 3800 |
| Methyl Ethyl Ketone | 9.70 | ND | ND | ND | 27,000 |
| Methyl Isobutyl Ketone | 120 | ND | ND | ND | 2800 |
| Total Petroleum Hydrocarbons (418.1) | Not tested | 5200 | 19,000 | 21,000 | 18,000* |

*The NRSRL for TPH is based on an C10-C32 chain length hydrocarbons, which cannot be distinguished by Method 418.1. See text for additional explanation.

Table 2. Results of Phase 1 Soil Samples

¹Neither concentrations of VOCs in soil samples from the storage area nor concentrations of metals in sludge exceed what are now the non-residential soil remediation levels (NRSRLs) of the ADEQ. The ADEQ established NRSRLs in 1997, six years after the soil investigation was completed.

pipe², UST-P, was the only other Phase 1 sample in which concentrations of any VOCs exceeded the NRSRLs. And, TCE was the only VOC for which the concentration exceeded the NRSRL.

TPH was detected in all three UST soil samples, and the concentration was highest in UST-P and UST-S. However, because of the analytical method that was used for TPH, the concentrations cannot be directly compared to the NRSRL.³

2.2.2 Phase 2 Soil Investigation

In its Phase 1 report, AEC recommended additional sampling and analysis of soil in the vicinity of the former UST, and this recommendation was accepted by the ADEQ. In May 1991, on behalf of Layke, The GeoWest Group drilled seven soil borings at and near the UST. Results were reported in The GeoWest Group's June 14, 1991 report *Results of Investigation at Layke, Inc.* Locations of borings are shown on Figure 2.

Borings LU-101B, -201B, and -202B were drilled at the location of the Phase 1 UST soil samples to evaluate the vertical extent of VOCs in soil. The other four borings were drilled to evaluate the lateral extent of VOCs and were offset from the first three by distances ranging from about 5 feet (LU-203B) to 22 feet (LU-103B). Samples from all the borings were collected at 10-foot intervals for laboratory analysis of VOCs. A total of 45 sample originals and three duplicates were analyzed.

The depths of the borings varied. LU-101B, at the former drain pipe was the deepest, 90 feet, and LU-204B was shallowest, 40 feet. At the time of the Phase 2 work, the estimated depth to groundwater was about 90 feet, based on a 1989 measurement in a nearby unused production well.⁴ After borings LU-201B, -202B, and -203B were drilled and sampled, 2-inch diameter PVC screen and casing were installed so that they could eventually be used for soil remediation by soil vapor extraction (SVE).

²A sink inside the machine shop was connected to the UST via a buried drain pipe. There were no other connections to the UST, and there was no external fill port.

³The NRSRL for TPH in soil is based on the fraction of TPH that has a carbon chain length of C10 to C32 (diesel fuel range). Method 418.1, which was the accepted method for measuring TPH at the time of the Layke investigation, cannot be used to distinguish chain length. However, it is unlikely that the concentration of TPH in the C10 to C32 range at Layke would have exceeded the present-day NRSRL. Petroleum hydrocarbons that were disposed of in the UST were mainly waste cutting oil, which has a carbon chain length greater than C32.

⁴The unused well, which is referred to in various reports as the Lansdale well, the Pincus well, and/or the WOC irrigation well, is located at the West Osborn Complex, about 0.5 mile west of Layke.

| Sample | TPH (mg/kg) | Benzene (mg/kg) | Toluene (mg/kg) | Ethylbenzene (mg/kg) | Xylenes (mg/kg) |
|------------|-------------|-----------------|-----------------|----------------------|-----------------|
| LU-101B-10 | 23,000 | 3.9 | 76 | 16 | 61 |
| LU-101B-20 | 6,600 | ND | 1.4 | ND | 0.59 |
| LU-201B-20 | 2,000 | ND | ND | ND | ND |
| LU-202B-20 | 600 | ND | ND | ND | ND |
| LU-203B-20 | 1,700 | ND | ND | ND | ND |
| LU-203B-20 | ND | ND | ND | ND | ND |
| NRSRL | 18,000 | 1.4 | 1,000,000 | 2700 | 2800 |

Table 3. Petroleum Hydrocarbons in Phase 2 Soil Samples

In the boreholes drilled closest to the former UST, TPH and BTEX compounds were detected in the 10- and 20-foot samples. These results are summarized on Table 3, along with the NRSRLs.

Halogenated compounds were detected in 13 of the 45 samples from the seven borings (29 percent). TCE, PCE, TCA, and chloroform (CLFM) were present, and dichlorobenzene was also detected at a trace level in one sample. Except for dichlorobenzene, these results are summarized on Table 4, which also presents the NRSRLs and the minimum groundwater protection levels (GPLs).

Minimum GPLs are soil standards that represent the concentrations of VOCs that are protective of groundwater quality in a worst-case situation, that is, when the

| Sample | TCE (mg/kg) | TCA (mg/kg) | PCE (mg/kg) | CLFM (mg/kg) |
|-------------|-------------|-------------|-------------|-----------------|
| LU-101B-10 | 76 | ND | 2.2 | ND |
| LU-101B-20 | 3.7 | ND | 0.35 | ND |
| LU-102B-60 | 0.021 | ND | ND | ND |
| LU-103B-60 | ND | 0.010 | ND | ND |
| LU-201B-20 | 0.6 | ND | ND | ND |
| LU-201B-30 | 0.02 | ND | ND | 0.1 |
| LU-201B-60 | 0.15 | ND | ND | ND |
| LU-201B-65 | 0.02 | ND | ND | ND |
| LU-202B-20 | 0.03 | ND | ND | 0.01 |
| LU-202B-60 | 0.24 | ND | ND | 0.01 |
| LU-203B-20 | 0.81 | ND | 0.05 | 0.07 |
| LU-203B-30 | 0.01 | ND | ND | 0.01 |
| LU-204B-30 | 0.03 | ND | ND | ND |
| NRSRL | 70 | 4800 | 170 | 5.3 |
| Minimum GPL | .61 | 1 | 1.3 | Not established |

Table 4. Halogenated VOCs in Phase 2 Soil Samples

soil profile is contaminated from the ground surface to the water table. If soil contamination does not extend to the water table, applicable GPLs are higher than the minimum values.

Minimum GPLs represent a more restrictive cleanup standard than NRSRLs. NRSRLs are concentrations that are protective of human health due to ingestion, direct exposure, or inhalation. GPLs, on the other hand, are derived from an ADEQ soil leaching model that predicts soil concentrations that will not cause a violation of an aquifer water quality standard. The ADEQ's model uses conservative assumptions, including an infiltration rate of 1 inch per year, which is implausible in a paved setting in Central Arizona such as Layke.

Notwithstanding the conservatism of the GPLs, it is clear that, with the exception of TCE in the shallowest soil at LU-101B, LU-201B, and LU-203B, the VOCs in soil at Layke did not represent a threat to groundwater quality. Where VOCs were detected below a depth of 20 feet,⁵ concentrations were a fraction of the GPLs. And, after the subsequent operation of a soil remediation system (discussed later), concentrations were reduced further.

2.3 HISTORICAL CHEMICAL AND SOLVENT USAGE

At about the same time that The GeoWest Group was conducting its soil investigation, AEC completed a June 14, 1991 report on historical use of chemicals and solvents, *Chemical Usage and Disposal Practices at Layke, Inc.* The report was prepared on behalf of Layke, and significant findings were that:

- From 1967, when Layke first started business at 3330 West Osborn Road, to about 1970, there was little if any use of TCE or other halogenated solvents. During this period, a parts washer was used for degreasing.
- In 1969, Layke acquired a vapor degreaser and also purchased TCE for use as a solvent. However, the vapor degreaser was not used for several years, and, because of the high cost, the use of TCE as a general solvent was discouraged.
- In 1978, Layke decommissioned its parts washer and began to use the vapor degreaser with TCE as a solvent. From 1977, the earliest date that records were available, to 1985, Layke's annual purchases of TCE ranged from 165 to 385 gallons. After 1985, it did not purchase TCE. TCA and PCE were also purchased, and only TCA was

⁵At boreholes close to the former UST, imported backfill extended to a depth of about 15 feet; therefore, samples shallower than 20 feet were not collected for analysis.

purchased from 1986 to 1988. In 1987, the vapor degreaser was decommissioned, and it was sold in 1989.

- After 1988, Layke did not purchase halogenated solvents.

Layke stored waste oils and solvents in 55-gallon drums, either inside the building or in the drum storage area. Water soluble oils were disposed of in the sink that was connected to the outside UST via the underground drain pipe (Figure 2). From time to time, small quantities of TCE or other solvents may have been disposed of into the sink and UST.

Based on AEC's report and the results of Phase 1 and Phase 2 soil sampling, it appears that the UST at Layke leaked through the seam under the lid and also at the connection with the drain pipe. However, the volume of leakage cannot be estimated, and the quantity of solvent purchased cannot be reconciled with the quantity disposed of. Most solvent was consumed by evaporation in the machine shop. Layke contracted with waste haulers to regularly pump out and dispose of the contents of the UST, but available records are incomplete, and tank contents consisted mainly of a mixture of water soluble cutting oil and water.

2.4 SVE SYSTEM OPERATION

In March 1995, with the approval and oversight of the ADEQ, Layke constructed and operated a soil vapor extraction (SVE) system at the location of the former UST. The system consisted of the three 2-inch SVE wells that had been constructed by The GeoWest Group in borings LU-201B, -202B, and -203B (Figure 2), a moisture separator, and a vacuum blower. SVE wells at LU-201B and LU-202B were both 60 feet deep and were screened from 10 to 60 feet. The SVE well at LU-203B was 48 feet deep and was screened from 10 to 48 feet.

During its first few days of operation, the SVE system removed TCE from the soil at a high rate. However, the concentration of TCE in the exhaust vapor declined, and after about 6 months, the rate of removal was about 0.1 pound per day. In its January 15, 1996 report, *Evaluation of Documents Pertaining to Air Emissions of Trichloroethylene (TCE) from the Soil Vapor Extraction Unit at Layke, Inc.*, AEC estimated that the SVE system removed about 100 pounds of TCE during the period from March 29 through October 31, 1995. The ADEQ's contractor, using a different method of calculation, estimated that the system may have removed as much as 250 to 300 pounds during its first six months of operation.

Verde Environmental Services operated the SVE system on behalf of Layke from March 1995 to June 1998 and submitted quarterly status monitoring reports to the ADEQ and Maricopa County. The SVE equipment is still present at Layke, but it has not been operated for more than 2 years. It was shut down when VOCs were no longer detectable in the system exhaust.

2.5 UST CASE FILE CLOSURE

Based on the results of the SVE system operation and the site characterization activities, the ADEQ granted UST case file closure to Layke on June 11, 1998. In the closure letter, the ADEQ stated that:

“the UST release...does not appear to be a significant threat to groundwater quality”.⁶

⁶June 11, 1998 letter from Mr. Quinn Thacker, Arizona Department of Environmental Quality, UST Corrective Action Section Technical Support Unit, to Mr. Ernest Apodaca, Layke, Inc., *Case Closure, LUST File #0922.01, Facility ID #0-002943, Maricopa County.*

3.0 GROUNDWATER

3.1 LAYKE'S WORK PLAN FOR GROUNDWATER INVESTIGATION

After reviewing the findings of AEC and The GeoWest Group, the ADEQ requested that Layke conduct a groundwater investigation. In response to the request, EMCON, on behalf of Layke, prepared a *Work Plan for Ground-Water Investigation at Layke, Inc.* dated October 7, 1991. The work plan described a phased approach to a groundwater investigation. In the first phase, one monitor well would be constructed close to the former UST. The decision to drill additional wells, if any, would be based on the results from the first well.

Because of budgeting concerns, Layke did not implement EMCON's groundwater investigation. Subsequent work at the site, as described in the following section, was conducted by the ADEQ and its contractors.

3.2 GROUNDWATER INVESTIGATION BY THE ADEQ AT LAYKE

The ADEQ implemented a phased groundwater investigation at Layke similar to the one proposed by EMCON. In May 1992, the ADEQ's contractor, The Earth Technology Corporation, drilled one on-site monitor well, WCP-4, about 8 feet south of the former UST (Figures 2 and 3). Three rounds of samples were then collected over the next three years.

In February 1995, the ADEQ drilled two additional wells to further evaluate groundwater contamination near Layke. One well was drilled south (WCP-10) and the other well was drilled west (WCP-11) of the Layke facility (Figure 3).

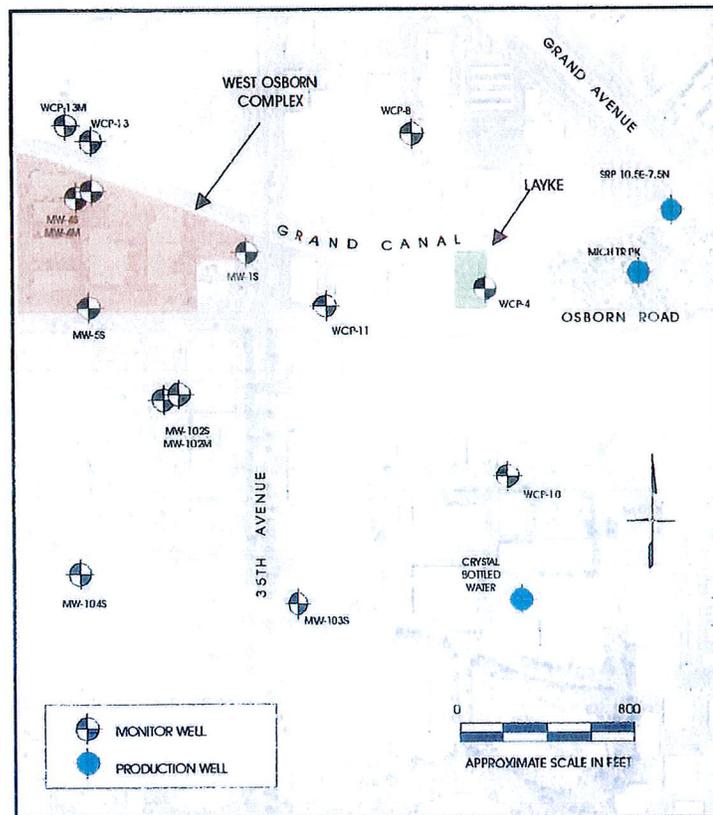


Figure 3. Wells near Layke, Inc.

All three wells that the ADEQ drilled for the Layke investigation have similar construction. Depths range from 125 to 130 feet, casing and screen are 4-inch diameter PVC, and the lower 40 feet of each well is screened.

The ADEQ collected soil samples for laboratory analysis only at WCP-4, and VOCs were detected only in the 94.5-foot sample. TCE was present at a concentration of 80 ug/kg. At the time that the well was drilled, the depth to groundwater at Layke was about 94.5 feet, so the soil sample was collected from the top of the saturated zone. Groundwater transport, rather than a source in the vadose zone, is the likely origin for the TCE in the soil sample.⁷

3.4 GROUNDWATER MOVEMENT

The direction of groundwater movement near Layke has been evaluated as part of other groundwater investigations, including the remedial investigation and feasibility study (RI/FS) at the nearby West Osborn Complex (WOC). Many of the wells shown on Figure 3 were installed as part of the WOC RI/FS, and from 1996 to 1999, most were measured monthly and sampled quarterly under the terms of a Consent Order.⁸ Since 1999, the ADEQ has made monthly water level measurements.

The results of water level measurements, particularly the most recent ones made by the ADEQ, show that the direction of groundwater movement near Layke is variable and is strongly influenced by pumping from the nearby SRP irrigation well 10.5E-7.5N. In the early part of the 1999 irrigation season, after an unusually dry winter, SRP began pumping many of its wells, including 10.5E-7.5N, to supplement surface water supplies in the canal

⁷If all the TCE at a concentration of 80 ug/kg in a saturated soil sample originated in the pore water, the pore water concentration would be about 350 ug/L (using a density of 2.7 kg/L for soil grains and a soil porosity of 0.33). This is within the range of TCE concentrations measured in the first groundwater samples from WCP-4 (340 to 420 ug/L).

⁸Other monitor wells not shown on Figure 3 were also sampled. Most are north, west, and south of the WOC.

system. The maximum drawdown in 1999 occurred in April,⁹ although effects of pumpage are also evident in water level measurements for the prior month. After April, in which total pumpage was 161 acre feet, the well was not pumped again in 1999, according to SRP records.¹⁰

Figure 4 shows the influence of pumping on water levels and the direction of groundwater flow.¹¹ Even though the SRP well was only being operated part of the time, the drawdown cone extended about 0.5 mile west and included both Layke and the east end of the WOC, where TCE concentrations have historically been much higher than at Layke. Groundwater from the WOC was being drawn toward Layke and 10.5E-7.5N. Under more prolonged pumping conditions, the drawdown cone would have become deeper and larger.

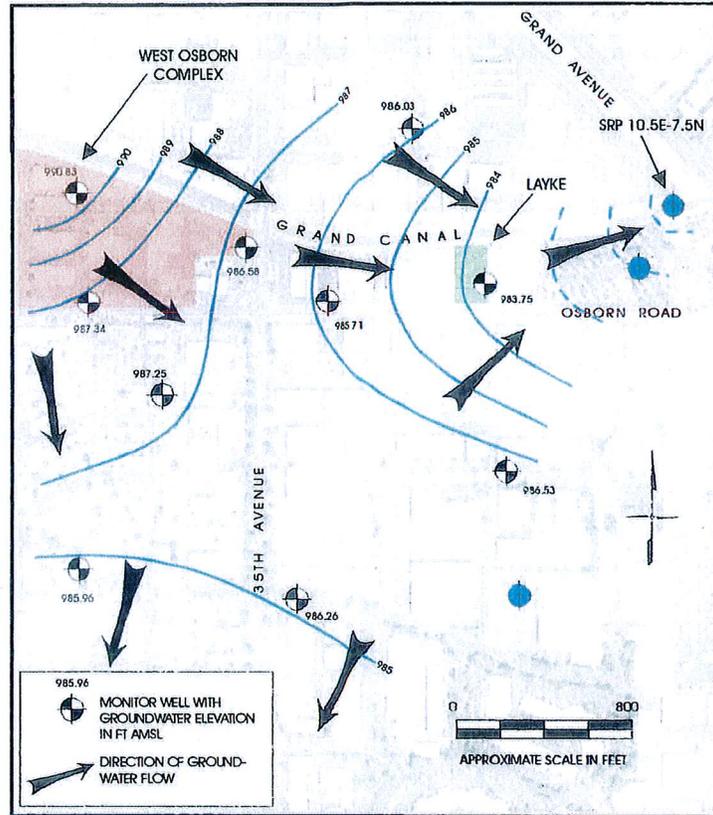


Figure 4. April 1999 Groundwater Map

Figure 5 shows the groundwater elevation and flow direction for approximately one year later, in March 2000. At the time of the March 2000 water level measurements, 10.5E-7.5N had not been pumped for 11 months, and the influence of pumping had dissipated. Groundwater at Layke and at the WOC flowed south. At Layke, the cessation of pumping caused a change in the direction of the gradient of more than 90 degrees.

⁹In April 1999, the ADEQ's contractor, Weston, began making monthly water-level measurements in the WCP WQARF Site. Figures 4 and 5 are based on Weston's measurements.

¹⁰10.5E-7.5N has a capacity of about 3,000 gpm, according to the SRP, and 161 acre-feet represents about 12 days of continuous pumping.

¹¹The direction of the horizontal component of groundwater flow (which is invariably much larger than the vertical component) can be estimated by the direction of the water table gradient in most geologic settings.

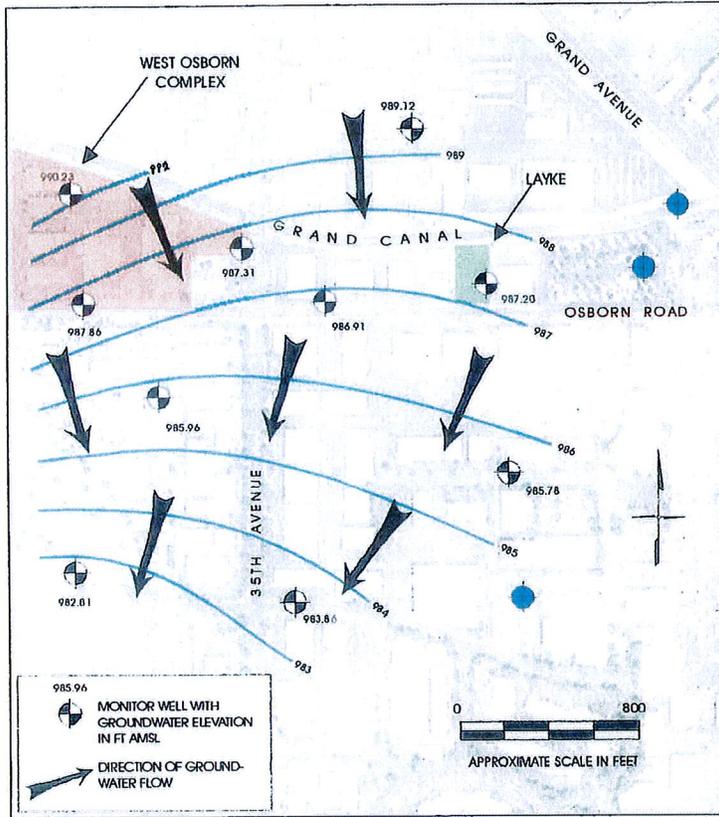


Figure 5. March 2000 Groundwater Map

The overall influence of pumping at 10.5E-7.5N during the more than 30-year period that Layke has been in operation is difficult to estimate. But, Figure 4 is probably more representative of hydrogeologic conditions prior to 1978. Prior to 1978, average annual pumpage at 10.5E-7.5N was more than 2600 acre-feet (Figure 6), which is equivalent to about 200 days per year. Significantly, the years prior to 1978 included the first 20 years of operations at the WOC, a period when the TCE plume at the WOC was initially developed and would have been susceptible to influence from pumpage.

Figure 5 is probably more representative of the present hydrogeologic conditions at Layke than Figure 4. Since 1978, average annual pumpage at 10.5E-7.5N has been about 600 acre-feet (Figure 6), which is equivalent to about 45 days of pumping each year.

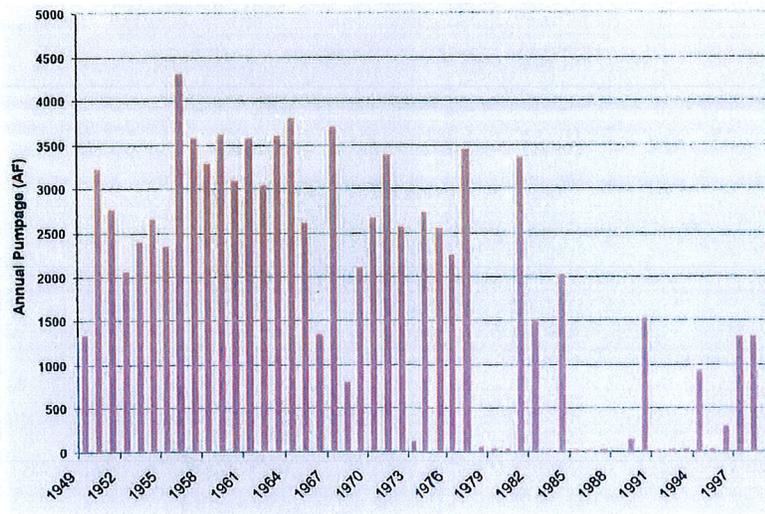


Figure 6. Annual Pumpage at 10.5E-7.5N

3.5 DISTRIBUTION OF TCE IN GROUNDWATER NEAR LAYKE

Because Layke is located between the WOC and SRP Well 10.5E-7.5N, the distribution of TCE in groundwater cannot be accurately assessed without considering potential off-site influences and historical trends. Table 5 lists historical TCE concentrations for the monitor wells near Layke. TCE was the VOC that was detected most frequently and in the highest concentration at all of these wells.¹²

The areal distribution of TCE in groundwater for February 1999 is shown on Figure 7 for shallow wells near Layke.¹³ The February 1999 sampling round is the most recent

| Date | Layke Wells | | | Other Wells | | | | | | | |
|--------|-------------|--------|--------|-------------|--------|-------|-------|-------|---------|---------|---------|
| | WCP-4 | WCP-10 | WCP-11 | WCP-8 | WCP-13 | MW-1S | MW-4S | MW-5S | MW-102S | MW-103S | MW-104S |
| May-92 | 420 | | | | | | | | | | |
| Jul-92 | 340 | | | | | | | | | | |
| Dec-92 | 370 | | | | | | | | | | |
| Jan-94 | 380 | | | | | | | | | | |
| Feb-96 | 190 | 33 | <0.5 | <0.5 | <0.5 | 25 | 40 | 37 | | | |
| Nov-96 | 2 | 16 | <0.50 | <0.50 | <0.50 | 19 | 340 | 480 | | | |
| Feb-97 | <0.50 | 15 | <0.50 | <0.50 | <0.50 | 17 | 130 | 230 | | | |
| May-97 | <0.50 | 20 | <0.50 | <0.50 | <0.50 | 27 | 600 | 230 | | | |
| Aug-97 | 0.58 | 19 | 1.5 | <0.50 | <0.50 | 73 | 480 | 140 | | | |
| Nov-97 | 0.76 | 29 | 2.1 | <0.50 | <0.50 | 58 | 170 | 97 | | | |
| Feb-98 | 1.4 | 11 | 3.8 | <0.50 | <0.50 | 65 | 25 | 96 | 60 | 59 | 32 |
| May-98 | <0.50 | 3.9 | 2.7 | <0.50 | | 37 | 7.2 | 39 | 98 | 29 | 25 |
| Aug-98 | 2.7 | 5.9 | 0.93 | <0.50 | | 45 | 15 | 110 | 49 | 28 | 67 |
| Nov-98 | 0.85 | 11 | 0.7 | <0.50 | | 46 | 4.9 | 110 | 41 | 29 | 110 |
| Feb-99 | <0.50 | 13 | 1.3 | <0.50 | | 39 | 14 | 91 | 40 | 40 | 83 |
| Jun-99 | | | | | | | | | | | 44 |
| Nov-99 | | | | | | | | | | 34 | 81 |

Table 5. TCE in Monitor Wells near Layke (ug/L)

¹²At WCP-4, TCE is the only VOC that has been detected in concentrations greater than 5 ug/L, the standard for drinking water quality and aquifer water quality.

¹³Deeper monitor wells have also been sampled, but these data are not included on Figure 5 and the wells themselves have been removed for clarity. The deeper wells occur in pairs with shallower wells and are shown on Figure 3 with an "M" suffix.

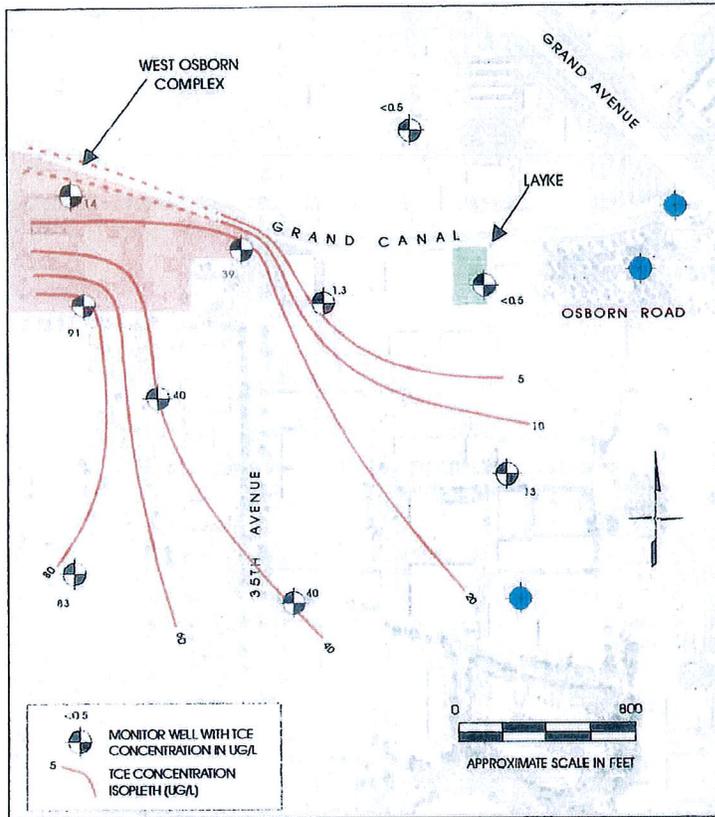


Figure 7. TCE in Groundwater, February 1999

comprehensive round of sampling and represents the last complete sampling round for the RI/FS at the WOC.

Production wells near Layke have not been tested as frequently as the monitor wells. However, in samples that have been collected at production wells, concentrations of VOCs do not exceed the AWQS. SRP Well 10.5E-7.5N has been sampled most frequently, approximately once a year since about 1988. The maximum concentration of TCE that has been detected is 0.9 ug/L.¹⁴

Highest concentrations of TCE in groundwater occur west of Layke, at the WOC. The maximum concentration that was measured in February

1999 was 91 ug/L at MW-5S. In February 1999, there was no TCE plume at Layke. TCE that is present south of Layke, at WCP-10, may have been derived from the large TCE plume at the WOC due to the influence of historical and recent pumpage.¹⁵

There has been a considerable decrease in the concentration of TCE at Layke since WCP-4 was first installed and sampled, apparently in response to the operation of the SVE

¹⁴According to SRP records, 10.5E-7.5N is 700 feet deep and is perforated from 210 to 680 feet. Therefore, water is derived from a much greater thickness of the saturated zone than at the monitor wells, which have a maximum depth of about 130 feet. When 10.5E-7.5N is pumped, any TCE that may be drawn into the top of the well from the shallow part of the aquifer is diluted many times over with uncontaminated deeper water.

¹⁵The lower concentrations of TCE at WCP-11 are not inconsistent with a WOC source for TCE at WCP-10. Until late 1997, there was a large water table mound under the Grand Canal west of 35th Avenue, and groundwater at WCP-11 was mostly recharged Canal water. Later, in January 1998, the SRP lined the Canal, and the mound dissipated. Concentrations of TCE in both WCP-11 and nearby MW-1S increased at the same time. Canal recharge did not affect WCP-10.

system (Table 5). The decrease began with the February 1996 groundwater sample, which was the first sample collected after startup of the SVE system in March 1995, continued for the next several samples, and has remained low ever since (Figure 8).

At other nearby wells, similar decreases in VOC concentrations have been correlated to a decline in the water level. However, at WCP-4, the decrease began to occur before the water level declined. Figure 8 shows that there was a small decline in the water level prior to 1996, but the biggest water level change began to occur in late 1996, after the concentration of TCE in the WCP-4 had already decreased to below the AWQS of 5 ug/L.

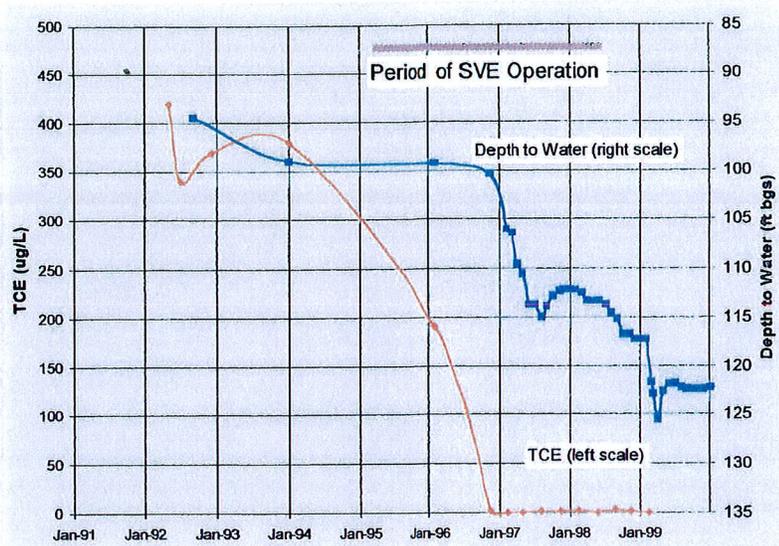


Figure 8. TCE and Water Level at WCP-4

4.0 CONCLUSIONS

TCE was released from the UST at Layke into near-surface soil. Groundwater at WCP-4 also contained TCE. However, both soil and groundwater have been effectively remediated. At the time that the SVE system was shut down, the system had removed more than 100 pounds of TCE, there was no detectable TCE in the exhaust vapor, and the concentration of TCE in groundwater had decreased below the AWQS and has remained below the AWQS. In four of the last nine groundwater samples from WCP-4, TCE has not been detected.

TCE is present at WCP-10, south of Layke, and concentrations at WCP-10 are greater than the AWQS. However, WCP-10 is within the zone of influence from SRP well 10.5E-7.5N. When the SRP well is pumping, TCE from the WOC is transported eastward, toward both WCP-10 and Layke. Eastward transport has occurred recently, and in the past, when the SRP well was pumped at higher rates, the influence of pumpage would have been even greater.

There is no evidence that groundwater beneath any part of the Layke facility is contaminated above the AWQS, and the SVE system has effectively remediated soil. The ADEQ has stated, in writing, that the UST release does not appear to be a significant threat to groundwater quality.

It is clear that the Layke facility is eligible for a decision of no further action with respect to the WCP West Grand Avenue WQARF Registry Site. Additional investigatory or remedial actions are neither necessary, feasible, nor practical.