



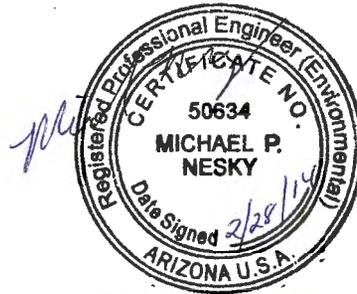
2013 Annual Monitoring Report

*UTC Aerospace Systems
Former UPCO Facility
Phoenix, Arizona*

February 2014



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Acronyms and Abbreviations

| | |
|---------|---|
| ADEQ | Arizona Department of Environmental Quality |
| ADOT | Arizona Department of Transportation |
| ADWR | Arizona Department of Water Resources |
| ASLD | Arizona State Land Department |
| AWQS | Arizona Aquifer Water Quality Standard |
| AZ HWMA | Arizona Hazardous Waste Management Act |
| bgs | below ground surface |
| COPCs | constituents of potential concern |
| 1,1-DCA | 1,1-dichloroethane |
| 1,1-DCE | 1,1-dichloroethene |
| DQO | data quality objective |
| GWMP | Groundwater Monitoring Work Plan |
| H+A | Hargis + Associates, Inc. |
| IDW | investigation-derived waste |
| LES | Liquid Environmental Solutions |
| MEK | 2-butanone |
| mg/L | milligrams per liter |
| POE | point of entry |
| ppbv | parts per billion by volume |

Acronyms and Abbreviations



| | |
|-------------------|--------------------------------------|
| PVC | polyvinyl chloride |
| QAPP | Quality Assurance Project Plan |
| QC | quality control |
| TDS | total dissolved solids |
| $\mu\text{g/L}$ | micrograms per liter |
| $\mu\text{g/m}^3$ | micrograms per cubic meter |
| UPCO | Universal Propulsion Company, Inc. |
| USEPA | U.S. Environmental Protection Agency |
| VOC | volatile organic compound |

1. Introduction

1.1 Report Summary

This Annual Monitoring Report (report) summarizes the monitoring activities conducted at the Universal Propulsion Company, Inc. (UPCO) facility (site) in Phoenix, Arizona during 2013. This report is part of a continuing overall site characterization for soil and groundwater pursuant to Part I of the Arizona Hazardous Waste Management Act (AZ HWMA) permit.

This report is supported by the Quality Assurance Project Plan (QAPP; H+A 2004a), Updated Groundwater Monitoring Work Plan (GWMP; ARCADIS 2012a), and the QAPP Addendum (ARCADIS 2012b). This report consists of the following:

- facility description;
- summary of previous groundwater investigations;
- summary of monitoring activities for the year;
- lists of wells that were sampled, including sample dates and analyses performed;
- data evaluation and verification;
- table of water level measurements including well identification, date and time of measurement, depth to water below measuring point, and groundwater elevation above mean sea level;
- table of analytical data;
- hydrographs for the UPCO facility groundwater monitor wells;
- maps of groundwater elevation data;
- trend graphs of perchlorate concentrations for the UPCO facility groundwater monitor wells;
- investigation-derived waste (IDW) documentation;
- copies of laboratory reports and data verification summaries; and
- recommendations for updates to the monitoring plan.

1.2 Site Description

The UPCO operations were transferred to a facility in Fairfield, California in the fourth quarter of 2009. Demolition of the UPCO facility occurred throughout 2009 and was completed in January 2010. The site is located approximately 2 miles north of the Deer Valley Airport, Phoenix, Arizona (Figure 1). Specifically, the facility was at the intersection of Central Avenue and Happy Valley Road at 25401 North Central Avenue. The site is within the southeast quarter of Section 5, Township 4 North, Range 3 East of the Gila and Salt River Baseline and Meridian. The UPCO operations were located on approximately 160 acres of land leased from the State of Arizona and consisted of numerous manufacturing and administrative buildings (Figure 2). A chain link fence surrounds the former manufacturing areas and restricts general access. Locks secure each gate and well vault to limit access and deter vandalism.

2. Monitoring Network

The following types of wells were utilized for the monitoring program in 2013:

- UPCO monitor wells and original facility production well;
- private domestic wells; and
- a nested soil vapor monitor well.

The primary objective of groundwater monitoring is to provide data to assess groundwater conditions at and near the facility. The study area for monitoring during 2013 included the site, private residences along the northern property boundary, and areas approximately ½ mile to the west, south, and east of the property boundary.

The primary objective of the soil vapor monitoring is to monitor the vertical distribution of constituents of potential concern (COPCs) in soil gas beneath the suspected volatile organic compound (VOC) source area in the former B-Complex area (Figure 2).

2.1 UPCO Groundwater Monitor Wells

The locations of the UPCO monitor wells are shown on Figure 3. Table 1 includes a summary of the locations and well construction details for UPCO monitor wells and original facility production well PW-1. Additional information regarding drilling and well construction details for the UPCO groundwater monitor wells was previously provided under separate cover in the following reports:

- Phase I Monitoring Well Construction Summary Report (H+A 2004b)
- Phase II Monitoring Well Installation Report (Malcolm Pirnie 2005)
- Phase III Monitoring Well Installation Report (Malcolm Pirnie 2006)
- Final Remedial Investigation Report (ARCADIS 2011a)
- Final 2009 Annual Monitoring Report (Malcolm Pirnie 2010)
- Final 2010 Annual Monitoring Report (ARCADIS 2011b)
- Final 2011 Annual Monitoring Report (ARCADIS 2012c)
- Final 2012 Annual Monitoring Report (ARCADIS 2013)

2.2 Private Domestic Wells

Beginning in 2004, UPCO collected groundwater samples from private wells located along Yearling Road in accordance with Consent Order (Order) No. P-136-04. The Order specified that UPCO collect semiannual groundwater samples from private wells located along Yearling Road north of the site for perchlorate analysis for a period of 2 years. UPCO voluntarily extended the semiannual private well sampling program beyond the first 2 years, collecting groundwater samples from various private wells according to owner requests and authorization. That Order was terminated and replaced with conditions in the AZ HWMA permit; the AZ HWMA Permit Condition III.C.1 requires semiannual private well sampling. Table 2 summarizes the locations and well construction details for private wells that are currently included in the monitoring program. The locations of the private wells are shown on Figure 4.

2.3 Soil Vapor Monitor Well

Beginning in 2008, UPCO began collecting soil gas samples from a nested soil vapor monitor well (SVMW-1) in the former B-Complex area. The nested soil vapor monitor well is used to monitor for potential vertical migration of VOCs in soil vapor. The location of SVMW-1 is shown on Figure 3. Table 1 includes a summary of screened intervals for SVMW-1. Additional information regarding drilling and well construction details for the soil vapor monitor well was previously provided under separate cover in the Final Remedial Investigation Report (ARCADIS 2011a).

3. Monitoring Activities

3.1 Historical Groundwater Investigation Activities

A summary of previous groundwater investigation activities is presented below. Additional information regarding previous activities was previously provided under separate cover in the following reports:

- Final Remedial Investigation Report (ARCADIS 2011a)
- Final 2010 Annual Monitoring Report (ARCADIS 2011b)
- Final 2011 Annual Monitoring Report (ARCADIS 2012c)
- Final 2012 Annual Monitoring Report (ARCADIS 2013)

3.1.1 2004 - 2012 Activities

3.1.1.1 Monitor Wells

Monitor wells MW-1 through MW-12 were installed during 2004 and 2005. From 2004 through 2012, perchlorate has been detected in MW-1, MW-2, MW-5, and MW-6 at concentrations ranging between 6.4 micrograms per liter ($\mu\text{g/L}$) and 130 $\mu\text{g/L}$. Perchlorate was detected in samples collected from MW-9, MW-10, and MW-11 at concentration ranging from less than the laboratory reporting limit of



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U.S. Environmental Protection Agency (USEPA) method 314.0 (2 µg/L) to 2.6 µg/L. Perchlorate was not detected above 2 µg/L in samples collected from MW-3, MW-4, MW-7, MW-8, or MW-12.

Monitor wells MW-13, MW-14, and MW-15 were installed in 2008. From 2008 through 2012, perchlorate has been detected in samples collected from MW-13 at concentrations ranging from 6.4 µg/L to 330 µg/L and from MW-14 at concentrations ranging from less than the laboratory reporting limit (2 µg/L) to 2.5 µg/L. Perchlorate has not been detected above the laboratory reporting limit (2 µg/L) in samples collected from MW-15.

Monitor well MW-18 was installed in 2009. Perchlorate was not detected above the laboratory reporting limit (2 µg/L) between 2009 and 2012.

Monitor wells MW-16, MW-17, and MW-19 were installed during the second quarter of 2011. Perchlorate was detected in samples collected from MW-19 at concentrations ranging from 33,000 µg/L to 55,000 µg/L between 2011 and 2012. Perchlorate was not detected above the laboratory reporting limit (2 µg/L) in MW-16 or MW-17 between 2011 and 2012.

Monitor wells MW-20 and MW-21 were installed in the first quarter of 2012. Perchlorate was detected in samples collected from MW-20 at concentrations ranging from 400 µg/L to 430 µg/L and from MW-21 at concentrations ranging from 5.5 µg/L to 6.2 µg/L in 2012.

Groundwater samples were not collected from site monitor wells in the fourth quarter of 2012 pending Arizona State Land Department (ASLD) approval of Special Land Use Permits.

Depth to groundwater measurements have been collected monthly from the UPCO monitor wells since 2004. Pressure transducers were installed in various UPCO monitor wells and private domestic wells periodically between 2007 and 2010 in an effort to expand the evaluation of the hydrogeological conditions at the site. Additional information regarding the collection of pressure transducer data was

previously provided under separate cover in the Final 2010 Annual Monitoring Report (ARCADIS 2011b) and the Final Remedial Investigation Report (ARCADIS 2011a).

3.1.1.2 Facility Monitoring Locations

The UPCO facility production well (PW-1) and former point of entry (POE) to the potable water system were sampled periodically as part of county requirements for water service providers from 2004 through 2009. PW-1 was not sampled in 2010 due to removal of the pump's power source that occurred during site demolition activities. Sampling of PW-1 resumed in the first quarter of 2011. Since 2004, perchlorate has been detected in PW-1 at concentrations ranging from 1.4 µg/L to 5.9 µg/L. PW-1 was not sampled in the fourth quarter of 2012 pending ASLD approval of Special Land Use Permits. From 2004 through the first quarter of 2009, perchlorate was detected at the POE at concentrations ranging from less than 2 µg/L to 3.0 µg/L. The location of the POE prior to site demolition, at the sink in the building A-1 lunchroom, no longer provided valuable data for monitoring groundwater quality at the UPCO site. Sampling at the POE for groundwater monitoring purposes was discontinued after the first quarter 2009.

3.1.1.3 Private Domestic Wells

UPCO and the Arizona Department of Environmental Quality (ADEQ) sampled private domestic wells during the fourth quarter of 2004 and semiannually in 2005 through 2009. Groundwater samples were only collected from private wells in the second quarter of 2010 because a site access agreement between UPCO and the ASLD had not been granted for the fourth quarter of 2010 to sample the onsite wells. ADEQ also sampled wells at the Arizona Department of Transportation (ADOT) facility located southwest of the UPCO facility in 2004. Perchlorate was not detected above the laboratory reporting limit (2 µg/L) in samples collected from the ADOT facility. Since 2004, perchlorate has been detected by USEPA method 332.0 in samples collected from the private domestic wells in concentrations ranging from 0.52 µg/L to 3.1 µg/L.

3.1.1.4 Soil Vapor Monitor Well

During 2008, a nested soil vapor monitor well (SVMW-1) was installed in the B-Complex. SVMW-1 consists of four nested wells, including one well with a 0.5-inch-diameter schedule 80 polyvinyl chloride (PVC) casing and 0.04-inch slot screen and three wells with 2-inch-diameter schedule 80 PVC casing with 0.02-inch slot screens. The screen interval for each sampling port was determined based on the analytical results for VOCs collected from boring BC-SG41 during the supplemental soil and soil gas investigation (ARCADIS 2011a). The soil gas monitoring screens, each 10 feet in length, were installed at 190-200 feet below ground surface (bgs; the 0.5-inch-diameter well), 140-150 feet bgs, 90-100 feet bgs, and 30-40 feet bgs.

Since 2008, 1,1-dichloroethene (1,1-DCE) has been detected at screening depths of 30-40 feet bgs, 90-100 feet bgs, 140-150 feet bgs, and 190-200 feet bgs at concentrations ranging from 430 parts per billion by volume (ppbv) to 3,200 ppbv, 18 ppbv to 23,000 ppbv, 6 ppbv to 3,500 ppbv, and 30 ppbv to 2,300 ppbv, respectively. Acetone has been detected at screening depths of 30-40 feet bgs, 90-100 feet bgs, 140-150 feet bgs, and 190-200 feet bgs at concentrations ranging from 50 ppbv to 1,500 ppbv, 25 ppbv to 2,500 ppbv, 46 ppbv to 1,300 ppbv, and 45 ppbv to 4,300 ppbv, respectively. Lower concentrations of several other VOCs such as 1,1-dichloroethane (1,1-DCA), 1,2,4-trimethylbenzene, 2-butanone (MEK), 2-hexanone, 2,2,4-trimethylpentane, 4-ethyltoluene, benzene, carbon disulfide, chloromethane, cyclohexane, heptane, hexane, ethanol, propene, tetrachloroethene, tetrahydrofuran, toluene, trichloroethene, and xylenes were also detected.

3.2 2013 Groundwater Monitoring

3.2.1 Administrative Activities

The following administrative activities related to the monitoring program occurred in 2013:

- Met with ASLD on January 30, 2013 to discuss the property purchase process and site access agreements (Special Land Use Permits)

- Received comments from ADEQ on February 26, 2013 regarding the Supplemental Groundwater Pre-Design Study Work Plan (ARCADIS 2012d)
- Submitted a letter to ADEQ on March 20, 2013 requesting an extension of the Supplemental Groundwater Pre-Design Study Work Plan submittal deadline
- Met with ADEQ on April 2, 2013 to discuss their February 26, 2013 comments on the Supplemental Groundwater Pre-Design Study Work Plan
- Submitted responses to ADEQ's February 26, 2013 comments on the Supplemental Groundwater Pre-Design Study Work Plan on April 19, 2013
- Submitted the revised Supplemental Groundwater Pre-Design Study Work Plan on May 20, 2013 (ARCADIS 2013b)
- Received approval of the revised Supplemental Groundwater Pre-Design Study Work Plan from ADEQ on May 23, 2013
- Received signatures from ASLD on July 19, 2013 on Notice of Intent to Drill forms for wells to be installed pursuant to the Supplemental Groundwater Pre-Design Study Work Plan
- Received confirmation of Arizona Department of Water Resources (ADWR) Drill Permits on July 31, 2013 for wells to be installed pursuant to the Supplemental Groundwater Pre-Design Study Work Plan
- Received ADWR Drill Permits on August 7, 2013 for wells to be installed pursuant to the Supplemental Groundwater Pre-Design Study Work Plan

3.2.2 Water Level Measurements

In accordance with the Updated GWMP (ARCADIS 2012a), groundwater elevation measurements were collected on a monthly basis from February to December 2013. Depth to water was measured to the nearest 0.01 foot with respect to a surveyed measurement point at the top of each well using a decontaminated electronic sounding device. Groundwater elevation measurements were not collected from monitor wells in January 2013, pending ASLD approval of Special Land Use Permits.

3.2.3 UPCO Facility Wells Sampling

Sampling activities occurred during all four quarters of 2013. Project-specific sampling procedures outlined in the Updated GWMP (ARCADIS 2012a) and industry standard methods were used. During 2013, groundwater samples were collected from UPCO groundwater monitor wells MW-1 through MW-21 and PW-1, as outlined in the Final 2012 Annual Monitoring Report (ARCADIS 2013a). A list of UPCO monitor wells sampled in 2013, including dates and analyses performed is provided in Table 3. Water level data collected in 2013 are presented in Table 4.

3.2.4 Private Wells Sampling

Private wells incorporated into the groundwater monitoring program were sampled using existing dedicated submersible pumps. Groundwater samples were collected in the first and third quarters of 2013. Sampling of private wells depends on site access from the property owners and the presence of water in the wells; several private wells pump dry. Therefore, not all private wells were sampled during each quarter. A list of private wells that were sampled in 2013, including dates and analyses performed, is included in Table 5.

3.2.5 Soil Vapor Monitor Well Sampling

Soil vapor monitor well SVMW-1 was sampled during the second quarter of 2013 from each nested interval. A vacuum pump was used to purge approximately three well volumes at a flow rate of less than 1 cubic foot per minute. A 1-liter Summa canister fitted with a dedicated 1-liter per minute flow restrictor was used at each sample interval for time-integrated sample collection.

3.3 Investigative-Derived Waste

Groundwater monitoring and well installation activities in 2013 generated purge water that was managed as IDW. The purge water was temporarily stored onsite in poly tanks prior to being transported offsite by MP Environmental for disposal at Liquid Environmental Solutions (LES) or

Stericycle. Purge water with perchlorate concentrations less than 100 µg/L was transported to LES, and purge water with perchlorate concentrations greater than 100 µg/L (i.e., purge water from MW-19 and MW-20) was transported to Stericycle for solidification and transport/disposal at either the Subtitle C Landfill in Beatty, NV or Heritage Environmental Services in Coolidge, AZ. In 2013, 25,425 gallons of non-hazardous purge water was generated at the site during the sampling activities. IDW documentation for 2013 is provided in Appendix A.

4. Data Evaluation

4.1 Groundwater Level Measurements

Groundwater elevations have been monitored at and near the UPCO facility to evaluate potential gradients. These measurements have been collected on a regular basis at UPCO site-wide monitor wells and private wells located near the north property boundary at 218 East Yearling Road and 520 East Yearling Road using electronic water level equipment. Private well locations are shown on Figure 4.

Historical depth to groundwater measurements and groundwater elevations for site and private wells are summarized in Appendix B. Historical hydrographs are presented in Appendix C. Groundwater elevation maps are provided on Figures 5 through 15.

The highest water elevations were observed in late 2004 to early 2005, and the lowest elevations for a majority of the wells were observed in 2013. Based on analysis of site geology and available hydrogeologic information, groundwater underlying the Site occurs within two distinct zones, separated by one or possibly several associated subsurface geologic structures (ARCADIS 2011a). Monitor wells completed in bedrock at the Site (MW-1, MW-2, MW-3, MW-4, MW-5, MW-8, MW-9, MW-11, MW-12, MW-13, MW-14, MW-15, MW-16, MW-18, MW-19, MW-20, and MW-21) exhibit groundwater elevations approximately 25 feet higher than wells completed in the consolidated Sedimentary Unit on the west side of the Site (MW-6, MW-7, MW-10, and MW-17). The difference in

groundwater elevation and depth to bedrock between the two zones is potentially an additional line of evidence for faulting along the western side of the Site (ARCADIS 2011a).

The monitor wells located east of the potential geologic structure showed a nearly static to slightly declining water level trend. The difference between the minimum and maximum groundwater elevations measured in each of these wells in 2013 (i.e., the groundwater elevation decline per well) varied between 0.29 feet in monitor well MW-5 and 2.85 feet in monitor well MW-15. The monitor wells located west of the potential geologic structure also showed slightly declining groundwater elevations. The groundwater decline in each of these wells in 2013 ranged from 0.81 feet in monitor well MW-10 to 1.73 feet in monitor well MW-6. The rising trend previously noted in the Final 2010 Annual Monitoring Report (ARCADIS 2011b) at MW-6 during 2010 appears to have been temporary.

4.2 Groundwater Quality Data

The following sections discuss the results of groundwater quality monitoring performed in 2013. The 2013 water quality analytical data for the UPCO monitor wells are summarized in Appendix D. The perchlorate results for the UPCO monitor wells are provided in Table 6. The perchlorate results for the private wells are provided in Table 7. A table presenting historical water quality analytical data for the private wells is provided in Appendix E. Perchlorate concentration trend plots and historical data for each UPCO monitor well are presented in Appendix F. Field parameter data collected during the 2013 sampling events are provided in Appendix G. General chemical data are shown on Piper and Stiff Diagrams in Appendix H. Figures 16 through 19 present perchlorate concentration maps for the first, second, third, and fourth quarters of 2013, respectively.

4.2.1 Perchlorate

The AZ HWMA Permit Condition Part IV.C.9 specifies a groundwater cleanup goal of 14 µg/L for perchlorate. The laboratory reporting limit using USEPA Method 314.0 was 3.0 µg/L in 2013 due to a change in laboratory. This is higher than the reporting limit in previous years of 2.0 µg/L.

Concentrations of perchlorate measured during 2013 were consistent with results collected in previous years (Appendix F). During the 2013 monitoring period, perchlorate was detected in monitor wells MW-1, MW-2, MW-5, MW-6, MW-8, MW-13, MW-19, MW-20, MW-21, and PW-1 at concentrations greater than 3.0 µg/L. Perchlorate was detected in groundwater samples collected from:

- MW-1 at concentrations ranging from 62.2 µg/L to 67.7 µg/L;
- MW-2 at concentrations ranging from 88.9 µg/L to 92.5 µg/L;
- MW-5 at concentrations ranging from 24.6 µg/L to 30.5 µg/L;
- MW-6 at concentrations ranging from 17.8 µg/L to 19.4 µg/L;
- MW-8 at a concentration of 3.0 µg/L;
- MW-13 at concentrations ranging from 20.8 µg/L to 30.3 µg/L;
- MW-19 at concentrations ranging from 29,200 µg/L to 32,500 µg/L;
- MW-20 at concentrations ranging from 417 µg/L to 447 µg/L;
- MW-21 at concentrations ranging from 5.1 µg/L to 6.1 µg/L; and
- PW-1 at concentrations ranging from 3.0 µg/L to 4.3 µg/L.

Perchlorate was not detected at concentrations above the laboratory reporting limit of 3.0 µg/L in the remaining UPCO monitor wells.

During the 2013 monitoring period, perchlorate was not detected in the private domestic wells at a concentration above the USEPA Method 314.0 laboratory reporting limit of 3.0 µg/L.

Groundwater samples collected from site wells that historically had no detections of perchlorate at concentrations above 3.0 µg/L, and each of the private domestic wells, were analyzed for perchlorate using two analytical test methods. In addition to USEPA Method 314.0, these samples were also analyzed by USEPA Method 332.0. These methods were performed for a comparative analysis between different perchlorate analytical testing methods. The results of the perchlorate comparative analyses for the site wells are included in Table 6, and show Method 332.0 concentration values

ranging between 0.12 µg/L in monitor well MW-18 and 2.3 µg/L in monitor well MW-11. The results of the perchlorate comparative analysis for the private wells are included in Table 7, and show Method 332.0 concentration values ranging between 0.53 µg/L and 1.4 µg/L.

4.2.2 General Chemistry

Alkalinity was measured in monitor wells MW-20 and MW-21 at concentrations of 166 milligrams per liter (mg/L) in MW-20 and 162 mg/L in MW-21. An Arizona Aquifer Water Quality Standard (AWQS) has not been established for alkalinity; however, these values are considered low compared to the common natural ranges observed for groundwater. Chloride was measured in monitor wells MW-20 and MW-21 at concentrations of 40.3 mg/L in MW-20 and 10.3 mg/L in MW-21. An AWQS has not been established for chloride; however these values are well below the USEPA secondary drinking water quality standard of 250 mg/L. Nitrate was measured in monitor wells MW-20 and MW-21 at concentrations of 6.3 mg/L in MW-20 and 1.4 mg/L in MW-21. The AWQS for nitrate is 10 mg/L. Sulfate was measured in monitor wells MW-20 and MW-21 at concentrations of 11.4 mg/L in MW-20 and 3.9 mg/L in MW-21. An AWQS has not been established for sulfate; however these values are well below the USEPA secondary drinking water quality standard of 500 mg/L. Calcium was measured in monitor wells MW-20 and MW-21 at concentrations of 39.7 mg/L in MW-20 and 40.3 mg/L in MW-21. An AWQS has not been established for calcium; however, these values are considered low compared to the common natural ranges observed for groundwater. Magnesium was detected in each of the UPCO monitor wells except MW-8 and MW-18 and ranged in concentration from 7.92 mg/L in MW-5 to 17.3 mg/L in MW-6 and MW-14. An AWQS has not been established for magnesium; however, these values are considered low compared to the common natural ranges observed for groundwater. Potassium was measured in monitor wells MW-20 and MW-21 at concentrations less than the laboratory reporting limit of 10 mg/L. An AWQS has not been established for potassium; however, these values are considered low compared to the common natural ranges observed for groundwater. Sodium was measured in monitor wells MW-20 and MW-21 at concentrations of 39.6 mg/L in MW-20 and 23.0 mg/L in MW-21. An AWQS has not been established for sodium; however,

these values are considered low compared to the common natural ranges observed for groundwater. Total dissolved solids (TDS) was measured in monitor wells MW-20 and MW-21 at concentrations of 304 mg/L in MW-20 and 220 mg/L in MW-21. An AWQS has not been established for TDS; however, these values are considered low compared to the common natural ranges observed for groundwater.

4.2.3 Metals

Arsenic was detected in each of the UPCO monitor wells except MW-4, MW-14, MW-15, and MW-16, and ranged in concentration from 5.0 µg/L in MW-13 to 45.8 µg/L in MW-8. The AWQS for arsenic is 50 µg/L. Barium was detected in each of the UPCO monitor wells with the exception of MW-8 and ranged in concentration from 6.3 µg/L in MW-7 and MW-10 to 308 µg/L in MW-14. The AWQS for barium is 2,000 µg/L. Chromium was detected in each of the UPCO monitor wells with the exception of MW-3, MW-6, MW-9, and MW-13 through MW-16 and ranged in concentration from 2.1 µg/L in MW-4 and MW-11 to 28.2 µg/L in MW-5. The AWQS for chromium is 100 µg/L. Iron was detected in monitor wells MW-2, MW-8, MW-17, MW-18, MW-19, and PW-1 and ranged in concentration from 216 µg/L in MW-8 to 3,680 µg/L in MW-17. A numeric standard has not been established for iron. Lead was detected in monitor wells MW-18 and MW-21 and ranged in concentration from 2.0 µg/L in MW-18 to 4.4 µg/L in MW-21. The AWQS for lead is 50 µg/L. Manganese was detected in monitor wells MW-2, MW-9, MW-16, MW-17, MW-18, and MW-21 and ranged in concentration from 20.1 µg/L in MW-21 to 130 µg/L in MW-9. A numeric standard has not been established for manganese. Cadmium, mercury, selenium, and silver were not detected above the laboratory reporting limits in any UPCO monitor well during 2013. Results for monitor well groundwater quality are provided in Appendix D.

4.2.4 VOCs and 1,4-dioxane

Three VOCs were detected during groundwater sampling activities in 2013 including Acetone, 1,1-dichloroethylene, and methyl chloride. Acetone was detected in the sample collected from MW-18 at a concentration of 34.7 µg/L during the first quarter sampling event. Acetone was not detected at a

concentration exceeding ten times the laboratory reporting limit (20 µg/L), and acetone has only been detected at the Site once in the past (45 µg/L in MW-16 in October 2008). Therefore, acetone is likely a laboratory contaminant. 1,1-Dichloroethylene was detected in samples collected from PW-1 at concentrations of 4.2 µg/L and 4.9 µg/L during the first- and third-quarter sampling events, respectively. The AWQS for 1,1-dichloroethylene is 7 µg/L. Methyl chloride was detected in the sample collected from PW-1 at a concentration of 1.3 µg/L during the third-quarter sampling event. An AWQS has not been established for methyl chloride.

1,4-Dioxane was detected in samples collected from MW-2, MW-3, MW-19, MW-20, MW-21, and PW-1 at concentrations ranging from 2.1 J µg/L to 14.2 J µg/L. An AWQS has not been established for 1,4-dioxane.

4.3 Soil Vapor Quality Data

Soil gas samples were collected from soil vapor monitor well SVMW-1 and analytical results are provided in Table 8. The primary COPC, 1,1-DCE, ranged from 4.6 ppbv (18 micrograms per cubic meter [µg/m³]) at 100 feet bgs to 580 ppbv (2,300 µg/m³) at 200 feet bgs. 2-Butanone ranged from 8.7 J ppbv (26 µg/m³) at 200 feet bgs to 78 ppbv (230 µg/m³) at 100 feet bgs. Acetone ranged from 28 J ppbv (67 µg/m³) at 200 feet bgs to 140 ppbv (340 µg/m³) at 100 feet bgs. Other VOCs detected in the soil gas samples, at lower concentrations, included 1,2,4-trimethylbenzene, 1,3-butadiene, 2,2,4-trimethylpentane, 2-hexanone, 2-propanol, 4-ethyltoluene, benzene, cyclohexane, ethanol, ethylbenzene, heptane, hexane, m,p xylenes, o-xylene, tetrachloroethene, tetrahydrofuran, toluene, and trichloroethene. Butane was detected in samples collected from each screened interval at concentrations ranging from 12 ppbv (30 µg/m³) at 200 feet bgs to 15 ppbv (35 µg/m³) at 150 feet bgs. A butane leak detection method was employed during sample collection; therefore, these results may imply that there is a leak in the sampling apparatus.

5. Quality Assurance and Data Verification

Analytical data provided by the laboratories were subjected to data review for quality control/quality assurance. A summary of the data verification is presented in Appendix I. Copies of the analytical data reports are provided in Appendix J.

Groundwater monitoring activities followed the quality assurance procedures outlined in the QAPP (H+A 2004a) and QAPP Addendum (ARCADIS 2012b). The project-specific QAPP establishes procedures and guidance for the following:

- data quality objectives;
- sample documentation and custody;
- sample container requirements;
- quality control (QC) procedures; and
- quality assurance management including, data management and data verification/validation procedures.

Samples were collected and submitted to the laboratory in a manner that provides data that are representative of site conditions. Laboratory analyses were conducted according to analytical methods described in USEPA guidance manuals. Field QC samples included field duplicates and trip blanks. Laboratory QC samples included method blanks, laboratory control samples, and matrix spike/matrix spike duplicate samples.

Laboratory deliverables consist of Level II data packages (including a QC summary). Data reported by the laboratory has been verified so that the data meets the data quality objectives (DQOs). The results were considered usable for the intended purposes, and the project DQOs specified in the QAPP (H+A 2004a) and the QAPP Addendum (ARCADIS 2012b) were met.

6. Future Monitoring Activities

The 2013 monitoring program was conducted in accordance with the procedures and methods outlined in the Updated GWMP (ARCADIS 2012a). UPSCO revised the monitoring program in 2010 to include the quarterly monitoring requirements for groundwater monitor well MW-18, and planned monitor wells MW-16, MW-17, and MW-19. These changes were incorporated in the Updated GWMP (ARCADIS 2012a). UPSCO revised the monitoring program again in 2012 to include the quarterly monitoring requirements for groundwater monitor wells MW-20 and MW-21. These changes were also incorporated in the Updated GWMP (ARCADIS 2012a). The former production well, PW-1, was converted to a monitor well in September 2011 and will continue to be utilized for site-wide monitoring. Private domestic wells will continue to be monitored on a semiannual basis, in the first and third quarters of 2014. The proposed 2014 sampling and analysis schedule is summarized in Table 9.

7. References

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