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SEP 4 2007

August 31, 2007

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

Re: Final 2006 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 final 2006 Annual Groundwater Report in accordance with Consent Order No. P-136-04. The report has been revised to address ADEQ's comments on the draft submittal.

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,

  
Jerry Ricketts  
Value Stream Director

cc: Robin Thomas, ADEQ  
David Haag, ADEQ  
Karen O'Regan, City of Phoenix  
Donn Stoltzfus, City of Phoenix  
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David Gordon, Malcolm Pirnie  
Karen Mittleider, UPCO

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**2006 ANNUAL GROUNDWATER REPORT  
UNIVERSAL PROPULSION COMPANY, INC.**

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**August 31, 2007**

***Prepared for:***

Universal Propulsion Company, Inc.  
25401 North Central Avenue  
Phoenix, Arizona 85085

***Prepared by:***

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## TABLE OF CONTENTS

	Page
<b>1.0 INTRODUCTION.....</b>	<b>1-1</b>
1.1 FACILITY DESCRIPTION .....	1-2
<b>2.0 GROUNDWATER MONITORING NETWORK.....</b>	<b>2-1</b>
2.1 UPCO MONITORING WELLS .....	2-1
2.2 PRIVATE DOMESTIC WELLS .....	2-1
<b>3.0 GROUNDWATER MONITORING ACTIVITIES.....</b>	<b>3-1</b>
3.1 PREVIOUS INVESTIGATIONS .....	3-1
3.1.1 2004.....	3-1
3.1.2 2005.....	3-2
3.2 2006 GROUNDWATER MONITORING .....	3-2
3.2.1 <i>Water Level Measurements</i> .....	3-2
3.2.2 <i>Sampling Frequency and Constituents</i> .....	3-2
3.3 INVESTIGATIVE DERIVED WASTE (IDW) .....	3-3
<b>4.0 DATA EVALUATION .....</b>	<b>4-1</b>
4.1 GROUNDWATER LEVEL MEASUREMENTS .....	4-1
4.2 GROUNDWATER QUALITY DATA .....	4-1
<b>5.0 QUALITY ASSURANCE AND DATA VERIFICATION .....</b>	<b>5-1</b>
<b>6.0 FUTURE MONITORING ACTIVITIES .....</b>	<b>6-1</b>
6.1 PROPOSED 2007 GROUNDWATER MONITORING PROGRAM .....	6-1
6.1.1 <i>Groundwater Level Measurements</i> .....	6-1
6.1.2 <i>Groundwater Sampling</i> .....	6-2
6.1.3 <i>Groundwater Analytes</i> .....	6-2
<b>7.0 REFERENCES.....</b>	<b>7-1</b>

## LIST OF TABLES

<b>Table</b>	
<b>No.</b>	<b>Description</b>
1	UPCO Monitoring Wells Information
2	Private Wells Information
3	UPCO Monitoring Wells Sampled and Analyses Performed
4	Private Wells Sampled and Analyses Performed
5	UPCO Monitoring Well Perchlorate Results
6	Private Well Perchlorate Results
7	UPCO Monitoring Well Perchlorate Comparison Results
8	Private Well Perchlorate Comparison Results
9	Proposed 2007 UPCO Monitoring Well Sampling and Analysis Schedule

## LIST OF FIGURES

<b>Figure</b>	
<b>No.</b>	<b>Description</b>
1	Site Location Map
2	Site Facilities Map
3	UPCO Monitoring Wells
4	Private Wells
5	Groundwater Elevations January 27, 2006
6	Groundwater Elevations February 20, 2006
7	Groundwater Elevations March 20, 2006
8	Groundwater Elevations May 22, 2006
9	Groundwater Elevations August 28, 2006
10	Groundwater Elevations November 13, 2006
11	First Quarter 2006 Perchlorate Concentration Map
12	Second Quarter 2006 Perchlorate Concentration Map
13	Third Quarter 2006 Perchlorate Concentration Map
14	Fourth Quarter 2006 Perchlorate Concentration Map

## APPENDICES

### Appendix

No.	Description
A	IDW Documentation
B	Water Level Data
C	Well Hydrographs
D	Water Quality Data
E	Private Well Water Quality Data
F	Water Quality Graphs
G	General Chemistry Piper and Stiff Diagrams
H	Data Verification Summaries
I	Laboratory Analytical Reports (CD)

## 1.0 INTRODUCTION

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This Annual Groundwater Report (report) summarizes groundwater monitoring activities conducted at the Universal Propulsion Company, Inc. (UPCO) facility (site) in Phoenix, Arizona during 2006. 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;
- quality assurance;
- 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 each of the UPCO facility groundwater monitoring wells;
- maps of groundwater elevation;
- trend graphs of perchlorate concentrations for each of 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

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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 2006 included the site, 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

In 2004 and 2005 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 the private wells for perchlorate analysis during a period of two years. The two year period specified in the Order ended in second quarter 2006. However, UPCO extended the private well sampling program and continued semi-annual sampling through 2006. UPCO has subsequently agreed to again extend the private well sampling for at least through second quarter 2008. The location of these

private wells is shown on Figure 4. Private well and owner contact information is included in Table 2. The private wells were sampled for perchlorate analysis during the second and fourth quarter of 2006.

## 3.0 GROUNDWATER MONITORING ACTIVITIES

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### 3.1 PREVIOUS INVESTIGATIONS

A more detailed discussion regarding previous groundwater investigations in 2004 and 2005 was presented in the 2005 Annual Groundwater Report (Malcolm Pirnie, 2006b). Below is a brief synopsis of that discussion.

#### 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 ( $\mu\text{g/L}$ ). The Arizona Department of Health Services (ADHS) Health Based Guidance Level (HBGL) for perchlorate is 14  $\mu\text{g/L}$ .

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  $\mu\text{g/L}$ .

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  $\mu\text{g/L}$ , respectively. Perchlorate was not detected above the laboratory reporting limit (2  $\mu\text{g/L}$ ) 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  $\mu\text{g/L}$ ) 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.

## **3.2 2006 GROUNDWATER MONITORING**

### **3.2.1 Water Level Measurements**

Depth to groundwater measurements were collected monthly during the first quarter 2006. Following ADEQ's approval of the 2005 Annual Groundwater Report (Malcolm Pirnie, 2006b) in April 2006, depth to groundwater measurements were conducted 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.

### **3.2.2 Sampling Frequency and Constituents**

#### **3.2.2.1 UPCO Facility Wells**

Monitoring wells MW-11 and MW-12 were installed in December 2005 and 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.

Sampling activities were conducted in accordance with 2005 Annual Groundwater Report (Malcolm Pirnie, 2006b) recommendations, project specific procedures 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 2006. 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 including, dates and analysis performed is provided 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 Baker tank. The water was sampled and characterized prior to offsite disposal. IDW documentation related to groundwater sampling during 2006 is presented in Appendix A.

## 4.0 DATA EVALUATION

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As agreed to by ADEQ during a meeting on February 8, 2007 related to the draft Remedial Investigation (RI) Summary Report (Malcolm Pirnie, 2006c) 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

Groundwater elevation maps were developed for the water level data collected for the first three months of 2006 and quarterly thereafter. Figures 5 through 10 present groundwater elevation maps for January 2006 through December 2006. Historic depth to groundwater measurements and groundwater elevations are summarized in Appendix B. Historic hydrographs are presented in Appendix C.

### 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 11 through 14 present perchlorate concentration maps for first quarter 2006 through fourth quarter 2006.

#### *General Chemistry:*

Water quality parameters were collected to analyze cation and anion balances. These parameters were used to generate Piper and Stiff diagrams and intended to give a general characterization of the water quality. The UPCO monitoring wells show fairly similar water chemistry with the exception of monitoring wells MW-1 and MW-11, which tended to have higher concentrations of sodium, chloride, and calcium.

#### *Perchlorate:*

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 for the private wells are provided in Table 8, and show 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 are also provided in Table 7. Due to sampling schedule of site monitor wells, only wells with perchlorate detection previously reported below 2 ug/L were sampled. Perchlorate analysis for UPCO monitor wells sampled during this quarter using Method 322.0 show a range in concentration between 0.59 ug/L in monitor well MW-3 and 2.2 ug/L in monitor well MW-11.

For informational purposes, the following discussion provides some detail on each of the methods used. Method 314.0 has been promulgated by the Environmental Protection Agency (EPA), is approved by the Arizona Department of Health Services (ADHS), and has been used for compliance purposes for UPCO groundwater monitoring to date. Method 314.0 is an ion chromatography (IC) technique using a conductivity detector. Del Mar Analytical (now TestAmerica) is licensed by the State of Arizona for this method and has been performing the analysis at their Irvine, California facility. UPCO's results have been reported at a limit of 2.0 micrograms per liter (ug/L). Method 314.0 has been known to have potential problems due to matrix interferences at low levels. Positive detections are confirmed by re-analyzing the sample after it has been spiked with a known concentration of perchlorate. The presence of two peaks in the chromatograph indicates a false positive.

Method 332.0 is among a number of emerging new methods for perchlorate analysis and was utilized in an attempt to obtain lower reporting limits and minimize potential false positives. Method 332.0 has been promulgated by EPA and was just approved by ADHS in January 2007. This method combines IC with mass spectrometry (MS) for detection. Del Mar-Irvine performed this analysis with a reporting limit of 0.10 ug/L

During the 2006 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 2.3 ug/L.

Perchlorate was not detected in the private wells sampled by UPCO or ADEQ above the laboratory reporting limit (2 ug/L). The provisional HBGL for perchlorate is 14 ug/L.

*VOCs:* Five VOCs were detected during 2006 groundwater sampling activities including 1,1-DCE, 1,4-dioxane, bromoform, trihalomethanes and bromodichloromethane (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 and bromodichloromethane do 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 MW-8, and ranged in concentration from non-detect to 0.099 mg/L. The AWQS for barium is 2 mg/L. Silver was detected in monitoring well MW-10 at a concentration of 0.0091 mg/L. An AWQS for silver has not been established. Chromium was detected in monitoring well MW-6 at a concentration of 0.022 mg/L. The AWQS for chromium is 0.1 mg/L. Other RCRA metals analyzed were below laboratory detection limits.

*Nitrate:* Each of the UPCO monitoring wells, PW-1, and the POE had nitrate detections during 2006. Nitrate concentrations ranged from 0.97 to 7.3 mg/L, which is below the AWQS of 10 mg/L for nitrate.

## 5.0 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 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

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### 6.1 PROPOSED 2007 GROUNDWATER MONITORING PROGRAM

In accordance with the 2005 Annual Groundwater Report approved by ADEQ, UPCO started quarterly monitoring activities of the UPCO facility wells and continued semi-annual monitoring of the private wells. The proposed 2007 sampling and analysis schedule is presented in Table 9.

#### 6.1.1 Groundwater Level Measurements

Depth to groundwater measurements were collected monthly during the first quarter 2006. Following ADEQ's approval of the 2005 Annual Groundwater Report (Malcolm Pirnie, 2006) in April 2006, depth to groundwater measurements were conducted on a quarterly basis.

As can be observed through review of the groundwater elevation maps, (Figure 5 through Figure 10), the groundwater elevation measurements are largely consistent over time. The exception is monitoring well MW-6 which appears to have greater response to recharge events than the other UPCO facility groundwater monitoring wells. As a contingency, groundwater level monitoring will resume on a monthly basis if two or more wells show an increase or decrease by more than two percent between quarterly monitoring events.

In addition, 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. The pressure transducers were programmed to collect continuous data at 20 minute intervals. 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. Figure 1 shows the graph of the data collected through 2006.

In an effort to expand the evaluation of the hydrogeological conditions at the site, pressure transducers are planned for four additional site wells and up to three of the private wells along Yearling Road in 2007. Installing pressure transducers in select wells will hopefully help assess potential relationships in hydraulic behavior of the aquifer system.

### **6.1.2 Groundwater Sampling**

As can be observed through review of the groundwater sampling data (Appendix D), the laboratory analytical results are largely consistent for target constituents in particular wells. Specifically, perchlorate and VOCs have not been detected above applicable laboratory reporting limits in the UPCO facility groundwater monitoring wells MW-3, MW-4, MW-7, MW-8, MW-9, MW-10 or MW-12 since these wells were installed. Therefore, semi-annual groundwater sampling for perchlorate and VOCs is proposed for these wells. Monitoring wells MW-1, MW-2, MW-5, MW-6, MW-11, PW-1 and POE will continue to be sampled on a quarterly basis. As a contingency, in the event that one of the semi-annually monitored wells exceed applicable regulatory standards for target constituents, ADEQ will be notified and an additional sample collected for confirmation. If the exceedence is confirmed, that particular well will be monitored quarterly.

UPCO continued semi-annual sampling at private wells along Yearling in 2006.

### **6.1.3 Groundwater Analytes**

As can be observed through review of the groundwater sampling data (Appendix D), the laboratory analytical results are largely consistent for various analytical constituents. Specifically, the only VOCs detected during groundwater monitoring activities include 1,1-DCE, 1,4-dioxane, and bromoform, bromodichloromethane, and trihalomethanes. Metals and nitrate detections have been below respective AWQS. The data suggests that VOC analysis on a semi-annual schedule, and metals and nitrate on an annual schedule would be sufficient for continued monitoring. Monitoring wells MW-1, MW-2, PW-1 and POE will continue to be sampled for VOCs during each quarterly sampling event as indicated in Table 9. As a contingency, quarterly sampling for a particular constituent will resume if a trend of increasing concentration or exceedence of a regulatory level is observed.

## 7.0 REFERENCES

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