

Data Validation Summary Report  
July to December 2012  
Annual Remedial Performance Sampling  
Nevada Environmental Response Trust (NERT)  
Henderson, Nevada

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## LIST OF ACRONYMS AND ABBREVIATIONS

DQO	Data Quality Objectives
DUP	Duplicate
DVSR	Data Validation Summary Report
ICV	Initial Calibration Verification
LCS/LCSD	Laboratory Control Sample / Laboratory Control Sample Duplicate
LDC	Laboratory Data Consultants, Inc.
MS/MSD	Matrix Spike / Matrix Spike Duplicate
PARCC	Precision, Accuracy, Representativeness, Comparability, Completeness
PQL	Practical Quantitation Limit
QA/QC	Quality Assurance / Quality Control
QAPP	Quality Assurance Project Plan
RPD	Relative Percent Difference
SDG	Sample Delivery Group
SQL	Sample Quantitation Limit
ug/L	Micrograms per Liter
ug/Kg	Micrograms per Kilogram
mg/L	Milligram per Liter
mg/Kg	Milligram per Kilogram
USEPA	United States Environmental Protection Agency
%D	Percent Difference
%R	Percent Recovery

## 1.0 INTRODUCTION

This data validation summary report (DVSR) has been prepared by Laboratory Data Consultants, Inc. (LDC) to assess the validity and usability of laboratory analytical data from the Annual Remedial Performance Sampling conducted at the Nevada Environmental Response Trust (NERT) site in Henderson, Nevada. The assessment was performed by ENVIRON as a part of the *Revised Phase B Quality Assurance Project Plan Tronox LLC Facility, Henderson, Nevada* dated May 2009 and included the collection and analyses of 450 environmental and quality control (QC) samples. The analyses were performed by the following methods:

Chromium by EPA SW 846 Method 6010 and EPA Method 200.7

Wet Chemistry:

Hexavalent Chromium by EPA SW 846 Method 7196

Total Dissolved Solids by EPA Method 160.1 and Standard Method 2540C

Perchlorate by EPA Method 314.0

Laboratory analytical services were provided by Eurofins (formerly MWH Laboratories, Inc.). The samples were grouped into sample delivery groups (SDGs). The water samples are associated with QA/QC samples designed to document the data quality of the entire SDG or a sub-group of samples within an SDG. Table I is a cross-reference table listing each sample, analysis, SDG, collection date, laboratory sample number, and matrix. All shaded samples in Table I were reviewed under Stage 4 validation guidelines.

The laboratory analytical data were validated in accordance with procedures described in the Nevada Division of Environmental Protection (NDEP) *Data Verification and Validation Requirements - Supplement* established for the BMI Plant Sites and Common Areas Projects, Henderson, Nevada, April 13, 2009. Consistent with the NDEP requirements, approximately ninety percent of the analytical data were validated according to Stage 2A data validation procedures and ten percent of the analytical data were validated according to Stage 4 data validation procedures. The analytical data were evaluated for quality assurance and quality control (QA/QC) based on the following documents: *Basic Remediation Company (BRC) Standard Operating Procedures (SOP) 40 Data Review/Validation*, Revision 4, May 2009, *Revised Phase B Quality Assurance Project Plan Tronox LLC Facility, Henderson, Nevada (QAPP)*, Revision, May 2009, *Contract Laboratory Program National Functional Guidelines for Inorganic Data Review*, October 2004, and the *EPA SW 846 Third Edition, Test Methods for Evaluating Solid Waste*, update I, July 1992; update IIA, August 1993; update II, September 1994; update IIB, January 1995; update III, December 1996; update IV, February 2007.

This report summarizes the QA/QC evaluation of the data according to precision, accuracy, representativeness, completeness, and comparability (PARCC) relative to the project data quality objectives (DQOs). This report provides a quantitative and qualitative assessment of the data and identifies potential sources of error, uncertainty, and bias that may affect the overall usability.

The PARCC summary report evaluates and summarizes the results of QA/QC data validation for the entire sampling program. Each analytical fraction has a separate section for each of the PARCC criteria. These sections interpret specific QC deviations and their effects on both individual data points and the analyses as a whole. Section 5.0 presents a summary of the PARCC criteria by comparing quantitative parameters with acceptability criteria defined in the project DQO's. Qualitative PARCC criteria are also summarized in this section.

## Precision and Accuracy of Environmental Data

Environmental data quality depends on sample collection procedures, analytical methods and instrumentation, documentation, and sample matrix properties. Both sampling procedures and laboratory analyses contain potential sources of uncertainty, error, and/or bias, which affect the overall quality of a measurement. Errors for sample data may result from incomplete equipment decontamination, inappropriate sampling techniques, sample heterogeneity, improper filtering, and improper preservation. The accuracy of analytical results is dependent on selecting appropriate analytical methods, maintaining equipment properly, and complying with QC requirements. The sample matrix also is an important factor in the ability to obtain precise and accurate results within a given media.

Environmental and laboratory QA/QC samples assess the effects of sampling procedures and evaluate laboratory contamination, laboratory performance, and matrix effects. QA/QC samples include: equipment blanks, field blanks, field duplicates, method blanks, laboratory control samples and laboratory control sample duplicates (LCS/LCSDs), laboratory duplicates (DUP), and matrix spike/matrix spike duplicates (MS/MSDs).

Before conducting the PARCC evaluation, the analytical data were validated according to the BRC SOP-40 (May 2009), QAPP (May 2009), Functional Guidelines (USEPA 2004), and EPA SW 846 Test Methods. Samples not meeting the acceptance criteria were qualified with a flag, an abbreviation indicating a deficiency with the data. The following are flags used in data validation.

- J- Estimated The associated numerical value is an estimated quantity with a negative bias. The analyte was detected but the reported value may not be accurate or precise.
- J+ Estimated The associated numerical value is an estimated quantity with a positive bias. The analyte was detected but the reported value may not be accurate or precise.
- J Estimated The associated numerical value is an estimated quantity. It is not possible to assess the direction of the potential bias. The analyte was detected but the reported value may not be accurate or precise. The "J" qualification indicates the data fell outside the QC limits, but the exceedance was not sufficient to cause rejection of the data.
- R Rejected The data is unusable (the compound or analyte may or may not be present). Use of the "R" qualifier indicates a significant variance from functional guideline acceptance criteria. Either resampling or reanalysis is necessary to determine the presence or absence of the rejected analyte. The "R" designation is also applied to yield only one complete set of data for a given sample and eliminate redundant data.
- U Nondetected Analyses were performed for the compound or analyte, but it was not detected. The "U" designation is also applied to suspected blank contamination. The "U" flag is used to qualify any result that is detected in an environmental sample and associated blank at less than the PQL.
- UJ Estimated/Nondetected Analyses were performed for the compound or analyte, but it was not detected and the sample quantitation or detection limit is an estimated quantity due to poor accuracy or precision. This qualification is also used to flag possible false negative results in the case where low bias in the analytical system is indicated by low calibration response, surrogate, or other spike recovery.
- None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.
- A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

The hierarchy of flags is listed below:

R > J	The R flag will always take precedence over the J qualifier.
J > J+ or J-	A non-biased (J) flag will always supersede biased (J+ or J-) flags since it is not possible to assess the direction of the potential bias.
J = J+ plus J-	Adding biased (J+, J-) flags with opposite signs will result in a non-biased flag (J).
UJ = U plus J or J+ or J-	The UJ flag is used when a non-detected (U) flag is added to a biased (J+ or J-) or non-biased flag (J).

Table II lists the reason codes used. Reason codes explain why flags have been applied and identify possible limitations of data use. Reason codes are cumulative except when one of the flags is R then only the reason code associated to the R flag will be used.

Table III presents the overall qualified results after all the flags or validation qualifiers and associated reason codes have been applied.

Once the data are reviewed and qualified according to the BRC SOP-40, QAPP, functional guidelines, and EPA Test Methods, the data set is then evaluated using PARCC criteria. PARCC criteria provide an evaluation of overall data usability. The following is a discussion of PARCC criteria as related to the project DQOs.

**Precision** is a measure of the agreement or reproducibility of analytical results under a given set of conditions. It is a quantity that cannot be measured directly but is calculated from percent recovery data. Precision is expressed as the relative percent difference (RPD):

$$RPD = (D1-D2)/\{1/2(D1+D2)\} \times 100$$

where:

D1 = reported concentration for the sample

D2 = reported concentration for the duplicate

Precision is primarily assessed by calculating an RPD from the percent recoveries of the spiked compounds for each sample in the MS/MSD pair. In the absence of an MS/MSD pair, a laboratory duplicate or LCS/LCSD pair can be analyzed as an alternative means of assessing precision. An additional measure of sampling precision was obtained by collecting and analyzing field duplicate samples, which were compared using the RPD result as the evaluation criteria.

MS and MSD samples are field samples spiked by the laboratory with target analytes prior to preparation and analysis. These samples measure the overall efficiency of the analytical method in recovering target analytes from an environmental matrix. A LCS is similar to an MS/MSD sample in that the LCS is spiked with the same target analytes prior to preparation and analysis. However, the LCS is prepared using a controlled interference-free matrix instead of a field sample aliquot. Laboratory reagent water is used to prepare aqueous LCS. The LCS measures laboratory efficiency in recovering target analytes from either an aqueous matrix in the absence of matrix interferences.

One primary sample is analyzed and accompanied by an unspiked laboratory duplicate. The data reviewer compares the reported results of the primary analysis and the laboratory duplicate, then calculates RPDs, which are used to assess laboratory precision.

Laboratory and field sampling precision are evaluated by calculating RPDs for aqueous field sample duplicate pairs. The sampler collects two field samples at the same location and under identically controlled conditions. The laboratory then analyzes the samples under identical conditions.

An RPD outside the numerical QC limit in either MS/MSD samples or LCS/LCSD indicates imprecision. Imprecision is the variance in the consistency with which the laboratory arrives at a particular reported result. Thus, the actual analyte concentration may be higher or lower than the reported result.

Possible causes of poor precision include sample matrix interference, improper sample collection or handling, inconsistent sample preparation, and poor instrument stability. In some duplicate pairs, results maybe reported in either the primary or duplicate samples at levels below the practical quantitation limit (PQL) or non-detected. Since these values are considered to be estimates, RPD exceedances from these duplicate pairs do not suggest a significant impact on the data quality.

**Accuracy** is a measure of the agreement of an experimental determination and the true value of the parameter being measured. It is used to identify bias in a given measurement system. Recoveries outside acceptable QC limits may be caused by factors such as instrumentation, analyst error, or matrix interference. Accuracy is assessed through the analysis of MS, MSD, LCS, and LCSD. In some cases, samples from multiple SDGs were within one QC batch and therefore are associated with the same laboratory QC samples. Accuracy of inorganic analyses is determined using the percent recoveries of MS and LCS analyses.

Percent recovery (%R) is calculated using the following equation:

$$\%R = (A-B)/C \times 100$$

where:

A = measured concentration in the spiked sample

B = measured concentration of the spike compound in the unspiked sample

C = concentration of the spike

The percent recovery of each analyte spiked in MS/MSD samples and LCS/LCSD is evaluated with the acceptance criteria specified by the previously noted documents. Spike recoveries outside the acceptable QC accuracy limits provide an indication of bias, where the reported data may overestimate or underestimate the actual concentration of compounds detected or quantitation limits reported for environmental samples.

**Representativeness** is a qualitative parameter that expresses the degree to which the sample data are characteristic of a population. It is evaluated by reviewing the QC results of blanks, samples and holding times. Positive detects of compounds in the blank samples identify compounds that may have been introduced into the samples during sample collection, transport, preparation, or analysis. The QA/QC blanks collected and analyzed are method blanks, equipment blanks and field blanks.

A method blank is a laboratory grade water or solid matrix that contains the method reagents and has undergone the same preparation and analysis as the environmental samples. The method blank provides a measure of the combined contamination derived from the laboratory source water, glassware, instruments, reagents, and sample preparation steps. Method blanks are prepared for each sample of a similar matrix extracted by the same method at a similar concentration level.

Initial and continuing calibration blanks consist of acidified laboratory grade water, which are injected at the beginning and at a regular frequency during each 12 - hour sample analysis run. These blanks estimate residual contaminants from the previous sample or standards analysis and measure baseline shifts that commonly occur in emission and absorption spectroscopy. Initial and continuing calibration blanks were only reviewed for samples on which Stage 4 review was performed.



Equipment blanks consist of analyte-free water poured over or through the sample collection equipment. The water is collected in a sample container for laboratory analysis. These blanks are collected after the sampling equipment is decontaminated and measure efficiency of the decontamination procedure. Equipment blanks were collected and analyzed for all target analytes.

Field blanks consist of analyte-free source water stored at the sample collection site. The water is collected from each source water used during each sampling event. Field blanks were collected and analyzed for all target analytes.

Contaminants found in both the environmental sample and the blank samples are assumed to be laboratory artifacts if both values are less than the PQL.

Holding times are evaluated to assure that the sample integrity is intact for accurate sample preparation and analysis. Holding times will be specific for each method and matrix analyzed. Holding time exceedance can cause loss of sample constituents due to biodegradation, precipitation, volatilization, and chemical degradation. In accordance with EPA guidance (USEPA 2004), sample results for analyses that were performed after the method holding time but less than two times the method holding time were qualified as estimated (J- or UJ) and sample results for analyses that were performed after two times the method holding time were qualified as rejected (R).

**Comparability** is a qualitative expression of the confidence with which one data set may be compared to another. It provides an assessment of the equivalence of the analytical results to data obtained from other analyses. It is important that data sets be comparable if they are used in conjunction with other data sets. The factors affecting comparability include the following: sample collection and handling techniques, matrix type, and analytical method. If these aspects of sampling and analysis are carried out according to standard analytical procedures, the data are considered comparable. Comparability is also dependent upon other PARCC criteria, because only when precision, accuracy, and representativeness are known can data sets be compared with confidence.

**Completeness** is defined as the percentage of acceptable sample results compared to the total number of sample results. Completeness is evaluated to determine if an acceptable amount of usable data were obtained so that a valid scientific site assessment can be completed. Completeness equals the total number of sample results for each fraction minus the total number of rejected sample results divided by the total number of sample results multiplied by 100. As specified in the project DQOs, the goal for completeness for target analytes in each analytical fraction is 90 percent.

Percent completeness is calculated using the following equation:

$$\%C = (T - R)/T \times 100$$

where:

%C = percent completeness

T = total number of sample results

R = total number of rejected sample results

Completeness is also determined by comparing the planned number of samples per method and matrix as specified in the QAPP, with the number determined above.

The following sections present a review of QC data for each analytical method.

## **2.0 CHROMIUM**

A total of 275 water samples were analyzed for chromium by EPA SW 846 Method 6010 and EPA Method 200.7. All metal data were assessed to be valid since none of the 275 total results were rejected based on holding time and QC exceedances. This section discusses the QA/QC supporting documentation as defined by the PARCC criteria and evaluated based on the DQOs.

### **2.1 Precision and Accuracy**

#### **2.1.1 Instrument Calibration**

Initial and continuing calibration verification results provide a means of evaluating accuracy within a particular SDG. Correlation coefficient (r) and percent recovery (%R) are the two major parameters used to measure the effectiveness of instrument calibration. The correlation coefficient indicates the linearity of the calibration curve. %R is used to verify the ongoing calibration acceptability of the analytical system.

The most critical of the two calibration parameters, r, has the potential to affect data accuracy across an SDG when it is outside the acceptable QC limits. %R exceedances suggest more routine instrumental anomalies, which typically impact all sample results for the affected analytes.

The correlation coefficients in the initial calibrations were within the acceptance criteria of  $\geq 0.995$  and the %Rs in the continuing calibration verification met the acceptance criteria of 90-110%.

#### **2.1.2 MS/MSD Samples**

All MS/MSD %Rs and RPDs met acceptance criteria.

#### **2.1.3 LCS/LCSD Samples**

All LCS/LCSD %Rs and RPDs met acceptance criteria.

#### **2.1.4 Field Duplicate Samples**

The field duplicate samples were evaluated for acceptable precision with RPDs or difference in instances the results were less than five times the reporting limit for the compounds. The field duplicate RPDs or differences were within the acceptance criteria. The field duplicate RPDs or differences are presented in detail in Attachment A, Section XIV.

#### **2.1.5 ICP Interference Check Sample**

All ICP interference check %Rs met acceptance criteria for the Stage 4 samples.

#### **2.1.6 Analyte Quantitation and Target Identification**

Raw data were evaluated for the Stage 4 samples. All analyte quantitation and target identifications were acceptable.

## **2.2 Representativeness**

### **2.2.1 Sample Preservation and Holding Times**

The evaluation of holding times to verify compliance with the method was conducted. All samples met the 180-day analysis holding time criteria for chromium.

### **2.2.2 Blanks**

Method blanks, initial and continuing calibration blanks, equipment blanks, and field blanks were analyzed to evaluate representativeness. The concentration for an individual target compound in any of the types of QA/QC blanks was used for data qualification.

If contaminants were detected in a blank, corrective actions were made for the chemical analytical data during data validation. The corrective action consisted of amending the laboratory reported results based on the following criteria.

Results Below the PQL If a sample result and blank contaminant value were less than the PQL, the sample result was amended as estimated (J) at the concentration reported in the sample results.

Results Above the PQL If a sample result and blank contaminant value were greater than the PQL and less than 10 times the blank contaminant value, the sample result was qualified as detected estimated (J+) at the concentration reported in the sample results.

No Action If blank contaminant values were less than the PQL and associated sample results were greater than the PQL, or if blank contaminant values were greater than the PQL and associated sample results were greater than 10 times the blank contaminant value, the result was not amended.

#### **2.2.2.1 Method and Calibration Blanks**

No data were qualified due to contaminants detected in the calibration blanks for this analysis.

#### **2.2.2.2 Equipment and Field Blanks**

No data were qualified due to contaminants detected in the equipment blanks for this analysis.

## **2.3 Comparability**

The laboratory used standard analytical methods for all of the analyses. In all cases, the Sample Quantitation Limits (SQLs) attained were at or below the PQLs. Methods 6010 and 200.7 both utilize multielemental determinations by inductively coupled plasma-atomic emission spectrometry using simultaneous optical systems and axial or radial viewing of the plasma, the comparability of the metals data is regarded as acceptable.

## **2.4 Completeness**

The completeness level attained for chromium field samples was 100 percent. This percentage was calculated as the total number of accepted sample results divided by the total number of sample results multiplied by 100.

### **3.0 WET CHEMISTRY**

A total of 23 water samples were analyzed for hexavalent chromium by EPA SW 846 Method 7196; 447 water samples were analyzed for perchlorate by EPA Method 314.0; and 449 water samples were analyzed for total dissolved solids by EPA Method 160.1 and Standard Method 2540C. All wet chemistry data were assessed to be valid with the exception of four of the 919 total results which were rejected based on holding time exceedances. This section discusses the QA/QC supporting documentation as defined by the PARCC criteria and evaluated based on the DQOs.

#### **3.1 Precision and Accuracy**

##### **3.1.1 Instrument Calibration**

As previously discussed in Section 2.1.1, initial and continuing calibration results provide a means of evaluating accuracy.

The correlation coefficients in the initial calibrations were within the acceptance criteria of  $\geq 0.995$  and the %Rs in the continuing calibration verification met the acceptance criteria of 90-110%.

##### **3.1.2 MS/MSD Samples**

All MS/MSD %Rs and RPDs met the acceptance criteria

##### **3.1.3 Duplicate (DUP) Samples**

All DUP RPDs met the acceptance criteria.

##### **3.1.4 LCS/LCSD Samples**

All LCS/LCSD %Rs and RPDs met the acceptance criteria.

##### **3.1.5 Field Duplicate Samples**

The field duplicate samples were evaluated for acceptable precision with RPDs or difference in instances the results were less than five times the reporting limit for the compounds. Two perchlorate results were qualified as detected estimated (J) due to RPD outside of acceptance criteria in field duplicate pair M-44 and VD-3. The details regarding the qualification of results are presented in Attachment B, Section X.

##### **3.1.6 Analyte Quantitation and Target Identification**

Raw data were evaluated for the Stage 4 samples. All analyte quantitation and target identifications were acceptable.

#### **3.2 Representativeness**

##### **3.2.1 Sample Preservation and Holding Times**

The evaluation of holding times to verify compliance with the method was conducted. All water samples met the 7-day analysis holding time criteria for total dissolved solids.

Due to a severe holding time criteria exceedance, the hexavalent chromium results for samples EB-1 (sampled on 8/8/12), EB-2 (sampled on 8/9/12), EB-2 (sampled on 11/7/12), and FB-1 (sampled on 8/6/12) were qualified as rejected (R). Additionally, 17 results for hexavalent chromium and perchlorate

were qualified as detected estimated (J-) or non-detected estimated (UJ). The analysis holding time criteria for water samples is 24 hours for hexavalent chromium and 28 days for perchlorate. The details regarding the qualification of results are presented in Attachment B, Section I.

### **3.2.2 Blanks**

As previously discussed in Section 2.2.2, method blanks, initial and calibration blanks, equipment blanks, and field blanks were analyzed to evaluate representativeness.

#### **3.2.2.1 Method and Calibration Blanks**

No contaminants were detected in the method or calibration blanks for this analysis.

#### **3.2.2.2 Equipment and Field Blanks**

No data were qualified due to contaminants detected in the equipment blanks for this analysis.

### **3.3 Comparability**

The laboratory used standard analytical methods for all of the analyses. In all cases, the SQLs attained were at or below the PQLs. Methods 160.1 and 2540C both utilize a well-mixed sample filtered through a glass fiber filter and the residue retained on the filter is dried to constant weight at 103-105°C, the comparability of the total dissolved solids data is regarded as acceptable.

### **3.4 Completeness**

The completeness level attained for wet chemistry field samples was 100 percent. This percentage was calculated as the total number of accepted sample results divided by the total number of sample results multiplied by 100.

## **4.0 VARIANCES IN ANALYTICAL PERFORMANCE**

The laboratory used standard analytical methods for all of the analyses throughout the project. No systematic variances in analytical performance were noted in the laboratory case narratives.

## **5.0 SUMMARY OF PARCC CRITERIA**

The validation reports present the PARCC results for all SDGs. Each PARCC criterion is discussed in detail in the following sections.

### **5.1 Precision and Accuracy**

Precision and accuracy were evaluated using data quality indicators such as calibration, surrogates, MS/MSD, DUP, LCS/LCSD, and field duplicates. The precision and accuracy of the data set were considered acceptable after integration of result qualification.

All calibrations were performed as required and met the acceptance criteria. All surrogate, MS/MSD, DUP, LCS/LCSD, and field duplicate percent recoveries, RPDs, and difference met acceptance criteria. All ICP interference check sample %Rs met acceptance criteria.

## 5.2 Representativeness

All samples for each method and matrix were evaluated for holding time compliance. All samples were associated with a method blank in each individual SDG. The representativeness of the project data is considered acceptable after integration of result qualification.

## 5.3 Comparability

Sampling frequency requirements were met in obtaining necessary equipment blanks, field blanks and field duplicates. The laboratory used standard analytical methods for the analyses. The analytical results were reported in correct standard units. Sample preservation, and sample integrity criteria were met. Holding times were within QC criteria with the exceptions noted in Section 3.2.1. The overall comparability is considered acceptable.

## 5.4 Completeness

Of the 1,194 total analytes reported, four of the sample results were rejected. The completeness for the SDGs is as follows:

<b>Parameter</b>	<b>Total Analytes</b>	<b>No. of Rejects</b>	<b>% Completeness</b>
Metals	275	0	100
Wet Chemistry	919	4	99.6
<b>Total</b>	<b>1,194</b>	<b>4</b>	<b>99.7</b>

The completeness percentage based on rejected data met the 90 percent DQO goal.

## 6.0 CONCLUSIONS AND RECOMMENDATIONS

The analytical data quality assessment for the water sample laboratory analytical results generated during the Annual Remedial Performance Sampling at the Nevada Environmental Response Trust (NERT) site in Henderson, Nevada established that the overall project requirements and completeness levels were met. The sample results that were found to be rejected (R) is unusable for all purposes. Sample results that were found to be estimated (J) are usable for limited purposes only. Based upon the Stage 2A and Stage 4 data validation all other results are considered valid and usable for all purposes.

## 7.0 REFERENCES

NDEP, 2009. Data Verification and Validation Requirements - Supplement established for the BMI Plant Sites and Common Areas Projects, Henderson, Nevada. April 13.

Basic Remediation Company (BRC), 2009. Standard Operating Procedures, SOP-40 Data Review/Validation. Revision 4. May 2009.

Revised Phase B Quality Assurance Project Plan Tronox LLC Facility, Henderson, Nevada (QAPP), Revision. May 2009.

Region 9 Superfund Data Evaluation/Validation Guidance, R6QA/006.1, Draft. December 2001.

USEPA, 2004. Contract Laboratory Program National Functional Guidelines for Inorganic Data Review. October 2004.

\_\_\_\_\_.1983. EPA Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020, Cincinnati, Ohio. March 1983.

\_\_\_\_\_.1996. EPA SW 846 Third Edition, Test Methods for Evaluating Solid Waste, update I, July 1992; update IIA, August 1993; update II, September 1994; update IIB, January 1995; update III, December 1996; update IV. February 2007.

(Eaton et al., 1998) *Standard Method for the Examination of Water and Wastewater* (20th ed.). Washington, DC: American Public Health Association.

TABLE I



SDG#: 401431

## VALIDATION SAMPLE TABLE

LDC#: 29120A

Project Name: 2012 Annual Remedial Performance Sampling

Parameters/Analytical Method

Client ID #	Lab ID #	Matrix	QC Type	Date Collected	CLO <sub>4</sub> (314.0)	TDS (160.1/ 2540C)									
ART-1	201207030402	water		07/02/12	X	X									
ART-2	201207030403	water		07/02/12	X	X									
ART-3	201207030404	water		07/02/12	X	X									
ART-4	201207030405	water		07/02/12	X	X									
ART-6	201207030406	water		07/02/12	X	X									
ART-7	201207030407	water		07/02/12	X	X									
ART-8	201207030408	water		07/02/12	X	X									
PC-99R2/R3	201207030409	water		07/02/12	X	X									
PC-115R	201207030410	water		07/02/12	X	X									
PC-116R	201207030411	water		07/02/12	X	X									
SF-1	201207030412	water		07/02/12	X	X									
PC-117	201207030413	water		07/02/12	X	X									
PC-118	201207030414	water		07/02/12	X	X									
PC-119	201207030415	water		07/02/12	X	X									
PC-120	201207030416	water		07/02/12	X	X									
PC-121	201207030417	water		07/02/12	X	X									
ART-9	201207030419	water		07/02/12	X	X									

Shaded cells indicate sample underwent Stage 4

EB = Equipment Blank, FB = Field Blank, FD = Field Duplicate

DUP = Laboratory Duplicate, MS = Matrix Spike, MSD = Matrix Spike Duplicate

SDG#: 402355

## VALIDATION SAMPLE TABLE

LDC#: 28996A

Project Name: 2012 Annual Remedial Performance Sampling

Parameters/Analytical Method

Client ID #	Lab ID #	Matrix	QC Type	Date Collected	CLO <sub>4</sub> (314.0)	TDS (160.1/ 2540C)									
M-83	201207130066	water			X	X									
PC-98R	201207130067	water			X	X									
PC-86	201207130068	water			X	X									
PC-90	201207130069	water			X	X									
PC-56	201207130070	water			X	X									
PC-58	201207130071	water			X	X									
PC-59	201207130072	water			X	X									
PC-60	201207130073	water			X	X									
PC-62	201207130074	water			X	X									
PC-68	201207130075	water			X	X									
PC-122	201207130076	water			X	X									
MW-K4	201207130077	water			X	X									
ARP-1	201207130078	water			X	X									
ARP-2A	201207130079	water			X	X									
ARP-3A	201207130080	water			X	X									
ARP-4A	201207130081	water			X	X									
ARP-5A	201207130082	water			X	X									
ARP-6B	201207130083	water			X	X									

Shaded cells indicate sample underwent Stage 4

EB = Equipment Blank, FB = Field Blank, FD = Field Duplicate

DUP = Laboratory Duplicate, MS = Matrix Spike, MSD = Matrix Spike Duplicate

SDG#: 402355

## VALIDATION SAMPLE TABLE

LDC#: 28996A

Project Name: 2012 Annual Remedial Performance Sampling

Parameters/Analytical Method

Client ID #	Lab ID #	Matrix	QC Type	Date Collected	CLO <sub>4</sub> (314.0)	TDS (160.1/ 2540C)									
ARP-7	201207130084	water			X	X									
PC-53	201207130085	water			X	X									
PC-103	201207130086	water			X	X									
MW-K5	201207130087	water			X	X									
PC-91	201207130088	water			X	X									
PC-97	201207130089	water			X	X									
PC-18	201207130090	water			X	X									
PC-55	201207130091	water			X	X									
PC-101R	201207130092	water			X	X									
M-83DUP	201207130066DUP	water	DUP			X									
PC-86DUP	201207130068DUP	water	DUP			X									
PC-58MS	201207130071MS	water	MS		X										
PC-58MSD	201207130071MSD	water	MSD		X										
PC-68DUP	201207130075DUP	water	DUP			X									

Shaded cells indicate sample underwent Stage 4

EB = Equipment Blank, FB = Field Blank, FD = Field Duplicate

DUP = Laboratory Duplicate, MS = Matrix Spike, MSD = Matrix Spike Duplicate

SDG#: 404682

## VALIDATION SAMPLE TABLE

LDC#: 28996B

Project Name: 2012 Annual Remedial Performance Sampling

Parameters/Analytical Method

Client ID #	Lab ID #	Matrix	QC Type	Date Collected	Cr (6010)	CLO <sub>4</sub> (314.0)	TDS (160.1/2540C)	Cr(VI) (7196)							
PC-123	201208080198	water		08/06/12	X	X	X								
PC-128	201208080199	water		08/06/12	X	X	X								
PC-129	201208080200	water		08/06/12	X	X	X								
PC-130	201208080201	water		08/06/12	X	X	X								
PC-124	201208080202	water		08/06/12	X	X	X								
PC-125	201208080203	water		08/06/12	X	X	X								
PC-126	201208080204	water		08/06/12	X	X	X								
PC-127	201208080205	water		08/06/12	X	X	X								
PC-131	201208080206	water		08/06/12	X	X	X								
PC-132	201208080207	water		08/06/12	X	X	X								
M-96	201208080208	water		08/06/12	X	X	X								
PC-54	201208080209	water		08/06/12	X	X	X								
M-48A	201208080210	water		08/06/12	X	X	X								
M-44	201208080211	water	FD2	08/06/12	X	X	X	X							
PC-71	201208080212	water		08/06/12	X	X	X								
PC-72	201208080213	water		08/06/12	X	X	X								
PC-73	201208080214	water		08/06/12	X	X	X								
PC-37	201208080215	water		08/06/12	X	X	X								

Shaded cells indicate sample underwent Stage 4

EB = Equipment Blank, FB = Field Blank, FD = Field Duplicate

DUP = Laboratory Duplicate, MS = Matrix Spike, MSD = Matrix Spike Duplicate

SDG#: 404682

## VALIDATION SAMPLE TABLE

LDC#: 28996B

Project Name: 2012 Annual Remedial Performance Sampling

Parameters/Analytical Method

Client ID #	Lab ID #	Matrix	QC Type	Date Collected	Cr (6010)	CLO <sub>4</sub> (314.0)	TDS (160.1/2540C)	Cr(VI) (7196)							
M-23	201208080216	water	FD1	08/06/12	X	X	X								
FB-1	201208080217	water	FB	08/06/12	X	X	X	X							
VD-1	201208080218	water	FD1	08/06/12	X	X	X								
VD-3	201208080219	water	FD2	08/06/12	X	X	X	X							
PC-123MS	201208080198MS	water	MS	08/06/12	X	X									
PC-123MSD	201208080198MSD	water	MSD	08/06/12	X	X									
PC-126MS	201208080204MS	water	MS	08/06/12	X										
PC-126MSD	201208080204MSD	water	MSD	08/06/12	X										
M-96DUP	201208080208DUP	water	DUP	08/06/12			X								
PC-37MS	201208080215MS	water	MS	08/06/12	X										
PC-37MSD	201208080215MSD	water	MSD	08/06/12	X										
M-23DUP	201208080216DUP	water	DUP	08/06/12			X								
VD-1MS	201208080218MS	water	MS	08/06/12		X									
VD-1MSD	201208080218MSD	water	MSD	08/06/12		X									
VD-1DUP	201208080218DUP	water	DUP	08/06/12			X								

Shaded cells indicate sample underwent Stage 4

EB = Equipment Blank, FB = Field Blank, FD = Field Duplicate

DUP = Laboratory Duplicate, MS = Matrix Spike, MSD = Matrix Spike Duplicate

SDG#: 404719

## VALIDATION SAMPLE TABLE

LDC#: 28996C

Project Name: 2012 Annual Remedial Performance Sampling

Parameters/Analytical Method

Client ID #	Lab ID #	Matrix	QC Type	Date Collected	Cr (6010)	CLO <sub>4</sub> (314.0)	TDS (160.1/2540C)								
I-O	201208080316	water		08/06/12	X	X	X								
I-P	201208080323	water		08/06/12	X	X	X								
I-H	201208080324	water		08/06/12	X	X	X								
I-U	201208080325	water		08/06/12	X	X	X								
I-T	201208080326	water		08/06/12	X	X	X								
I-G	201208080327	water		08/06/12	X	X	X								
I-Q	201208080328	water		08/06/12	X	X	X								
I-F	201208080329	water		08/06/12	X	X	X								
I-N	201208080330	water		08/06/12	X	X	X								
I-E	201208080331	water		08/06/12	X	X	X								
I-M	201208080332	water		08/06/12	X	X	X								
I-D	201208080333	water		08/06/12	X	X	X								
I-C	201208080334	water		08/06/12	X	X	X								
I-S	201208080335	water		08/06/12	X	X	X								
I-L	201208080336	water		08/06/12	X	X	X								
I-R	201208080337	water		08/06/12	X	X	X								
I-B	201208080338	water		08/06/12	X	X	X								
I-AR	201208080339	water		08/06/12	X	X	X								

Shaded cells indicate sample underwent Stage 4

EB = Equipment Blank, FB = Field Blank, FD = Field Duplicate

DUP = Laboratory Duplicate, MS = Matrix Spike, MSD = Matrix Spike Duplicate

SDG#: 404719

VALIDATION SAMPLE TABLE

LDC#: 28996C

Project Name: 2012 Annual Remedial Performance Sampling

Parameters/Analytical Method

Client ID #	Lab ID #	Matrix	QC Type	Date Collected	Cr (6010)	CLO <sub>4</sub> (314.0)	TDS (160.1/2540C)								
I-BDUP	201208080338DUP	water	DUP	08/06/12			X								
I-ARMS	201208080339MS	water	MS	08/06/12	X										
I-ARMSD	201208080339MSD	water	MSD	08/06/12	X										

Shaded cells indicate sample underwent Stage 4

EB = Equipment Blank, FB = Field Blank, FD = Field Duplicate

DUP = Laboratory Duplicate, MS = Matrix Spike, MSD = Matrix Spike Duplicate

SDG#: 404737

## VALIDATION SAMPLE TABLE

LDC#: 28996D

Project Name: 2012 Annual Remedial Performance Sampling

Parameters/Analytical Method

Client ID #	Lab ID #	Matrix	QC Type	Date Collected	Cr (6010)	CLO <sub>4</sub> (314.0)	TDS (160.1/2540C)								
ART-1	201208080449	water		08/06/12	X	X	X								
ART-2	201208080450	water		08/06/12	X	X	X								
ART-3	201208080451	water		08/06/12	X	X	X								
ART-4	201208080452	water		08/06/12	X	X	X								
ART-6	201208080454	water		08/06/12	X	X	X								
ART-7	201208080455	water		08/06/12	X	X	X								
ART-8	201208080456	water		08/06/12	X	X	X								
PC-99R2/R3	201208080457	water		08/06/12	X	X	X								
PC-115R	201208080458	water		08/06/12	X	X	X								
PC-116R	201208080459	water		08/06/12	X	X	X								
SF-1	201208080460	water		08/06/12	X	X	X								
PC-117	201208080461	water		08/06/12	X	X	X								
PC-118	201208080462	water		08/06/12	X	X	X								
PC-119	201208080463	water		08/06/12	X	X	X								
PC-120	201208080464	water		08/06/12	X	X	X								
PC-121	201208080465	water		08/06/12	X	X	X								
PC-133	201208080466	water		08/06/12	X	X	X								
ART-9	201208080467	water		08/06/12	X	X	X								

Shaded cells indicate sample underwent Stage 4

EB = Equipment Blank, FB = Field Blank, FD = Field Duplicate

DUP = Laboratory Duplicate, MS = Matrix Spike, MSD = Matrix Spike Duplicate



SDG#: 404737

**VALIDATION SAMPLE TABLE**

LDC#: 28996D

**Project Name:** 2012 Annual Remedial Performance Sampling

Parameters/Analytical Method

Client ID #	Lab ID #	Matrix	QC Type	Date Collected	Cr (6010)	CLO <sub>4</sub> (314.0)	TDS (160.1/2540C)								
ART-1MS	201208080449MS	water	MS	08/06/12		X									
ART-1MSD	201208080449MSD	water	MSD	08/06/12		X									

Shaded cells indicate sample underwent Stage 4

EB = Equipment Blank, FB = Field Blank, FD = Field Duplicate

DUP = Laboratory Duplicate, MS = Matrix Spike, MSD = Matrix Spike Duplicate

SDG#: 404790

## VALIDATION SAMPLE TABLE

LDC#: 28996E

Project Name: 2012 Annual Remedial Performance Sampling

Parameters/Analytical Method

Client ID #	Lab ID #	Matrix	QC Type	Date Collected	Cr (6010)	CLO <sub>4</sub> (314.0)	TDS (160.1/2540C)								
H-28A	201208080709	water		08/07/12	X	X	X								
M-6A	201208080710	water		08/07/12	X	X	X								
M-5A	201208080720	water		08/07/12	X	X	X								
M-7B	201208080721	water		08/07/12	X	X	X								

Shaded cells indicate sample underwent Stage 4

EB = Equipment Blank, FB = Field Blank, FD = Field Duplicate

DUP = Laboratory Duplicate, MS = Matrix Spike, MSD = Matrix Spike Duplicate

SDG#: 404947

## VALIDATION SAMPLE TABLE

LDC#: 29120B

Project Name: 2012 Annual Remedial Performance Sampling

Parameters/Analytical Method

Client ID #	Lab ID #	Matrix	QC Type	Date Collected	Cr (6010)	CLO <sub>4</sub> (314.0)	TDS (160.1/2540C)								
PC-135A	201208080711	water		08/07/12	X	X	X								
PC-136	201208080712	water		08/07/12	X	X	X								
PC-148	201208080713	water		08/07/12	X	X	X								
PC-144	201208080714	water		08/07/12	X	X	X								
PC-149	201208080715	water		08/07/12	X	X	X								
PC-150	201208080716	water		08/07/12	X	X	X								
M-64	201208080717	water		08/07/12	X	X	X								
M-65	201208080718	water		08/07/12	X	X	X								
M-66	201208080719	water		08/07/12	X	X	X								
PC-144MS	201208080714MS	water	MS	08/07/12	X										
PC-144MSD	201208080714MSD	water	MSD	08/07/12	X										
PC-149MS	201208080715MS	water	MS	08/07/12	X										
PC-149MSD	201208080715MSD	water	MSD	08/07/12	X										

Shaded cells indicate sample underwent Stage 4

EB = Equipment Blank, FB = Field Blank, FD = Field Duplicate

DUP = Laboratory Duplicate, MS = Matrix Spike, MSD = Matrix Spike Duplicate

SDG#: 405034

## VALIDATION SAMPLE TABLE

LDC#: 28996F

Project Name: 2012 Annual Remedial Performance Sampling

Parameters/Analytical Method

Client ID #	Lab ID #	Matrix	QC Type	Date Collected	Cr (6010)	CLO <sub>4</sub> (314.0)	TDS (160.1/2540C)	Cr(VI) (7196)							
M-79	201208100203	water		08/08/12	X	X	X								
M-69	201208100204	water		08/08/12	X	X	X								
M-135	201208100205	water		08/08/12	X	X	X								
M-131	201208100206	water		08/08/12	X	X	X								
M57A	201208100207	water		08/08/12	X	X	X								
M-25	201208100208	water		08/08/12	X	X	X								
EB-1	201208100209	water	EB	08/08/12	X	X	X	X							
M-37	201208100210	water		08/08/12	X	X	X	X							
I-V	201208100211	water		08/08/12	X	X	X								
I-K	201208100212	water		08/08/12	X	X	X								
I-J	201208100213	water		08/08/12	X	X	X								
I-Z	201208100214	water		08/08/12	X	X	X								
I-I	201208100215	water		08/08/12	X	X	X								
M-31A	201208100216	water		08/08/12	X	X	X								
M-12A	201208100217	water	FD1	08/08/12	X	X	X	X							
M-11	201208100218	water		08/08/12	X	X	X	X							
M-10	201208100219	water		08/08/12	X	X	X	X							
M-35	201208100220	water	FD2	08/08/12	X	X	X								

Shaded cells indicate sample underwent Stage 4

EB = Equipment Blank, FB = Field Blank, FD = Field Duplicate

DUP = Laboratory Duplicate, MS = Matrix Spike, MSD = Matrix Spike Duplicate

SDG#: 405034

## VALIDATION SAMPLE TABLE

LDC#: 28996F

Project Name: 2012 Annual Remedial Performance Sampling

Parameters/Analytical Method

Client ID #	Lab ID #	Matrix	QC Type	Date Collected	Cr (6010)	CLO <sub>4</sub> (314.0)	TDS (160.1/2540C)	Cr(VI) (7196)							
M-68	201208100221	water		08/08/12	X	X	X								
VD-4	201208100222	water	FD1	08/08/12	X	X	X	X							
VD-2	201208100223	water	FD2	08/08/12	X	X	X								
M-79MS	201208100203MS	water	MS	08/08/12	X										
M-79MSD	201208100203MSD	water	MSD	08/08/12	X										
M-135MS	201208100205MS	water	MS	08/08/12	X										
M-135MSD	201208100205MSD	water	MSD	08/08/12	X										
M-131MS	201208100206MS	water	MS	08/08/12	X										
M-131MSD	201208100206MSD	water	MSD	08/08/12	X										
M-131DUP	201208100206DUP	water	DUP	08/08/12			X								
M57ADUP	201208100207DUP	water	DUP	08/08/12			X								
M-11DUP	201208100218DUP	water	DUP	08/08/12			X								
M-10MS	201208100219MS	water	MS	08/08/12	X										
M-10MSD	201208100219MSD	water	MSD	08/08/12	X										
M-10DUP	201208100219DUP	water	DUP	08/08/12			X								

Shaded cells indicate sample underwent Stage 4

EB = Equipment Blank, FB = Field Blank, FD = Field Duplicate

DUP = Laboratory Duplicate, MS = Matrix Spike, MSD = Matrix Spike Duplicate

SDG#: 405048

**VALIDATION SAMPLE TABLE**

LDC#: 29044A

**Project Name:** 2012 Annual Remedial Performance Sampling

Parameters/Analytical Method

Client ID #	Lab ID #	Matrix	QC Type	Date Collected	Cr (200.7)	TDS (160.1/2540C)								
M-10	201208100245	water		08/08/12	X	X								

Shaded cells indicate sample underwent Stage 4

EB = Equipment Blank, FB = Field Blank, FD = Field Duplicate

DUP = Laboratory Duplicate, MS = Matrix Spike, MSD = Matrix Spike Duplicate

SDG#: 405208

## VALIDATION SAMPLE TABLE

LDC#: 28996G

Project Name: 2012 Annual Remedial Performance Sampling

Parameters/Analytical Method

Client ID #	Lab ID #	Matrix	QC Type	Date Collected	Cr (6010)	CLO <sub>4</sub> (314.0)	TDS (160.1/2540C)	Cr(VI) (7196)							
M-19	201208110091	water		08/09/12	X	X	X								
M-22A	201208110092	water		08/09/12	X	X	X								
M-36	201208110093	water		08/09/12	X	X	X	X							
M-38	201208110094	water		08/09/12	X	X	X								
M-67	201208110095	water		08/09/12	X	X	X								
M-74	201208110096	water		08/09/12	X	X	X								
M-73	201208110097	water		08/09/12	X	X	X								
EB-2	201208110098	water	EB	08/09/12	X	X	X	X							
M-83	201208110099	water		08/09/12	X	X	X								
M-80	201208110100	water		08/09/12	X	X	X								
M-81A	201208110101	water		08/09/12	X	X	X								
M-70	201208110102	water		08/09/12	X	X	X								
M-71	201208110103	water		08/09/12	X	X	X								
M-72	201208110104	water		08/09/12	X	X	X								
M-14A	201208110105	water		08/09/12	X	X	X								

Shaded cells indicate sample underwent Stage 4

EB = Equipment Blank, FB = Field Blank, FD = Field Duplicate

DUP = Laboratory Duplicate, MS = Matrix Spike, MSD = Matrix Spike Duplicate

SDG#: 405883

## VALIDATION SAMPLE TABLE

LDC#: 28996H

Project Name: 2012 Annual Remedial Performance Sampling

Parameters/Analytical Method

Client ID #	Lab ID #	Matrix	QC Type	Date Collected	Cr (6010)	CLO <sub>4</sub> (314.0)	TDS (160.1/2540C)								
PC-98R	201208170274	water		08/14/12	X	X	X								
PC-86	201208170275	water		08/13/12	X	X	X								
PC-90	201208170276	water		08/13/12	X	X	X								
PC-56	201208170277	water		08/15/12	X	X	X								
PC-58	201208170278	water		08/15/12	X	X	X								
PC-59	201208170279	water		08/15/12	X	X	X								
PC-60	201208170280	water		08/15/12	X	X	X								
PC-62	201208170281	water		08/15/12	X	X	X								
PC-68	201208170282	water		08/15/12	X	X	X								
PC-122	201208170283	water		08/13/12	X	X	X								
MW-K4	201208170284	water		08/14/12	X	X	X								
ARP-1	201208170285	water		08/14/12	X	X	X								
ARP-2A	201208170286	water		08/14/12	X	X	X								
ARP-3A	201208170287	water		08/14/12	X	X	X								
ARP-4A	201208170288	water		08/14/12	X	X	X								
ARP-5A	201208170289	water		08/14/12	X	X	X								
ARP-6B	201208170290	water		08/14/12	X	X	X								
ARP-7	201208170291	water		08/14/12	X	X	X								

Shaded cells indicate sample underwent Stage 4

EB = Equipment Blank, FB = Field Blank, FD = Field Duplicate

DUP = Laboratory Duplicate, MS = Matrix Spike, MSD = Matrix Spike Duplicate



SDG#: 405883

## VALIDATION SAMPLE TABLE

LDC#: 28996H

Project Name: 2012 Annual Remedial Performance Sampling

Parameters/Analytical Method

Client ID #	Lab ID #	Matrix	QC Type	Date Collected	Cr (6010)	CLO <sub>4</sub> (314.0)	TDS (160.1/2540C)								
PC-53	201208170292	water		08/13/12	X	X	X								
PC-103	201208170293	water		08/15/12	X	X	X								
MW-K5	201208170294	water		08/13/12	X	X	X								
PC-91	201208170295	water		08/13/12	X	X	X								
PC-97	201208170296	water		08/13/12	X	X	X								
PC-18	201208170297	water		08/15/12	X	X	X								
PC-55	201208170298	water		08/14/12	X	X	X								
PC-101R	201208170299	water		08/14/12	X	X	X								
PC-94	201208170300	water		08/15/12	X	X	X								
ART-7B	201208170307	water		08/13/12	X	X	X								
PC-98RMS	201208170274MS	water	MS	08/14/12	X										
PC-98RMSD	201208170274MSD	water	MSD	08/14/12	X										
PC-86DUP	201208170275DUP	water	DUP	08/13/12			X								
PC-60MS	201208170280MS	water	MS	08/15/12	X										
PC-60MSD	201208170280MSD	water	MSD	08/15/12	X										
PC-62DUP	201208170281DUP	water	DUP	08/15/12			X								
PC-91MS	201208170295MS	water	MS	08/13/12	X										
PC-91MSD	201208170295MSD	water	MSD	08/13/12	X										

Shaded cells indicate sample underwent Stage 4

EB = Equipment Blank, FB = Field Blank, FD = Field Duplicate

DUP = Laboratory Duplicate, MS = Matrix Spike, MSD = Matrix Spike Duplicate

SDG#: 405883

## VALIDATION SAMPLE TABLE

LDC#: 28996H

Project Name: 2012 Annual Remedial Performance Sampling

Parameters/Analytical Method

Client ID #	Lab ID #	Matrix	QC Type	Date Collected	Cr (6010)	CLO <sub>4</sub> (314.0)	TDS (160.1/2540C)								
PC-91DUP	201208170295DUP	water	DUP	08/13/12			X								
PC-18MS	201208170297MS	water	MS	08/15/12		X									
PC-18MSD	201208170297MSD	water	MSD	08/15/12		X									
PC-94MS	201208170300MS	water	MS	08/15/12	X										
PC-94MSD	201208170300MSD	water	MSD	08/15/12	X										

Shaded cells indicate sample underwent Stage 4

EB = Equipment Blank, FB = Field Blank, FD = Field Duplicate

DUP = Laboratory Duplicate, MS = Matrix Spike, MSD = Matrix Spike Duplicate

SDG#: 408121

## VALIDATION SAMPLE TABLE

LDC#: 28996I

Project Name: 2012 Annual Remedial Performance Sampling

Parameters/Analytical Method

Client ID #	Lab ID #	Matrix	QC Type	Date Collected	CLO <sub>4</sub> (314.0)	TDS (160.1/2540C)									
ART-1	201209060585	water		09/05/12	X	X									
ART-2	201209060586	water		09/05/12	X	X									
ART-3	201209060587	water		09/05/12	X	X									
ART-4	201209060588	water		09/05/12	X	X									
ART-6	201209060589	water		09/05/12	X	X									
ART-7	201209060590	water		09/05/12	X	X									
ART-8	201209060591	water		09/05/12	X	X									
PC-99R2/R3	201209060592	water		09/05/12	X	X									
PC-115R	201209060593	water		09/05/12	X	X									
PC-116R	201209060594	water		09/05/12	X	X									
SF-1	201209060595	water		09/05/12	X	X									
PC-117	201209060596	water		09/05/12	X	X									
PC-118	201209060597	water		09/05/12	X	X									
PC-119	201209060598	water		09/05/12	X	X									
PC-120	201209060599	water		09/05/12	X	X									
PC-121	201209060600	water		09/05/12	X	X									
PC-133	201209060601	water		09/05/12	X	X									
ART-9	201209060602	water		09/05/12	X	X									

Shaded cells indicate sample underwent Stage 4

EB = Equipment Blank, FB = Field Blank, FD = Field Duplicate

DUP = Laboratory Duplicate, MS = Matrix Spike, MSD = Matrix Spike Duplicate

SDG#: 408121

**VALIDATION SAMPLE TABLE**

LDC#: 28996I

**Project Name:** 2012 Annual Remedial Performance Sampling

Parameters/Analytical Method

Client ID #	Lab ID #	Matrix	QC Type	Date Collected	CLO <sub>4</sub> (314.0)	TDS (160.1/2540C)									
PC-117MS	201209060596MS	water	MS	09/05/12	X										
PC-117MSD	201209060596MSD	water	MSD	09/05/12	X										

Shaded cells indicate sample underwent Stage 4

EB = Equipment Blank, FB = Field Blank, FD = Field Duplicate

DUP = Laboratory Duplicate, MS = Matrix Spike, MSD = Matrix Spike Duplicate

SDG#: 409004

## VALIDATION SAMPLE TABLE

LDC#: 28996J

Project Name: 2012 Annual Remedial Performance Sampling

Parameters/Analytical Method

Client ID #	Lab ID #	Matrix	QC Type	Date Collected	Cr (6010)	CLO <sub>4</sub> (314.0)	TDS (160.1/2540C)								
M-83	201209140054	water		09/12/12		X	X								
PC-98R	201209140055	water		09/11/12		X	X								
PC-86	201209140056	water		09/10/12		X	X								
PC-90	201209140057	water		09/10/12		X	X								
PC-56	201209140058	water		09/10/12		X	X								
PC-58	201209140059	water		09/10/12		X	X								
PC-59	201209140060	water		09/10/12		X	X								
PC-60	201209140061	water		09/10/12		X	X								
PC-62	201209140062	water		09/10/12		X	X								
PC-68	201209140063	water		09/10/12		X	X								
PC-122	201209140064	water		09/11/12		X	X								
MW-K4	201209140065	water		09/11/12		X	X								
ARP-1	201209140066	water		09/11/12		X	X								
ARP-2A	201209140067	water		09/11/12		X	X								
ARP-3A	201209140068	water		09/11/12		X	X								
ARP-4A	201209140069	water		09/11/12		X	X								
ARP-5A	201209140070	water		09/11/12		X	X								
ARP-6B	201209140071	water		09/11/12		X	X								

Shaded cells indicate sample underwent Stage 4

EB = Equipment Blank, FB = Field Blank, FD = Field Duplicate

DUP = Laboratory Duplicate, MS = Matrix Spike, MSD = Matrix Spike Duplicate

SDG#: 409004

## VALIDATION SAMPLE TABLE

LDC#: 28996J

Project Name: 2012 Annual Remedial Performance Sampling

Parameters/Analytical Method

Client ID #	Lab ID #	Matrix	QC Type	Date Collected	Cr (6010)	CLO <sub>4</sub> (314.0)	TDS (160.1/2540C)								
ARP-7	201209140072	water		09/11/12		X	X								
PC-53	201209140073	water		09/11/12		X	X								
PC-103	201209140074	water		09/11/12		X	X								
MW-K5	201209140075	water		09/11/12		X	X								
PC-91	201209140076	water		09/10/12		X	X								
PC-97	201209140077	water		09/10/12		X	X								
PC-18	201209140078	water		09/10/12		X	X								
PC-55	201209140079	water		09/10/12		X	X								
PC-101R	201209140080	water		09/11/12		X	X								
ART-7B	201209140081	water		09/11/12	X	X	X								
M-83DUP	201209140054DUP	water	DUP	09/12/12			X								
PC-68DUP	201209140063DUP	water	DUP	09/10/12			X								

Shaded cells indicate sample underwent Stage 4

EB = Equipment Blank, FB = Field Blank, FD = Field Duplicate

DUP = Laboratory Duplicate, MS = Matrix Spike, MSD = Matrix Spike Duplicate

SDG#: 411090

## VALIDATION SAMPLE TABLE

LDC#: 28996K

Project Name: 2012 Annual Remedial Performance Sampling

Parameters/Analytical Method

Client ID #	Lab ID #	Matrix	QC Type	Date Collected	CLO <sub>4</sub> (314.0)	TDS (160.1/2540C)									
ART-1	201210040094	water		10/02/12	X	X									
ART-2	201210040095	water		10/02/12	X	X									
ART-3	201210040096	water		10/02/12	X	X									
ART-4	201210040097	water		10/02/12	X	X									
ART-6	201210040098	water		10/02/12	X	X									
ART-7	201210040099	water		10/02/12	X	X									
ART-8	201210040100	water		10/02/12	X	X									
PC-99R2/R3	201210040101	water		10/02/12	X	X									
PC-115R	201210040102	water		10/02/12	X	X									
PC-116R	201210040103	water		10/02/12	X	X									
SF-1	201210040104	water		10/02/12	X	X									
PC-117	201210040105	water		10/02/12	X	X									
PC-118	201210040106	water		10/02/12	X	X									
PC-119	201210040107	water		10/02/12	X	X									
PC-120	201210040108	water		10/02/12	X	X									
PC-121	201210040109	water		10/02/12	X	X									
PC-133	201210040110	water		10/02/12	X	X									
ART-9	201210040111	water		10/02/12	X	X									

Shaded cells indicate sample underwent Stage 4

EB = Equipment Blank, FB = Field Blank, FD = Field Duplicate

DUP = Laboratory Duplicate, MS = Matrix Spike, MSD = Matrix Spike Duplicate

SDG#: 412098

## VALIDATION SAMPLE TABLE

LDC#: 28996L

Project Name: 2012 Annual Remedial Performance Sampling

Parameters/Analytical Method

Client ID #	Lab ID #	Matrix	QC Type	Date Collected	CLO <sub>4</sub> (314.0)	TDS (160.1/ 2540C)									
M-83	201210120126	water		10/10/12	X	X									
PC-98R	201210120127	water		10/10/12	X	X									
PC-86	201210120128	water		10/09/12	X	X									
PC-90	201210120129	water		10/09/12	X	X									
PC-56	201210120130	water		10/09/12	X	X									
PC-58	201210120131	water		10/09/12	X	X									
PC-59	201210120132	water		10/09/12	X	X									
PC-60	201210120133	water		10/09/12	X	X									
PC-62	201210120134	water		10/09/12	X	X									
PC-68	201210120135	water		10/09/12	X	X									
PC-122	201210120136	water		10/10/12	X	X									
MW-K4	201210120137	water		10/10/12	X	X									
ARP-1	201210120138	water		10/09/12	X	X									
ARP-2A	201210120139	water		10/10/12	X	X									
ARP-3A	201210120140	water		10/10/12	X	X									
ARP-4A	201210120141	water		10/10/12	X	X									
ARP-5A	201210120142	water		10/10/12	X	X									
ARP-6B	201210120143	water		10/10/12	X	X									

Shaded cells indicate sample underwent Stage 4

EB = Equipment Blank, FB = Field Blank, FD = Field Duplicate

DUP = Laboratory Duplicate, MS = Matrix Spike, MSD = Matrix Spike Duplicate



SDG#: 412098

## VALIDATION SAMPLE TABLE

LDC#: 28996L

Project Name: 2012 Annual Remedial Performance Sampling

Parameters/Analytical Method

Client ID #	Lab ID #	Matrix	QC Type	Date Collected	CLO <sub>4</sub> (314.0)	TDS (160.1/2540C)									
ARP-7	201210120144	water		10/10/12	X	X									
PC-53	201210120145	water		10/10/12	X	X									
PC-103	201210120146	water		10/10/12	X	X									
MW-K5	201210120147	water		10/10/12	X	X									
PC-91	201210120148	water		10/09/12	X	X									
PC-97	201210120149	water		10/09/12	X	X									
PC-18	201210120150	water		10/09/12	X	X									
PC-55	201210120151	water		10/09/12	X	X									
PC-101R	201210120152	water		10/10/12	X	X									
M-83DUP	201210120126DUP	water	DUP	10/10/12		X									
PC-62MS	201210120134MS	water	MS	10/09/12	X										
PC-62MSD	201210120134MSD	water	MSD	10/09/12	X										
PC-68DUP	201210120135DUP	water	DUP	10/09/12		X									
ARP-1MS	201210120138MS	water	MS	10/09/12	X										
ARP-1MSD	201210120138MSD	water	MSD	10/09/12	X										

Shaded cells indicate sample underwent Stage 4

EB = Equipment Blank, FB = Field Blank, FD = Field Duplicate

DUP = Laboratory Duplicate, MS = Matrix Spike, MSD = Matrix Spike Duplicate

SDG#: 414468

## VALIDATION SAMPLE TABLE

LDC#: 29120C

Project Name: 2012 Annual Remedial Performance Sampling

Parameters/Analytical Method

Client ID #	Lab ID #	Matrix	QC Type	Date Collected	Cr (6010)	CLO <sub>4</sub> (314.0)	TDS (160.1)	Cr(VI) (7196)							
M-48A	201211070300	water		11/05/13	X	X	X								
M-44	201211070301	water	FD1	11/05/13	X	X	X								
PC-71	201211070302	water		11/05/13	X	X	X								
PC-72	201211070303	water	FD2	11/05/13	X	X	X								
PC-73	201211070304	water		11/05/13	X	X	X								
PC-37	201211070305	water		11/05/13	X	X	X								
VD-1	201211070306	water	FD1	11/05/13	X	X	X	X							
VD-3	201211070307	water	FD2	11/05/13	X	X	X								
FB-1	201211070308	water	FB	11/05/13	X	X	X	X							
M-95	201211070309	water		11/05/13	X	X	X	X							
PC-123	201211070310	water		11/05/13	X	X	X								
PC-128	201211070311	water		11/05/13	X	X	X								
PC-129	201211070312	water		11/05/13	X	X	X								
PC-130	201211070313	water		11/05/13	X	X	X								
PC-131	201211070314	water		11/05/13	X	X	X								
PC-132	201211070315	water		11/05/13	X	X	X								
PC-124	201211070316	water		11/05/13	X	X	X								
PC-125	201211070317	water		11/05/13	X	X	X								

Shaded cells indicate sample underwent Stage 4

EB = Equipment Blank, FB = Field Blank, FD = Field Duplicate

DUP = Laboratory Duplicate, MS = Matrix Spike, MSD = Matrix Spike Duplicate

SDG#: 414468

## VALIDATION SAMPLE TABLE

LDC#: 29120C

Project Name: 2012 Annual Remedial Performance Sampling

Parameters/Analytical Method

Client ID #	Lab ID #	Matrix	QC Type	Date Collected	Cr (6010)	CLO <sub>4</sub> (314.0)	TDS (160.1)	Cr(VI) (7196)							
PC-126	201211070318	water		11/05/13	X	X	X								
PC-127	201211070319	water		11/05/13	X	X	X								
M-96	201211070320	water		11/05/13	X	X	X								
PC-54	201211070321	water		11/05/13	X	X	X								
M-48DUP	201211070300DUP	water	DUP	11/05/13			X								
PC-73MS	201211070304MS	water	MS	11/05/13	X										
PC-73MSD	201211070304MSD	water	MSD	11/05/13	X										
VD-1MS	201211070306MS	water	MS	11/05/13	X			X							
VD-1MSD	201211070306MSD	water	MSD	11/05/13	X			X							
PC-128DUP	201211070311DUP	water	DUP	11/05/13			X								
PC-132MS	201211070315MS	water	MS	11/05/13		X									
PC-132MSD	201211070315MSD	water	MSD	11/05/13		X									

Shaded cells indicate sample underwent Stage 4

EB = Equipment Blank, FB = Field Blank, FD = Field Duplicate

DUP = Laboratory Duplicate, MS = Matrix Spike, MSD = Matrix Spike Duplicate

SDG#: 414469

## VALIDATION SAMPLE TABLE

LDC#: 28996M

Project Name: 2012 Annual Remedial Performance Sampling

Parameters/Analytical Method

Client ID #	Lab ID #	Matrix	QC Type	Date Collected	Cr (6010)	CLO <sub>4</sub> (314.0)	TDS (160.1/2540C)								
ART-1	201211070322	water		11/05/12	X	X	X								
ART-2	201211070323	water		11/05/12	X	X	X								
ART-3	201211070324	water		11/05/12	X	X	X								
ART-4	201211070325	water		11/05/12	X	X	X								
ART-6	201211070327	water		11/05/12	X	X	X								
ART-7	201211070328	water		11/05/12	X	X	X								
ART-8	201211070329	water		11/05/12	X	X	X								
PC-99R2/R3	201211070330	water		11/05/12	X	X	X								
PC-115R	201211070331	water		11/05/12	X	X	X								
PC-116R	201211070332	water		11/05/12	X	X	X								
SF-1	201211070333	water		11/05/12	X	X	X								
PC-117	201211070334	water		11/05/12	X	X	X								
PC-118	201211070335	water		11/05/12	X	X	X								
PC-119	201211070336	water		11/05/12	X	X	X								
PC-120	201211070337	water		11/05/12	X	X	X								
PC-121	201211070338	water		11/05/12	X	X	X								
PC-133	201211070339	water		11/05/12	X	X	X								
ART-9	201211070340	water		11/05/12	X	X	X								

Shaded cells indicate sample underwent Stage 4

EB = Equipment Blank, FB = Field Blank, FD = Field Duplicate

DUP = Laboratory Duplicate, MS = Matrix Spike, MSD = Matrix Spike Duplicate

SDG#: 414469

## VALIDATION SAMPLE TABLE

LDC#: 28996M

Project Name: 2012 Annual Remedial Performance Sampling

Parameters/Analytical Method

Client ID #	Lab ID #	Matrix	QC Type	Date Collected	Cr (6010)	CLO <sub>4</sub> (314.0)	TDS (160.1/2540C)								
PC-118MS	201211070335MS	water	MS	11/05/12		X									
PC-118MSD	201211070335MSD	water	MSD	11/05/12		X									
PC-119DUP	201211070336DUP	water	DUP	11/05/12			X								
PC-120MS	201211070337MS	water	MS	11/05/12	X										
PC-120MSD	201211070337MSD	water	MSD	11/05/12	X										
PC-120DUP	201211070337DUP	water	DUP	11/05/12			X								
PC-121MS	201211070338MS	water	MS	11/05/12	X										
PC-121MSD	201211070338MSD	water	MSD	11/05/12	X										

Shaded cells indicate sample underwent Stage 4

EB = Equipment Blank, FB = Field Blank, FD = Field Duplicate

DUP = Laboratory Duplicate, MS = Matrix Spike, MSD = Matrix Spike Duplicate

SDG#: 414470

## VALIDATION SAMPLE TABLE

LDC#: 29044B

Project Name: 2012 Annual Remedial Performance Sampling

Parameters/Analytical Method

Client ID #	Lab ID #	Matrix	QC Type	Date Collected	Cr (6010)	CLO <sub>4</sub> (314.0)	TDS (160.1/2540C)								
I-O	201211070341	water		11/05/12	X	X	X								
I-P	201211070346	water		11/05/12	X	X	X								
I-H	201211070347	water		11/05/12	X	X	X								
I-U	201211070348	water		11/05/12	X	X	X								
I-T	201211070349	water		11/05/12	X	X	X								
I-G	201211070350	water		11/05/12	X	X	X								
I-Q	201211070351	water		11/05/12	X	X	X								
I-F	201211070352	water		11/05/12	X	X	X								
I-N	201211070353	water		11/05/12	X	X	X								
I-E	201211070354	water		11/05/12	X	X	X								
I-M	201211070355	water		11/05/12	X	X	X								
I-D	201211070356	water		11/05/12	X	X	X								
I-C	201211070357	water		11/05/12	X	X	X								
I-S	201211070358	water		11/05/12	X	X	X								
I-L	201211070359	water		11/05/12	X	X	X								
I-R	201211070360	water		11/05/12	X	X	X								
I-B	201211070361	water		11/05/12	X	X	X								
I-AR	201211070362	water		11/05/12	X	X	X								

Shaded cells indicate sample underwent Stage 4

EB = Equipment Blank, FB = Field Blank, FD = Field Duplicate

DUP = Laboratory Duplicate, MS = Matrix Spike, MSD = Matrix Spike Duplicate

SDG#: 414470

## VALIDATION SAMPLE TABLE

LDC#: 29044B

Project Name: 2012 Annual Remedial Performance Sampling

Parameters/Analytical Method

Client ID #	Lab ID #	Matrix	QC Type	Date Collected	Cr (6010)	CLO <sub>4</sub> (314.0)	TDS (160.1/2540C)								
I-CMS	201211070357MS	water	MS	11/05/12		X									
I-CMSD	201211070357MSD	water	MSD	11/05/12		X									
I-LMS	201211070359MS	water	MS	11/05/12	X										
I-LMSD	201211070359MSD	water	MSD	11/05/12	X										
I-ARMS	201211070362MS	water	MS	11/05/12	X										
I-ARMSD	201211070362MSD	water	MSD	11/05/12	X										
I-ARDUP	201211070362DUP	water	DUP	11/05/12			X								

Shaded cells indicate sample underwent Stage 4

EB = Equipment Blank, FB = Field Blank, FD = Field Duplicate

DUP = Laboratory Duplicate, MS = Matrix Spike, MSD = Matrix Spike Duplicate

SDG#: 414625

## VALIDATION SAMPLE TABLE

LDC#: 29044C

Project Name: 2012 Annual Remedial Performance Sampling

Parameters/Analytical Method

Client ID #	Lab ID #	Matrix	QC Type	Date Collected	Cr (6010)	CLO <sub>4</sub> (314.0)	TDS (160.1/2540C)	Cr(VI) (7196)							
M-23	201211080246	water		11/06/12	X	X	X								
M-64	201211080250	water		11/06/12	X	X	X								
M-65	201211080251	water		11/06/12	X	X	X								
M-66	201211080252	water		11/06/12	X	X	X								
M-69	201211080253	water		11/06/12	X	X	X								
M-135	201211080254	water		11/06/12	X	X	X								
M-131	201211080255	water		11/06/12	X	X	X								
M-57A	201211080256	water		11/06/12	X	X	X								
EB-1	201211080257	water	EB	11/06/12	X	X	X	X							
M-37	201211080258	water		11/06/12	X	X	X	X							
M-25	201211080259	water		11/06/12	X	X	X								
PC-136	201211080260	water		11/06/12	X	X	X								
PC-144	201211080261	water		11/06/12	X	X	X								
PC-135A	201211080262	water		11/06/12	X	X	X								
PC-148	201211080263	water		11/06/12	X	X	X								
PC-149	201211080264	water		11/06/12	X	X	X								
PC-150	201211080265	water		11/06/12	X	X	X								
M-97	201211080266	water		11/06/12	X	X	X								

Shaded cells indicate sample underwent Stage 4

EB = Equipment Blank, FB = Field Blank, FD = Field Duplicate

DUP = Laboratory Duplicate, MS = Matrix Spike, MSD = Matrix Spike Duplicate



SDG#: 414625

## VALIDATION SAMPLE TABLE

LDC#: 29044C

Project Name: 2012 Annual Remedial Performance Sampling

Parameters/Analytical Method

Client ID #	Lab ID #	Matrix	QC Type	Date Collected	Cr (6010)	CLO <sub>4</sub> (314.0)	TDS (160.1/2540C)	Cr(VI) (7196)							
M-79	201211080650	water		11/06/12	X	X	X								
M-23DUP	201211080246DUP	water	DUP	11/06/12			X								
M-131DUP	201211080255DUP	water	DUP	11/06/12			X								
M-57ADUP	201211080256DUP	water	DUP	11/06/12			X								
M-25DUP	201211080259DUP	water	DUP	11/06/12			X								
PC-150MS	201211080265MS	water	MS	11/06/12	X										
PC-150MSD	201211080265MSD	water	MSD	11/06/12	X										
M-97MS	201211080266MS	water	MS	11/06/12	X										
M-97MSD	201211080266MSD	water	MSD	11/06/12	X										

Shaded cells indicate sample underwent Stage 4

EB = Equipment Blank, FB = Field Blank, FD = Field Duplicate

DUP = Laboratory Duplicate, MS = Matrix Spike, MSD = Matrix Spike Duplicate

SDG#: 414768

## VALIDATION SAMPLE TABLE

LDC#: 29044D

Project Name: 2012 Annual Remedial Performance Sampling

Parameters/Analytical Method

Client ID #	Lab ID #	Matrix	QC Type	Date Collected	Cr (6010)	CLO <sub>4</sub> (314.0)	TDS (160.1/2540C)	Cr(VI) (7196)							
I-V	201211090194	water		11/07/12	X	X	X								
I-K	201211090195	water		11/07/12	X	X	X								
I-J	201211090196	water		11/07/12	X	X	X								
I-Z	201211090197	water		11/07/12	X	X	X								
I-I	201211090198	water		11/07/12	X	X	X								
M-35	201211090199	water		11/07/12	X	X	X								
M-19	201211090200	water		11/07/12	X	X	X								
M-68	201211090201	water	FD	11/07/12	X	X	X								
M-67	201211090202	water		11/07/12	X	X	X								
M-74	201211090203	water		11/07/12	X	X	X								
M-73	201211090204	water		11/07/12	X	X	X								
M-80	201211090205	water		11/07/12	X	X	X								
M-81A	201211090206	water		11/07/12	X	X	X								
M-83	201211090207	water		11/07/12	X	X	X								
M-70	201211090208	water		11/07/12	X	X	X								
M-71	201211090209	water		11/07/12	X	X	X								
M-72	201211090210	water		11/07/12	X	X	X								
VD-4	201211090211	water	FD	11/07/12	X	X	X								

Shaded cells indicate sample underwent Stage 4

EB = Equipment Blank, FB = Field Blank, FD = Field Duplicate

DUP = Laboratory Duplicate, MS = Matrix Spike, MSD = Matrix Spike Duplicate

SDG#: 414768

## VALIDATION SAMPLE TABLE

LDC#: 29044D

Project Name: 2012 Annual Remedial Performance Sampling

Parameters/Analytical Method

Client ID #	Lab ID #	Matrix	QC Type	Date Collected	Cr (6010)	CLO <sub>4</sub> (314.0)	TDS (160.1/2540C)	Cr(VI) (7196)							
EB-2	201211090212	water	EB	11/07/12	X	X	X	X							
M-22A	201211090213	water		11/07/12	X	X	X								
M-115	201211090214	water		11/07/12	X	X	X								
I-VDUP	201211090194DUP	water	DUP	11/07/12			X								
M-19MS	201211090200MS	water	MS	11/07/12	X										
M-19MSD	201211090200MSD	water	MSD	11/07/12	X										
M-73DUP	201211090204DUP	water	DUP	11/07/12			X								
M-80DUP	201211090205DUP	water	DUP	11/07/12			X								
M-83DUP	201211090207DUP	water	DUP	11/07/12			X								
M-70MS	201211090208MS	water	MS	11/07/12		X									
M-70MSD	201211090208MSD	water	MSD	11/07/12		X									
EB-2MS	201211090212MS	water	MS	11/07/12	X										
EB-2MSD	201211090212MSD	water	MSD	11/07/12	X										

Shaded cells indicate sample underwent Stage 4

EB = Equipment Blank, FB = Field Blank, FD = Field Duplicate

DUP = Laboratory Duplicate, MS = Matrix Spike, MSD = Matrix Spike Duplicate

SDG#: 414918

## VALIDATION SAMPLE TABLE

LDC#: 29044E

Project Name: 2012 Annual Remedial Performance Sampling

Parameters/Analytical Method

Client ID #	Lab ID #	Matrix	QC Type	Date Collected	Cr (6010)	CLO <sub>4</sub> (314.0)	TDS (160.1/2540C)	Cr(VI) (7196)							
M-14A	201211100213	water		11/08/12	X	X	X								
M-38	201211100214	water		11/08/12	X	X	X								
M-36	201211100215	water		11/08/12	X	X	X	X							
M-31A	201211100216	water		11/08/12	X	X	X								
M-52	201211100217	water		11/08/12	X	X	X								
M-12A	201211100218	water	FD	11/08/12	X	X	X	X							
M-11	201211100219	water		11/08/12	X	X	X	X							
M-10	201211100220	water		11/08/12	X	X	X	X							
M-79	201211100221	water		11/08/12	X	X	X								
VD-2	201211100222	water	FD	11/08/12	X	X	X	X							
M-14ADUP	201211100213DUP	water	DUP	11/08/12			X								
M-38MS	201211100214MS	water	MS	11/08/12		X									
M-38MSD	201211100214MSD	water	MSD	11/08/12		X									
M-11MS	201211100219MS	water	MS	11/08/12	X										
M-11MSD	201211100219MSD	water	MSD	11/08/12	X										
M-10MS	201211100220MS	water	MS	11/08/12	X										
M-10MSD	201211100220MSD	water	MSD	11/08/12	X										

Shaded cells indicate sample underwent Stage 4

EB = Equipment Blank, FB = Field Blank, FD = Field Duplicate

DUP = Laboratory Duplicate, MS = Matrix Spike, MSD = Matrix Spike Duplicate

SDG#: 414973

**VALIDATION SAMPLE TABLE**

LDC#: 28996N

**Project Name:** 2012 Annual Remedial Performance Sampling

Parameters/Analytical Method

Client ID #	Lab ID #	Matrix	QC Type	Date Collected	Cr (200.7)	TDS (160.1/2540C)									
M-10	201211100402	water		11/08/12	X	X									

Shaded cells indicate sample underwent Stage 4

EB = Equipment Blank, FB = Field Blank, FD = Field Duplicate

DUP = Laboratory Duplicate, MS = Matrix Spike, MSD = Matrix Spike Duplicate

SDG#: 415755

## VALIDATION SAMPLE TABLE

LDC#: 29044F

Project Name: 2012 Annual Remedial Performance Sampling

Parameters/Analytical Method

Client ID #	Lab ID #	Matrix	QC Type	Date Collected	Cr (6010)	CLO <sub>4</sub> (314.0)	TDS (160.1/2540C)								
MW-K4	201211160091	water		11/14/12	X	X	X								
ARP-1	201211160092	water		11/14/12	X	X	X								
ARP-2A	201211160093	water		11/14/12	X	X	X								
ARP-3A	201211160094	water		11/14/12	X	X	X								
ARP-4A	201211160095	water		11/14/12	X	X	X								
ARP-5A	201211160096	water		11/14/12	X	X	X								
ARP-6B	201211160097	water		11/14/12	X	X	X								
ARP-7	201211160098	water		11/14/12	X	X	X								
PC-53	201211160099	water		11/14/12	X	X	X								
PC-103	201211160100	water		11/14/12	X	X	X								
MW-K5	201211160101	water		11/14/12	X	X	X								
PC-98R	201211160102	water		11/14/12	X	X	X								
PC-86	201211160103	water		11/13/12	X	X	X								
PC-90	201211160104	water		11/13/12	X	X	X								
PC-56	201211160105	water		11/13/12	X	X	X								
PC-58	201211160106	water		11/13/12	X	X	X								
PC-59	201211160107	water		11/13/12	X	X	X								
PC-60	201211160108	water		11/13/12	X	X	X								

Shaded cells indicate sample underwent Stage 4

EB = Equipment Blank, FB = Field Blank, FD = Field Duplicate

DUP = Laboratory Duplicate, MS = Matrix Spike, MSD = Matrix Spike Duplicate

SDG#: 415755

## VALIDATION SAMPLE TABLE

LDC#: 29044F

Project Name: 2012 Annual Remedial Performance Sampling

Parameters/Analytical Method

Client ID #	Lab ID #	Matrix	QC Type	Date Collected	Cr (6010)	CLO <sub>4</sub> (314.0)	TDS (160.1/2540C)								
PC-62	201211160109	water		11/13/12	X	X	X								
PC-68	201211160110	water		11/13/12	X	X	X								
PC-122	201211160111	water		11/14/12	X	X	X								
PC-91	201211160112	water		11/13/12	X	X	X								
PC-97	201211160113	water		11/13/12	X	X	X								
PC-18	201211160114	water		11/14/12	X	X	X								
PC-55	201211160115	water		11/14/12	X	X	X								
PC-101R	201211160116	water		11/14/12	X	X	X								
PC-92	201211160117	water		11/13/12	X	X	X								
PC-94	201211160118	water		11/13/12	X	X	X								
ART-7B	201211160119	water		11/14/12	X	X	X								
ARP-1MS	201211160092MS	water	MS	11/14/12		X									
ARP-1MSD	201211160092MSD	water	MSD	11/14/12		X									
PC-86MS	201211160103MS	water	MS	11/13/12		X									
PC-86MSD	201211160103MSD	water	MSD	11/13/12		X									
PC-86DUP	201211160103DUP	water	DUP	11/13/12			X								
PC-56MS	201211160105MS	water	MS	11/13/12	X	X									
PC-56MSD	201211160105MSD	water	MSD	11/13/12	X	X									

Shaded cells indicate sample underwent Stage 4

EB = Equipment Blank, FB = Field Blank, FD = Field Duplicate

DUP = Laboratory Duplicate, MS = Matrix Spike, MSD = Matrix Spike Duplicate

SDG#: 415755

**VALIDATION SAMPLE TABLE**

LDC#: 29044F

**Project Name:** 2012 Annual Remedial Performance Sampling

Parameters/Analytical Method

Client ID #	Lab ID #	Matrix	QC Type	Date Collected	Cr (6010)	CLO <sub>4</sub> (314.0)	TDS (160.1/2540C)								
PC-68DUP	201211160110DUP	water	DUP	11/13/12			X								
PC-122MS	201211160111MS	water	MS	11/14/12	X										
PC-122MSD	201211160111MSD	water	MSD	11/14/12	X										

Shaded cells indicate sample underwent Stage 4

EB = Equipment Blank, FB = Field Blank, FD = Field Duplicate

DUP = Laboratory Duplicate, MS = Matrix Spike, MSD = Matrix Spike Duplicate



SDG#: 416332

**VALIDATION SAMPLE TABLE**

LDC#: 289960

**Project Name:** 2012 Annual Remedial Performance Sampling

Parameters/Analytical Method

Client ID #	Lab ID #	Matrix	QC Type	Date Collected	Cr(VI) (7196)										
M-44	201211210428	water		11/20/12	X										

Shaded cells indicate sample underwent Stage 4

EB = Equipment Blank, FB = Field Blank, FD = Field Duplicate

DUP = Laboratory Duplicate, MS = Matrix Spike, MSD = Matrix Spike Duplicate

SDG#: 417707

## VALIDATION SAMPLE TABLE

LDC#: 29044G

Project Name: 2012 Annual Remedial Performance Sampling

Parameters/Analytical Method

Client ID #	Lab ID #	Matrix	QC Type	Date Collected	CLO <sub>4</sub> (314.0)	TDS (160.1/2540C)									
ART-1	201212070008	water		12/04/12	X	X									
ART-2	201212070009	water		12/04/12	X	X									
ART-3	201212070010	water		12/04/12	X	X									
ART-4	201212070011	water		12/04/12	X	X									
ART-6	201212070012	water		12/04/12	X	X									
ART-7	201212070013	water		12/04/12	X	X									
ART-8	201212070014	water		12/04/12	X	X									
PC-99R2/R3	201212070015	water		12/04/12	X	X									
PC-115R	201212070016	water		12/04/12	X	X									
PC-116R	201212070017	water		12/04/12	X	X									
SF-1	201212070018	water		12/04/12	X	X									
PC-117	201212070019	water		12/04/12	X	X									
PC-118	201212070020	water		12/04/12	X	X									
PC-119	201212070021	water		12/04/12	X	X									
PC-120	201212070022	water		12/04/12	X	X									
PC-121	201212070023	water		12/04/12	X	X									
PC-133	201212070024	water		12/04/12	X	X									
ART-9	201212070025	water		12/04/12	X	X									

Shaded cells indicate sample underwent Stage 4

EB = Equipment Blank, FB = Field Blank, FD = Field Duplicate

DUP = Laboratory Duplicate, MS = Matrix Spike, MSD = Matrix Spike Duplicate

SDG#: 417933

## VALIDATION SAMPLE TABLE

LDC#: 29044H

Project Name: 2012 Annual Remedial Performance Sampling

Parameters/Analytical Method

Client ID #	Lab ID #	Matrix	QC Type	Date Collected	CLO <sub>4</sub> (314.0)	TDS (160.1/2540C)									
MW-K4	201212080200	water		12/06/12	X	X									
ARP-1	201212080201	water		12/06/12	X	X									
ARP-2A	201212080202	water		12/06/12	X	X									
ARP-3A	201212080203	water		12/06/12	X	X									
ARP-4A	201212080204	water		12/06/12	X	X									
ARP-5A	201212080205	water		12/06/12	X	X									
ARP-6B	201212080206	water		12/06/12	X	X									
ARP-7	201212080207	water		12/06/12	X	X									
PC-53	201212080208	water		12/06/12	X	X									
PC-103	201212080209	water		12/06/12	X	X									
MW-K5	201212080210	water		12/06/12	X	X									
M-83	201212080211	water		12/06/12	X	X									
PC-98R	201212080212	water		12/06/12	X	X									
PC-86	201212080213	water		12/05/12	X	X									
PC-90	201212080214	water		12/05/12	X	X									
PC-68	201212080215	water		12/05/12	X	X									
PC-122	201212080216	water		12/06/12	X	X									
PC-91	201212080217	water		12/05/12	X	X									

Shaded cells indicate sample underwent Stage 4

EB = Equipment Blank, FB = Field Blank, FD = Field Duplicate

DUP = Laboratory Duplicate, MS = Matrix Spike, MSD = Matrix Spike Duplicate

SDG#: 417933

## VALIDATION SAMPLE TABLE

LDC#: 29044H

Project Name: 2012 Annual Remedial Performance Sampling

Parameters/Analytical Method

Client ID #	Lab ID #	Matrix	QC Type	Date Collected	CLO <sub>4</sub> (314.0)	TDS (160.1/ 2540C)									
PC-97	201212080218	water		12/05/12	X	X									
PC-18	201212080219	water		12/05/12	X	X									
PC-55	201212080220	water		12/05/12	X	X									
PC-101R	201212080221	water		12/06/12	X	X									
PC-53MS	201212080208MS	water	MS	12/06/12	X										
PC-53MSD	201212080208MSD	water	MSD	12/06/12	X										
M-83DUP	201212080211DUP	water	DUP	12/06/12		X									
PC-68DUP	201212080215DUP	water	DUP	12/05/12		X									

Shaded cells indicate sample underwent Stage 4

EB = Equipment Blank, FB = Field Blank, FD = Field Duplicate

DUP = Laboratory Duplicate, MS = Matrix Spike, MSD = Matrix Spike Duplicate

TABLE II

**Table II. Qualification Codes and Definitions**

<b>Reason Code</b>	<b>Explanation</b>
a	qualified due to low abundance ( radiochemical activity)
be	qualified due to equipment blank contamination
bf	qualified due to field blank contamination
bl	qualified due to lab blank contamination
bt	qualified due to trip blank contamination
bp	qualified due to pump blank contamination (wells w/o dedicated pumps, when contamination is detected in the Pump Blk)
br	qualified due to filter blank contamination (aqueous Hexavalent Chromium and Dissolved sample fractions)
c	qualified due to calibration problems
cp	qualified due to insufficient ingrowth (radiochemical only)
dc	duel column confirmation %D exceeded
e	concentration exceeded the calibration range
fd	qualified due to field duplicate imprecision
h	qualified due to holding time exceedance
i	qualified due to internal standard areas
k	qualified as Estimated Maximum Possible Concentrations (dioxins and PCB congeners)
l	qualified due to LCS recoveries
ld	qualified due to lab duplicate imprecision (matrix duplicate, MSD, LCSD)
m	qualified due to matrix spike recoveries
nb	qualified due to negative lab blank contamination (nondetect results only)
nd	qualified due to non-detected target analyte
o	other
p	qualified as a false positive due to contamination during shipping
pH	sample preservation not within acceptance range
q	qualified due to quantitation problem
s	qualified due to surrogate recoveries
sd	serial dilution did not meet control criteria
sp	detected value reported >SQL <PQL
st	sample receipt temperature exceeded
t	qualified due to elevated helium tracer concentrations
vh	volatile headspace detected in aqueous sample containers submitted for VOC analysis
x	qualified due to low % solids
z	qualified due to ICS results

TABLE III

Table III. Overall Qualified Results

SDG	Client Sample ID	Sample Date	Method	Client Analyte ID	Analyte	Lab Result	Lab Qualifier	Units	Validator Qualifier	Reason Code	Reason Code Definition	Qualification Finding	
404682	M-44	08/06/12	EPA 314.0	14797-73-0	Perchlorate	750000		ug/l	J	fd	Field Duplicate	48	%
404682	VD-3	08/06/12	EPA 314.0	14797-73-0	Perchlorate	460000		ug/l	J	fd	Field Duplicate	48	%
414470	I-L	11/05/12	EPA 314.0	14797-73-0	Perchlorate	2000000		ug/l	J-	h	Holding Time	36	Days
405034	EB-1	08/08/12	7196	18540-29-9	Hexavalent chromium (Cr VI)		u	mg/l	R	h	Holding Time	63.75	Hours
405034	M-10	08/08/12	7196	18540-29-9	Hexavalent chromium (Cr VI)	0.015		mg/l	J-	h	Holding Time	58.25	Hours
405034	M-11	08/08/12	7196	18540-29-9	Hexavalent chromium (Cr VI)	2.5		mg/l	J-	h	Holding Time	59.75	Hours
405034	M-12A	08/08/12	7196	18540-29-9	Hexavalent chromium (Cr VI)	8.9		mg/l	J-	h	Holding Time	60.75	Hours
405034	M-37	08/08/12	7196	18540-29-9	Hexavalent chromium (Cr VI)	0.011		mg/l	J-	h	Holding Time	62.75	Hours
405034	VD-4	08/08/12	7196	18540-29-9	Hexavalent chromium (Cr VI)	8.9		mg/l	J-	h	Holding Time	60.75	Hours
405208	EB-2	08/09/12	7196	18540-29-9	Hexavalent chromium (Cr VI)		u	mg/l	R	h	Holding Time	8	Days
405208	M-36	08/09/12	7196	18540-29-9	Hexavalent chromium (Cr VI)	28		mg/l	J-	h	Holding Time	8	Days
414468	FB-1	11/05/12	7196	18540-29-9	Hexavalent chromium (Cr VI)		u	mg/l	UJ	h	Holding Time	31.5	Hours
414468	M-95	11/05/12	7196	18540-29-9	Hexavalent chromium (Cr VI)	0.73		mg/l	J-	h	Holding Time	32.5	Hours
414468	VD-1	11/05/12	7196	18540-29-9	Hexavalent chromium (Cr VI)	0.92		mg/l	J-	h	Holding Time	31.25	Hours
414625	EB-1	11/06/12	7196	18540-29-9	Hexavalent chromium (Cr VI)		u	mg/l	UJ	h	Holding Time	29.75	Hours
414625	M-37	11/06/12	7196	18540-29-9	Hexavalent chromium (Cr VI)	0.072		mg/l	J-	h	Holding Time	30.5	Hours
414768	EB-2	11/07/12	7196	18540-29-9	Hexavalent chromium (Cr VI)		u	mg/l	R	h	Holding Time	57.25	Hours
414918	M-10	11/08/12	7196	18540-29-9	Hexavalent chromium (Cr VI)	0.065		mg/l	J-	h	Holding Time	31.5	Hours
414918	M-11	11/08/12	7196	18540-29-9	Hexavalent chromium (Cr VI)	1.7		mg/l	J-	h	Holding Time	33	Hours
414918	M-12A	11/08/12	7196	18540-29-9	Hexavalent chromium (Cr VI)	8.5		mg/l	J-	h	Holding Time	33.75	Hours
414918	M-36	11/08/12	7196	18540-29-9	Hexavalent chromium (Cr VI)	28		mg/l	J-	h	Holding Time	35.5	Hours
414918	VD-2	11/08/12	7196	18540-29-9	Hexavalent chromium (Cr VI)	8.2		mg/l	J-	h	Holding Time	34	Hours
404682	FB-1	08/06/12	EPA 7196A	18540-29-9	Hexavalent chromium (Cr VI)		u	mg/l	R	h	Holding Time	50.5	Hours
404682	M-44	08/06/12	EPA 7196A	18540-29-9	Hexavalent chromium (Cr VI)	0.94		mg/l	J-	h	Holding Time	51	Hours
404682	VD-3	08/06/12	EPA 7196A	18540-29-9	Hexavalent chromium (Cr VI)	0.96		mg/l	J-	h	Holding Time	51	Hours



ATTACHMENT A

Metals Data Validation Report

## Chromium by EPA SW 846 Method 6010 and EPA Method 200.7

### I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

### II. ICPMS Tune

ICP-MS was not utilized in these SDGs.

### III. Calibration

An initial calibration was performed.

The frequency and analysis criteria of the initial calibration verification (ICV) and continuing calibration verification (CCV) were met for samples on which a Stage 4 review was performed.

Calibration data were not evaluated for the samples reviewed by Stage 2A criteria.

### IV. Blanks

Method blanks were reviewed for each matrix as applicable. No chromium was found in the initial, continuing and preparation blanks with the following exceptions:

SDG	Method Blank ID	Analyte	Maximum Concentration	Associated Samples
404947	ICB/CCB	Chromium	0.0003 mg/L	PC-135A PC-136 PC-148 PC-144 PC-149 PC-150 M-64 M-65 M-66

If blank contaminant values were less than the PQL and associated sample results were greater than the PQL, or if blank contaminant values were greater than the PQL and associated sample results were greater than 10 times the blank contaminant value, no sample data was qualified.

Samples EB-1 (from SDG 405034), EB-2 (from SDG 405208), EB-1 (from SDG 414625), and EB-2 (from SDG 414768) were identified as equipment blanks. No chromium was found with the following exceptions:

SDG	Blank ID	Sampling Date	Analyte	Concentration	Associated Samples
405208	EB-2	8/9/12	Chromium	0.0025 mg/L	M-19 M-22A M-36 M-38 M-67 M-74 M-73 M-83 M-80 M-81A M-70 M-71 M-72 M-14A

Samples FB-1 (from SDG 404682) and FB-1 (from SDG 414468) were identified as field blanks. No chromium was found.

If blank contaminant values were less than the PQL and associated sample results were greater than the PQL, or if blank contaminant values were greater than the PQL and associated sample results were greater than 10 times the blank contaminant value, no sample data was qualified.

#### V. ICP Interference Check Sample (ICS) Analysis

The frequency of analysis and criteria were met for samples on which a Stage 4 review was performed.

ICP Interference check sample analysis data were not evaluated for the samples reviewed by Stage 2A criteria.

#### VI. Matrix Spike Analysis

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

#### VII. Duplicate Sample Analysis

The laboratory has indicated that there were no duplicate (DUP) analyses specified for the samples in all SDGs, and therefore duplicate analyses were not performed.

### VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

### IX. Internal Standards (ICP-MS)

ICP-MS was not utilized in these SDGs.

### X. Furnace Atomic Absorption QC

Graphite furnace atomic absorption was not utilized in these SDGs.

### XI. ICP Serial Dilution

ICP serial dilution was not performed for these SDGs.

### XII. Sample Result Verification

All sample result verifications were acceptable for samples on which a Stage 4 review was performed. Raw data were not evaluated for the samples reviewed by Stage 2A criteria.

### XIII. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

### XIV. Field Duplicates

Samples M-23 and VD-1 and samples M-44 and VD-3 (from SDG 404682), samples M-12A and VD-4 and samples M-35 and VD-2 (from SDG 405034), samples M-44 and VD-1 and samples PC-72 and VD-3 (from SDG 414468), samples M-68 and VD-4 (from SDG 414768), and samples M-12A and VD-2 (from SDG 414918) were identified as field duplicates. No chromium was detected in any of the samples with the following exceptions:

SDG	Analyte	Concentration (mg/L)		RPD (Limits)	Difference (Limits)	Flags	A or P
		M-23	VD-1				
404682	Chromium	0.97	0.93	4 (≤30)	-	-	-

SDG	Analyte	Concentration (mg/L)		RPD (Limits)	Difference (Limits)	Flags	A or P
		M-44	VD-3				
404682	Chromium	0.50	0.54	8 (≤30)	-	-	-

SDG	Analyte	Concentration (mg/L)		RPD (Limits)	Difference (Limits)	Flags	A or P
		M-12A	VD-4				
405034	Chromium	8.6	8.7	1 (≤30)	-	-	-

SDG	Analyte	Concentration (mg/L)		RPD (Limits)	Difference (Limits)	Flags	A or P
		M-35	VD-2				
405034	Chromium	4.6	4.7	2 (≤30)	-	-	-

SDG	Analyte	Concentration (mg/L)		RPD (Limits)	Difference (Limits)	Flag	A or P
		M-44	VD-1				
414468	Chromium	0.91	0.91	0 (≤30)	-	-	-

SDG	Analyte	Concentration (mg/L)		RPD (Limits)	Difference (Limits)	Flag	A or P
		PC-72	VD-3				
414468	Chromium	0.19	0.20	5 (≤30)	-	-	-

SDG	Analyte	Concentration (mg/L)		RPD (Limits)	Difference (Limits)	Flag	A or P
		M-68	VD-4				
414768	Chromium	1.2	1.2	0 (≤30)	-	-	-

SDG	Analyte	Concentration (mg/L)		RPD (Limits)	Difference (Limits)	Flag	A or P
		M-12A	VD-2				
414918	Chromium	7.8	7.9	0 (≤30)	-	-	-

**2011 Annual Remedial Performance Sampling**

**Chromium - Data Qualification Summary - SDGs 404682, 404719,404737, 404790, 404947, 405034, 405048, 405208, 405883, 409004, 414468, 414469, 414470, 414625, 414768, 414918, 414973, and 415755**

No Sample Data Qualified in these SDGs

**2011 Annual Remedial Performance Sampling**

**Chromium - Laboratory Blank Data Qualification Summary - SDGs 404682, 404719, 404737, 404790, 404947, 405034, 405048, 405208, 405883, 409004, 414468, 414469, 414470, 414625, 414768, 414918, 414973, and 415755**

No Sample Data Qualified in these SDGs

**2011 Annual Remedial Performance Sampling**

**Chromium - Field Blank Data Qualification Summary – SDGs 404682, 404719,404737, 404790, 404947, 405034, 405048, 405208, 405883, 409004, 414468, 414469, 414470, 414625, 414768, 414918, 414973, and 415755**

No Sample Data Qualified in these SDGs

ATTACHMENT B

Wet Chemistry Data Validation Report

**Hexavalent Chromium by EPA SW 846 Method 7196**  
**Perchlorate by EPA Method 314.0**  
**Total Dissolved Solids by EPA Method 160.1 and Standard Method 2540C**

**I. Technical Holding Times**

All technical holding time requirements were met with the following exceptions:

SDG	Sample	Analyte	Total Time From Sample Collection Until Analysis	Required Holding Time From Sample Collection Until Analysis	Flag	A or P
404682	M-44 VD-3	Hexavalent chromium	51 hours	24 hours	J- (all detects) R (all non-detects)	P
404682	FB-1	Hexavalent chromium	50.5 hours	24 hours	J- (all detects) R (all non-detects)	P
405034	EB-1	Hexavalent chromium	63.75 hours	24 hours	J- (all detects) R (all non-detects)	P
405034	M-37	Hexavalent chromium	62.75 hours	24 hours	J- (all detects) R (all non-detects)	P
405034	M-11	Hexavalent chromium	59.75 hours	24 hours	J- (all detects) R (all non-detects)	P
405034	M-10	Hexavalent chromium	58.25 hours	24 hours	J- (all detects) R (all non-detects)	P
405034	VD-4 M-12A	Hexavalent chromium	60.75 hours	24 hours	J- (all detects) R (all non-detects)	P
405208	M-36 EB-2	Hexavalent chromium	8 days	24 hours	J- (all detects) R (all non-detects)	P
414468	FB-1	Hexavalent chromium	31.5 hours	24 hours	J- (all detects) UJ (all non-detects)	P
414468	M-95	Hexavalent chromium	32.5 hours	24 hours	J- (all detects) UJ (all non-detects)	P
414468	VD-1	Hexavalent chromium	31.25 hours	24 hours	J- (all detects) UJ (all non-detects)	P
414470	I-L	Perchlorate	36 days	28 days	J- (all detects) UJ (all non-detects)	P



SDG	Sample	Analyte	Total Time From Sample Collection Until Analysis	Required Holding Time From Sample Collection Until Analysis	Flag	A or P
414625	EB-1	Hexavalent chromium	29.75 hours	24 hours	J- (all detects) UJ (all non-detects)	P
414625	M-37	Hexavalent chromium	30.5 hours	24 hours	J- (all detects) UJ (all non-detects)	P
414768	EB-2	Hexavalent chromium	57.25 hours	24 hours	J- (all detects) R (all non-detects)	P
414918	M-36	Hexavalent chromium	35.5 hours	24 hours	J- (all detects) UJ (all non-detects)	P
414918	M-12A	Hexavalent chromium	33.75 hours	24 hours	J- (all detects) UJ (all non-detects)	P
414918	M-11	Hexavalent chromium	33.0 hours	24 hours	J- (all detects) UJ (all non-detects)	P
414918	M-10	Hexavalent chromium	31.5 hours	24 hours	J- (all detects) UJ (all non-detects)	P
414918	VD-2	Hexavalent chromium	34.0 hours	24 hours	J- (all detects) UJ (all non-detects)	P

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

## II. Initial Calibration

All criteria for the initial calibration of each method were met for samples on which a Stage 4 review was performed.

Initial calibration data were not evaluated for the samples reviewed by Stage 2A criteria.

## III. Calibration Verification

Calibration verification frequency and analysis criteria were met for samples on which a Stage 4 review was performed.

Calibration verification data were not evaluated for the samples reviewed by Stage 2A criteria.

#### IV. Blanks

Method blanks were reviewed for each matrix as applicable. No contaminant concentrations were found in the initial, continuing and preparation blanks.

Samples EB-1 (from SDG 405034), EB-2 (from SDG 405208), EB-1 (from SDG 414625), and EB-2 (from SDG 414768) were identified as equipment blanks. No contaminant concentrations were found with the following exceptions:

SDG	Equipment Blank ID	Sampling Date	Analyte	Concentration	Associated Samples
405034	EB-1	8/8/12	Perchlorate	2.9 ug/L	M-79 M-69 M-135 M-131 M57A M-25 M-37 I-V I-K I-J I-Z I-I M-31A M-12A M-11 M-10 M-35 M-68 VD-4 VD-2
405208	EB-2	8/9/12	Perchlorate Total dissolved solids	76 ug/L 20 mg/L	M-19 M-22A M-36 M-38 M-67 M-74 M-73 M-83 M-80 M-81A M-70 M-71 M-72 M-14A

SDG	Equipment Blank ID	Sampling Date	Analyte	Concentration	Associated Samples
414625	EB-1	11/6/12	Perchlorate	61 ug/L	M-23 M-64 M-65 M-66 M-69 M-135 M-131 M-57A M-37 M-25 PC-136 PC-144 PC-135A PC-148 PC-149 PC-150 M-97 M-79
414768	EB-2	11/7/12	Perchlorate	19 ug/L	I-V I-K I-J I-Z I-I M-35 M-19 M-68 M-67 M-74 M-73 M-80 M-81A M-83 M-70 M-71 M-72 VD-4 M-22A M-115

Samples FB-1 (from SDG 404682) and FB-1 (from SDG 414468) were identified as field blanks. No contaminant concentrations were found.

If blank contaminant values were less than the PQL and associated sample results were greater than the PQL, or if blank contaminant values were greater than the PQL and associated sample results were greater than 10 times the blank contaminant value, no sample data was qualified.

#### V. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

## VI. Duplicates

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable. Results were within QC limits.

## VII. Laboratory Control Samples

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

## VIII. Sample Result Verification

All sample result verifications were acceptable for samples on which a Stage 4 review was performed. Raw data were not evaluated for the samples reviewed by Stage 2A criteria.

## IX. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

## X. Field Duplicates

Samples M-44 and VD-3 and samples M-23 and VD-11 (from SDG 404682), samples M-12A and VD-4 and samples M-35 and VD-2 (from SDG 405034), samples M-44 and VD-1 and samples PC-72 and VD-3 (from SDG 414468), samples M-68 and VD-4 (from SDG 414768), and samples M-12A and VD-2 (from SDG 414918) were identified as field duplicates. No contaminant concentrations were detected in any of the samples with the following exceptions:

SDG	Analyte	Concentration		RPD (Limits)	Difference (Limits)	Flags	A or P
		M-44	VD-3				
404682	Perchlorate	750000 ug/L	460000 ug/L	48 (≤30)	-	J (all detects)	A
404682	Total dissolved solids	8400 mg/L	8400 mg/L	0 (≤30)	-	-	-
404682	Hexavalent chromium	0.94 mg/L	0.96 mg/L	2 (≤30)	-	-	-

SDG	Analyte	Concentration		RPD (Limits)	Difference (Limits)	Flags	A or P
		M-23	VD-1				

SDG	Analyte	Concentration		RPD (Limits)	Difference (Limits)	Flags	A or P
		M-23	VD-1				
404682	Perchlorate	310000 ug/L	310000 ug/L	0 ( $\leq 30$ )	-	-	-
404682	Total dissolved solids	4400 mg/L	4500 mg/L	2 ( $\leq 30$ )	-	-	-

SDG	Analyte	Concentration		RPD (Limits)	Difference (Limits)	Flags	A or P
		M-12A	VD-4				
405034	Perchlorate	170000 ug/L	180000 ug/L	6 ( $\leq 30$ )	-	-	-
405034	Total dissolved solids	6400 mg/L	6500 mg/L	2 ( $\leq 30$ )	-	-	-
405034	Hexavalent chromium	8.9 mg/L	8.9 mg/L	0 ( $\leq 30$ )	-	-	-

SDG	Analyte	Concentration		RPD (Limits)	Difference (Limits)	Flags	A or P
		M-35	VD-2				
405034	Perchlorate	180000 ug/L	190000 ug/L	5 ( $\leq 30$ )	-	-	-
405034	Total dissolved solids	4600 mg/L	4500 mg/L	2 ( $\leq 30$ )	-	-	-

SDG	Analyte	Concentration		RPD (Limits)	Difference (Limits)	Flags	A or P
		M-44	VD-1				
414468	Perchlorate	750000 ug/L	720000 ug/L	4 ( $\leq 30$ )	-	-	-
414468	Total dissolved solids	8500 mg/L	8400 mg/L	1 ( $\leq 30$ )	-	-	-

SDG	Analyte	Concentration		RPD (Limits)	Difference (Limits)	Flags	A or P
		PC-72	VD-3				
414468	Perchlorate	230000 ug/L	240000 ug/L	4 ( $\leq 30$ )	-	-	-
414468	Total dissolved solids	6700 mg/L	6800 mg/L	1 ( $\leq 30$ )	-	-	-

SDG	Analyte	Concentration		RPD (Limits)	Difference (Limits)	Flags	A or P
		M-68	VD-4				
414768	Perchlorate	120000 ug/L	120000 ug/L	0 ( $\leq 30$ )	-	-	-
414768	Total dissolved solids	6000 mg/L	5900 mg/L	2 ( $\leq 30$ )	-	-	-

SDG	Analyte	Concentration		RPD (Limits)	Difference (Limits)	Flags	A or P
		M-12A	VD-2				
414918	Perchlorate	170000 ug/L	170000 ug/L	0 ( $\leq 30$ )	-	-	-
414918	Total dissolved solids	6200 mg/L	6100 mg/L	2 ( $\leq 30$ )	-	-	-
414918	Hexavalent chromium	8.5 mg/L	8.2 mg/L	4 ( $\leq 30$ )	-	-	-

**2012 Annual Remedial Performance Sampling**

**Wet Chemistry - Data Qualification Summary - SDGs 401431, 402355, 404682, 404719, 404737, 404790, 404947, 405034, 405048, 405208, 405883, 408121, 409004, 411090, 412098, 414468, 414469, 414470, 414625, 414768, 414918, 414973, 415755, 416332, 417707, 417933**

SDG	Sample	Analyte	Flag	A or P	Reason
404682 405034 405208 414768	M-44 VD-3 FB-1 EB-1 M-37 M-11 M-10 VD-4 M-12A M-36 EB-2 EB-2	Hexavalent chromium	J- (all detects) R (all non-detects)	P	Technical holding times
414468 414625 414918	FB-1 M-95 VD-1 EB-1 M-37 M-36 M-12A M-11 M-10 VD-2	Hexavalent chromium	J- (all detects) UJ (all non-detects)	P	Technical holding times
414470	I-L	Perchlorate	J- (all detects) UJ (all non-detects)	P	Technical holding times
404682	M-44 VD-3	Perchlorate	J (all detects)	A	Field duplicates (RPD)

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