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February 28, 2013

Mr. Richard Olm, P.E.  
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Hazardous Waste Permits Unit  
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Phoenix, Arizona 85007

Re: 2012 Annual Monitoring Report  
Arizona Hazardous Waste Management Act (AZ HWMA) Permit AZD 980 814 479  
Universal Propulsion Company, Inc.  
Phoenix, Arizona 85085

Dear Mr. Olm:

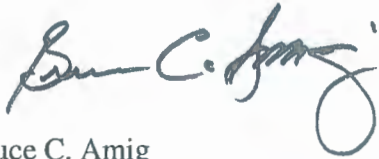
Please find attached the 2012 Annual Monitoring Report for the former Universal Propulsion Company, Inc. (UPCO) facility.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision according to a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based upon my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

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Please contact Ms. Karen Mittleider at (602) 243-2338 if you have any questions or need additional information.

Sincerely,



Bruce C. Amig  
Manager, Remedial Programs

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**UTC Aerospace Systems**

## ***2012 Annual Monitoring Report***

*UTC Aerospace Systems  
Former UPSCO Facility  
Phoenix, Arizona*

***February 2013***



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## 2012 Annual Monitoring Report

UTC Aerospace Systems  
Former UPCO Facility  
Phoenix, Arizona

Prepared for:



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February 2013

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<b>Acronyms and Abbreviations</b>	<b>A-1</b>
<b>1. Introduction</b>	<b>1</b>
1.1 Report Summary	1
1.2 Site Description	2
<b>2. Monitoring Network</b>	<b>2</b>
2.1 UPCO Groundwater Monitor Wells	3
2.2 Private Domestic Wells	3
2.3 Soil Vapor Monitor Well	4
<b>3. Monitoring Activities</b>	<b>4</b>
3.1 Historical Groundwater Investigation Activities (2004-2011)	4
3.1.1 2004 - 2011 Activities	4
3.1.1.1 Monitor Wells	4
3.1.1.2 Facility Monitoring Locations	5
3.1.1.3 Private Domestic Wells	6
3.1.1.4 Soil Vapor Monitor Well	6
3.2 2012 Groundwater Monitoring	7
3.2.1 Administrative Activities	7
3.2.2 Water Level Measurements	8
3.2.3 UPCO Facility Wells Sampling	8
3.2.4 Private Wells Sampling	9
3.2.5 Soil Vapor Monitor Well Sampling	9
3.3 Well Installation Activities	10
3.4 Survey	10
3.5 Investigative-Derived Waste	10
<b>4. Data Evaluation</b>	<b>11</b>
4.1 Groundwater Level Measurements	11
4.2 Groundwater Quality Data	12

4.2.1	Perchlorate	12
4.2.2	VOCs	14
4.2.3	Metals	14
4.3	Soil Vapor Quality Data	15
<b>5.</b>	<b>Quality Assurance and Data Verification</b>	<b>15</b>
<b>6.</b>	<b>Future Monitoring Activities</b>	<b>16</b>
<b>7.</b>	<b>References</b>	<b>17</b>

**Tables**

Table 1	UPCO Monitor Well Information
Table 2	Private Well Information
Table 3	UPCO Monitor Wells Sampled and Analyses Performed in 2012
Table 4	2012 UPCO Monitor Well Water Levels
Table 5	Private Wells Sampled and Analyses Performed in 2012
Table 6	2012 UPCO Monitor Well Perchlorate Results
Table 7	2012 Private Well Perchlorate Results
Table 8	2012 Soil Vapor Monitor Well (SVMW-1) Results
Table 9	Proposed 2013 UPCO Sampling and Analysis Schedule

**Figures**

Figure 1	Site Location Map
Figure 2	Site Facilities Map
Figure 3	UPCO Monitor Wells
Figure 4	Private Wells
Figure 5	Groundwater Elevation January 19, 2012
Figure 6	Groundwater Elevation February 27, 2012
Figure 7	Groundwater Elevation March, 27, 2012
Figure 8	Groundwater Elevation April 28, 2012

Figure 9	Groundwater Elevation May 8, 2012
Figure 10	Groundwater Elevation June 29, 2012
Figure 11	Groundwater Elevation July 30, 2012
Figure 12	Groundwater Elevation August 7-19, 2012
Figure 13	Groundwater Elevation September 6, 2012
Figure 14	First Quarter 2012 Perchlorate Concentration Map
Figure 15	Second Quarter 2012 Perchlorate Concentration Map
Figure 16	Third Quarter 2012 Perchlorate Concentration Map



## Appendices

A	Well Construction Diagrams, Lithologic Logs, and Geotechnical Data (CD)
B	IDW Documentation
C	Historical Water Level Data
D	Monitor Well Hydrographs
E	2012 Monitor Well Water Quality Data
F	Historical Private Well Water Quality Data
G	Historical Monitor Well Perchlorate Concentrations and Plots
H	Summary of 2012 Field Data
I	Piper and Stiff Diagrams for Monitor Wells
J	2012 Data Verification Summaries
K	2012 Laboratory Reports (CD)

**Acronyms and Abbreviations**

ADEQ	Arizona Department of Environmental Quality
ADOT	Arizona Department of Transportation
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
EPA	Environmental Protection Agency
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





QAPP	Quality Assurance Project Plan
QC	quality control
µg/L	micrograms per liter
µg/m <sup>3</sup>	micrograms per cubic meter
UPCO	Universal Propulsion Company, Inc.
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 2012. 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). The July 2012 revisions to the GWMP and QAPP Addendum incorporate the new monitor wells (MW-20 and MW-21) installed at the former UPCO facility. 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 two 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 an address of 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 2012:

- 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 2012 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. 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 in Figure 4. 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)

## **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 two years. UPCO voluntarily extended the semiannual private well sampling program beyond the first two 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. The locations of these 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 (2004-2011)**

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

#### **3.1.1 2004 - 2011 Activities**

##### **3.1.1.1 Monitor Wells**

Monitor wells MW-1 through MW-12 were installed during 2004 and 2005. From 2004 through 2011, perchlorate has been detected in MW-1, MW-2, MW-5, and MW-6 at concentrations ranging from 47 micrograms per liter ( $\mu\text{g/L}$ ) to 130  $\mu\text{g/L}$ , 39  $\mu\text{g/L}$  to 96  $\mu\text{g/L}$ , 6.4  $\mu\text{g/L}$  to 32  $\mu\text{g/L}$ , and 14  $\mu\text{g/L}$  to 20  $\mu\text{g/L}$ , respectively. Perchlorate was detected in samples collected from MW-11 at concentrations ranging from less than the laboratory reporting limit (2  $\mu\text{g/L}$ ) to 2.6  $\mu\text{g/L}$ . Perchlorate was not detected above 2  $\mu\text{g/L}$  in samples collected from MW-3, MW-4, MW-7, MW-8, MW-9, MW-10, and MW-12.



Monitor wells MW-13, MW-14, and MW-15 were installed in 2008. From 2008 through 2011, 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 2 µg/L to 2.6 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 2011.

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 from 45,000 to 55,000 µg/L during 2011. Perchlorate was not detected above the laboratory reporting limit (2 µg/L) in MW-16 or MW-17.

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 less than 2 µg/L to 4.8 µg/L. 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 value-added 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 Arizona State Land Department (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 in samples collected from the private domestic wells in concentrations ranging from 0.58 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 B-Complex. SVMW-1 consists of four nested wells, including one well with a 0.5-inch diameter schedule 80 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, 420 ppbv to 23,000 ppbv, 6 ppbv to 3,500 ppbv, and 30 ppbv to 600 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), 2-butanone (MEK), carbon disulfide, chloromethane, heptane, hexane, propene, tetrachloroethene, toluene, and trichloroethene were also detected.

### **3.2 2012 Groundwater Monitoring**

#### **3.2.1 Administrative Activities**

The following administrative activities related to the monitoring program occurred in 2012:

- The Aquifer Test and Monitor Well Installation Work Plan was submitted to ADEQ on January 17, 2012, and was approved on February 7, 2012 (ARCADIS 2012d).
- A Class I Permit Modification Request was submitted on January 23, 2012 that incorporated the Corrective Measures Study Work Plan (ARCADIS 2011c) and the Corrective Measures Study Aquifer Testing and Well Installation Work Plan (ARCADIS 2012d). ADEQ responded with comments on January 26, 2012. ADEQ approved the request on February 7, 2012.
- The Corrective Measures Study Progress Report was submitted to ADEQ on February 14, 2012 (ARCADIS 2012e).
- The Corrective Measures Study Report (ARCADIS 2012f) was submitted to ADEQ on March 15, 2012, and responses to comments were submitted on July 5, 2012 and September 28, 2012. A meeting was held on October 4, 2012 to discuss comments with ADEQ and ASLD.



- Public notice of the February 2012 Class I Permit Modification was sent on March 20, 2012. ADEQ responded with comments on May 24, 2012.
- The 2012 Updated Groundwater Monitoring Plan (ARCADIS 2012a) and 2012 Updated Quality Assurance Project Plan Addendum (ARCADIS 2012b) were submitted to ADEQ on July 25, 2012.
- A Class I Permit Modification Request was submitted on July 13, 2012 that incorporated the 2012 Updated Groundwater Monitoring Plan (ARCADIS 2012a) and the 2012 Updated Quality Assurance Project Plan Addendum (ARCADIS 2012b). ADEQ approved the request on September 5, 2012.
- A Proposed Path Forward Letter was submitted on October 15, 2012 (ARCADIS 2012g).
- Public notice of the September 2012 Class I Permit Modification was sent on November 30, 2012.
- The Supplemental Groundwater Pre-Design Study Work Plan was submitted to ADEQ on December 17, 2012 (ARCADIS 2012h).

### 3.2.2 Water Level Measurements

In accordance with the Updated GWMP (ARCADIS 2012a), groundwater elevation measurements were collected on a monthly basis from January to September 2012. 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 October, November, or December 2012, pending the execution of a Special Land Use Permit (SLUP) by ASLD.

### 3.2.3 UPCO Facility Wells Sampling

Sampling activities occurred during the first three quarters in 2012. Groundwater samples were not collected in the fourth quarter of 2012 because a site access agreement between UPCO and the ASLD

was not granted to sample the onsite wells for the fourth quarter. Project-specific sampling procedures outlined in the Updated GWMP (ARCADIS 2011a; ARCADIS 2012a), and industry standard methods were used. During 2012, groundwater samples were collected from UPCO groundwater monitor wells MW-1 through MW-21 and PW-1, as outlined in the Final 2011 Annual Monitoring Report (ARCADIS 2012c).

Monitor wells MW-20 and MW-21 were installed during the first quarter of 2012. MW-20 and MW-21 are shallow bedrock wells that were installed in the vicinity of the C-Complex and New Burn Area, respectively (Figure 3). These monitor wells were sampled for baseline analyses, including perchlorate, metals, VOCs, and general water chemistry. A list of UPCO monitor wells sampled in 2012, including dates and analyses performed, is provided in Table 3. Water level data collected in 2012 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 2012. 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 2012, 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 first quarter of 2012 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 Well Installation Activities**

The installation of monitor wells MW-20 and MW-21 was completed in the first quarter of 2012. The well completion details are summarized in Table 1, and the as-built well construction diagrams, lithologic logs, and geotechnical data are provided in Appendix A.

### **3.4 Survey**

A state-registered land surveyor established horizontal and vertical control of monitor wells MW-20 and MW-21 (as discussed in Section 3.3) on February 15, 2012. The vertical coordinates of the sounding port, top of casing, and ground surface were surveyed in the Arizona State Plane Coordinate System (NGVD 29) with units of international feet above mean sea level. The measuring point elevation of the PVC sounding tube port contained in the well seal was measured to the nearest 0.01 foot. The measuring point was marked on the north side of the port. The horizontal coordinates of the well were surveyed in the Arizona State Plane Coordinate System, Central Zone, North American Datum 1983 (NAD 83) with units of international feet. Survey information is provided in Table 1.

### **3.5 Investigative-Derived Waste**

Groundwater monitoring and well installation activities in 2012 generated purge water and soil cuttings that were 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 a Subtitle C Landfill in Beatty, NV. In 2012, 18,620 gallons of non-hazardous purge water was generated at the site during the sampling activities. The soil cuttings were transported offsite by MP Environmental for disposal at the Northwest Regional Landfill. Twenty-eight tons of non-hazardous soil cuttings were generated at the site. IDW documentation for 2012 is provided in Appendix B.

#### **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 in Figure 4.

Historical depth to groundwater measurements and groundwater elevations for site and private wells are summarized in Appendix C. Historical hydrographs are presented in Appendix D. Groundwater elevation maps are provided on Figures 5 through 13.

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 2011 and 2012. A potential geologic structure (ARCADIS, 2011a) is located east of the area monitored by MW-6, MW-7, MW-10, and MW-18 and generally on the west side of the UPCO facility. Groundwater elevations on the west side of the structure are approximately 30 feet higher than on the east side of the structure. 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 2012 (i.e., the groundwater elevation decline per well) varied between 0.13 feet in monitor well MW-5 and 1.30 feet in monitor well MW-15.

West of the potential geologic structure, groundwater elevations were also declining. The difference between the minimum and maximum groundwater elevations for monitor wells MW-6, MW-7, MW-10, and MW-18 ranged from 0.24 feet to 3.04 feet. 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 2012. The 2012 water quality analytical data for the UPCO monitor wells are summarized in Appendix E. 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 F. Perchlorate concentration trend plots and historical data for each UPCO monitor well are presented in Appendix G. Field parameter data collected during the 2012 sampling events are provided in Appendix H. Figures 14 through 16 present perchlorate concentration maps for the first, second, and third quarters of 2012, respectively. General chemical data are shown on Piper and Stiff Diagrams in Appendix I.

### **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 Environmental Protection Agency (EPA) Method 314.0 is 2.0 µg/L. Concentrations of perchlorate measured during 2012 were consistent with results collected in previous years. During the 2012 monitoring period, perchlorate was detected in monitor wells MW-1, MW-2, MW-5, MW-6, MW-9, MW-10, MW-11, MW-13, MW-14, MW-19, MW-20, MW-21, and PW-1. Perchlorate was detected in groundwater samples collected from:

- MW-1 at concentrations ranging from 68 µg/L to 81 µg/L;
- MW-2 at concentrations ranging from 82 µg/L to 91 µg/L;
- MW-5 at concentrations ranging from 24 µg/L to 26 µg/L;
- MW-6 at concentrations ranging from 18 µg/L to 20 µg/L;
- MW-9 at a concentration of 2.1 µg/L;
- MW-10 at a concentration of 2.5 µg/L;
- MW-11 at concentrations ranging from 2.2 µg/L to 2.6 µg/L;



- MW-13 at concentrations ranging from 11 µg/L to 16 µg/L;
- MW-14 at a concentration of 2.4 µg/L;
- MW-19 at concentrations ranging from 33,000 µg/L to 36,000 µg/L;
- MW-20 at concentrations ranging from 400 µg/L to 430 µg/L;
- MW-21 at concentrations ranging from 5.5 µg/L to 6.2 µg/L; and
- PW-1 at concentrations ranging from 3.7 µg/L to 5.9 µg/L.

Perchlorate was not detected at concentrations above the laboratory reporting limit of 2.0 µg/L in the remaining UPCO monitor wells.

During the 2012 monitoring period, perchlorate was not detected in the private domestic wells at a concentration above the EPA Method 314.0 laboratory reporting limit of 2.0 µg/L. Perchlorate was detected at a concentration of 2.0 µg/L in the private domestic wells at 16 East Yearling Yard, 218 East Yearling, and 520 East Yearling.

Groundwater samples collected from site wells that historically had no detections of perchlorate at concentrations above 2.0 µg/L, and each of the private domestic wells, were analyzed for perchlorate using two analytical test methods. In addition to EPA Method 314.0, these samples were also analyzed for EPA 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 0.10 µg/L in monitor well MW-18 and 3.3 µg/L in monitor well PW-1. 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 0.52 µg/L and 1.7 µg/L.

#### 4.2.2 VOCs

Four VOCs were detected during groundwater sampling activities in 2012 including 1,1-dichloroethane (1,1-DCA), 1,1-DCE, naphthalene, and 1,4-dioxane. These detections were at concentrations below the applicable Arizona Aquifer Water Quality Standard (AWQS). 1,1-DCA was detected in samples collected from PW-1 at concentrations of 0.65 µg/L and 0.64 µg/L during the first and third quarter sampling events, respectively. An AWQS has not been established for 1,1-DCA. 1,1-DCE was detected in samples collected from PW-1 at concentrations of 5.5 µg/L and 5.0 µg/L during the first and third quarter sampling events, respectively. The AWQS for 1,1-DCE is 7.0 µg/L. Naphthalene was detected in a sample collected from MW-2 at a concentration of 2.7 µg/L during the first quarter sampling event. An AWQS has not been established for naphthalene. 1,4-Dioxane was detected in samples collected from MW-2, MW-20, and PW-1 at concentrations ranging from 2.8 µg/L to 14 µg/L. An AWQS has not been established for 1,4-dioxane.

#### 4.2.3 Metals

Arsenic was detected in each of the UPCO monitor wells except MW-20 and ranged in concentration from 0.001 milligram per liter (mg/L) in MW-14 to 0.047 mg/L in MW-8. The AWQS for arsenic is 0.05 mg/L. Barium was detected in each of the UPCO monitor wells and ranged in concentration from 0.0028 mg/L in MW-8 to 0.29 mg/L in MW-14. The AWQS for barium is 2.0 mg/L. Calcium was detected in monitor wells MW-1, MW-2, MW-4, MW-5, MW-13, MW-19, MW-20, and MW-21 and ranged in concentration from 26 mg/L in MW-5 to 43 mg/L in MW-1. A numeric standard has not been established for calcium. Chromium was detected in monitor wells MW-1, MW-2, MW-5, MW-7, MW-8, MW-10, MW-11, MW-12, MW-13, MW-17, MW-18, MW-19, MW-20, MW-21, and PW-1 and ranged in concentration from 0.0017 mg/L in MW-13 to 0.031 mg/L in MW-5. The AWQS for chromium is 0.10 mg/L. Iron was detected in monitor wells MW-1, MW-8, MW-13, MW-18, and MW-19 and ranged in concentration from 0.10 mg/L to 0.78 mg/L. A numeric standard has not been established for iron. Lead was detected in monitor wells MW-4, MW-6, MW-7, MW-8, MW-9,

MW-16, MW-17, MW-18, and MW-21, and ranged in concentration from 0.0016 mg/L to 0.019 mg/L. The AWQS for lead is 0.05 mg/L. Magnesium was detected in monitor wells MW-1, MW-2, MW-4, MW-5, MW-13, MW-19, MW-20, and MW-21 and ranged in concentration from 8.4 mg/L in MW-21 to 16 mg/L in MW-19. A numeric standard has not been established for magnesium. Selenium was detected in monitor wells MW-11, MW-14, and PW-1 and ranged in concentration from 0.0030 mg/L in MW-14 to 0.0056 mg/L in PW-1. The AWQS for selenium is 0.05 mg/L. No other metals analyzed during the monitoring period were detected above the laboratory detection limits. Results for monitor well groundwater quality are provided in Appendix E.

#### **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 6.0 ppbv (24 micrograms per cubic meter [ $\mu\text{g}/\text{m}^3$ ]) at 150 feet bgs to 600 ppbv ( $2,400 \mu\text{g}/\text{m}^3$ ) at 200 feet bgs. 2-Butanone ranged from 120 ppbv ( $350 \mu\text{g}/\text{m}^3$ ) at 40 feet bgs to 900 ppbv ( $2,700 \mu\text{g}/\text{m}^3$ ) at 200 feet bgs. Acetone ranged from 360 ppbv ( $860 \mu\text{g}/\text{m}^3$ ) at 90 feet bgs to 4,300 ppbv ( $10,000 \mu\text{g}/\text{m}^3$ ) at 200 feet bgs. Propene ranged from 160 ppbv ( $280 \mu\text{g}/\text{m}^3$ ) at 90 feet bgs to 820 ppbv ( $1,400 \mu\text{g}/\text{m}^3$ ) at 200 feet bgs. Other VOCs detected in the soil gas samples, at lower concentrations, included 2-hexanone, hexane, and tetrachloroethene. Soil vapor monitor well results are provided in Table 8.

#### **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 J. Copies of the analytical data reports are provided in Appendix K.

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 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 EPA guidance manuals. Field quality control (QC) samples included field duplicates and trip blanks. Laboratory QC samples included method blanks, laboratory control samples (LCS), and matrix spike/matrix spike duplicate (MS/MSD) 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 2012 monitoring program was conducted in accordance with the procedures and methods outlined in the Updated GWMP (ARCADIS 2012a). UPCO 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). UPCO 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 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 2013. The 2013 sampling and analysis schedule is summarized in Table 9.

## **7. References**

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