

Appendix A
Data Quality Summary

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Acronyms and Abbreviations

1,2,3-Trichloropropane

CADRE Computer Aided Review and Evaluation Software

CLP Contract Laboratory Program

EPA Environmental Protection Agency

ICP Inductively Coupled Plasma

NDMA N-Nitrosodimethyl amine

QA Quality assurance

QC Quality Control

RI Remedial Investigation

RL Reporting Limit

RPD Relative Percent Difference

RSD Relative Percent Difference

SVOC Semivolatile Organic Compound

ug/L microgram per liter

VOC Volatile Organic Compound

Data Quality Summary

This Data Quality summary presents the results of quality control (QC) and quality assurance (QA) activities employed by the U.S. Environmental Protection Agency (EPA) during data collection for the Omega Chemical Superfund Site remedial investigation (RI). The goal of implementing QC and QA activities is to ensure that the conclusions and recommendations presented in the RI report are supported by chemical data of known, acceptable, and documented quality. The QC/QA activities include:

- Monitoring of field activities for compliance with approved plans;
- Preparation and analysis of field QC samples, including field blanks, equipment rinsate blanks, and field duplicates; and
- Data review and validation.

These activities acceptance standards are described in the *Quality Assurance Project Plan (QAPP), Omega Chemical Superfund Site, Operable Unit 2 Remedial Investigation/Feasibility Study*, July 2004.

Based on the evaluation of the QA/QC information, EPA's data collection achieved the 90 percent project completeness goal – that is, 90 percent of the data are usable for the intended purpose. No major issues were identified associated with collection or analysis of field or QC samples that negatively impacted data usability.

Although sample results are flagged as estimates in some cases, the overall findings of the data review and validation indicate that the primary data are of sufficient quality to support the conclusions and recommendations of the RI.

A1.1 Data Review and Validation

In order to document that the collected data were of sufficient quality, data review and validation were performed according to Region 9 guidance (EPA, 2001). Data review included Tier 1 review, both automated and manual, and manual Tier 2 review, described as follows:

Tier 1A and Tier 2 Review – Tier 1A and Tier 2 review are manual review of essential QC information without review of raw data. Tier 2 is an expanded review of the data that includes review of additional method QC results such as calibration statistics along with all of the elements of the Tier 1A review. Tier 1A review was applied to the data from the Region 9 laboratory; both Tier 1A and Tier 2 review were applied to some of the emergent chemicals results that were analyzed by laboratories outside the EPA Contract Laboratory Program (CLP), due to the specialized nature of these test methods.

Tier 1B Review – CLP data review involved application of Computer-Aided Data Review and Evaluation (CADRE) software to perform an automated review.

Data review and validation for both the Tier 1A and Tier 1B approaches considered the QC elements listed below.

- Sample Holding Times
- Method Blanks
- Laboratory Control Samples
- Continuing Calibration Standards
- Matrix Spikes
- Sample Duplicates and Spike Duplicates
- Volatile System Monitoring Compounds
- Internal Standards
- Surrogates

Tier 1B Review – Tier 3 validation includes all of the elements of the Tier 1 and Tier 2 reviews along with qualitative and quantitative evaluation of the raw data. The findings of the Tier 3 validation are considered representative of the entire data set and are discussed in detail by event in subsequent sections of this Appendix.

Table A1-1 summarizes the overall number of samples reviewed by event and validation level. The percent validation goal was achieved for all methods containing site related analytes. Several of the data packages for emergent chemicals from the 2004 groundwater monitoring program were not reviewed. As data from the same laboratories was reviewed according to plan for subsequent events with out significant negative findings, the unreviewed data are considered to be of similar quality and this deficiency is not considered to impact usability of these data.

Note: Several SDGs for the most recent sampling event (July2007) were not received in time to complete the data review and validation and these results are not included in the draft DQA. The details of the data review and validation of these data will be included in the next revision of the RI report.

A2.1 Field Quality Control

Field quality control samples include field blanks, equipment blanks, trip blanks, and field duplicate samples.

A2.1.1 Field Duplicates

Field duplicate samples are collocated samples used to evaluate the overall reproducibility taking into account both field and analytical variability. Field duplicate results are evaluated by comparing the calculated relative percent difference (RPD) to the acceptance criteria specified in Table A-2 of the Omega QAPP. The RPD is calculated as follows:

$$RPD = \frac{100 * (\text{Primary Result} - \text{Field Duplicate Result})}{\frac{1}{2} * (\text{Primary Result} + \text{Field Duplicate Result})}$$

The RPD was calculated for results where an analyte was detected in both the primary and field duplicate samples. If the analyte was not detected in either one or both of the duplicate samples, the RPD was not calculated. Where both results are below the reporting limit, no RPD is calculated. The reporting limits in both the primary and field duplicates were

comparable and are considered to be in agreement. In the cases where the analyte is detected in one of the field duplicate samples, the results are considered to be in agreement if the difference between either the positive results and the reporting limit or the reporting limits are less than 25 percent. Attachment 1 presents the field duplicate results obtained during the groundwater sampling events and remedial investigation sampling events and Table A1-2 summarizes the field duplicate outliers. The following lists the percent of acceptable results based on comparable duplicate pairs by analytical group:

- 80% of the comparable volatile organic compound (VOC) field duplicate results were within the 30% acceptance criterion;
- 90 % of the comparable 1,4-dioxane field duplicate results were within the 30% acceptance criterion;
- 92% of the comparable hexavalent chrome field duplicate results were within the 30% acceptance criterion;
- 67% of the comparable N-nitrosodimethyl amine (NDMA) field duplicate results were within the 30% acceptance criterion;
- 96% of the comparable perchlorate results were within the 50% acceptance criterion.

There were only two comparable field duplicate results for 1,2,3-trichloropropane and the RPD in both cases was 44 percent, above the 30% project acceptance criterion. The concentrations were below the 0.005 ug/L reporting limit and the absolute concentration difference between the results was small. Because of the small difference between the duplicate concentrations, the field duplicate results do not negatively impact data usability. For the entire field duplicate set, there were 675 comparable results; of these, 89% were within project acceptance criteria. Field duplicate results are affected by analytical precision, field variations, and the difference in sample matrices. While groundwater is generally considered a homogenous matrix, there can be differences depending on the order of sample collection and overall sample handling in the field and the laboratory. These factors are likely responsible of the observed differences.

A1.1.2 Quality Control Blanks

Quality control blanks included field, equipment, and trip blanks. Field blanks are prepared to evaluate the potential for environmental contamination at the point of sample collection, equipment blanks are prepared to evaluate the effectiveness of equipment decontamination, and trip blanks are prepared to evaluate the contamination of samples during shipment and storage. The following sections present the detections in the quality control blanks prepared during each sampling event. Table A1-3 summarizes the number and type of quality control samples collected by event. The following sections present and evaluation of the quality control blank results. Except where discussed in the following sections, the results of the field quality control blanks are considered acceptable and satisfactorily demonstrate that no significant contamination was introduced during sampling, shipment, or storage.

First Quarter 2004, Groundwater

Field quality control samples associated with this event included two field blanks. Chloroform was detected above the reporting limit in both of the field blanks. Table A1.4 presents the details of these detects.

TABLE A1.4
First Quarter 2004, Field Blank Results

Sample Identification	Collection Date	Sample Type	Analyte	Concentration	Reporting Limit
OC2-00-W-2-3	March 2, 2004	Field Blank	Chloroform	1.2 ug/L	0.5 ug/L
OC2-00-W-2-16	March 4, 2004	Field Blank	Chloroform	1.2 ug/L	0.5 ug/L
			TDS	27 mg/L	20 m g/L

ug/L: microgram per liter

mg/L: milligram per liter

TDS: Total Dissolved Solids

Second Quarter 2004, Groundwater

Field quality control samples included two field blanks and one equipment blank. Acetone and chloroform were detected above the reporting limit in two field blanks and one equipment blank. Table A1.5 presents the details of these detected results.

TABLE A1.5
Second Quarter 2004, Field and Equipment Blank Results

Sample ID	Collection Date	Sample Type	Analyte	Concentration (ug/L)	Reporting Limit (ug/L)
OC2-00-W-2-35	June 21, 2004	Field Blank	Chloroform	0.82	0.5
			Acetone	8.6	5.0
OC2-00-W-2-48	June 23, 2004	Field Blank	Chloroform	0.73	0.5
			Acetone	8.1	5.0
OC2-00-W-3-24	June 15, 2004	Equipment Blank	Chloroform	0.73	0.5
			Acetone	6.0	5.0

Third Quarter 2004, Groundwater

Field quality control samples included two field blanks. Chloroform was detected above the reporting limit and 1,2,3-trichloropropane was detected below the reporting limit in both of the field blanks. Benzene was detected below the reporting limit and acetone was detected above the reporting limit in one of the field blanks. Table A1.6 presents the details of these detected results.

TABLE A1.6
Third Quarter 2004, Field and Equipment Blank Results

Sample ID	Collection Date	Type	Analyte	Concentration (ug/L)	Reporting Limit (ug/L)
OC2-00-W-2-57	September 13, 2004	Field Blank	Chloroform	1.6	0.5
			1,2,3-TCP	0.0024	0.005
OC2-00-W-2-68	September 15, 2004	Field Blank	Chloroform	1.5	0.5
			Benzene	0.053	0.5
			1,2,3-TCP	0.0041	0.005
			Acetone	5.3	5

ug/L: microgram per liter
1,2,3-TCP: 1,2,3-trichloropropane

Fourth Quarter 2004, Groundwater

Field quality control samples included three field blanks and one equipment blank. Table A1-7 presents the equipment and field blank results. Table A1-8 summarizes the number of detections by analyte in the field blanks.

TABLE A1-8
Summary of Results for Field and Equipment Blanks, Fourth Quarter 2004

Analyte	Number of Result above the Reporting Limit	Number of Results Below the Reporting Limit
Chloroform	2	1
Ethylbenzene	3	
Methylene Chloride	3	
Toluene		3
Benzene (detected in 2 of 3 field blanks)		2
Tetrachloroethene (detected in 2 of 3 field blanks)		2
Acetone (detected in 1 of 2 field blanks)	1	
Xylenes (total)		3

With the exception of the tetrachloroethane, the detected analytes represent common laboratory contaminants and the presence of these compounds in the field blanks does not indicate contamination from environmental conditions. However, the equipment blank results, most notably the result for tetrachloroethene indicates a potential decontamination problem or other issue such as a mislabeled sample. It should be noted that the highest concentration sample collected on 12/1/2004 was collected prior to collection of the highest concentration sample, implying that carry over from incomplete decontamination was not

responsible for the concentration of target analytes in the equipment blank. For these reasons, the equipment blank results are considered unreliable and not representative of the effectiveness of field decontamination procedures.

TABLE A1-7
Fourth Quarter 2004, Field Blank and Equipment Blank Results

Sample ID	Collection Date	Type	Analyte	Concentration in ug/L	Reporting Limit in ug/L
OC2-00-W-2-78	30-Nov-04	Field Blank	Chloroform	0.57	0.5
			Ethylbenzene	0.053	0.5
			Methylene chloride	0.62	0.5
			Toluene	0.29	0.5
			Xylenes, total	0.11	0.5
OC2-00-W-2-96	06-Dec-04	Field Blank	Benzene	0.1	0.5
			Chloroform	0.41	0.5
			Ethylbenzene	0.051	0.5
			Methylene chloride	0.57	0.5
			Tetrachloroethene	0.07	0.5
			Toluene	0.24	0.5
			Xylenes, total	0.11	0.5
OC2-00-W-2-111	09-Dec-04	Field Blank	Acetone	7.3	5
			Benzene	0.083	0.5
			Chloroform	0.45	0.5
			Ethylbenzene	0.05	0.5
			Methylene chloride	0.61	0.5
			Tetrachloroethene	0.22	0.5
			Toluene	0.26	0.5
			Xylenes, total	0.11	0.5
OC2-OW1A-W-3-84	01-Dec-04	Equipment Blank	1,1,1-Trichloroethane	1.8	0.5
			1,1,1-Trichloroethane	1.6	0.5
			1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	0.4	0.5
			1,1-Dichloroethene	0.45	0.5
			Acetone	7.4	5
			Benzene	0.57	0.5
			Bromomethane	0.15	0.5
			Bromomethane	4.6	0.5
			Carbon disulfide	0.29	0.5

TABLE A1-7
Fourth Quarter 2004, Field Blank and Equipment Blank Results

Sample ID	Collection Date	Type	Analyte	Concentration in ug/L	Reporting Limit in ug/L
			Chloroform	0.32	0.5
			Chloromethane	1.6	0.5
			N-Nitrosodimethylamine	0.0041	0.002
			Tetrachloroethene	140	0.5
			Toluene	0.2	0.5
			Trichloroethene	1.1	0.5

First Quarter 2005, Semiannual Groundwater Sampling

Two field blanks were prepared. The only target analytes detected were chloroform (1.5 and 2.6 ug/L) above the 0.5 ug/L reporting limit and methylene chloride (0.12 ug/L) below the 0.5 ug/L reporting limit.

Third Quarter 2005, Semiannual Groundwater Sampling

Two field blanks were prepared on August 30th and September 2nd, 2005. Table A1-9 presents the analytes detected in the field blanks. Methylene chloride, toluene, and total xylenes were detected above the reporting limit in one or both of the field blanks. All of the other analytes detected were below the reporting limit.

TABLE A1-9
Third Quarter 2005, Field Blank Results

Blank Identification	Date Collected	Analyte	Type	Results (ug/L)	Reporting Limit (ug/L)
OC2-MW4A-W-2-136	30-Aug-05	Benzene	Field Blank	0.19	0.5
	30-Aug-05	Ethylbenzene		0.13	0.5
	30-Aug-05	Methylene chloride		1.1	0.5
	30-Aug-05	Toluene		0.85	0.5
	30-Aug-05	Xylenes, total		0.54	0.5
OC2-MW11-W-2-154	02-Sep-05	Acetone	Field Blank	1.7	5
	02-Sep-05	Benzene		0.18	0.5
	02-Sep-05	Ethylbenzene		0.11	0.5
	02-Sep-05	Methylene chloride		2.2	0.5
	02-Sep-05	Toluene		0.75	0.5
	02-Sep-05	Xylenes, total		0.48	0.5

TABLE A1-9
Third Quarter 2005, Field Blank Results

Blank Identification	Date Collected	Analyte	Type	Results (ug/L)	Reporting Limit (ug/L)
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ug/L: microgram per liter

First Quarter 2006, Semiannual Groundwater Sampling

There are seven trip blanks, four field blanks, and two equipment blanks associated with this event. There were no analytes detected in any of the blanks other than the blanks listed in Table A1-10.

Chloromethane was detected in three trip blanks at concentrations below the reporting limit. Acetone and tetrachloroethene were detected in one equipment blank at concentrations below the reporting limit. Based on the trip blank results, no contamination is expected associated with sample shipment and storage. Based on the equipment blank results, the decontamination procedures were sufficient to ensure no carryover contamination between samples.

TABLE A1-10
First Quarter 2006, Field and Trip Blank Results

Sample Identification	Type	Collection Date	Analyte	Result (ug/L)	Reporting Limit (ug/L)
OC2-MW13B-W-3-202	Equipment Blank	15-Mar-06	Acetone	2.2	5
		15-Mar-06	Tetrachloroethene	0.2	0.5
OC2-MW17B-W-4-182	Trip Blank	13-Mar-06	Chloromethane	0.2	0.5
OC2-MW7-W-4-156	Trip Blank	06-Mar-06	Chloromethane	0.2	0.5
OC2-MW8D-W-4-160	Trip Blank	07-Mar-06	Chloromethane	0.2	0.5

ug/L: microgram per liter

Third Quarter 2006, Semiannual Groundwater Sampling

Three field blanks and eight trip blanks are associated with this event. There were no positive results reported in the trip blanks. Table A1-11 presents the detected analytes in the field blanks.

TABLE A1-11
Third Quarter 2006, Field Blank Results

Sample Identification	Type	Collection Date	Analyte	Result (ug/L)	RL (ug/L)
OC2-MW18C-W-2-208	Field Blank	28-Aug-06	Chloroform	0.3	0.5
OC2-MW8D-W-2-221	Field Blank	30-Aug-06	Chloroform	0.3	0.5
OC2-MW17C-W-2-241	Field Blank	05-Sep-06	Chloroform	0.4	0.5
OC2-MW1A-W-2-257	Field Blank	08-Sep-06	Chloroform	0.4	0.5
		08-Sep-06	Tetrachloroethene	0.2	0.5

ug/L: microgram per liter

First Quarter 2007, Semiannual Groundwater Sampling

Four field blanks were collected during this sampling event. The Table A1-12 presents the target analytes detected in these blanks:

TABLE A1-12
First Quarter 2007, Field Blank Results

Sample Name	Type	Collection Date	Analyte	Result	RL (ug/L)
OC2-AB1-W-2-457	Field Blank	26-Feb-07	Trichloroethene	0.26	0.5
OC2-AB2-W-2-465	Field Blank	27-Feb-07	Methyl ethyl ketone	4.5	5
OC2-AB4-W-2-478	Field Blank	01-Mar-07	Methyl ethyl ketone	4.2	5
OC2-AB8-W-2-506	Field Blank	07-Mar-07	Methylene chloride	0.7	0.5

Only methylene chloride was detected in the field blanks at a concentration above the reporting limit. The presence of trichloroethene in the field blank collected on February 26 may represent either field or laboratory carryover; however, the very low concentration is not sufficient to have a significant effect on the associated samples.

Third Quarter 2007, Semiannual Groundwater Sampling

Fourteen field blanks were collected during this event. Table A1-13 presents the detected analytes in the field blanks.

TABLE A1-13
Third Quarter 2007, Field Blank Results

Sample Identification	Collection Date	Type	Analyte	Result (ug/L)	RL (ug/L)
OC2-AB5-W-2-X	7/13/2007	Field Blank	Styrene	0.02	0.5
			Tetrachloroethene	0.039	0.5
OC2-AB11-W-2-X	7/23/2007	Field Blank	Chloroform	0.084	0.5

TABLE A1-13
Third Quarter 2007, Field Blank Results

Sample Identification	Collection Date	Type	Analyte	Result (ug/L)	RL (ug/L)
			Chloroform	0.074	0.5
			Cyclohexane	0.17	0.5
OC2-AB12-W-2-X	7/24/2007	Field Blank	Benzene	0.051	0.5
OC2-AB13-W-2-X	7/25/2007	Field Blank	Chloroform	0.051	0.5
OC2-AB14-W-2-X	7/26/2007	Field Blank	Chloromethane	0.37	0.5

Not considered common laboratory contaminants, the concentrations are well below the method reporting limits. Because the reported concentrations are so low, the results are not considered indicative of a significant contamination problem.

Remedial Investigation, Hydropunch Sampling

Field quality control samples associated with this event included four equipment blanks and two field blanks. Zinc and chromium were detected above the reporting limit in one of the equipment blanks; the remainder of the metals detected in the equipment blank was well below the method reporting limit. Of the organic compounds detected only methylene chloride, a common laboratory contaminant, was detected above the reporting limit.

Table A1.14 presents the details of these detects.

TABLE A1.14
Remedial Investigation, Hydropunch Sampling, Field and Equipment Blank Results

Sample Identification	Collection Date	Type	Analyte	Result (ug/L)	RL (ug/L)
OC2-HPW1A-W-3-393	12-Mar-07	Equipment Blank	Aluminum	253	200
			Barium	0.78	10
OC2-HP2923A-W-2-512	11-Apr-07	Field Blank	Toluene	0.22	0.5
OC2-HPRA4-W-2-283	10-Jan-07	Field Blank	Methylene chloride	0.72	0.5
OC2-EB-W-3-282	10-Jan-07	Equipment Blank	Methylene chloride	0.7	0.5
OC2-HP2917A-W-3-440	09-Apr-07	Equipment Blank	Toluene	0.33	0.5
OC2-HP2923A-W-3-511	11-Apr-07	Equipment Blank	Chloromethane	0.17	0.5
			Toluene	0.21	0.5
OC2-HPW1A-W-3-393	12-Mar-07	Equipment Blank	Calcium	420	5000
			Chromium	4.3	2
OC2-HPW1A-W-3-393	12-Mar-07	Equipment Blank	Magnesium	81.1	5000
			Manganese	0.26	1
			Potassium	209	5000
			Sodium	856	5000

TABLE A1.14
Remedial Investigation, Hydropunch Sampling, Field and Equipment Blank Results

Sample Identification	Collection Date	Type	Analyte	Result (ug/L)	RL (ug/L)
			Zinc	3.3	2

ug/L: microgram per liter

A1.1 Rejected Data

Where serious quality control deficiencies exist, data may be rejected for project use. For the Omega groundwater monitoring and remedial investigation sampling, no positive results were rejected. The following describes situations where reporting limits were rejected due in most part to sensitivity issues.

A1.2.1 First Quarter 2004, Quarterly Groundwater Sampling

The internal standard area counts were outside the validation criteria in the sample from location MW8C. The reporting limits for bromoform, 1,2-dichlorobenzene, 1,3-dichlorobenzene, 1,4-dichlorobenzene, 1,2-dibromo-3-chloropropane, 1,2,3-trichlorobenzene, and 1,2,4-trichlorobenzene are rejected. The surrogate results were below the rejection criterion in the sample from location MW2A. As a result, the reporting limits for bromomethane, chloromethane, chloroethane, and carbon disulfide are rejected.

A1.2.2 Second Quarter 2004, Quarterly Groundwater Sampling

Silver reporting limits were rejected in all samples in SDG MY1C21 specifically because of LCS recovery of 10%, well below the rejection criterion. However, because of a problem with the analyses using the inductively coupled plasma (ICP) mass spectrometry (MS) technique, all of the ICP-MS results were rejected for use and the ICP-atomic emission spectroscopy analysis results were reported for all metals. Atrazine reporting limits were rejected in 29 samples due to low calibration standard response factors.

A1.2.3 Third Quarter 2004, Quarterly Groundwater Sampling

Based on the Tier 1B review of SDG MY1FS1, the beryllium quantitation limits were qualified as rejected in four samples because the percent recovery in the continuing calibration standard was outside the rejection criterion; beryllium was also rejected in 11 samples because of ICP-MS internal standard recoveries outside the acceptance criteria. Chromium, cobalt, and copper were rejected in one sample because of ICP-MS internal standard recoveries outside the acceptance criteria.

A1.2.4 Fourth Quarter 2004, Quarterly Groundwater Sampling

Thirty 1,2-dibromochloropropane and 25 atrazine quantitation limits were rejected for low initial and continuing calibration relative response factors. The true quantitation limits may be higher than reported because of low sensitivity for these compounds..

A1.2.5 First Quarter 2005, Semiannual Groundwater Sampling

There were no results rejected for project use based on the data review and validation findings.

A1.2.6 Third Quarter 2005, Semiannual Groundwater Sampling

There were no results rejected for project use based on the data review and validation findings.

A1.2.7 First Quarter 2006, Semiannual Groundwater Sampling

There were no results rejected for project use based on the data review and validation findings.

A1.2.8 Third Quarter 2006, Semiannual Groundwater Sampling

There were no results rejected for project use based on the data review and validation findings.

A1.2.9 First Quarter 2007, Semiannual Groundwater Sampling

Seventeen 1,2-dibromo-3-chloropropane results were rejected due to low response factors in the calibration standards. Low response factors may indicate low sensitivity for these compounds and for this reason, the reported quantitation limits are considered unreliable and the true reporting limits may be higher and false negatives may exist.

A.1.2.10 Third Quarter 2007, Semiannual Groundwater Sampling

Two 1,4-dioxane results were rejected due to low response factors. Hexachlorobutadiene, 3,3'-dichlorobenzidine, and 4-chloroaniline quantitation limits in the sample from location MW24A were rejected because of low surrogate recoveries.

A1.2.11 Remedial Investigation, Hydropunch Sampling

Based on the Tier 2 review, the quantitation limits for dibromochloropropane in one sample, 1,4-dioxane in 56 samples, and vinyl chloride in one sample were rejected because of low response factors in the initial and/or continuing calibration standards. Low response factors may indicate low sensitivity for these compounds and for this reason, the reported quantitation limits are considered unreliable and the true reporting limits may be higher and false negatives may exist.

A1.3 Summary of Tier 3 Data Review Findings

This section describes the findings of the Tier 3 validation. The Tier 3 validation is considered representative the acceptability of the entire data set. Additional information regarding the complete Omega OU2 data set is provided in the following:

- Attachment 2 presents a listing by method of all SDGs, samples, and validation level;
- Attachment 3 presents all of the estimated based on the Tiers 1 and 2 review and 3 validation.

The number and type of qualifiers by reason code and event are summarized in Table A1-16. In general, the results of the Tier 3 validation are considered representative of the data set as a whole. The following sections present a discussion of the findings of the Tier 3 validation by event.

A1.3.1 First Quarter 2004, Groundwater

For this event, Tier 3 validation was performed on the VOC and SVOC results for the sample from location MW-3A and on the results for all samples for COD, hexavalent chromium and NMDA.

Volatile Organic Compounds: The Tier 3 validation resulted in qualification of the VOC groundwater results for the following QC metrics: initial and continuing calibration.

- **Initial Calibration Relative Response Factor (Reason Codes C2 and C5)**
Relative response factors (RRFs) for 1,2-dibromo-3-chloropropane, 2-butanone, 2-hexanone, 4-methyl-2-pentanone, and acetone were below the 0.05 validation criterion in the initial calibration and the continuing calibration verification for the sample from location MW3A. The results for these compounds were nondetected and the quantitation limits are qualified as estimated, UJ. Where results are nondetected, false negatives may exist.
- **Continuing Calibration (Reason Code C3)**
The continuing calibration percent differences (%D) were outside the ± 30 percent control limit for isopropylbenzene and methylene chloride. Results for these analytes are nondetected and the quantitation limits are qualified as estimated, UJ.
- **Initial Calibration Relative Standard Deviation (Reason Code C1)**
The initial calibration relative standard deviations (RSD) for Freon-113 and methylene chloride were estimated due to the RSD exceeding the $\pm 30\%$ quality control (QC) criteria. The quantitation limits are qualified as estimated, UJ.

Semivolatile Organic Compounds: The Tier 3 validation resulted in qualification of the SVOC groundwater results for the following QC metrics: initial calibration, continuing calibration and surrogates.

- **Continuing Calibration (Reason Code C3)**
The percent differences between the initial calibration and continuing calibration response factors for 4-nitroaniline and di-n-octylphthalate exceeded the $\pm 30\%$ QC criteria. The results and quantitation limits in the associated samples are qualified as estimated, UJ.
- **Initial Calibration Relative Standard Deviation (Reason Code C1)**
The percent RSD for di-n-octylphthalate exceeded the $\pm 30\%$ QC criteria. The detected results and quantitation limits are qualified as estimated J/UJ in associated samples.
- **Surrogates (Reason Code A3)**
The surrogate recoveries for 1,1-biphenyl, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, bis(2-ethylhexyl)phthalate, butylbenzyl phthalate, caprolactam, dibenzo(a,h)anthracene, diethylphthalate, dimethylphthalate,

di-n-butylphthalate, di-n-octylphthalate, 4,6-dinitro-2-o-cresol, and indeno(1,2,3-cd)pyrene exceeded the method specific lower control limits in the sample from location MW3A. The detected results and quantitation limits are qualified as estimated J/UJ. A low bias may exist; where results are nondetected, false negatives may exist.

A1.3.2 Second Quarter 2004, Groundwater

For this event, the Tier 3 validation was performed on metals results.

Metals: The Tier 3 validation resulted in qualification of the dissolved metals by ICP-AES groundwater results for serial dilution and internal standard outliers.

- **Serial Dilution (Reason Code Q7)**

The results and quantitation limits for potassium in the samples from locations MW1A, MW1B, MW2A, MW3A, MW5A, MW6A, MW7A, MW8A, MW8B, MW8C, MW8D, MW9B, MW10A, and MW11A were estimated because an ICP serial dilution result was outside method QC limits of $\pm 10\%$ difference between the diluted and undiluted analysis. Results reported for potassium in these samples are considered quantitatively uncertain. Chemical and physical interferences may exist due to sample matrix effects. The result for the diluted sample was lower than the original sample, therefore, the reported potassium sample results may be biased high.

- **Internal Standard (Reason Code Q5)**

The internal standard recovery did not meet the method acceptance criteria for silver in the inductively coupled plasma-mass spectroscopy analysis. As a result the silver results and quantitation limits in samples from locations MW1A, MW11, MW1B, MW2, MW3, MW5, MW7, MW8A, MW8C, and MW8D are qualified as estimated.

- **Missing Quality Control Sample (Reason Code Q10)**

For SDGs MY1C21, metals by ICP-AES, and MY1C22, metals by ICP-MS, there was interference noted in the MS analysis, presumably due to high concentrations of silicon. As a result, antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, lead, manganese, nickel, selenium, silver, thallium, vanadium, and zinc are reported from the ICP-AES analysis along with the minerals. However, the laboratory did not perform the required matrix spike for these analytes. All of the results and quantitation limits for these analytes are qualified as estimated to alert the user to the uncertainty associated with the missing QC sample.

A1.3.3 Third Quarter 2004, Groundwater

For this event, Tier 3 validation was performed on VOC and SVOC results.

Volatile Organic Compounds: The Tier 3 validation resulted in qualification of the VOC groundwater results for the following QC metrics: initial and continuing calibration, hold time, and surrogates.

- **Laboratory Blank Contamination (Reason Code B1)**

The following analytes in the samples from the specified locations were qualified as estimated because of contamination in the associate laboratory blank:

- Methylene chloride in samples from locations MW1A, MW1B, MW2, MW4A, MW4B, MW4C, MW5, MW6, MW7, and MW8A,
- Benzene in samples from locations MW1A, MW1B, MW2, MW4A, MW4C, MW6, MW7, MW8A, MW8C, MW8D, and MW9B
- Bromomethane in samples from locations MW4B, MW1A, and MW4B
- Chlorobenzene in the sample from location MW4B
- Tetrachloroethene in the sample from location MW3

The results for the indicated analytes are considered as the maximum amount present in the sample and may be considered not detected.

- **Field Blank Contamination (Reason Code B3)**

The following analytes in the samples from the specified locations were qualified as estimated because of contamination in the associate field blank:

- Benzene in samples from locations MW1A, MW1B, MW2, MW4A, MW4C, MW6, MW7, MW8A, MW8C, MW8D, and MW9B
- Chloroform in samples from locations MW4C, MW8A, MW8B, MW8C, MW8D, and MW9B

The results for the indicated analytes are considered as the maximum amount present in the sample and may be considered not detected.

- **Initial and Continuing Calibration Relative Response Factor (Reason Codes C2 and C5)**

Relative Response Factors (RRFs) for the initial calibration for 1,2-dibromo-3-chloropropane, 2-butanone, 2-hexanone, and acetone were below the 0.05 validation criterion. Relative Response Factors (RRFs) for the continuing calibration for 1,2-dibromo-3-chloropropane, 2-butanone, 2-hexanone, and acetone were below the 0.05 validation criterion. Results and quantitation limits in all samples were qualified as estimated, J/UJ. Detected results for these analytes were considered the minimum concentrations at which the analytes are present in the sample. Where results are nondetected, false negatives may exist.

- **Continuing Calibration Percent Difference (Reason Code C3)**

The continuing calibration percent differences (%D) were outside the $\pm 30/50$ percent control limit for the following compounds:

- 1,2-Dibromoethane, methylcyclohexane, and 1,2,3-trichlorobenzene in samples from locations MW7A, MW8A, MW8D, and MW10A
- Bromomethane in samples from locations MW1A, MW1B, MW2A, MW3A, MW4A, MW4B, MW4C, MW5A, MW6A, and MW7A
- Dichlorodifluoromethane in samples from locations MW7A, MW8A, MW8D, MW10A, and the field blank collected on September 13, 2004

- Freon-113 in samples from locations MW1A, MW1B, MW2A, MW3A, MW4A, MW4B, MW4C, MW5A, MW6A, MW7A, MW8A, MW8D, and MW10A
- Methyl acetate in the sample from location MW4B, MW7, MW10, MW1A, MW1B, MW2, MW3, MW4A, MW4C, MW5, MW6, MW8A, MW8B, MW8C, MW8D, and MW9B.
- Methylene chloride in the samples from locations MW1A, MW1B, MW2A, MW3A, MW4A, MW4B, MW4C, MW5A, MW6A, MW7A, MW8C, and MW9B

The results and quantitation limits for the analytes listed above in the specified samples were qualified as estimated.

- **Initial Calibration Relative Standard Deviation (Reason Code C1)**

The results and quantitation limits for the listed analytes in the specified samples were estimated due to the initial calibration RSD exceeding the QC criteria:

- Methyl acetate in samples from location MW4B.
- Methylene chloride and 1,2-dibromo-3-chloropropane in samples from locations MW7A, MW8A, MW8D, and MW10A.

The results and quantitation limits for methyl acetate in all samples and methylene chloride in the samples specified are qualified as estimated.

- **Surrogate (Reason Code A3)**

The results and quantitation limits for the following analytes in the indicated samples were estimated due to surrogate recoveries above the upper quality control (QC) criteria:

- cis-1,2-Dichloroethene in samples from locations MW1B, MW2A, MW4A, MW4B, MW5A, and MW10A
- Chloromethane in samples from locations MW1A, MW4B, MW5A, and MW6A

- **Holding Time (Reason Code Q4)**

The analysis of the sample from location MW7A exceeded the 7-day technical holding time for unpreserved water samples by 1 day, and the results and quantitation limits are flagged as estimated, J/UJ. Detected results for this sample may be biased low. Where results are nondetected, false negatives may exist.

- **Initial Calibration Range Exceeded (Reason Code Q1)**

Concentrations of trichlorofluoromethane, 1,1-dichloroethene, 1,1,2-trichloro-1,2,2-trifluoroethane, trichloroethene and tetrachloroethene were reported from an undiluted analysis of the sample from location MW10A. The sample was not reanalyzed at a dilution. The J flagged results should be considered qualitatively acceptable, but quantitatively questionable and should be considered as the minimum concentrations at which the analytes are present in the sample.

Semivolatile Organics: The Tier 3 validation resulted in qualification of the SVOC groundwater results for the following QC metrics: initial calibration, continuing calibration and surrogates.

- **Laboratory Blank (Reason Code B1)**

Di-n-butyl phthalate was detected in the laboratory blank. As a result, di-n-butyl phthalate results are qualified as not detected in samples from location MW4B, MW1B, MW2, MW4A, MW4B, MW4C, MW8A, MW8C, MW8D, and MW9B.
- **Sample Quantitation (Reason Code Q2)**

The results for 4-nitrophenol in samples from MW4A and MW4B were qualified as not detected based on the professional judgment of the data validator because the mass spectra did not meet method requirements. These results have been qualified as not detected at the reporting limit.
- **Initial and Continuing Calibration Relative Response Factor (Reason Codes C2 and C5)**

Relative Response Factors (RRFs) for atrazine were below the 0.05 validation criterion in the initial calibration and the continuing calibration verifications for samples from locations MW1A, MW1B, MW2A, MW4A, MW4B, MW4C, MW5A, MW6A, MW8A, MW8B, MW8C, MW8D, and MW9B. Atrazine was not detected in any sample and reporting limits are estimated.
- **Continuing Calibration (Reason Code C3)**

The results for benzaldehyde (-59%D) in samples from locations MW1A, MW1B, MW2A, MW4A, MW4B, MW4C, MW5A, MW6A, MW8A, MW8B, MW8C, MW8D, and MW9B were estimated due to the continuing calibration verification %D exceeding the $\pm 25\%$ QC criteria. Results and quantitation limits were qualified as estimated, J/UJ.
- **Initial Calibration (Reason Code C1)**

The results and quantitation limits for benzaldehyde, 2,4-dinitrophenol, and atrazine in samples from locations MW1A, MW1B, MW2A, MW4A, MW4B, MW4C, MW5A, MW6A, MW8A, MW8B, MW8C, MW8D, MW9B were estimated, J/UJ, due to the initial calibration percent relative standard deviation (%C2) exceeding the $\pm 50\%$ quality control (QC) criteria.
- **Surrogates (Reason Code A3)**

The results and quantitation limits for the following samples from the indicated locations are estimated due to surrogate recoveries below the lower QC limits and are flagged, J/UJ. Detected results for affected analytes may be biased low and where results are nondetected, false negatives may exist:

 - Caprolactam, 1,1'-biphenyl, dimethylphthalate, diethylphthalate, di-n-butylphthalate, butylbenzylphthalate, bis(2-ethylhexyl)phthalate, and di-n-octylphthalate in samples from locations MW3A, MW7A, MW9B, and MW10A
 - 4,6-Dinitro-2-methyl phenol in samples from locations MW1A, MW1B, MW2A, MW3A, MW4A, MW4B, ME4C, MW5A, MW6A, ME8A, MW8B, MW8C, MW8D, MW9B, and MW10A
 - Naphthalene, 2-methylnaphthalene, 2-chloronaphthalene, acenaphthylene, and acenaphthene in the sample from location MW3A.
- **Failed Spectral Match (Reason Code Q2)**

Based on the data validation findings, the mass spectra for 4-nitrophenol in samples MW4A and MW4B did not meet the spectral match criteria. The results for 4-nitrophenol in these samples is considered not detected at the reporting limit.

A1.3.4 Fourth Quarter 2004, Groundwater

The Tier 3 validation was performed on NDMA and metals results.

NDMA

- **Internal Standard/Surrogate (Reason Code Q5 and A3)**
Internal standard/surrogate recoveries for NDMA were below the QC limits of 25-150% for samples from locations MW8A, MW8B, MW8C, and MW8D. Since sample results are nondetected the quantitation limits are flagged as estimated, UJ, and false negatives may exist.

Metals

- **Initial Calibration Blank (Reason Code B5) and Continuing Calibration Blank (Reason Code B6)**
 - Aluminum in the initial and continuing calibration blanks associated with the sample from location MW3A.
 - Potassium in the continuing calibration blanks associated with samples from locations MW2 and MW3A.

The results for the analytes above should be considered the maximum sample concentration and may be considered not detected.

A1.3.5 First Quarter 2005, Semiannual Groundwater Sampling

Data validation was performed on VOC, NDMA, and 1,2,3-trichloropropane results.

Volatile Organic Compounds: The Tier 3 validation resulted in qualification of the VOC groundwater results for the following QC metrics: continuing calibration and surrogates.

- **Laboratory Blank Contamination (Reason Code B1)**
The following analytes in the samples from the specified locations were qualified as estimated because of contamination in the associate laboratory blank:
 - Chloroform in samples from locations MW4C, MW7, MW8A, MW8B, MW8C, MW8D, and MW9B
 - cis-1,2-Dichloropropene in samples from locations MW10, MW1B, MW2, MW3, MW6, and MW7
 - Methylene chloride in samples from locations MW1B, MW4A, MW4B, MW5, MW6, and MW7
 - Tetrachloroethene in the sample from location MW3

The results for the indicated analytes are considered as the maximum amount present in the sample and may be considered not detected.

- **Field Blank Contamination (Reason Code B3)**

The following analytes in the samples from the specified locations were qualified as estimated because of contamination in the associate laboratory blank:

- Chloroform in samples from locations MW4C, MW7, MW8A, MW8B, MW8C, MW8D, MW9B, MW10
- cis-1,2-Dichloropropene in samples from locations MW10, MW1B, MW2, MW3, MW6, and MW7
- Methylene chloride in samples from locations MW1B, MW4A, MW10, MW2, MW3, MW4B, MW5, MW6, and MW7

The results for the indicated analytes are considered as the maximum amount present in the sample and may be considered not detected.

- **Continuing Calibration Relative Response Factor (Reason Code C5)**

Relative Response Factors (RRFs) for acetone were below the 0.05 validation criterion in the continuing calibration verification for the samples from locations MW1A, MW4A, MW4B, MW4C, MW5, MW8A, MW8B, MW8C, MW8D, and MW9B. The results were all nondetected and the quantitation limits are qualified as estimated, UJ. Where results are nondetected, false negatives may exist.

- **Continuing Calibration Percent Difference (Reason Code C3)**

The continuing calibration percent differences (%D) were outside the ± 30 percent control limit for methyl acetate, tetrachloroethene, carbon disulfide, methyl tert-butyl ether, and 1,1-dichloroethane the associated continuing calibrations. All detected results and nondetected quantitation limits are qualified as estimated, J/UJ in the following samples:

- Methyl acetate in samples from locations MW1B, MW2, MW3, MW4A, MW4B, MW5, MW6, MW7, and MW10;
- Tetrachloroethene in samples from locations MW1A, MW4A, MW4B, MW4C, MW8A, MW8B, MW8C, MW8D, and MW9B;
- Carbon disulfide, methyl tert-butyl ether, and 1,1-dichloroethane in samples from locations MW1B, MW2, MW3, MW6, MW7, and MW10

- **Surrogates (Reason Code A3)**

Results for the following analytes are qualified as estimated J,UJ due to surrogate recoveries outside quality control limits:

- Dichlorodifluoromethane in the sample from location MW4A
- trans-1,2-Dichloroethene and cis-1,2-dichloroethene in samples from locations MW1A, MW4A, MW4B, MW4C, and MW5
- 1,1-Dichloroethane in samples from locations MW4A, MW4B, MW5

- 1,1-Dichloroethene, 1,1,2-trichloro-1,2,2-trifluoroethane, methyl tert-butyl ether, and carbon tetrachloride in the sample from location MW7

Detected results for affected analytes where surrogate recoveries fell below QC limits (trans-1,2-dichloroethene and cis-1,2-dichloroethene in the sample from location MW4C) may be biased low; where results are nondetected, false negatives may exist. All other results listed above are reported from samples where the surrogate recoveries exceeded QC limits. Detected results for affected analytes where surrogate recoveries exceeded QC limits may be biased high. For surrogate recoveries that exceeded QC limits, only detected results for associated analytes are qualified.

- **Matrix Spike/Matrix spike Duplicate Relative Percent Difference (Reason Code D2)**
The chloroform relative percent difference between the MS/MSD exceeded the method acceptance criterion. The chloroform result in the sample from location MW1B is qualified as estimated.

NDMA and 1,2,3-Trichloropropane: The Tier 3 validation resulted in qualification of the NDMA and 1,2,3-trichloropropane groundwater results for the following QC metrics: internal standard/surrogates.

- **Internal standard/surrogate (Reason Code Q5 and A3)**
Results for the following analytes are qualified as estimated due to internal standard/surrogate recoveries outside the QC limits and are flagged, J. The recoveries fell below the QC limits and results are considered quantitatively questionable. Where sample results are nondetected, false negatives may exist:
 - NDMA in samples from locations MW7 and MW10

A1.3.6 Third Quarter 2005, Semiannual Groundwater Sampling

For this event, data validation was performed on VOC results.

Volatile Organic Compounds: The Tier 3 validation resulted in qualification of the VOC groundwater results for the following QC metrics: initial calibration and surrogates.

- **Laboratory (Reason Code B1), Source Blank (Reason Code B7), and Field (Reason Code B3) Blank Contamination**
The following analytes in the samples from the specified locations were qualified as estimated because of contamination in the associated source, laboratory and field blanks:
 - Benzene in the sample from location MW2
 - Acetone and cis-1,3-dichloropropene in the sample from location MW11
 - Methylene chloride in samples from locations MW2 and MW711

The results for the indicated analytes are considered as the maximum amount present in the sample and may be considered not detected.

- **Initial Calibration Relative Standard Deviation (Reason Code C1)**

Results for methylene chloride are estimated in all samples due to a large RSD in the initial calibration. The RSD for methylene chloride exceeded the 30.0% validation criterion in the initial calibration. The results and quantitation limits are qualified as estimated. Where results are nondetected, false negatives may exist.

- **Surrogates (Reason Code A3)**

Results for the following analytes are qualified as estimated J, UJ due to surrogate recoveries outside quality control limits:

- 1,1-Dichloroethane and chloroform in the sample from location MW2
- cis-1,3-Dichloropropene, trans-1,3-dichloropropene, and 1,1,2-trichloroethane in the sample from location MW11

Detected results for affected analytes where surrogate recoveries fell below QC limits (trans-1,3-dichloropropene, cis-1,3-dichloropropene, and 1,1,2-trichloroethane in the sample from location MW11) may be biased low; where results are nondetected, false negatives may exist. All other results listed above are reported from samples where the surrogate recoveries exceeded QC limits. Detected results for affected analytes where surrogate recoveries exceeded QC limits may be biased high. For surrogate recoveries that exceeded QC limits, only detected results for associated analytes are qualified.

NDMA and 1,2,3 Trichloropropane: The Tier 3 validation resulted in qualification of the NDMA and 1,2,3-trichloropropane groundwater results for the following QC metrics: internal standard/surrogates.

- **Internal standard/Surrogate (Reason Code Q5 and A3)**

Results and detection limits for the following analytes are qualified as estimated due to internal standard/surrogate recoveries outside the QC limits and are flagged, J/UJ. The recoveries fell below the QC limits and results are considered quantitatively questionable. Where sample results are nondetected, false negatives may exist:

- NDMA in samples from locations MW2, MW11, and field blank collected on 9/2/05

A1.3.7 First Quarter 2006, Semiannual Groundwater Sampling

For this event, data validation was performed on VOC, hexavalent chromium, and NDMA results.

Volatile Organic Compounds: The Tier 3 validation resulted in qualification of the VOC groundwater results for the following QC metrics: initial and continuing calibration.

- **Equipment (Reason Code B2) and Trip (Reason Code B4) Blank Contamination**

The following analytes in the samples from the specified locations were qualified as estimated because of contamination in the associated equipment and trip blank:

- Freon 113 in samples from locations MW13B and MW23D
- Tetrachloroethene in the sample from location MW23D

The results for the indicated analytes are considered as the maximum amount present in the sample and may be considered not detected.

- **Initial Calibration Relative Standard Deviation (Reason Code C1)**

The result for naphthalene is estimated the sample from location MW15 due to a large RSD in the initial calibration. The RSD for naphthalene exceeded the 30.0% validation criterion in the initial calibration performed March 3, 2006. The nondetected result quantitation limit is qualified as estimated UJ. Where results are nondetected, false negatives may exist.

Hexavalent Chromium: The Tier 3 validation resulted in qualification of the hexavalent chromium groundwater results for the following QC metrics: internal standard/surrogates.

- **Continuing Calibration (Reason Code C3)**

Results and detection limits for hexavalent chromium in samples from locations MW7, MW8A, MW8B, and MW8C are qualified as estimated because the final continuing calibration verification standard result (106%) is outside the QC limits of 95-105% and results are flagged, J/UJ. Results greater than or equal to the practical quantitation limit (PQL) are considered quantitatively uncertain. The results reported for hexavalent chromium in all the listed samples may be biased high.

NDMA: The Tier 3 validation resulted in no qualifications but the reviewer suggested that the practical quantitation limit (PQL) for NDMA be increased from the laboratory reported PQL of 0.002 ug/L to 0.2ug/L. The laboratory reported a NDMA detected result of 0.0009 ug/L for the sample from location MW8C. However the signal to noise ratio is only 3 and the area is only 393 for the concentration of 0.0009 ug/L. The area for low standard of the initial calibration is only 1074. In the reviewer's professional judgment, the sample PQL should be raised to 0.02ug/L and non-detected sample results should be reported as 0.02U.

A1.3.8 Third Quarter 2006, Semiannual Groundwater Sampling

For this event, Tier 3 validation was performed on five hexavalent chromium, NDMA, and 1,2,3-TCP results and 10 VOC results.

NDMA: The Tier 3 validation reports indicate that all quality control analyses met the project requirements. However, for NDMA, the validator indicates that the response of the low point standard does not meet the abundance criteria and as such, the reported quantitation limit may not be achievable. As a result, the validator recommends that the RL be raised to 0.01. The Tier 2 reports include the same finding.

Volatile Organic Compounds

- **Initial Calibration Relative Standard Deviation (Reason Code C1)**

The results and quantitation limits for acetone, 2-butanone, and bromoform were qualified as estimated in all samples in SDG 06254A because the RSD in the initial calibration did not meet the $\pm 20\%$ acceptance criteria.

- **Continuing Calibration (Reason Code C3)**

The percent difference between the response factors in the initial and continuing calibration did not meet the $\pm 30\%$ acceptance criteria for the following analytes in the indicated samples:

- Acetone, 2-butanone, and dichlorodifluoromethane in the sample from locations MW1B

- Bromoform, vinyl chloride and trichlorofluoroethane in the sample from location MW13B
- Bromomethane in the samples from MW1B and MW23C

For this reason, the results and quantitation limits in all samples are qualified as estimated, J/UJ.

- **Laboratory Control Sample (LCS) (Reason Code A1)**

The recoveries for the following analytes were below the lower control limit in the laboratory control sample associated. Associated samples from the indicated locations are qualified as estimates:

- Bromomethane and 2-butanone samples from locations MW13B, MW12, MW1B, and MW1A
- Bromomethane in samples from locations MW23C and MW1B

- **Matrix Spike Relative Percent Difference (Reason Code D2)**

The styrene quantitation limits are qualified as estimated in all samples because the RPD between the matrix spike and matrix spike duplicate sample exceeded the 20 percent acceptance criterion.

- **Quantitation Limit Standard (Reason Code Q6)**

The quantitation limit standard (QLS) is a QC sample analyzed by the Region 9 laboratory to support reporting of results near the MDL. The recoveries of 1,2-dibromo-3-chloropropane, 2-hexanone, and bromomethane from the QLS standard did not meet the laboratory acceptance criteria. As a result, the results and quantitation limits for these analytes in the following samples from the indicated locations are qualified as estimated:

- Bromomethane and 1,2-dibromo-3-chloropropane in the sample from location MW23C
- 2-Hexanone in the sample from location MW14

A1.3.9 First Quarter 2007, Semiannual Groundwater Sampling

The findings of the Tier 3 validation are considered representative of the quality of the entire data set. For this event, Tier 3 validation was performed on 10 samples analyzed for metals, five samples analyzed for hexavalent chromium, 16 samples analyzed for 1,4-dioxane (semivolatile method), and 20 groundwater samples analyzed for VOCs (SIM method). Because of problems with the automated validation system, additional review was conducted at the Tier 2 level to verify the initial validation flags. Where changes were made, the flags and associated reason codes were updated.

Volatile Organic Compounds, Secondary Ion Monitoring

- **Initial and Continuing Calibration Relative Response Factor (Reason Codes C2 and C5)**

Results and quantitation limits for 1,4 dioxane in samples MW4B, MW4A, MW5, MW15, and MW18C and MW6 and 1,2-dibromo-3 chloropropane in all samples were qualified as estimated due to low response factors in the initial and continuing calibrations.

A1.3.10 Third Quarter 2007, Semiannual Groundwater Sampling

The findings of the Tier 3 validation are considered representative of the quality of the entire data set. For this event, Tier 3 validation was performed on 20 samples analyzed for trace volatiles and SIM volatiles and 17 samples analyzed for 1,4-dioxane (semivolatile method). Because of problems with the automated validation system, additional review was conducted at the Tier 2 level to verify the initial validation flags. Where changes were made, the flags and associated reason codes were updated.

Volatile Organic Compounds

- **Laboratory Blank Contamination (Reason Code B1)**

The following analyte in the samples from the specified locations were qualified as estimated because of contamination in the associate laboratory blank:

- Chloroform in samples from locations MW17A, MW14, MW20A, MW20B, MW5, MW14, MW17A, MW17B, MW5, and MW6

The results for the indicated analytes are considered as the maximum amount present in the sample and may be considered not detected.

- **Equipment Blank (Reason Code B2)**

The results for the following analytes are qualified as not detected due to blank contamination:

- 1,1-Dichloroethene in samples MW3, MW18C, MW18B, MW18A, and MW16C;
- Methylene chloride in all samples in SDG Y3CN1;
- Chloroform in samples from locations MW17B, MW17A, MW6, MW20B, MW20A, MW18B, MW18A, MW10, MW16C, and MW16B.

- **Initial Calibration Relative Response Factor (Reason Codes C2 and C5)**

Results for the following analytes in the indicated samples are qualified as estimated because of low response factors in the initial and continuing calibrations

- 1,4-Dioxane in samples from locations MW17A, MW6, MW5, MW20A, and MW14;
- Acetone in all samples in SDG Y3CD1;

- **Surrogate Recovery (Reason Code A3)**

The recoveries of the surrogates associated with the following analytes did not meet the acceptance criteria:

- Trans-1,2-Dichloroethene and cis 1,2-dichloroethene in samples MW17B, MW17A, MW6, MW5, and MW14;
- 1,1-Dichloroethane in the sample from location MW17A

- 1,4-Dioxane in samples from locations MW10, MW14, MW16C, MW17A, MW17B, MW18A, MW18C, MW20A, MW20B, MW20C, MW3, MW5, and MW6
- **Result above High Concentration Standard (Reason Code Q1)**
The result chloroform was reported in the sample from location MW5 at a concentration well above the 20 ug/L high point initial calibration standard. These results are qualified as estimated J; the concentrations are considered outside the linear range of the calibration and this large extrapolation may result in a negative bias, the results should be considered the minimum amount in the sample.
- **Internal Standard (Reason Code Q5)**
The internal standard recovery for the internal standard in the sample from location MW17A did not meet the ± 50 percent acceptance criteria. As a result, the 1,4 dioxane result in this sample is qualified as estimated.

A1.3.11 Remedial Investigation, Hydropunch Sampling

For this event, Tier 3 validation was performed on the metals and volatiles sample results.

Volatile Organic Compounds: The Tier 3 validation resulted in qualification of the VOC groundwater results for the following QC metrics: results over calibration range, initial and continuing calibration response factors, and low surrogate recoveries.

- **Result above High Concentration Standard (Reason Code Q1)**
The results for 1,1-dichloroethene and trichloroethene were reported in the sample from location HPW2A at a concentration slightly above the 20 ug/L high point initial calibration standard. These results are qualified as estimated J; however, the concentrations are considered within the linear range of the calibration and this slight extrapolation should not negatively impact the usability of the data.
- **Initial Calibration Relative Response Factor (Reason Codes C2 and C5)**
Relative Response Factors (RRFs) did not meet the 0.05 response factor acceptance criterion for the following analytes: 1,4-dioxane, acetone, methyl acetate, and methyl ethyl ketone in samples from locations HP27-7A, HP27-8A, HP27-9A, HP27-9B, HP27-10A, HP-27-11A, HP27-12A, HP-27-12B, HP27-13A, HP27-14A, HP27-14B, HP-1A, HP27-1B, HP27-2A, HP27-2B, and MW26 9hydrant). The affected results are presented in Table A9-3. The results and quantitation limits for these compounds were qualified as estimated, J/UJ.
- **Surrogate Recovery (Reason Code A3)**
The recoveries of the surrogates associated with the following analytes did not meet the acceptance criteria:
 - 1,4 dioxane in samples from locations HPW- 2A, HP29-10A, HP29-11A, HP29-12A, HP27-6A, HP27-7A, HP27-8A, HP27-9A, HP27-9B, HP29-14B (surrogate 1,4-dioxane d-8, recoveries 151%-182%)
 - 1,1,2,2-Tetrachloroethane, in sample from location HP27-8A (surrogate 1,1,2,2-tetrachloroethane-d2 recovery 68%)
 - 1,2-dichloropropane in samples from locations HP29-1A and HP29-11A

- Cis-1,2-dichloroethene and trans-1,2-dichloroethene in samples from locations HP277A, HP277A (field duplicate), HP27-8A, HP27-9A, HP279B, and HP29-14A (1,1-dichloroethene-d2 recoveries 108-487)
- Bromodichloromethane, Cyclohexane and methylcyclohexane in samples from location HPW-1A and HP29-11A (surrogate 1,2-dichloropropane-d6 recoveries 72%-78%)

Where surrogate recoveries do not meet the method requirements, there is the possibility of a matrix effect or other sample related issue. The concentrations in these samples should be considered to have an increased uncertainty.

Metals: The Tier 3 validation resulted in qualification of the SVOC groundwater results for the following QC metrics: continuing and initial calibration blanks, method blank, and serial dilution recoveries.

- **Equipment Blank Contamination (Reason Code B3)**

The following analytes in the indicated samples are qualified because of contamination in the associated equipment blank:

- Aluminum, chromium, and zinc in samples from locations HP27-1A, HP27-2A, and HP27-2B

The results and quantitation limits for the listed analytes in the specified samples are qualified as estimated, UJ.

- **Continuing Calibration Blank (Reason Code B6), Initial Calibration Blank (Reason Code B5), Method Blank (Reason Code B1)**

The following analytes in the indicated samples are qualified because of contamination in one or both of the calibration blanks:

- Antimony in samples from locations HPW1A, HPW1B, and HPW2A;
- Cadmium in the samples from locations HPW1B and HPW2B
- Vanadium in the sample from location HPW1A

The results and quantitation limits for the listed analytes in the specified samples are qualified as estimated, UJ.

- **Calibration Percent Difference (Reason Code C3)**

The results and quantitation limits for silver are qualified as estimated in the sample from location HPW-1B did not meet the $\pm 10\%$ difference criteria.

- **Serial Dilution (Reason Code SerDil)**

Calcium results were qualified as estimated in samples from locations HPW6b, HPW5B, HPW5B field duplicate, HPW7B, HPW7B, HPW8B, HPW1A, HPW1B, HPW2A, and HPW2B. The serial dilution is analyzed to evaluate the presence of matrix effects. In this case, the likely source of the serial dilution outliers are the high concentrations of calcium in the samples and the effect of dissolved salts on analytical precision.

References

Quality Assurance Project Plan, Omega Chemical Superfund Site, Operable Unit 2 Remedial Investigation/Feasibility Study, July 2004.

U.S. Environmental Protection Agency (EPA). 2001b Region 9 Superfund Data Evaluation/Validation Guidance, R9QA/006.1