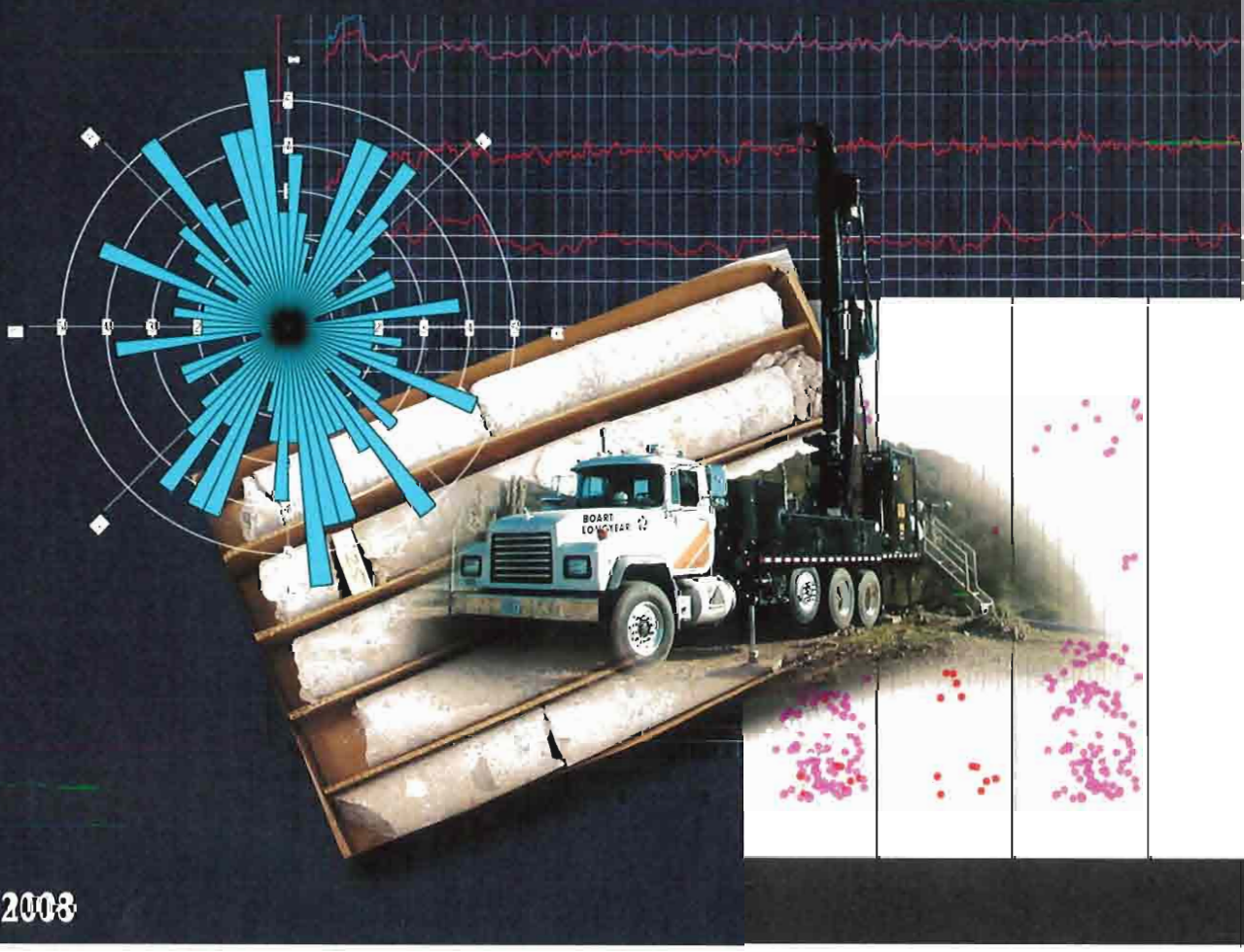
2007 ANNUAL GROUNDWATER REPORT

Universal Propulsion Co., Inc.



MARCH 2008

DRAFT

GOODRICH

MALCOLM PIRNIE

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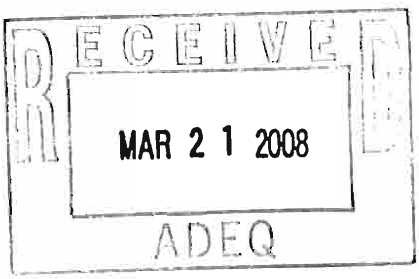
UNIVERSAL PROPULSION COMPANY, INC.



March 2008

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March 21, 2008

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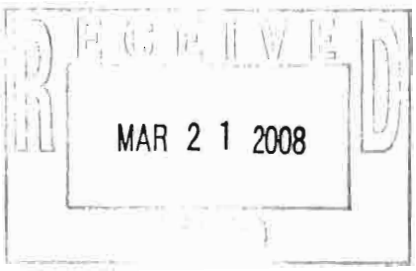

Re: Draft 2007 Annual Groundwater Report
Consent Order P-136-04
Universal Propulsion Company, Inc.
Phoenix, Arizona 85085

Dear Mr. Olm:

Universal Propulsion Company, Inc. (UPCO) is providing to the Arizona Department of Environmental Quality (ADEQ) the enclosed draft 2007 Annual Groundwater Report in accordance with Consent Order No. P-136-04.

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 (623) 516-3340, extension 2266 if you have any questions or need additional information.

Sincerely,

for Jerry Ricketts
Value Stream Director

cc: Robin Thomas, ADEQ
David Haag, ADEQ
Karen O'Regan, City of Phoenix
Donn Stoltzfus, City of Phoenix
Karen Mittleider, UPCO
Cynthia Stefanovic, ASLD
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1.0 INTRODUCTION

This Draft Annual Groundwater Report (report) summarizes groundwater monitoring activities conducted at the Universal Propulsion Company, Inc. (UPCO) facility (site) in Phoenix, Arizona during 2007. This report is part of an overall site characterization for soil and groundwater pursuant to Consent Order (Order) No. P-136-04 entered into between UPCO and the Arizona Department of Environmental Quality (ADEQ).

This report is supported by the Remedial Investigation Work Plan (Hargis+Associates, Inc. (H+A), 2004a), Quality Assurance Project Plan (QAPP) (H+A, 2004b), and the Groundwater Monitoring Plan (Malcolm Pirnie, 2004a). This report consists of the following:

- facility description;
- summary of previous groundwater investigations;
- data evaluation and verification;
- summary of groundwater monitoring activities for the year;
- lists of wells that were sampled, including sample dates and analyses performed;
- 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 water quality analytical data;
- hydrographs for the UPCO facility groundwater monitoring wells;
- maps of groundwater elevation data;
- trend graphs of perchlorate concentrations for the UPCO facility groundwater monitoring wells;
- investigation derived waste (IDW) documentation;
- copies of laboratory reports and data verification summaries; and
- recommendations for revisions to the groundwater monitoring plan.

1.1 FACILITY DESCRIPTION

The UPCO facility is located approximately two miles north of the Deer Valley Airport, Phoenix, Arizona (Figure 1). Specifically, the facility is 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 facility is located on approximately 160 acres of land leased from the State of Arizona and consists of numerous manufacturing and administrative buildings (Figure 2). A fence surrounds the facility and restricts general access. The facility was initially constructed in 1972.

2.0 GROUNDWATER MONITORING NETWORK

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 is collected to evaluate local groundwater conditions. The following types of wells are currently being utilized in the groundwater monitoring program:

- UPCO monitoring wells and a production well; and
- private domestic wells.

The study area for groundwater monitoring during 2007 included the site, some private residences along the northern property boundary, and approximately ½ mile to the west, south, and east. The combination of wells is used to establish background groundwater quality, assess groundwater quality at and near the site, and evaluate local groundwater flow conditions.

2.1 UPCO MONITORING WELLS

The locations of existing UPCO facility groundwater monitoring wells are shown on Figure 3. Table 1 includes a summary of the location and well construction details for UPCO groundwater monitoring wells and production well PW-1. Additional information regarding drilling and well construction details for the UPCO groundwater monitoring 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, 2006a)

2.2 PRIVATE DOMESTIC WELLS

Beginning in 2004, UPCO collected groundwater samples from private wells located along Yearling Road in accordance with the Order. 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, in accordance with the Order beginning in 2004 and ending during the second quarter of 2006. After that period, UPCO agreed to extend the private well sampling program with the current agreement running though second quarter 2008. The location of these private wells is shown on Figure 4. Private well information is included in Table 2. The private wells were sampled for perchlorate analysis during the second and fourth quarter of 2007.

3.0 GROUNDWATER MONITORING ACTIVITIES

3.1 PREVIOUS GROUNDWATER INVESTIGATION ACTIVITIES

A summary of previous groundwater investigation activities is presented below:

3.1.1 2004

The UPCO facility production well (PW-1) and point of entry (POE) have been sampled periodically as part of county requirements for water service providers. During 2004, perchlorate was detected at concentrations ranging from non-detect to 2.1 micrograms per liter (µg/L).

Monitoring wells MW-1 and MW-2 were installed in December 2003 and sampled three times during the first quarter of 2004. During those sampling events, perchlorate was detected in samples collected from MW-1 and MW-2 at concentrations ranging from 39 to 130 µg/L.

Monitoring wells MW-3 through MW-6 were installed in August 2004 and sampled three times during the fourth quarter of 2004. Monitoring wells MW-7 and MW-8 were installed in October 2004 and sampled twice during the second quarter of 2004. During those sampling events, perchlorate was detected in samples collected from MW-5 and MW-6 at concentrations of 6.4 and 18 µg/L, respectively. Perchlorate was not detected above the laboratory reporting limit (2 ug/L) in samples collected from MW-3, MW-4, MW-7, and MW-8.

UPCO and ADEQ sampled private domestic wells once during the fourth quarter of 2004. ADEQ also sampled wells at the Arizona Department of Transportation (ADOT) facility located south west of the UPCO facility. Perchlorate was not detected above the laboratory reporting limit (2 ug/L) in samples collected from the private wells or at the ADOT facility.

Depth to groundwater measurements were collected monthly at each of the UPCO monitoring wells during 2004.

3.1.2 2005

Monitoring wells MW-9 and MW-10 were installed in January 2005 and sampled quarterly during 2005. During those sampling events, perchlorate was not detected above the laboratory reporting limit (2 ug/L).

UPCO and ADEQ sampled private domestic wells semi-annually during 2005. Perchlorate was not detected above the laboratory reporting limit (2 ug/L) in samples collected from the private wells.

Depth to groundwater measurements were collected monthly at each of the UPCO monitoring wells during 2005.

3.1.3 2006

Monitoring wells MW-11 and MW-12 were installed in December 2005 and initially sampled quarterly during 2006. During those sampling events, perchlorate was detected in samples collected from MW-11 at concentrations ranging from less than the laboratory reporting limit (2 ug/L) to 2.2 ug/L. Perchlorate was not detected above the laboratory reporting limit (2 ug/L) in samples collected from MW-12.

During the fourth quarter 2006 groundwater monitoring event conducted in November, the private wells were analyzed for perchlorate using two analytical methods. The two methods included EPA Method 314.0, which is specified in the Order, and EPA Method 332.0. This was performed for a comparative analysis between different perchlorate analytical testing methods. The results of the perchlorate comparative analysis showed concentration values ranging between 0.68 ug/L and 2.0 ug/L. The results of the perchlorate analysis for the UPCO monitoring wells using both methods were analyzed for only wells with perchlorate detection previously reported below 2 ug/L. Perchlorate analysis for UPCO monitor wells sampled during this quarter using Method 322.0 showed a range in concentration between 0.59 ug/L in monitor well MW-3 and 2.2 ug/L in monitor well MW-11. The provisional HBGL for perchlorate is 14 ug/L.

3.2 2007 GROUNDWATER MONITORING

3.2.1 Water Level Measurements

Depth to groundwater measurements were collected on a quarterly basis. During each quarterly sampling event, static water level measurements were taken prior to the commencement of purging and sampling activities at each well. 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 meter.

Pressure transducers were installed during November 2006 in selected site monitor wells (MW-1, MW-3, MW-4, MW-6, MW-9, and MW-12) for continuous ambient water level monitoring and evaluation of possible seasonal or long term water level fluctuations. Data from the pressure transducers are downloaded approximately every two weeks, reduced, and plotted to produce a graph of water level elevation versus time. Precipitation

and barometric pressure data are also included on the graph to assess potential external influence on the measurements recorded. In an effort to expand the evaluation of the hydrogeological conditions at the site, additional pressure transducers were installed on April 4, 2007 in four other site wells (PW-1, MW-7, MW-8, and MW-10) and two of three private wells along Yearling Road (218 E.Yearling and 520 E.Yearling). Between the weeks of July 7 and August 6 2007, UPCO conducted a geophysical survey and installed a pressure transducer at a third private well located along Yearling Road (18 E. Yearling).

3.2.2 Sampling Frequency and Constituents

3.2.2.1 *UPCO Facility Wells*

Sampling activities were conducted in accordance with 2006 Annual Groundwater Report (Malcolm Pirnie, 2007a) recommendations, project specific procedures are outlined in the Groundwater Monitoring Plan (Malcolm Pirnie, 2004), and industry standard methods. Groundwater samples were collected from UPCO groundwater monitoring wells (MW-1 to MW-12) on a quarterly basis in 2007. Samples from the production well were collected at the well head and POE. A list of UPCO monitoring wells sampled including dates and analysis performed is provided in Table 3.

3.2.2.2 *Private Wells*

Private wells that were incorporated into the groundwater monitoring program were sampled using existing dedicated submersible pumps. Groundwater samples were collected from the closest available port to the well head prior to filtration or treatment systems (i.e. reverse osmosis, carbon filters, softeners). Approximately 5 gallons of water were flushed through the sampling port prior to collecting samples from the private wells. A list of private wells that were sampled in 2007 including dates and analysis performed is included in Table 4.

3.3 INVESTIGATIVE DERIVED WASTE (IDW)

Water generated during sampling of the monitoring wells was stored in a 5,000 gallon poly tank. The water was sampled and characterized prior to offsite disposal. IDW documentation related to groundwater sampling during 2007 is presented in Appendix A.

4.0 DATA EVALUATION

As agreed to by ADEQ during a meeting on February 8, 2007 related to the draft Remedial Investigation (RI) Summary Report and Draft conceptual site model (CSM), hydraulic interpretation including groundwater elevation contours and groundwater concentration contours are not presented in this draft report until ADEQ concurs with the Draft CSM.

4.1 GROUNDWATER LEVEL MEASUREMENTS

Figures 5 through 8 present groundwater elevation maps for each quarter of 2007. Historic depth to groundwater measurements and groundwater elevations are summarized in Appendix B. Historic hydrographs are presented in Appendix C. Graphs of the transducer data collected to date are presented in Appendix C.

Although, not all site wells have similar length of water level record, the highest water elevations were observed in late 2004 to early 2005, and the lowest elevations were observed in 2007. Groundwater elevations calculated through 2007 varied between 0.29 and 0.47 feet in wells located east of a potential hydraulic flow barrier (Malcolm Pirnie, 2007), with the exception of monitor wells MW-3 and MW-4. Groundwater elevations calculated through 2007 varied by 0.82 feet in wells located west of this hydraulic flow barrier (Malcolm Pirnie, 2007b), with the exception of MW-6. Monitor wells MW-3 and MW-4 showed sustained decline for the most of 2007. The variation in groundwater elevation is further explained in detail in the Supplemental RI Tech Memo #2 (Malcolm Pirnie, 2007b).

The addition of pressure transducers in selected wells and access to private wells to the north of UPCO has enhanced the understanding of current groundwater flow conditions. A review of groundwater level data collected to date from the transducers indicate that the groundwater elevation in the private wells are currently lower than at the nearest site wells, MW-3 and MW-4. Wells MW-3 and MW-4 are completed in consolidated sedimentary and bedrock units, respectively and both show an overall declining water level trend. More recently, some of the private well owners have also resorted to drilling deeper wells as water levels have continued to decline. Hydrographs for the private wells show steep pumping level drawdowns ranging from 10 to 50 feet below static levels, especially during the on-cycles which may correlate with cumulative peak periods of use (Appendix C). However, this steep drawdown has not been observed in nearest site wells, showing at a minimum that the short term pumping related drawdown does not extend very far. Although, as noted above, wells MW-3 and MW-4 show steeper water

level declines when compared to other onsite wells suggesting that the overall lowered water table to the north is propagating south toward the site.

4.2 GROUNDWATER QUALITY DATA

Tables presenting water quality analytical data for the UPCO monitoring wells, UPCO production well and POE are summarized in Appendix D. The perchlorate results for the UPCO monitoring wells are provided in Table 5. A table presenting water quality analytical data for the private wells is provided in Appendix E. The perchlorate results for the private wells are provided in Table 6. Perchlorate concentration trend plots for each UPCO monitoring well are presented in Appendix F. Figures 9 through 12 present perchlorate concentration maps for first quarter 2007 through fourth quarter 2007.

Perchlorate:

The Arizona Department of Health Services (ADHS) Health Based Guidance Level (HBGL) for perchlorate is 14 µg/L. During the 2007 monitoring period, perchlorate was detected in monitoring wells MW-1, MW-2, MW-5, MW-6 and MW-11. Perchlorate was not detected at concentrations above the laboratory reporting limit (2 ug/L) in other UPCO wells, including the deep monitoring well (MW-12) located near MW-1. Perchlorate was detected in samples collected from PW-1 and the POE at concentrations ranging from less than the laboratory reporting limit (2 ug/L) to 3 ug/L.

During the 2007 groundwater monitoring period, the site wells were analyzed for perchlorate using three analytical methods. The three methods included EPA Method 314, which is specified in the Order, and EPA Methods 332 and 6850. This was performed for a comparative analysis between different perchlorate analytical testing methods. Method 332 is among a number of newer methods for perchlorate analysis and was utilized in an attempt to obtain lower reporting limits and minimize potential false positives. Method 332 has been promulgated by EPA and was approved by Arizona Department of Health Services (ADHS) in January 2007. The results of this comparison is provided in Table 7.

Table 7 also include quality assurance and quality control (QA/QC) samples collected from public and private sources and analyzed by each of the three methods for comparative evaluation. Due to sampling schedule of site monitor wells, only wells with perchlorate detection previously reported below 2 ug/L were sampled. The results of the perchlorate comparative analysis for the site wells are provided in Table 7, and show concentration values ranging between 0.58 ug/L and 2.25 ug/L. The results of the perchlorate comparative analysis for the private wells are included in Table 7, and show concentration values ranging between 0.64 ug/L and 1.4 ug/L

VOCs:

Four VOCs were detected during 2007 groundwater sampling activities including 1,1-DCE, 1,4-dioxane, bromoform, and trihalomethanes (Appendix D). These were detected at concentrations below the applicable AWQS standard. The EPA preliminary remediation goal (PRG) for 1,4-dioxane is 6.1 ug/L. Bromoform does not have applicable AWQS, HBGL or PRG standards.

RCRA Metals:

Barium was detected in each of the UPCO monitoring wells, except for MW-7, PW-1 and POE, and ranged in concentration from non-detect to 0.13 mg/L. The AWQS for barium is 2 mg/L. Arsenic was detected in monitoring well MW-8 at a concentration of 0.052 mg/L, which exceeds the AWQS of 0.05 mg/L for arsenic. Calcium, potassium, sodium, and magnesium were detected in PW-1 and POE. However, no AWQS have been established for these metals. Chromium was detected in monitoring well MW-5 at a concentration of 0.027 mg/L. The AWQS for chromium is 0.1 mg/L. Other RCRA metals analyzed were below laboratory detection limits.

5.0 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 G. Copies of the analytical data reports are provided in Appendix H.

Groundwater monitoring activities followed the quality assurance procedures outlined in the QAPP (H+A, 2004b). 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 data 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), and Level IV data packages for 10 percent of the samples. Data reported by the laboratory has been verified that the data meets the data quality objectives. Ten percent of the data underwent data validation. The results were considered usable for the intended purposes, and the project data quality objectives (DQOs) specified in the QAPP (H+A, 2004b) were met.

6.0 FUTURE MONITORING ACTIVITIES

6.1 PROPOSED 2008 GROUNDWATER MONITORING PROGRAM

The 2008 groundwater monitoring program is presented in the updated Groundwater Monitoring Plan (Malcolm Pirnie, 2008). The sampling and analysis schedule is summarized in Table 8.

7.0 REFERENCES

Hargis + Associates, Inc. (H+A), 2004a. Draft Remedial Investigation Work Plan, Volume 1 of II, Goodrich Universal Propulsion Company, Inc., June 11, 2004.

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