

## **ATTACHMENT 1: QUALITY ASSURANCE/QUALITY CONTROL SUMMARY**

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A comprehensive QA/QC plan for groundwater monitoring is described in detail in the Quality Assurance Project Plan for the *Work Plan for Performing a Remedial Investigation/Feasibility Study*<sup>1</sup> (Work Plan). QC checks, including both field and laboratory, are the specific operational techniques and activities used to fulfill the QA requirements. Proper sample acquisition and handling procedures are necessary to ensure the integrity of the analytical results.

### **Field Quality Assurance/Quality Control**

The field QA/QC samples collected for JPL groundwater monitoring included duplicate samples, equipment rinsate blanks and trip blanks. These QC sample results were used as part of a qualitative evaluation of the aquifer recovery. Table 1-1 presents a summary of contaminants detected in quality control samples collected during the March - April 2006 sampling event.

Duplicate samples were used to evaluate the precision of the laboratory analyses. Duplicate samples for VOCs, metals, and/or perchlorate analyses were collected from monitoring wells MW-3 (Screen 2), MW-6, MW-11 (Screen 2), MW-12 (Screen 1), MW-19 (Screen 1), MW-21 (Screen 5), MW-23 (Screen 2) and MW-24 (Screen 2). All of the analytical results for the duplicate samples were comparable to the results of the original groundwater samples (Tables 1 and 2).

Equipment rinsate blanks were collected each day non-dedicated sampling equipment was used. The equipment rinsate blanks, consisting of distilled water run through the sampling equipment after decontamination, were analyzed for all contaminants of concern to monitor possible cross-contamination of samples due to inadequate decontamination. Total Cr was detected at low concentrations in 8 of 13 equipment blanks. Methyl Ethyl Ketone (2-Butanone) was detected at low concentrations in 2 of 13 equipment blanks.

Trip blanks which consisted of reagent-grade water placed in a vial and transported with the sample bottles to and from the field, were submitted to the laboratory with each daily shipment of groundwater samples. Trip blanks were used to help identify cross-contamination of groundwater samples during transport and/or deficiencies in the laboratory bottle cleaning and sample handling procedures. No contaminants were detected in the trip blanks.

A source blank consists of distilled water used by sampling personnel for equipment decontamination. The source blank is collected at the sampling site and is preserved, as appropriate. This QC sample serves as a check on contamination present in the source water. There was no source blank was collected during the March - April 2006 sampling event, however the same source of water has been used in previous groundwater monitoring events and only very low levels of contaminants, if any, were reported.

### **Laboratory Quality Assurance/Quality Control**

Laboratory QC samples included surrogate compounds (for VOC analyses), matrix spike samples, blank spike samples, and method blanks. The results of the laboratory QC samples were used by the laboratory to determine the accuracy and precision of the analytical techniques with respect to the JPL groundwater matrix, and to identify anomalous results due to laboratory contamination or instrument malfunction.

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<sup>1</sup> Ebasco. 1993. *Work Plan for Performing a Remedial Investigation/Feasibility Study*, National Aeronautics and Space Administration Jet Propulsion Laboratory, Pasadena, California. December.

## DATA VERIFICATION AND VALIDATION

The purpose of data verification and validation is to assure that the data collected meet the data quality objectives (DQOs) outlined in the Quality Assurance Project Plan of the Work Plan. The process was intended to ensure that the data are of sufficient quality for use in meeting the objectives outlined in the Work Plan. Data verification and validation indicated that all of the sample results obtained from the January – March 2006 event were acceptable for their intended use of characterizing aquifer quality.

### *Data Verification*

All data collected were subjected to data verification. Data verification included confirming that the sample identification numbers on laboratory reports matched those on the chain-of-custody records. Data verification also included reviewing analytical data reports to assure that all samples were analyzed and all required analytes were quantified for each sample.

### *Data Validation*

Data validation is a systematic review of the analytical data that is used to determine the compliance of the with established method performance criteria and determine whether the data quality is sufficient to support the data quality objectives. Validation of a data package included review of the technical holding time requirements, review of sample preparation, review of the initial and continuing calibration data, review and recalculation of the laboratory QC sample data, review of the equipment performance, reconciliation of the raw data with the reduced results, identification of data anomalies, and qualification of data to identify data usability limitations.

Data validation was performed by an independent subcontractor, Laboratory Data Consultants, Inc. (LDC), Carlsbad, CA. One hundred percent of all data analyzed by the analytical laboratories, Applied Physics and Chemistry Laboratory (APCL) and Laucks Testing Laboratories, were validated. Ninety percent of the data were subjected to Level III validation and ten percent of the data were subjected to Level IV validation in accordance with the *EPA Contract Laboratory Program National Functional Guidelines for Organic/Inorganic Data Review*<sup>2,3</sup>. The data were evaluated to ensure suitability and usability for the purpose of the groundwater monitoring report.

### *Data Validation Qualifiers*

Analytical data were qualified based on data validation reviews. For chemical data, qualifiers were assigned in accordance with the EPA guidelines. Individual laboratory data flags can be found in Technical Memorandum Attachment 2 (Data Validation Reports). There were two exceptions to the analytical criteria as noted in the laboratory validation reports.

- The holding time requirement was exceeded for the Hexavalent chromium analysis for the groundwater sample collected from MW-16. The holding time requirement was 24 hours and the actual time of analysis was 25.25 hours.
- The holding time requirement was exceeded for the nitrate analysis for the groundwater sample collected from MW-24-1. The holding time requirement was 48 hours and the actual time of analysis was 4 days.

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<sup>2</sup> U.S. EPA 1999. *Contract Laboratory Program National Functional Guidelines for Organic Data Review*. February.

<sup>3</sup> U.S. EPA 2004. *Contract Laboratory National Program Functional Guidelines for Inorganic Data Review*. December.

These exceptions to the analytical criteria resulted in the assignment of “J” flags to the results by Laboratory Data Consultants, Inc. The “J” flag indicates that the result is an estimated value. No analytical data were rejected for non-compliance with method requirements during the data validation.

**ATTACHMENT 1**  
**TABLE A-1**  
**SUMMARY OF CONTAMINANTS DETECTED IN QUALITY CONTROL SAMPLES**  
**COLLECTED DURING THE MARCH - APRIL 2006 SAMPLING EVENT**

Blank Type	Sample ID Number	Sampling Location(s)	Total Chromium (ug/L)	Methylene Chloride (ug/L)	1,2,3-Trichloropropane (ug/L)	2-Butanone (ug/L)
Equipment Blank	EB-1-3-8-06	MW-21	1.03	0.5 U	0.5U	5.0 U
Equipment Blank	EB-2-3906	MW-20	1.09	0.5 U	0.5 U	5.0 U
Equipment Blank	EB-3-31006	MW-26	1.25 J	0.5 U	0.5 U	5.0 U
Equipment Blank	EB-4-31306	MW-25	3.92 J	0.5 U	0.5 U	5.0 U
Equipment Blank	EB-5-31406	MW-18	4.86 J	0.5 U	0.5 U	5.0 U
Equipment Blank	EB-6-3/15/06	MW-22	1.42	0.5 U	0.5 U	5.0 U
Equipment Blank	EB-7-3/16/06	MW-4	1.0 U	0.5 U	0.5 U	1.6 J
Equipment Blank	EB-8-3/17/06	MW-24	2.01	0.5 U	0.5 U	5.0 U
Equipment Blank	EB-9-3/20/06	MW-19, MW-3	1.0 U	0.5 U	0.5 U	1.04 J
Equipment Blank	EB-10-3/21/06	MW-14, MW-17	1.0 U	0.5 U	0.5 U	5.0 U
Equipment Blank	EB-11-3/22/06	MW-23	1.0 U	0.5 U	0.5 U	5.0 U
Equipment Blank	EB-12-3/23/06	MW-12	1.0 U	0.5 U	0.5 U	5.0 U
Equipment Blank	EB-13-3/24/06	MW-11	5.62	0.5 U	0.5 U	5.0 U
Trip Blank	TB-1-3-8-06	MW-21	NA	0.5 U	0.5 U	5.0 U
Trip Blank	TB-2-3906	MW-20	NA	0.5 U	0.5 U	5.0 U
Trip Blank	TB-3-31006	MW-26	NA	0.5 U	0.5 U	5.0 U
Trip Blank	TB-4-31306	MW-25	NA	0.5 U	0.5 U	5.0 U
Trip Blank	TB-5-31406	MW-18	NA	0.5 U	0.5 U	5.0 U
Trip Blank	TB-6-3/15/06	MW-22	NA	0.5 U	0.5 U	5.0 U
Trip Blank	TB-7-3/16/06	MW-4	NA	0.5 U	0.5 U	5.0 U
Trip Blank	TB-8-3/17/06	MW-24	NA	0.5 U	0.5 U	5.0 U
Trip Blank	TB-9-3/20/06	MW-19, MW-3	NA	0.5 U	0.5 U	5.0 U
Trip Blank	TB-10-3/21/06	MW-14, MW-17	NA	0.5 U	0.5 U	5.0 U
Trip Blank	TB-11-3/22/06	MW-23	NA	0.5 U	0.5 U	5.0 U
Trip Blank	TB-12-3/23/06	MW-12	NA	0.5 U	0.5 U	5.0 U
Trip Blank	TB-13-3/24/06	MW-11	NA	0.5 U	0.5 U	5.0 U
Trip Blank	TB-14-3/27/06	MW-5	NA	0.5 U	0.5 U	5.0 U
Trip Blank	TB-15-3/29/06	MW-7	NA	0.5 U	0.5 U	5.0 U
Trip Blank	TB-16-3/30/06	MW-10, MW-13, MW-16	NA	0.5 U	0.5 U	5.0 U
Trip Blank	TB-17-3/31/06	MW-6	NA	0.5 U	0.5 U	5.0 U

**Notes**

- J Indicates an estimated value.
- ug/L Micrograms per liter
- U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.
- UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.
- NA Not Analyzed