# ATTACHMENT 1: QUALITY ASSURANCE/QUALITY CONTROL SUMMARY

This attachment summarizes the quality assurance/quality control (QA/QC) procedures and results from the third quarter 2005 groundwater sampling event. A comprehensive QA/QC plan for groundwater monitoring is described in detail in the *Quality Assurance Project Plan for the Groundwater Monitoring Plan*. QA can be described as an integrated system of activities in the quality planning and assessment to provide the project with a measurable assurance that the established standards of quality are met. QC checks, including both field and laboratory, are the specific operational techniques and activities used to fulfill the QA requirements.

## FIELD QUALITY ASSURANCE/QUALITY CONTROL

Field QA/QC samples were collected to verify the quality of sampling procedures. The field QA/QC program included the collection of duplicate samples, equipment blanks, trip blanks, and source blanks. Laboratory QA/QC samples were used by the laboratory according to analytical method requirements.

Duplicate samples for VOCs, metals, and/or perchlorate analyses were collected from deep multiport monitoring wells MW-04 (Screen 2), MW-11 (Screen 2), MW-17 (Screen 1), MW-21 (Screen 3), MW-22 (Screen 3), MW-24 (Screens 1 and 5), and MW-26 (Screen 1). Duplicate samples also were collected from shallow wells MW-5, MW-10, and MW-15. All of the analytical results for the duplicate samples were comparable to the results of the original groundwater samples.

Matrix spike (MS) and matrix spike duplicate (MSD) samples were collected for 10% of samples that were analyzed for volatile organic compounds (VOCs), chromium, hexavalent chromium [Cr(VI)] and/or perchlorate. These samples were used for laboratory QA/QC requirements.

One equipment blank was collected from the Westbay sample-collection bottles during each day of sampling the deep multiport wells. Equipment blank samples consisted of distilled water that was passed through the sampling equipment after the equipment was decontaminated. Equipment blanks were analyzed for the same constituents as the groundwater samples, except for cations and anions, total dissolved solids (TDS), and pH, to identify potential cross-contamination due to inadequate decontamination. Because only dedicated sampling equipment was used, equipment blanks were not collected during sampling of the shallow wells. Chromium was detected at low concentrations in six equipment blanks, and 2-butanone was detected at low concentrations in three equipment blanks.

A trip blank, consisting of American Society for Testing Materials Type II water placed in two 40-mL glass vials by the laboratory, was transported with the empty sample bottles to the field and back to the laboratory with the groundwater samples to identify potential cross-contamination of groundwater samples during transport. One trip blank was submitted for VOC analysis with each shipment of groundwater samples to the laboratory. No constituents of concern were detected in the trip blanks during the third quarter 2005 sampling event.

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 reagent (preservative) and environmental contamination. One source blank was collected during the third quarter 2005 sampling event. Chromium and 2-butanone were detected at low concentrations in the source blank.

Table 1-1 presents a summary of compounds detected in QC samples collected during the third quarter 2005 sampling event.

**DATA VERIFICATION AND VALIDATION**

The purpose of data verification and validation is to ensure that the data collected meet the data quality objectives (DQOs) outlined in the *Quality Assurance Project Plan of the Groundwater Monitoring Plan*. Data verification and validation indicated that all of the sample results obtained from the third quarter 2005 event were acceptable for their intended use of characterizing aquifer quality.

**Verification.** All data collected were subjected to data verification. In general, data verification assesses the completeness of the data and identifies non-technical errors in the data package that can be corrected (e.g., typographical errors). This process included verifying that the sample identifiers on laboratory reports matched those on the chain-of-custody records. Data verification also included reviewing analytical data reports to ensure that all samples were analyzed and all required analytes were quantified for each sample.

**Validation.** Data validation was used to determine the compliance of the analytical data 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 a fixed-base analytical laboratory (APCL) were validated. Ninety percent of the data were subjected to Level III validation and 10% of the data were subjected to Level IV validation in accordance with the United States Environmental Protection Agency (U.S. EPA) Contract Laboratory Program National Functional Guidelines for Organic/Inorganic Data Review[2]. The data were evaluated to help ensure suitability and usability for the purpose of the groundwater monitoring report.

**Validation Qualifiers.** Analytical data were qualified based on data validation reviews. For chemical data, qualifiers were assigned in accordance with U.S. EPA guidelines. For the third quarter 2005 there were a few exceptions to the analytical criteria as noted in the laboratory data validation reports:

- Methylene chloride was detected in several method blanks prepared by the analytical laboratory. For all samples associated with the blanks that contained methylene chloride, LDC assigned the "U" qualifier to the sample results.

[2] U.S. EPA. 2004. *Contract Laboratory Program National Functional Guidelines for Data Validation.* December.

- Chromium was detected in a few of the method blanks prepared by the analytical laboratory. For all samples associated with the blanks that contained chromium, LDC assigned the "U" qualifier to the sample results.
- The continuing calibration data did not meet analytical criteria for chromium for two data sets; therefore, LDC assigned the "J" qualifier for the chromium sample results.

Individual laboratory data flags can be found in the data validation reports provided in Attachment 2. No data were rejected for noncompliance with method requirements during the course of validation.

**ATTACHMENT 1**
**TABLE 1-1**
**SUMMARY OF CONTAMINANTS DETECTED IN QUALITY CONTROL SAMPLES**
**COLLECTED DURING THE JULY - SEPTEMBER 2005 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-1-7/19/05 | MW-25 | **0.15U*** | 0.5 U | NA | 10.0 U |
| Equipment Blank | EB-2-7/20/05 | MW-19 | NA | 0.5 U | NA | 10.0 U |
| Equipment Blank | EB-3-7/21/05 | MW-18 | **0.16U*** | 0.5 U | **0.005U** | 10.0 U |
| Equipment Blank | EB-4-7/25/05 | MW-24 | **0.36U*** | 0.5 U | NA | 10.0 U |
| Equipment Blank | EB-5/7/26/05 | MW-21 | **0.36U*** | 0.5 U | NA | 10.0 U |
| Equipment Blank | EB-6-7/27/05 | MW-3 | **0.24JU*** | 0.5 U | NA | 10.0 U |
| Equipment Blank | EB-7-7/28/05 | MW-12 | **0.48U*** | **2.0U*** | NA | 10.0 U |
| Equipment Blank | EB-8-8/1/05 | MW-20 | **0.64J** | **1.8U*** | NA | **5J** |
| Equipment Blank | EB-9-8/2/05 | MW-4 | **1.5** | **1.4U*** | NA | 10.0 U |
| Equipment Blank | EB-10-8/3/05 | MW-14 | NA | **1.2U*** | NA | 10.0 U |
| Equipment Blank | EB-11-8/4/05 | MW-23, MW-26 | **2.0** | **1.3U*** | NA | 10.0 U |
| Equipment Blank | EB-12-8/15/05 | MW-17 | **1.9** | **1.4U*** | NA | **8J** |
| Equipment Blank | EB-13-9/8/05 | MW-12, MW-18, MW-19 | **0.27J** | **1.2U*** | NA | 10.0 U |
| Equipment Blank | EB-14-9/9/05 | MW-14, MW-23, MW-24 | **0.59J** | **1.2U*** | NA | **10** |
| | | | | | | |
| Source Blank | SB-1-3Q05 | -- | **2.3** | **1.4U*** | **0.5U** | **4J** |
| | | | | | | |
| Trip Blank | TB-1-7/19/05 | MW-25 | NA | 0.5U | NA | 0.5 U |
| Trip Blank | TB-2-7/20/05 | MW-19 | NA | 0.5U | NA | 0.5 U |
| Trip Blank | TB-3-7/21/05 | MW-18 | NA | 0.5 U | NA | 0.5 U |
| Trip Blank | TB-4/7/25/05 | MW-24 | NA | 0.5 U | NA | 0.5 U |
| Trip Blank | TB-5-7/26/05 | MW-21 | NA | 0.5 U | NA | 0.5 U |
| Trip Blank | TB-6-7/27/05 | MW-3 | NA | 0.5 U | NA | 0.5 U |
| Trip Blank | TB-7-7/28/05 | MW-12 | NA | **1.4U*** | NA | 0.5 U |
| Trip Blank | TB-8-8/1/05 | MW-20 | NA | **1.3U*** | NA | 0.5 U |
| Trip Blank | TB-9-8/2/05 | MW-11 | NA | **1.2U*** | NA | 0.5 U |
| Trip Blank | TB-10-8/3/05 | MW-22 | NA | **1.2U*** | NA | 0.5 U |
| Trip Blank | TB-11-8/4/05 | MW-23, MW-26 | NA | **1.4U*** | NA | 0.5 U |
| Trip Blank | TB-12-8/9/05 | MW-7, MW-13 | NA | **1.2U*** | NA | 0.5 U |
| Trip Blank | TB-13-8/10/05 | MW-10, MW-16 | NA | **1.3U*** | NA | 0.5 U |
| Trip Blank | TB-14-8/11/05 | MW-5, MW-6 | NA | **1.3U*** | NA | 0.5 U |
| Trip Blank | TB-15-8/15/05 | MW-17 | NA | **1.3U*** | NA | 0.5 U |
| Trip Blank | TB-16-9/2/05 | MW-15 | NA | **1.4U*** | NA | 0.5 U |
| Trip Blank | TB-17-9/8/05 | MW-12, MW-18, MW-19 | NA | **1.3U*** | NA | 0.5 U |
| Trip Blank | TB-18-9/9/05 | MW-14, MW-23, MW-24 | NA | **1.3U*** | NA | 0.5 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. |
| * | U value assigned after data validation |
| ND | Not detected |
| NA | Not analyzed |