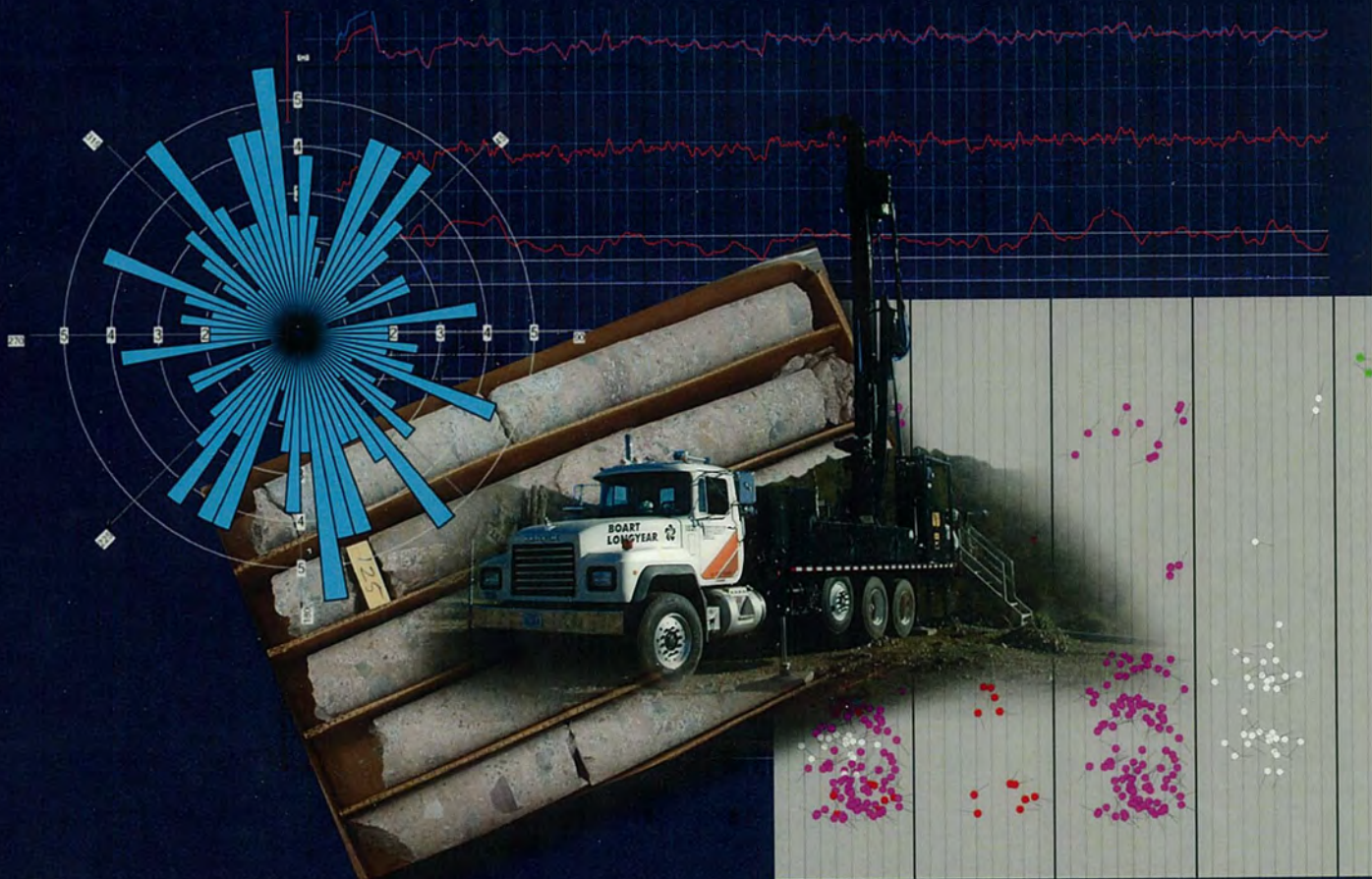


# 2011 Annual Monitoring Report

Universal Propulsion Co. Inc.



March 2012

GOODRICH

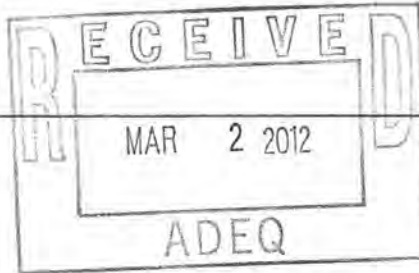
ARCADIS





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ARIZONA DEPARTMENT OF  
ENVIRONMENTAL QUALITY

MAR - 5 2012

Waste Programs Div.  
Permits Section

February 27, 2012

Mr. Richard Olm, P.E.  
Arizona Department of Environmental Quality  
Hazardous Waste Permits Unit  
1110 West Washington Street  
Phoenix, Arizona 85007



Re: 2011 Annual Monitoring Report  
Universal Propulsion Company, Inc.  
Phoenix, Arizona 85085

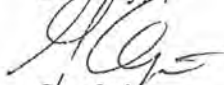
Dear Mr. Olm:

Please find attached the 2011 Annual Monitoring Report for the Universal Propulsion Company, Inc. (UPCO).

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 gather 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.

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

Sincerely,



Guy Ogino  
Site Leader

cc: Robin Thomas, ADEQ  
Anthony Leverock, ADEQ  
David Haag, ADEQ  
Bruce Campbell, ASLD

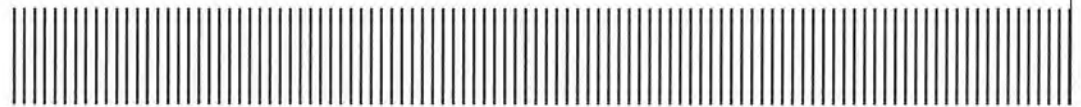
Philip McNeely, City of Phoenix  
Donn Stoltzfus, City of Phoenix  
Karen Mittleider, Goodrich Interiors  
David Gordon, ARCADIS

**Universal Propulsion Company, Inc.**

25401 North Central Avenue • Phoenix, Arizona 85085

# 2011 Annual Monitoring Report

February 2012



Report Prepared By:

**ARCADIS U.S., Inc.**

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3994-003



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# 1. Introduction

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This Annual Monitoring Report (report) summarizes the monitoring activities conducted at the Universal Propulsion Company, Inc. (UPCO) facility (site) in Phoenix, Arizona during 2011. This report continues to be part of an overall site characterization for soil and groundwater pursuant to Part I in the Arizona Hazardous Waste Management Act (AZ HWMA).

This report is supported by the Quality Assurance Project Plan (QAPP) (H+A, 2004b), Groundwater Monitoring Plan (Malcolm Pirnie, 2004), Updated Groundwater Monitoring Work Plan (GWMP) (Malcolm Pirnie, 2008a; ARCADIS, 2011d), and the QAPP Addendum (Malcolm Pirnie, 2009c; ARCADIS, 2011c). The October 2011 revisions to the GWMP and QAPP Addendum incorporate the new monitoring wells (MW-16, MW-17 and MW-19) 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.

## 1.1. 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 previous manufacturing areas and restricts general access. Locks secure each gate and well vault to limit access and deter vandalism.



## 2. Monitoring Network

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The following types of wells were utilized for the monitoring program in 2011:

- UPCO monitor wells and a 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 quality at and near the facility for target chemical constituents. Groundwater elevation data are collected to evaluate local groundwater conditions. The study area for monitoring during 2011 included the site, some 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 contaminants 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 location and well construction details for UPCO monitor wells and production well PW-1. Table 2 summarizes the private wells that are 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 is provided in the following reports:

- Phase I Monitoring Well Construction Summary Report (H+A, 2004c)
- 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)

## **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 semi-annual groundwater samples from private wells located along Yearling Road north of the site for perchlorate analysis for a period of two years. UPCO collected groundwater samples from various private wells, according to owner requests and authorization, beginning in 2004 and ending during the second quarter of 2006. The Order has been terminated; however, UPCO voluntarily agreed to extend the private well sampling program with the current agreement running through the completion of the Remedial Investigation (RI) activities. The AZ HWMA Permit Condition III.C.1 requires semi-annual 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 is provided in the Final Remedial Investigation Report (ARCADIS, 2011a).

## 3. Monitoring Activities

---

### 3.1. Previous Groundwater Investigation Activities

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

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

#### 3.1.1. 2004 - 2010 Activities

##### 3.1.1.1. Monitor Wells

Monitor wells MW-1 through MW-12 were installed during 2004 and 2005. From 2004 through 2010, 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 2010, perchlorate has been detected in samples collected from MW-13 at concentrations ranging from 12  $\mu\text{g/L}$  to 330  $\mu\text{g/L}$  and from MW-14 at concentrations ranging from less than 2  $\mu\text{g/L}$  to 2.6  $\mu\text{g/L}$ . Perchlorate has not been detected above the laboratory reporting limit (2  $\mu\text{g/L}$ ) in samples collected from MW-15.

Monitor well MW-18 was installed in 2009. During 2009 and 2010, perchlorate was not detected above the laboratory reporting limit (2  $\mu\text{g/L}$ ).

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



Monitoring Report (ARCADIS, 2011b) and the Draft Interim Remedial Investigation Report (Malcolm Pirnie, 2009a).

### **3.1.1.2. Facility Monitoring Locations**

The UPCO facility production well (PW-1) and 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. 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 not performed beyond 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 in the second quarter of 2010 since a site access agreement between UPCO and the State Land Department had not been granted for the fourth quarter 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. The soil gas monitoring screens, each ten 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 30-40 feet bgs, 90-100 feet bgs, 140-150 feet bgs, and 190-200 feet bgs at concentrations ranging from 650 parts per billion by volume (ppbv) to 3,200 ppbv, 450 ppbv to 23,000 ppbv, 240 ppbv to 3,500 ppbv, and 180 ppbv to 360 ppbv, respectively. Acetone has been detected at screening depths 30-40 feet bgs, 90-100 feet bgs, 140-150 feet bgs, and 190-200 feet bgs at concentrations ranging from 610 ppbv to 1,100 ppbv, 240 ppbv to 1,200 ppbv, 180 ppbv to 1,300 ppbv, and 150 ppbv to 3,500 ppbv, respectively. Lower concentrations of several other VOCs such as 1,1-dichloroethane, 2-butanone (MEK), carbon disulfide, chloromethane, heptane, hexane, propene, tetrachloroethene, toluene, and trichloroethene were also detected.

## **3.2. 2011 Groundwater Monitoring**

### **3.2.1. Administrative Activities**

The following administrative activities related to the monitoring program occurred in 2011:

- A Special Land Use Permit (SLUP) was granted by the Arizona State Land Department on January 28, 2011 to provide site access for monitoring purposes.
- Consent Order P-136-04 for the UPCO site has been terminated and the AZ HWMA Permit was issued for the former UPCO facility under EPA Facility ID number AZD 980 814 479 and dated June 30, 2011. All corrective action activities moving forward will be conducted under the AZ HWMA Permit for the former UPCO Facility.
- The Final Remedial Investigation Report (ARCADIS, 2011a) was submitted on July 1, 2011 to ADEQ. ADEQ responded with comments in a letter dated August 9, 2011. In response to ADEQ's comments, UPCO submitted a Class 1 Permit Modification request on August 12, 2011 to incorporate the Final Remedial Investigation Report into the Permit and also submitted replacement pages for the report on August 23, 2011.
- ADEQ approved the Final Remedial Investigation Report and the Class 1 Permit Modification on August 29, 2011.

- An Updated Groundwater Monitoring Plan and QAPP Addendum were submitted to ADEQ as Class 1 Permit Modification requests on October 13, 2011.
- ADEQ approved the Updated Groundwater Monitoring Plan, the QAPP Addendum, and the Class 1 Permit Modification requests on December 21, 2011.

### **3.2.2. Water Level Measurements**

In accordance with the Updated GWMP (Malcolm Pirnie, 2008a; ARCADIS, 2011d), groundwater elevation measurements were collected on a monthly basis. 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.

Water level measurements were not collected from monitor wells in January 2011, pending the execution of the SLUP by the State Land Department. Manual water level measurement data were collected monthly beginning in February 2011.

### **3.2.3. UPCO Facility Wells Sampling**

Sampling activities occurred during each of the four quarters in 2011. Project specific sampling procedures outlined in the Groundwater Monitoring Plan (Malcolm Pirnie, 2004), the Updated GWMP (Malcolm Pirnie, 2008a; ARCADIS, 2011d), and industry standard methods were used. Groundwater samples were collected from UPCO groundwater monitor wells MW-1 through MW-19 and PW-1, as outlined in the Final 2010 Annual Monitoring Report (ARCADIS, 2011b) in 2011.

A dedicated submersible pump was installed at MW-18 on March 25, 2011 and a groundwater sample was collected on March 30, 2011. The power supply to the former production well (PW-1) was removed during 2010 site demolition activities. On March 23, 2011, a temporary generator was connected to PW-1 so that the well could provide water to support well installation activities at MW-16, MW-17 and MW-19. A groundwater sample was collected from PW-1 on March 30, 2011. The conversion of production well PW-1 to a monitor well was completed on September 2, 2011, and the monitor well was sampled on September 6, 2011. The installation of monitor wells MW-16, MW-17 and MW-19 was completed in the second quarter of 2011. These monitor wells were sampled for baseline analyses, including perchlorate, metals, VOCs, and general water chemistry. A list of UPCO monitor wells sampled in 2011, including dates and analysis performed, is provided in Table 3.



#### **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 2011. A list of private wells that were sampled in 2011, including dates and analyses performed, is included in Table 5.

There were a few private wells that have historically been monitored that were not sampled in 2011 after multiple attempts to contact the property owners for well access. One private well, 106 West Yearling, was not sampled in the first quarter of 2011. Two private wells, 18 East Yearling and 25903 North Second Street, were not sampled in the third quarter of 2011.

#### **3.2.5. Soil Vapor Monitor Well Sampling**

Soil vapor monitor well, SVMW-1, was sampled during each quarter of 2011 from each nested interval. A vacuum pump was used to purge approximately three well volumes at a flow rate of less than one cubic feet per minute. A one-liter Summa canister fitted with a dedicated one-liter per minute flow restrictor was used at each sample interval for time-integrated sample collection.

### **3.3. Well Conversion and Installation Activities**

The installation of monitor wells MW-16, MW-17 and MW-19 was completed in the second quarter of 2011. The as-built well construction diagrams are provided in Appendix A.

The former production well, PW-1, was converted from a production well to a monitor well by replacing the dedicated pump with a smaller pump (Grundfos SQ15-290) on September 2, 2011.

### **3.4. Survey**

A state registered land surveyor established horizontal and vertical control of monitor wells MW-16, MW-17, and MW-19 (as discussed in Section 3.3) on April 15, 2011. 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 activities in 2011 generated purge water and soil cuttings that were managed as investigative derived waste (IDW). The purge water was temporarily stored on-site in a poly tank prior to being transported offsite by MP Environmental for disposal at Liquid Environmental Solutions (LES) and Stericycle. Purge water with perchlorate concentrations less than 100 ug/L were transported to LES, and purge water with perchlorate concentrations greater than 100 ug/L (i.e., purge water from MW-19) were transported to Stericycle for solidification and transport/disposal at a Subtitle C Landfill in Beatty, NV. In 2011, 23,000 gallons of non-hazardous purge water was generated at the site. The soil cuttings were transported offsite by MP Environmental for disposal at Waste Management. Sixty-five tons of non-hazardous soil cuttings were generated at the site. IDW documentation for 2011 is provided in Appendix B.

## 4. Data Evaluation

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### 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 and pressure transducers. 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 for 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 2010 and 2011. A potential geologic structure (Malcolm Pirnie, 2009a) 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/slightly declining water level trend. The difference between the minimum and maximum groundwater elevations measured in each of these wells in 2011 (i.e., the groundwater elevation decline per well) varied between 0.25 feet in monitor well MW-9 and 1.75 feet in monitor well MW-16.

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 -0.67 feet to 2.08 feet. The rising trend previously noted in the Final 2010 Annual Monitoring Report 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 2011. Tables presenting 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 historic water quality analytical data for the private wells is provided in Appendix F. Perchlorate concentration trend plots for each UPCO monitor well are presented in Appendix G. Field parameter data collected during the 2011 sampling events is provided in Appendix H. Figures 16 through 19 present perchlorate concentration maps for the first, second, third, and fourth quarters of 2011, 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 EPA Method 314.0 is 2.0 µg/L. During the 2011 monitoring period, perchlorate was detected in monitor wells MW-1, MW-2, MW-5, MW-6, MW-11, MW-13, MW-19, and PW-1. Perchlorate was detected in groundwater samples collected from MW-1 at concentrations ranging from 67 µg/L to 73 µg/L; from MW-2 at concentrations ranging from 87 µg/L to 90 µg/L; from MW-5 at concentrations ranging from 20 µg/L to 25 µg/L; from MW-6 at concentrations ranging from 14 µg/L to 18 µg/L; from MW-13 at concentrations ranging from 6.4 µg/L to 8.7 µg/L; from MW-19 at concentrations ranging from 45,000 µg/L to 55,000 µg/L; from PW-1 at concentrations ranging from 3.8 µg/L and 4.4 µg/L; and from MW-11 at a concentration of 2.0 µg/L.

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

During the 2011 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, except for 16 East Yearling Yard at a concentration of 2.0 µg/L.

Groundwater collected from the site wells that historically have not detected 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. Two 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 0.53 µg/L in monitor well MW-3 and 2.7 µg/L in monitor well MW-9. 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 0.00089 µg/L and 2.1 µg/L.

#### 4.2.2. VOCs

Three VOCs were detected during 2011 groundwater sampling activities including 1,1-dichloroethene (1,1-DCE), 1,1-dichloroethane (1,1-DCA), and 1,4-dioxane. These detections were at concentrations below the applicable Arizona Aquifer Water Quality Standard (AWQS). 1,1-DCE was detected in groundwater samples collected from PW-1 at concentrations of 5.0 µg/L and 6.2 µg/L during the first and third quarter sampling events, respectively. The AWQS for 1,1-DCE is 7.0 µg/L. 1,1-DCA was detected in PW-1 at concentrations of 0.61 µg/L and 0.72 µg/L during the first and third quarter sampling events, respectively. A numeric standard has not been established for 1,1-DCA. 1,4-dioxane was detected in samples collected at MW-2 and PW-1 at concentrations ranging from 2.6 µg/L to 3.0 µg/L. 1,4-Dioxane does not have an applicable AWQS.

#### 4.2.3. Metals

Arsenic was detected in each of the UPCO monitor wells in 2011 and ranged in concentration from 0.0019 mg/L to 0.048 mg/L in monitor wells MW-8 and MW-13. The AWQS for arsenic is 0.05 mg/L. Barium was detected in each of the UPCO monitor wells and ranged in concentration from 0.006 mg/L to 0.29 mg/L in MW-14. The AWQS for barium is 2 mg/L. Chromium was detected in monitor wells MW-1, MW-2, MW-5, MW-6, MW-7, MW-8, MW-10, MW-11, MW-12, MW-17, MW-18, MW-19, and PW-1 and ranged in concentration from 0.0015 mg/L to 0.031 mg/L. The AWQS for chromium is 0.1 mg/L. Lead was detected in monitor wells MW-1, MW-2, MW-3, MW-4, MW-5, MW-6, MW-7, MW-8, MW-10, MW-12, MW-13, MW-14, MW-15, MW-17, MW-19, and PW-1, and ranged in concentration from 0.0011 mg/L to 0.0018 mg/L in MW-6. The AWQS for lead is 0.05 mg/L. Selenium was detected in monitor wells MW-11, MW-17, and MW-19 and ranged in concentration from 0.002 mg/L to 0.0044 mg/L. The AWQS for selenium is 0.05 mg/L. Monitor wells MW-16, MW-17, and MW-19 were analyzed for calcium, magnesium, potassium, and sodium. Calcium detections ranged in concentration from 30 mg/L to 41 mg/L; magnesium detections ranged in concentration from 9.5 mg/L to 15 mg/L; potassium detections ranged in concentration from 2.9 mg/L to 7.5 mg/L; and sodium detections ranged in concentration from 35 mg/L to 50 mg/L. A numeric standard has not been established for cations. 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 30 ppbv (120 micrograms per cubic meters, or µg/m<sup>3</sup>) at 150 feet bgs to 6,900 ppbv (27,000 µg/m<sup>3</sup>) at 100 feet bgs. Acetone ranged from <97 ppbv (<230 µg/m<sup>3</sup>) at 40 feet bgs to 2,500 ppbv

(5,900  $\mu\text{g}/\text{m}^3$ ) at 100 feet bgs. Propene ranged from <0.5 ppbv (<0.86  $\mu\text{g}/\text{m}^3$ ) at all depths to 1,400 ppbv (2,400  $\mu\text{g}/\text{m}^3$ ) at 100 feet bgs. Other VOCs detected in the soil gas samples, at a lower concentration, included 1,1-DCA, 1,2,4-trimethylbenzene, 2,2,4-trimethylpentane, 2-butanone (MEK), 2-hexanone, benzene, bromomethane, carbon disulfide, carbon tetrachloride, chloroform, chloromethane, cyclohexane, dichlorodifluoromethane, ethyl acetate, ethylbenzene, Freon 113, heptanes, hexane, methylene chloride, n-octane, tetrachloroethene, toluene, trichloroethene, and xylenes. Soil vapor monitoring well results are provided in Table 8.



## 5. Quality Assurance and Data Verification

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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, 2004b) and QAPP Addendum (Malcolm Pirnie, 2009c; ARCADIS, 2011c). 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 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, 2004b) and the QAPP Addendum (Malcolm Pirnie, 2009c; ARCADIS, 2011c) were met.

## 6. Future Monitoring Activities

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The 2011 monitoring program was conducted in accordance with the procedures and methods outlined in the Updated GWMP (Malcolm Pirnie, 2008a; ARCADIS, 2011d). UPCO revised the monitoring program in 2010 to include the quarterly monitoring requirements for groundwater monitoring well MW-18, and planned monitoring wells MW-16, MW-17, and MW-19. These changes were incorporated in the Updated GWMP (ARCADIS, 2011d). 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 semi-annual basis, in the first and third quarters of 2012. The 2012 sampling and analysis schedule is summarized in Table 10.

## 7. References

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