APPENDIX E
DATA REVIEW MEMORANDA

Prepared for:
Tronox LLC
Henderson, Nevada

Data Validation Summary Report

ENSR Corporation
February 2007

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Prepared for:
Tronox LLC
Henderson, Nevada

Data Validation Summary Report

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1.0 INTRODUCTION

The purpose of limited data validation for the Semi-Annual Performance Report for Chromium and Perchlorate laboratory results was to determine the suitability of the data for future on-site environmental assessments.

MWH Laboratories in Monrovia, California was the lab contracted by Tronox for the Semi-Annual Performance Report for Chromium and Perchlorate chemical analyses. MWH performed the analysis of selected parameters in groundwater samples as a part of Tronox's routine monitoring at the Henderson site.

The specific analyses performed by the laboratory and reviewed in this report are restricted to total chromium, hexavalent chromium, and perchlorate.

2.0 DATA VALIDATION PROCESS

The laboratory results for the Semi-Annual Performance Report for Chromium and Perchlorate were subjected to thorough data review rather than formal full data validation as recommended in the guidance on data validation provided by NDEP for the BMI Plant Sites (NDEP, 2006). MWH did not provide complete data packages with raw data for the reviewed results and therefore, verification of the initial and continuing calibrations and other elements in the Tier 2 list beyond batch QC were not available for review. The laboratory did submit sample and batch QC results with narratives in pdf format and EQuIS format electronic data deliverables (EDDs). The EDDs were imported into an EQuIS database at Tronox specifically created for the ongoing monitoring at the Henderson site. ENSR performed a limited validation on the data using the hard copy data package and subsequently entered the qualifiers into the database.

Limited validation consisted of reviewing the following data elements to the level of summary data forms.

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Laboratory blanks/equipment blanks/ field blanks
- Laboratory control sample (LCS)/ laboratory control sample duplicate (LCSD) results
- Matrix spike/matrix spike duplicate (MS/MSD) results
- Laboratory duplicate results
- Field duplicate results
- Quantitation limits and sample results

Analytical data were evaluated with reference to the National Functional Guidelines (EPA, 1999 and 2004) and other method appropriate validation guidance documents, as well as the Region 9 Superfund Data

Evaluation/Validation Guidance (EPA, 2001), the above mentioned NDEP Guidance on Data Validation (NDEP, 2006), the quality control (QC) criteria provided by the laboratory. The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodologies. The specific guidelines used for the various methods were as follows:

- Inorganic analytical data were evaluated with reference to "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review" (EPA, 2004)

In general, the validation qualifiers and definitions employed were based on those used by EPA in the document mentioned above. Validation qualifiers and definitions are listed in **Table E-1**. A reason code was assigned to all the applications of validation qualifiers for this project. The reason codes and their explanations are listed in **Table E-2**. These codes were entered in the project database for each application of a validation qualifier that changed a lab qualifier or result value to indicate the primary reason(s) for data qualification. Conversions of the laboratory reported “ND” for not detected to the U qualifier in the database and the laboratory-applied “J” qualifier to indicate results less than the reporting limit but greater than the method detection limit are not further discussed in this report.

Data validation was organized by MWH Laboratory Report which is also identified as the SDG (Sample Data Group) in the tables. For four groups of SDGs, a combined data validation memorandum was written by a data validator and reviewed by a peer at ENSR’s Westford office. These memoranda are included on CD-ROM as pdf documents and include lists of the data reviewed by the laboratory SDGs listed in Appendix A of each memo**.**

3.0 DATA VALIDATION RESULTS

The data validation qualifiers and reason codes were used to select all the data in the database where results were qualified as a result of validation. This information was sorted by the quality control (QC) review elements listed below:

- Holding times and sample preservation
- Laboratory blanks/equipment blanks/ field blanks
- Laboratory control sample (LCS)/ laboratory control sample duplicate (LCSD) results
- Matrix spike/matrix spike duplicate (MS/MSD) results
- Laboratory duplicate results
- Field duplicate results
- Quantitation limits and sample results
- Calculation and transcription verifications

Tables E-3 lists all the results, including rejected data points which were qualified based on quality control issues identified with regard to holding times, matrix spike results, calibration/quantitation. No QC issues were identified that resulted in qualification of results based on blanks, LCS/LCSD results, lab duplicate results, or field duplicate results. Reason codes, Data Quality Indicators (DQI), and the nonconforming DQI results are listed in the table as requested by NDEP.

3.1 Holding Times and Sample Preservation

Holding times were derived from the EPA methods utilized and were calculated beginning from the time of sample collection. The majority of analyses were performed within the method-specified holding times. Exceptions are listed in **Table E-3** and summarized in the validation memos. The DQI result value in Table E-3 is the time elapsed between sample collection and analysis. The holding time for hexavalent chromium in water is 24 hours from collection to analysis. The holding time for perchlorate in water is 28 days from collection to analysis. No data were rejected on the basis of holding time exceedances but some results were qualified as estimated.

No data required qualification on the basis of sample preservation issues.

3.2 Blank Contamination

In general, laboratory and field blanks were free of contamination. No data required qualification due to blank contamination.

3.3 Laboratory Control Samples

LCS and LCSD recoveries met QC acceptance criteria for all of the analyses reviewed

3.4 Matrix Spike Samples

MS and MSD recoveries met the QC acceptance criteria for the majority of analyses. **Table E3** lists the sample results qualified based on MS or MSD recoveries which were outside the laboratory acceptance criteria. The DQI result value for MS/MSD data is in percent recovery (%R) units. Results associated with total chromium spike recoveries less than 30% were qualified as estimated (J-) if positive and rejected (R) if not detected in the associated samples. A single low MS/MSD recovery result pair for total chromium in the ground water sample from well I-F resulted in the qualification as estimated and possibly biased low (J-) results for all the associated samples analyzed in that batch. The single non-detect result in well I-AR for chromium was rejected as unusable due to the association with the low recoveries in the matrix spike and matrix spike duplicate of well I-F.

3.5 Laboratory Duplicates

The evaluation of laboratory duplicate precision included an assessment of the agreement between LCS and LCSDs, MS and MSDs, and matrix duplicates, as measured through relative percent difference (RPD). None of the results required qualified during validation based on laboratory duplicate precision.

3.6 Field Duplicates

The results of the 10 groundwater sample duplicate pairs collected during the Semiannual Report period were evaluated during validation. RPDs were compared to the objectives of 30% maximum RPD for aqueous samples. No results were qualified during validation based on field duplicate precision nonconformances.

3.7 Quantitation / Calibration

Table E-3 lists the single result that was qualified during validation based on calibration related quantitation issues. This was based on a marginal exceedance of the matrix conductivity threshold (MCT) for a diluted sample used for perchlorate analysis.

3.8 Rejected Results

Table E-3 lists a single sample data point that was rejected and is considered unusable due to poor matrix spike recoveries. See Section 3.4 above for a discussion of this rejection. Rejected results values were removed from the database; hence the result column appears empty. The reason this result was rejected is indicated in the reason code and discussed in the validation memo.

4.0 EVALUATION OF DATA QUALITY INDICATORS

Data validation information was used to evaluate the data quality indicators (DQI) of precision, accuracy, representativeness, comparability, completeness, and sensitivity for results in the dataset for the Henderson Semi-Annual Performance Report for Chromium and Perchlorate. Each of these DQI parameters is discussed in sections below.

4.1 Precision

Precision is the measure of agreement among repeated measurements of the same property under identical or substantially similar conditions. Field precision was assessed through the collection and

measurement of field duplicates and expressed as the RPD of the sample and field duplicate pair results. In general the field duplicate precision was acceptable for all analytes reported.

Laboratory precision was assessed through the RPD results for matrix duplicates, LSC/LCSD pairs, and MS/MSD pairs. No nonconformances which resulted in the application of validation qualifiers were discovered. In general, the laboratory duplicate precision was acceptable.

4.2 Accuracy

Accuracy is the degree of agreement between an observed value and an accepted reference or true value. Laboratory accuracy was assessed during the validation using the recoveries of positive control samples (i.e., MS and MSD, LCS and LCSD, and surrogate spikes). The spike recoveries which resulted in the application of validation qualifiers are discussed in Sections 3.3 and 3.4 of this report and listed in Table E-3. In general the laboratory accuracy was acceptable. The only exception was a total chromium MS/MSD pair with %Rs below 30%. All the associated MS/MSD results were qualified as estimated and biased low (J-) for detections and rejected for non-detects. This is discussed in the memo and listed in Table E-3. Accuracy is also indirectly addressed via the negative control samples for field activities (i.e. trip, equipment, and field blanks), as well as laboratory negative control samples (i.e., method blanks and calibration blanks). All negative control sample results were acceptable.

Bias as a component of accuracy is also evaluated with the validation of holding time and quantitation results discussed in Sections 3.1and 3.7 of this report. These evaluations resulted in the minor qualification of some results as described in the data validation memos.

4.3 Representativeness

Representativeness is the measure of the degree to which data suitably represent a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition. Aspects of representativeness addressed during validation include the review of sample collection information in the chain-of-custody (COC) documentation, conformity of laboratory analyses to workplan intentions, adherence of the documented laboratory procedures to method requirements, and completeness of the laboratory data packages. Most of the issues identified during this evaluation did not result in the qualification of laboratory data but did involve re-submittals of data from the laboratories to correct problems that were discovered during the validation process. All of these issues were resolved or were judged to have no impact on data validation. Other aspects of data representativeness such as adherence to recommended holding times and field and laboratory precision assessments are discussed in Sections 3.1, 3.3, 3.4, and 3.5 of this report.

4.4 Completeness

Completeness is a measure of the amount of valid data obtained from a measurement system, expressed as a percentage of the number of valid measurements that were or should have been collected. Valid data is defined as all the data points judged to be valid (i.e. not rejected), as a result of the validation process.

Field completeness is defined as the percentage of samples actually collected versus those intended to be collected in accordance with the plan for routine monitoring. All intended samples were collected in accordance with the monitoring schedule. All COC requests were faithfully executed by the laboratories with the minor exceptions discussed in the memos.

Laboratory completeness is defined as percentage of valid data points versus the total expected from the laboratory analyses. Actual laboratory completeness was 100% on the basis of sample analysis (i.e., all requested analyses were performed and reported by the laboratories), and 99.95% completeness based on valid data (0.05% of the data was rejected during data validation).

4.5 Comparability

Comparability is a qualitative expression of the measure of confidence that two or more data sets may contribute to a common analysis. Comparability of data within the investigation was maximized by using standard methods for sampling and analysis, reporting data, and data validation. Standard water/wastewater program methods from EPA were employed by the MWH laboratory for all analyses .

4.6 Sensitivity

Sensitivity is the capability of a method or instrument to discriminate between measurement responses representing different levels of the variable of interest and particularly the capability of measuring a constituent at low levels. For the EPA methods employed in this project sensitivity is measured by the method detection limit (MDL) and reporting limit (RL). Reporting limits in general were sample quantitation limits based on the low point of calibration and adjusted for sample-specific factors such as exact aliquot size, dilutions, etc. In general, the MWH reporting limits were based on MDLs, therefore no estimated values between the MDL and RL (laboratory J qualified) were provided. Sensitivity of the methods employed was adequate for the routine monitoring needs and consistent with the historical data for the site

5.0 CONCLUSIONS

One hundred percent of the laboratory data for the Semi-Annual Performance Report for Chromium and Perchlorate were subjected to a limited validation using standardized guidelines and procedures recommended by EPA and NDEP. Ninety eight percent of the results for this project were accepted as

reported by the laboratory without additional qualification based on validation actions and should be considered valid for all decision making purposes. A subset of the laboratory results were qualified based on issues discovered during the validation and those results are summarized in Tables E-3. The qualified data are grouped in this table based on the reason for qualification (see Table E-2), the Data Quality Indicator (DQI) involved, and the qualifier flags applied (see Table E-1). Two percent of the results for this project were qualified as estimated due to minor QC problems with precision, accuracy, and representativeness. These estimated results should be considered usable for decision making purposes provided the potential bias is considered when the data are used. A single result, only 0.05% of the total results, was rejected as unusable due to more serious QC problems involving spike recoveries. This rejected result should not be used for decision making purposes. Details of the rejected results are discussed in Section 3.4 and 3.8 of this report. The overall impact of these rejected results on the usefulness of the project data is negligible. Based on the results of data validation the overall goals for data quality were achieved for the dataset used in the Semi-Annual Performance Report for Chromium and Perchlorate report.

6.0 REFERENCES

EPA, 1999 USEPA “Contract Laboratory Program National Functional Guidelines for Organic Data Review”

EPA, 2001 USEPA “Draft Region 9 Superfund Data Evaluation/Validation Guidance”

EPA, 2004 USEPA “Contract Laboratory Program National Functional Guidelines for Inorganic Data Review”

EPA, 2005 USEPA Analytical Services Branch (ASB) “National Functional Guidelines for Chlorinated Dibenzo-p-Dioxins (CDDs) and Chlorinated Dibenzofurans (CDFs) Data Review”

ENSR, February 2006 Upgradient Investigation Workplan Addendum, Tronox Facility, Henderson, Nevada

ENSR, August 2006 DRAFT Quality Assurance Project Plan, Tronox LLC Facility Henderson, Nevada

DOE, 1997 Department of Energy “Evaluation of Radiochemical Data Usability”

NDEP, 2006 NDEP “Guidance on Data Validation, BMI Pant Sites and Common Areas Projects, Henderson, Nevada”

NUREG, 2004 USEPA, Department of Energy, Department of Defense, Department of Homeland Security, Nuclear Regulatory Commission, National Institute of Standards and Technology, US Geological Survey, Food and Drug Administration “ Multi-Agency Radiological Laboratory Analytical Protocols Manual (MARLAP)”

Table E-1
Data Validation Qualifiers
Semi-Annual Performance Report for Chromium and Perchlorate , Tronox Facility, Henderson, Nevada

Validation Qualifier	Definition
J	The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
J+	The result is an estimated quantity and the result may be biased high. This qualifier is applied only to inorganic analyte results.
J-	The result is an estimated quantity and the result may be biased low. This qualifier is applied only to inorganic analyte results.
UJ	The analyte was not detected above the sample reporting limit and the reporting limit is approximate.
U	The analyte was analyzed for, but was not detected above the sample reporting limit
R	The result is rejected and unusable due to serious data deficiencies. The presence or absence of the analyte cannot be verified.
B	The result may be a false positive totally attributable to blank contamination. This qualifier is applied only to radiochemical results.
JB	The result may be biased high and partially attributable to blank contamination. This qualifier is applied only to radiochemical results.
Z	The result is a probable false positive due to cross-contamination during shipping.

Note:

See Table E-2 for reason code definitions

Table E-2
Data Validation Qualifier Reason Codes
Semi-Annual Performance Report for Chromium and Perchlorate , Tronox Facility, Henderson, Nevada

Code	Explanation
j-b	estimated due to blank contamination
j-bl	estimated due to lab blank contamination
j-be	estimated due to equipment blank contamination
j-d	estimated due to lab duplicate imprecision (matrix duplicate, MSD, LCSD)
j-f	estimated due to field duplicate imprecision
j-s	estimated due to surrogate recoveries
j-m	estimated due to matrix spike recoveries
j-h	estimated due to holding time exceedance
j-l	estimated due to LCS recoveries
j-c	estimated due to calibration problems
j-x	estimated due to low % solids
j-y	estimated due to serial dilution results
j-i	estimated due to internal standard areas
j-z	estimated due to ICS results
j-r	estimated due to quantitation problem
u-be	negated due to equipment blank contamination
u-bl	negated due to lab blank contamination
u-q	nondetected level changed due to quantitation problem
uj-a	estimated nondetect due to low abundance (radiochemical activity)
uj-b	estimated nondetect due to negative blank contamination (nondetect results only)
uj-bl	estimated nondetect due to negative lab blank contamination (nondetect results only)
uj-be	estimated nondetect due to negative equipment blank contamination (nondetect results only)
uj-cp	estimated nondetect due to insufficient ingrowth (radiochemical only)
uj-d	estimated nondetect due to lab duplicate imprecision (matrix duplicate, MSD, LCSD)
uj-f	estimated nondetect due to field duplicate imprecision
uj-s	estimated nondetect due to surrogate recoveries
uj-m	estimated nondetect due to matrix spike recoveries
uj-h	estimated nondetect due to holding time exceedance
uj-l	estimated nondetect due to LCS recoveries
uj-c	estimated nondetect due to calibration issues
uj-x	estimated nondetect due to low % solids
uj-z	estimated nondetect due to ICS results
uj-i	estimated nondetect due to internal standard areas
uj-q	estimated nondetect level changed due to quantitation problem
r-s	rejected due to surrogate recoveries
r-m	rejected due to matrix spike recoveries
r-h	rejected due to holding time exceedance
r-l	rejected due to LCS recoveries
r-c	rejected due to calibration
r-p	rejected as a false positive due to contamination during shipping
z-p	qualified as a probable false positive due to contamination during shipping

Table E-3
Qualifications Based on DQI Exceedances
Semi-Annual Performance Report , Tronox Facility- Henderson, Nevada

Sample ID	SDG	Method	Analyte	Result	Units	Validation Qualifier	Reason Code	DQI	DQI Result
EB-1_08/01/06	180373	SW 846 7196	Chromium-(VI)	0.005	mg/l	UJ	uj-h	Holding time	30.5 hours
EB-1_10/31/06	187864	SW 846 7196	Chromium-(VI)	0.005	mg/l	UJ	uj-h	Holding time	29 hrs
EB-2_08/03/06	180613	SW 846 7196	Chromium-(VI)	0.005	mg/l	UJ	uj-h	Holding time	28 days
EB-2_11/01/06	188039	SW 846 7196	Chromium-(VI)	0.005	mg/l	UJ	uj-h	Holding time	27 hours
EFFLUENT-COMP_07/08/06	178430	EPA 314	Perchlorate	12	ug/l	J	j-c	Calibration	>MCT
EFFLUENT-COMP_08/19/06	184629	EPA 314	Perchlorate	10.000	ug/l	UJ	uj-h	Holding time	34 days
FB-1_07/31/06	180295	SW 846 7196	Chromium-(VI)	0.005	mg/l	UJ	uj-h	Holding time	35 hours
FB-1_10/30/06	187781	SW 846 7196	Chromium-(VI)	0.005	mg/l	UJ	uj-h	Holding time	24 .25 hours
I-AR_10/31/06	187864	SW 846 6010B	Chromium-total		mg/l	R	r-m	MS,MSD%R	17%,16%
I-B_10/31/06	187864	SW 846 6010B	Chromium-total	0.14	mg/l	J-	j-m	MS,MSD%R	17%,16%
I-C_10/31/06	187864	SW 846 6010B	Chromium-total	5.5	mg/l	J-	j-m	MS,MSD%R	17%,16%
I-D_10/31/06	187864	SW 846 6010B	Chromium-total	9.2	mg/l	J-	j-m	MS,MSD%R	17%,16%
I-E_10/31/06	187864	SW 846 6010B	Chromium-total	12	mg/l	J-	j-m	MS,MSD%R	17%,16%
I-F_10/31/06	187864	SW 846 6010B	Chromium-total	25	mg/l	J-	j-m	MS,MSD%R	17%,16%
I-L_10/31/06	187864	SW 846 6010B	Chromium-total	0.77	mg/l	J-	j-m	MS,MSD%R	17%,16%
I-M_10/31/06	187864	SW 846 6010B	Chromium-total	12	mg/l	J-	j-m	MS,MSD%R	17%,16%
I-N_10/31/06	187864	SW 846 6010B	Chromium-total	14	mg/l	J-	j-m	MS,MSD%R	17%,16%
INFLUENT_08/21/06	182001	EPA 314	Perchlorate	169000	ug/l	J	j-h	Holding time	29 days
I-Q_10/31/06	187864	SW 846 6010B	Chromium-total	32	mg/l	J-	j-m	MS,MSD%R	17%,16%
I-R_10/31/06	187864	SW 846 6010B	Chromium-total	0.55	mg/l	J-	j-m	MS,MSD%R	17%,16%
I-S_10/31/06	187864	SW 846 6010B	Chromium-total	1.6	mg/l	J-	j-m	MS,MSD%R	17%,16%
M-10_08/02/06	180449	SW 846 7196	Chromium-(VI)	0.38	mg/l	J	j-h	Holding time	29 hours
M-10_10/31/06	187868	SW 846 7196	Chromium-(VI)	0.32	mg/l	J	j-h	Holding time	29 hours
M-100_08/03/06	180613	SW 846 7196	Chromium-(VI)	0.32	mg/l	J	j-h	Holding time	29 hours
M-100_11/02/06	188099	SW 846 7196	Chromium-(VI)	0.01	mg/l	UJ	uj-h	Holding time	29 hours
M-11_08/02/06	180449	SW 846 7196	Chromium-(VI)	2.4	mg/l	J	j-h	Holding time	29 hours
M-11_10/31/06	187864	SW 846 7196	Chromium-(VI)	2.8	mg/l	J	j-h	Holding time	29 hours
M-12A_08/02/06	180449	SW 846 7196	Chromium-(VI)	13	mg/l	J	j-h	Holding time	32 hours
M-12A_11/01/06	188039	SW 846 7196	Chromium-(VI)	13	mg/l	J	j-h	Holding time	27 hours
M-22A_08/04/06	180635	EPA 314	Perchlorate	2000000	ug/l	J	j-h	Holding time	46 days
M-36_08/03/06	180613	SW 846 7196	Chromium-(VI)	39	mg/l	J	j-h	Holding time	25 hours
M-36_11/02/06	188099	SW 846 7196	Chromium-(VI)	39	mg/l	J	j-h	Holding time	25 hours
M-37_08/01/06	180373	SW 846 7196	Chromium-(VI)	0.06	mg/l	J	j-h	Holding time	32 hours
M-37_11/02/06	188099	SW 846 7196	Chromium-(VI)	0.025	mg/l	UJ	uj-h	Holding time	24.5 hours

Table E-3
Qualifications Based on DQI Exceedances
Semi-Annual Performance Report , Tronox Facility- Henderson, Nevada

Sample ID	SDG	Method	Analyte	Result	Units	Validation Qualifier	Reason Code	DQI	DQI Result
M-44_07/31/06	180295	SW 846 7196	Chromium-(VI)	1.0	mg/l	J	j-h	Holding time	33 hours
M-84_08/03/06	180613	SW 846 7196	Chromium-(VI)	0.022	mg/l	J	j-h	Holding time	28.5 hours
M-84_11/02/06	188099	SW 846 7196	Chromium-(VI)	0.017	mg/l	J	j-h	Holding time	25 hours
MD-1_11/02/06	188099	SW 846 7196	Chromium-(VI)	0.31	mg/l	J	j-h	Holding time	25 hours
MD-2_07/31/06	180295	SW 846 7196	Chromium-(VI)	1.2	mg/l	J	j-h	Holding time	33 hours
MD-2_11/02/06	188099	SW 846 7196	Chromium-(VI)	0.019	mg/l	J	j-h	Holding time	24.5 hours
MD-4_08/03/06	180613	EPA 314	Perchlorate	664000	ug/l	J	j-h	Holding time	78 days
MD-5_08/03/06	180613	SW 846 7196	Chromium-(VI)	0.022	mg/l	J	j-h	Holding time	27 hours

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Memorandum

Date:	December 26, 2006	
To:	Sally Bilodeau/Camarillo	
From:	Sheena Blair and Sharon Mc Kechnie/Westford	
Subject:	Data Review Routine Monitoring Program 3rd Quarter 2006 Tronox LLC Henderson, Nevada	
Distribution:	Robert Kennedy/Westford	04020-023-110 TH3rdqtr

SUMMARY

A limited review was performed on the data for raw groundwater samples, raw surface water samples, two equipment blanks, and a field blank analyzed for all or a subset of the following parameters:

- Perchlorate by EPA Method 314,
- Hexavalent chromium by SW-846 Method 7196
- Total chromium by SW846 6010B or EPA 200.7

The samples were collected at the Tronox LLC site in Henderson, Nevada from June 5 through August 10, 2006 and submitted to MWH Laboratories in Monrovia, CA for analysis. The MWH project numbers, sample collection dates and analyses included in this review are summarized in Appendix A at the end of this memo. The data reports provided by MWH did not support a validation at the Tier 2 level as requested by NDEP. All provided QC elements submitted by MWH were reviewed and results of that review are summarized below.

The sample results were assessed according to the "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review" (October 2004), the Region 9 Superfund Data Evaluation/Validation Guidance, NDEP guidance (May 2006), and by the laboratory quality control (QC) criteria. The validation guidelines were modified to accommodate the non-CLP methodologies.

The data reviewed required minor qualification for selected samples and were considered generally acceptable for decision making. No major problems were identified and no data were rejected.

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REVIEW ELEMENTS

The elements selected for review are based on the documentation provided in the laboratory data reports. Sample data were reviewed for the following elements:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Method blanks/equipment blanks/field blanks
- Laboratory control sample/laboratory control sample duplicate (LCS/LCSD) results
- Matrix spike/matrix spike duplicate (MS/MSD) results
- Laboratory duplicate results
- Field duplicate results
- Sample results/detection limits

DISCUSSION

Agreement of Analyses Conducted with COC Requests

Sample reports were checked to verify that the results reported corresponded to analytical requests as detailed on the chain of custody (COC) documentation. The following discrepancy was noted.

- **Report number 180295**: Sample M-96 was incorrectly identified on the sample container as M-94. The client was notified about this discrepancy and the sample ID was changed by the laboratory to reflect the correct ID. It was determined that no sample was collected for site location M-94 and that a sample from this location was scheduled to be collected at a later date. No validation action was required other than this notation.

The following issues were also noted:

- At the time of sampling the field personnel made a notation on the pre-printed COC if any of the samples listed were not collected. In general these samples were not collected due to dry wells or low volume.

- In many cases where more than one COC was submitted with the samples the laboratory did not sign each individual chain in the “Received by” box. The laboratory was notified of this omission and requested to sign each chain received upon receipt of the samples.

Holding Times and Sample Preservation

Method-specified holding times were met for all samples analyzed except for the following:

- **Report number 180295**: The hexavalent chromium analyses for samples M-44, MD-2 and FB-1 were performed a few hours outside of the method specified holding time of 24 hours. Detected and nondetect results for samples M-44, MD-2 and FB-1were therefore qualified as estimated (J and UJ, respectively).

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- **Report number 180373R**: The hexavalent chromium analyses for samples M-37 and EB-1 were performed a few hours outside of the method specified holding time of 24 hours. Detected and nondetect results for samples M-37 and EB-1 were therefore qualified as estimated (J and UJ, respectively).

- **Report number 180449R:** The hexavalent chromium analyses for samples M-10, M-11 and M-12A were performed a few hours outside of the method specified holding time of 24 hours. Detected and nondetect results for samples M-10, M-11 and M-12A were therefore qualified as estimated (J and UJ, respectively).

- **Report number 180613:** The hexavalent chromium analyses for samples M-100, M-84, M-36 MD-5 and EB-2 were performed a few hours outside of the method specified holding time of 24 hours. Detected and nondetect results for samples M-100, M-84, M-36 MD-5 and EB-2 were therefore qualified as estimated (J and UJ, respectively).

- **Report numbers 180613:** The reanalysis of field duplicate sample MD-4 for perchlorate was performed outside twice the accepted holding time of 28 days. This detected field duplicate result was therefore qualified (J) as an estimated value.

- **Report number 180635R:** Although the initial perchlorate analysis for sample M-22A was performed within the method specified holding time, the reanalysis at a higher dilution factor was performed outside the method specified holding time of 28 days. The detected result for M-22A was therefore qualified as estimated (J).

The cooler temperatures upon receipt at the laboratory met the acceptable range of $4 \pm 2^{o}C$.

Documentation regarding sample pH verification upon receipt at the laboratory for total chromium was not included in the data package. No action was taken except for this notation.

Method Blanks/Equipment Blanks/Field Blanks

Field blank FB-1(collected July 7, 2006), equipment blank EB-1 (collected August 1, 2006), and equipment blank EB-2 (collected November 1, 2006), were reviewed in association with the samples collected during the 3rd Quarter 2006

Perchlorate, total chromium and hexavalent chromium were not detected in any of the method blanks field blank FB-1 or equipment blank EB-1.

Perchlorate was detected in equipment blank sample EB-2 at 6.7 μg/L. The perchlorate results all associated samples were significantly greater than the reporting limits and the concentration detected in equipment blank EB-2. It was considered that the low level of blank contamination present would have no impact on the perchlorate results; therefore no validation action was taken on this basis.

LCS/LCSD Results

The percent recoveries (%R) and relative percent differences (RPDs) of the LCSs/LCSDs for perchlorate, total chromium and hexavalent chromium met the laboratory acceptance criteria.

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MS/MSD Results

The %Rs and RPDs of the MS/MSDs for all client specific samples met the laboratory acceptance criteria.

In most cases the batch MS/MSD analyses were performed on samples from other clients, and although this practice is acceptable, the results could not be directly applied to the samples reviewed in these data packages due to possible differences in the sample matrix and type. No validation action was taken on this basis.

Laboratory Duplicate Results

No laboratory duplicates were analyzed for perchlorate, total chromium and hexavalent chromium. Precision in the laboratory was demonstrated by the MS/MSD and/or the LCS/LCSD analyses (see discussions above).

Field Duplicate Results

The following field duplicates pairs were submitted with the samples collected during the 3rd Quarter 2006 and were included in this review. The following table summarizes the sample IDs, the detected results and the associated RPDs.

Analyte	Sample IDs/Collection Date	Sample	Duplicate	RPD (%)
Perchlorate (µg/L)	PC-123/MD-1 (7/31/2006)	313000	330000	5
Total Chromium (mg/L)		1.5	1.4	9
Perchlorate (µg/L)	M-44/MD-2 (7/31/2006)	783000	775000	1
Hexavalent Chromium (mg/L)		1.0	1.2	18
Total Chromium (mg/L)		0.98	0.99	1
Perchlorate (µg/L)	M-48/MD-3 (7/31/2006)	216000	158000	31
Total Chromium (mg/L)		1.4	1.4	0
Perchlorate (µg/L)	M-71/MD-4 (8/03/2006)	608000	12200	192
			(664000)	(9)
Total Chromium (mg/L)		5.3	5.2	2
Perchlorate (µg/L)	M-84/MD-5 (8/03/2006)	1710	1940	13
Total Chromium (mg/L)		0.020 U	0.024	NC
Hexavalent Chromium (mg/L)		0.022	0.022	0

The RPD for total chromium in field duplicate pair M-84 and MD-5 was not calculable (NC) due to a nondetect sample result. Precision was deemed acceptable since the field duplicate result was <10x the sample quantitation limit (SQL). The RPDs for perchlorate in field duplicate pairs M-71/MD-4 (192%) and M-48/MD-3 (31%) were deemed acceptable due to the sample and duplicate results being <10x the SQL with the absolute difference being < 4x the SQL. Results of a reanalysis outside the

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holding time for sample MD-4 are provided in parenthesis. The reanalysis result indicates the original high RPD was probably attributable to a laboratory dilution error in the first analysis of MD-4. No validation actions were required based on this information. The remaining RPDs met the QC acceptance criteria of 30% maximum RPD for an aqueous matrix.

Sample Results/Detection Limits

Analytical dilutions were necessary for most samples due to matrix interferences or to bring the perchlorate and total chromium concentrations within the instrument calibration range.

Appendix A: 3rd Quarter 2006

MWH Report #	Sample Collection Date	Analyses
175759R	6/5/2006	Perchlorate
176375	6/12/2006	Perchlorate
176781	6/14/2006	Perchlorate
176877R	6/19/2006	Perchlorate
177581R	6/27/2006	Perchlorate
178126R	7/5/2006	Perchlorate
178450R	7/10/2006	Perchlorate
178999	7/12/2006	Perchlorate
179189	7/17/2006	Perchlorate
179799	7/24/2006	Perchlorate
180212R	7/21/2006	Perchlorate
180295	7/31/2006	Perchlorate, Total Chromium, Hexavalent Chromium
180333	8/1/2006	Perchlorate, Total Chromium,
180373R	8/1/2006	Perchlorate, Total Chromium, Hexavalent Chromium
180449R	8/2/2006	Perchlorate, Total Chromium, Hexavalent Chromium
180532R	8/2/2006	Total Chromium
180613, 180613R	8/3/2006	Perchlorate, Total Chromium, Hexavalent Chromium
180635R	8/4/0606	Perchlorate, Total Chromium,
180789	8/7/2006	Perchlorate, Total Chromium,
181008R	8/7-9/2006	Perchlorate, Total Chromium, Hexavalent Chromium
181213	8/10/2006	Perchlorate, Total Chromium,

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Memorandum

Date:	January 22, 2007	
To:	Sally Bilodeau/Camarillo	
From:	Sheena Blair and Sharon Mc Kechnie/Westford	
Subject:	Data Review Routine Monitoring Program Influent and Effluent 3rd Quarter 2006 Tronox LLC Henderson, Nevada	
Distribution:	Robert Kennedy/Westford	04020-023-110 TH3rdqtr2

SUMMARY

A limited review was performed on the data for raw groundwater samples and composites analyzed for all or a subset of the following parameters:

- Perchlorate by EPA Method 314
- Dissolved hexavalent chromium by EPA 218.6
- Total chromium by EPA 200.7

The samples were collected at the Tronox LLC site in Henderson, Nevada from June 25 through September 26, 2006 and submitted to MWH Laboratories in Monrovia, CA for analysis. The MWH report numbers and the sample collection dates that were included in this review are summarized in Appendix A at the end of this memo. The data reports provided by MWH did not support a validation at the Tier 2 level as requested by NDEP. All provided QC elements submitted by MWH were reviewed and results of that review are summarized below.

The sample results were assessed according to the "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review" (October 2004), the Region 9 Superfund Data Evaluation/Validation Guidance, NDEP guidance (May 2006), and by the laboratory quality control (QC) criteria. The validation guidelines were modified to accommodate the non-CLP methodologies.

The data reviewed required minor qualification for selected samples and were considered generally acceptable for decision making. No major problems were identified and no data were rejected.

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REVIEW ELEMENTS

The elements selected for review are based on the documentation provided in the laboratory data reports. Sample data were reviewed for the following elements:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Method blanks/equipment blanks/field blanks
- Laboratory control sample/laboratory control sample duplicate (LCS/LCSD) results
- Matrix spike/matrix spike duplicate (MS/MSD) results
- Laboratory duplicate results
- Field duplicate results
- Sample results/detection limits

DISCUSSION

Agreement of Analyses Conducted with COC Requests

Sample reports were checked to verify that the results reported corresponded to analytical requests as detailed on the chain of custody (COC) documentation. The following discrepancy was noted.

- **Report number 184629:** The initial perchlorate analysis for the effluent composite collected August 13-19, 2006 yielded a result that did not match historical data. The original samples collected August 13 through 19, 2006 were held in storage by the client. A new composite was prepared and submitted to MWH on September 21, 2006. The perchlorate result for the re-submitted effluent composite was flagged as estimated due to hold time nonconformance (see discussion below).

The following issue was also noted:

- **Report number 179200:** Although the analysis date for perchlorate was noted on the "Laboratory Data Report" for samples Effluent and Influent, the analysis time was not. There was no impact on the sample results since the analyses was performed well within the method specified holding time and did not affect the holding time calculation.

Holding Times and Sample Preservation

Method-specified holding times were met for all samples analyzed except as noted below:

- **Report number 184629:** As noted above sample Effluent-Comp was re-analyzed after a newly composted sample was submitted. The reanalysis for perchlorate was performed outside of the method specified holding time of 28 days; therefore the nondetect perchlorate result was estimated (UJ).

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- **Report number 182001:** Although the initial perchlorate analysis for sample Influent was performed within the method specified holding time, the reanalysis at a higher dilution factor was performed outside the method specified holding time of 28 days. The detected result for sample Influent was therefore qualified as estimated (J).

The cooler temperatures upon receipt at the laboratory met the acceptable range of 4± 2°C.

Documentation regarding sample pH verification upon receipt at the laboratory for total chromium was not included in the data package. No action was taken except for this notation.

Method Blanks/Equipment Blanks/Field Blanks

No equipment or field blanks were submitted with the samples included in this review. No validation actions were required on this basis.

Perchlorate, total chromium and hexavalent chromium were not detected in any of the method blanks.

LCS/LCSD Results

The percent recoveries (%R) and relative percent differences (RPDs) of the LCSs/LCSDs for perchlorate, total chromium and hexavalent chromium met the laboratory acceptance criteria.

MS/MSD Results

The %Rs and RPDs of the MS/MSDs for all client specific samples met the laboratory acceptance criteria.

In most cases the batch MS/MSD analyses were performed on samples from other clients, and although this practice is acceptable, the results could not be directly applied to the samples reviewed in these data packages due to possible differences in the sample matrix and type. No validation action was taken on this basis.

Laboratory Duplicate Results

No laboratory duplicates were analyzed for perchlorate, total chromium and hexavalent chromium. Precision in the laboratory was demonstrated by the MS/MSD and/or the LCS/LCSD analyses (see discussions above).

Field Duplicate Results

Field duplicate samples were not submitted with the samples in the project numbers under review.

Sample Results/Detection Limits

Analytical dilutions were necessary for most samples due to matrix interferences or to bring the perchlorate and total chromium concentrations within the instrument calibration range.

Report number 178430: The MWH "Report Comments" states that the perchlorate result for sample Effluent-Comp (5x dilution) was estimated due to the sample conductivity slightly exceeding the matrix

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conductivity threshold (MCT). The detected perchlorate result for sample Effluent-Comp was therefore qualified as estimated (J).

Appendix A: Influent and Effluent 3rd Quarter 2006

MWH Report #	Sample Collection Date	Analyses
178096	7/5/2006	Perchlorate, Total Chromium
178141	6/25-7/1/2006	Perchlorate
178430	7/2-8/6/2006	Perchlorate
179200	7/9-15/2006	Perchlorate
178485	7/10/2006	Perchlorate, Total Chromium
179278R	7/17/2006	Perchlorate, Total Chromium
179845	7/24/2006	Perchlorate, Total Chromium
179795	7/16-22/2006	Perchlorate
180215	7/23-29/2006	Perchlorate
180764	7/30-8/5/2006	Perchlorate
180287	7/31/2006	Perchlorate, Total Chromium
180523	8/2/2006	Hexavalent Chromium
181386	8/6-12/2006	Perchlorate
182021	8/13-19/2006	Perchlorate
184629	8/13-19/2006	Perchlorate
181548	8/15/2006	Perchlorate, Total Chromium
182001	8/21/2006	Perchlorate, Total Chromium
182538	8/20-26/2006	Perchlorate
183167	8/27-9/2/2006	Perchlorate
182576	8/28/2006	Perchlorate, Total Chromium
183705	9/3-9/2006	Perchlorate
183178	9/5/2006	Perchlorate, Total Chromium
184379	9/10-16/2006	Perchlorate
183732	9/11/2006	Perchlorate, Total Chromium
183879	9/12/2006	Hexavalent Chromium
184939	9/17-23/2006	Perchlorate
184346	9/18/2006	Perchlorate, Total Chromium
185459	9/24-30/2006	Perchlorate
185030	9/25/2006	Perchlorate, Total Chromium
185028	9/25/2006	Perchlorate
185067	9/26/2006	Hexavalent Chromium

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Memorandum

Date:	January 8, 2007	
To:	Sally Bilodeau/Camarillo	
From:	Sheena Blair and Sharon Mc Kechnie/Westford	
Subject:	Data Review Routine Monitoring Program 4th Quarter 2006 Tronox LLC Henderson, Nevada	
Distribution:	Robert Kennedy/Westford	04020-023-110 TH4thqtr

SUMMARY

A limited review was performed on the data for raw groundwater samples, raw surface water samples, two equipment blanks, and a field blank analyzed for all or a subset of the following parameters:

- Perchlorate by EPA Method 314
- Hexavalent chromium by SW-846 Method 7196
- Total chromium by SW846 6010B or EPA 200.7

The samples were collected at the Tronox LLC site in Henderson, Nevada from September 5 through December 13, 2006 and submitted to MWH Laboratories in Monrovia, California for analysis. The MWH project numbers, sample collection dates and analyses included in this review are summarized in Attachment A at the end of this memo. The data reports provided by MWH did not support a validation at the Tier 2 level as requested by NDEP. All provided QC elements submitted by MWH were reviewed and results of that review are summarized below.

The sample results were assessed according to the "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review" (October 2004), the Region 9 Superfund Data Evaluation/Validation Guidance, NDEP guidance (May 2006), and by the laboratory quality control (QC) criteria. The validation guidelines were modified to accommodate the non-CLP methodologies.

The nondetect total chromium result for sample I-AR reported (under report number 187864) was rejected (R) due to low matrix spike recovery. In general the remaining data reviewed for the 4th Qtr. required minor qualification for selected samples and considered to be generally acceptable for decision making purposes.

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REVIEW ELEMENTS

The elements selected for review are based on the documentation provided in the laboratory data reports. Sample data were reviewed for the following elements:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Method blanks/equipment blanks/field blanks
- Laboratory control sample/laboratory control sample duplicate (LCS/LCSD) results
- Matrix spike/ matrix spike duplicate (MS/MSD) results
- Laboratory duplicate results
- Field duplicate results
- Sample results/detection limits

DISCUSSION

Agreement of Analyses Conducted with COC Requests

Sample reports were checked to verify that the results reported corresponded to analytical requests as detailed on the chain of custody (COC) documentation. The following minor discrepancies were noted:

- **Report number 191032:** For sample ARP-5 the "Sampler Comments" section of the COC stated "no sample well dry" however, a date and time were listed for sample ARP-5, and the laboratory reported a perchlorate result for this sample. No validation action was taken other than this notation.

- **Report number 191032:** For sample PC-122 the "Sampler Comments" section of the COC stated "no sample" however, a date and time were listed for sample PC-122, and the laboratory reported a perchlorate result for this sample. No validation action was taken other than this notation.

The following issues were also noted:

- At the time of sampling the field personnel made a notation on the pre-printed COC if any of the samples listed were not collected. In general these samples were not collected due to dry wells or low volume.

- In many cases where more than one COC was submitted with the samples the laboratory did not sign each individual chain in the "Received by" box. The laboratory was notified of this omission and requested to sign each chain received upon receipt of the samples.

Holding Times and Sample Preservation

- **Report number 187781:** The hexavalent chromium analysis for the field blank FB-1 was performed 12 minutes outside of the method specified holding time of 24 hours. The nondetect result for the field blank FB-1 was therefore qualified as estimated (UJ).

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- **Report number 187864R:** The hexavalent chromium analyses for samples M-10, M-11 and EB-1 were performed several hours outside of the method specified holding time of 24 hours. Detected and nondetect results for samples M-10, M-11 and EB-1were therefore qualified as estimated (J and UJ, respectively).

- **Report number 188039R:** The hexavalent chromium analyses for samples EB-2, and M-12A were performed several hours outside of the method specified holding time of 24 hours. Detected and nondetect results for samples EB-2, and M-12A were therefore qualified as estimated (J and UJ, respectively).

- **Report number 188099:** The hexavalent chromium analyses for samples M-36, M-100, M-84, M-37, MD-1 and MD-2 were performed several hours outside of the method specified holding time of 24 hours. Detected and nondetect results for samples M-36, M-100, M-84, M-37, MD-1 and MD-2 were therefore qualified as estimated (J and UJ, respectively).

The cooler temperatures upon receipt at the laboratory met the acceptable range of $4 \pm 2^{o}C$.

Documentation regarding sample pH verification upon receipt at the laboratory for total chromium was not included in the data packages. No action was taken except for this notation.

Method Blanks/ Equipment Blanks/ Field Blanks

Field blank FB-1, equipment blank EB-1 (collected October 31, 2006), and equipment blank EB-2 (collected November 1, 2006), were reviewed in association with the samples collected during the 4th Quarter 2006

Total chromium and hexavalent chromium were not detected in any of the method blanks, equipment blanks or in the field blank. Perchlorate was detected in EB-1 at 11 µg/L and EB-2 at 35 µg/L. The perchlorate results for the associated samples were significantly greater than the reporting limits and the concentration detected in equipment blanks EB-1 and EB-2. It was considered that the low level of blank contamination present would have no impact on the perchlorate results; therefore no validation action was taken on this basis.

LCS/LCSD Results

The percent recoveries (%R) and relative percent differences (RPDs) of the LCSs/LCSDs for perchlorate, total chromium and hexavalent chromium met the laboratory acceptance criteria.

MS/MSD Results

The %Rs and RPDs of the MS/MSDs for all client specific samples met the laboratory acceptance criteria. except as noted in the table below.

Report Number 187864R

Sample ID	Analyte	MS %R	MSD %R	RPD
I-F	Total Chromium	17.2	15.9	ok
Associated Samples: I-Q, I-F, I-N, I-E, I-M, I-D, I-C, I-S, I-L, I-R, I-B, I-AR				

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Sample results were qualified as follows:

- If the %Rs were < 30%, then positive sample results were qualified as estimated (J-) and nondetect results were rejected (R).

In most cases the batch MS/MSD analyses were performed on samples from other clients, and although this practice is acceptable, the results could not be directly applied to the samples reviewed in these data packages due to possible differences in the sample matrix and type. No validation action was taken on this basis.

Laboratory Duplicate Results

No laboratory duplicates were analyzed for perchlorate, total chromium and hexavalent chromium. Precision in the laboratory was demonstrated by the MS/MSD and/or the LCS/LCSD analyses (see discussions above).

Field Duplicate Results

The following field duplicates pairs were submitted with the samples collected during the 4th Quarter 2006 and were included in this review. The following table summarizes the sample IDs, the detected results and the associated RPDs.

Analyte	Sample IDs/Collection Date	Sample	Duplicate	RPD (%)
Perchlorate (µg/L)	M100/MD-1 (11/2/2006)	5960	54800	161
Total Chromium (mg/L)		0.25	0.29	14
Hexavalent Chromium (mg/L)		0.010 U	0.31	NC
Perchlorate (µg/L)	M-84/MD-2 (11/2/2006)	1100	1150	4
Hexavalent Chromium (mg/L)		0.017	0.019	11
Perchlorate (µg/L)	PC-127/MD-3 (10/30/2006)	386000	387000	0.3
Total Chromium (mg/L)		1.4	1.4	0
Perchlorate (µg/L)	PC-129/MD-4 (10/30/2006)	430000	437000	2
Total Chromium (mg/L)		0.61	0.64	5
Perchlorate (µg/L)	PC-128/MD-5 (10/30/2006)	137000	130000	5
Total Chromium (mg/L)		0.020 U	0.072	NC
The field duplicates were associated with the samples by collection date and analyte.				

The RPD for total chromium in field duplicate pair PC-128 and MD-5 was not calculable (NC) due to a nondetect sample result. Precision was deemed acceptable since the field duplicate result was <10x the sample quantitation limit (SQL). The RPD for hexavalent chromium in field duplicate pair M-100 and MD-1 were NC due to a nondetect sample result. Precision was not acceptable since the field duplicate result was >10x the SQL. The associated samples were already qualified for holding time nonconformance and no further validation action was required on this basis. The RPD (161%) for perchlorate in field duplicate pair M-100 and MD-1 was deemed acceptable due to the sample and duplicate results being <10x the SQL with the absolute difference being <4x the SQL. The analytical value from MD-1 was used in lieu of M-100 in the report tables, plates, and maps because it is in close

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agreement with historical values obtained from M-100. The remaining RPDs met the QC acceptance criteria of 30% maximum RPD for an aqueous matrix.

Sample Results/Detection Limits

Analytical dilutions were necessary for most samples due to matrix interferences or to bring the perchlorate and total chromium concentrations within the instrument calibration range.

Attachment A: 4th Quarter 2006

MWH Report #	Sample Collection Date	Analyses
183153R	09/05/2006	Perchlorate
183346	09/06/2006	Perchlorate
183688R	09/11/2006	Perchlorate
183865	09/12/2006	Perchlorate
184164	09/11-14/2006	Perchlorate
184425	09/18/2006	Perchlorate
184942	09/25/2006	Perchlorate
185470R	10/02/2006	Perchlorate
186060R	10/09/2006	Perchlorate
186449R	10/12/2006	Perchlorate
186701	10/16/2006	Perchlorate
187149	10/23/2006	Perchlorate
187781	10/30/2006	Perchlorate, Total Chromium, Hexavalent Chromium
187864R	10/31/2006	Perchlorate, Total Chromium, Hexavalent Chromium
187868	10/31/2006	Total Chromium
188039R	11/01/2006	Perchlorate, Total Chromium, Hexavalent Chromium
188099	11/02/2006	Perchlorate, Total Chromium, Hexavalent Chromium
188143	11/03/2006	Perchlorate, Total Chromium,
188290	11/06/2006	Perchlorate, Total Chromium,
188442	11/07/2006	Perchlorate, Total Chromium,
188528	11/08/2006	Perchlorate, Total Chromium,
188662R	11/09/2006	Perchlorate, Total Chromium,
188806	11/13/2006	Perchlorate
189349	11/20/2006	Perchlorate
189628	11/27/2006	Perchlorate

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Attachment A: 4th Quarter 2006

MWH Report #	Sample Collection Date	Analyses
190157R	12/04/2006	Perchlorate
190771R	12/11/2006	Perchlorate
191032	12/11-13/2006	Perchlorate

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Memorandum

Date:	January 22, 2007	
To:	Sally Bilodeau/Camarillo	
From:	Sheena Blair and Sharon Mc Kechnie/Westford	
Subject:	Data Review Routine Monitoring Program Influent and Effluent 4th Quarter 2006 Tronox LLC Henderson, Nevada	
Distribution:	Robert Kennedy/Westford	04020-023-110 TH4thqtr2

SUMMARY

A limited review was performed on the data for raw groundwater samples analyzed for all or a subset of the following parameters:

- Perchlorate by EPA Method 314
- Dissolved hexavalent chromium by EPA 218.6
- Total chromium by EPA 200.7

The samples were collected at the Tronox LLC site in Henderson, Nevada from October 1 through December 16, 2006 and submitted to MWH Laboratories in Monrovia, CA for analysis. The MWH report numbers and the sample collection dates that were included in this review are summarized in Appendix A at the end of this memo. The data reports provided by MWH did not support a validation at the Tier 2 level as requested by NDEP. All provided QC elements submitted by MWH were reviewed and results of that review are summarized below.

The sample results were assessed according to the "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review" (October 2004), the Region 9 Superfund Data Evaluation/Validation Guidance, NDEP guidance (May 2006), and by the laboratory quality control (QC) criteria. The validation guidelines were modified to accommodate the non-CLP methodologies.

The data reviewed required minor qualification for selected samples and were considered generally acceptable for decision making. No major problems were identified and no data were rejected.

REVIEW ELEMENTS

The elements selected for review are based on the documentation provided in the laboratory data reports. Sample data were reviewed for the following elements:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation

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- Method blanks/equipment blanks/field blanks
- Laboratory control sample/laboratory control sample duplicate (LCS/LCSD) results
- Matrix spike/matrix spike duplicate (MS/MSD) results
- Laboratory duplicate results
- Field duplicate results
- Sample results/detection limits

DISCUSSION

Agreement of Analyses Conducted with COC Requests

Sample reports were checked to verify that the results reported corresponded to analytical requests as detailed on the chain of custody (COC) documentation. The following discrepancy was noted.

- **Report number 191410:** The sample collection dates for samples Effluent-Comp and Influent –Comp were incorrectly listed on the COC as December 10, 2006 to October 16, 2006 instead of December 10, 2006 to December 16, 2006. MWH processed the samples under the correct collection dates. No validation action was taken other than this notation.

The following issue was also noted:

- **Report number 179200:** Although the analysis date for perchlorate was noted on the "Laboratory Data Report" the analysis time was not. There was no impact on the sample results since the analyses was performed within the method specified holding time.

Holding Times and Sample Preservation

Method-specified holding times were met for all samples analyzed.

In general the cooler temperatures upon receipt at the laboratory met the acceptable range of $4 \pm 2^{o}C$. However, the cooler submitted October 31, 2006 and reported under MWH report number 187757 had a receipt temperature of $8^{o}C$ which slightly exceeded the acceptance criterion. No validation action was taken for this minor nonconformance other than this notation.

Documentation regarding sample pH verification upon receipt at the laboratory for total chromium was not included in the data package. No action was taken except for this notation.

Method Blanks/Equipment Blanks/Field Blanks

No equipment or field blanks were submitted with the samples included in this review. No validation actions were required on this basis.

Perchlorate, total chromium and hexavalent chromium were not detected in any of the method blanks.

LCS/LCSD Results

The percent recoveries (%R) and relative percent differences (RPDs) of the LCSs/LCSDs for perchlorate, total chromium and hexavalent chromium met the laboratory acceptance criteria.

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MS/MSD Results

The %Rs and RPDs of the MS/MSDs for all client specific samples met the laboratory acceptance criteria.

In most cases the batch MS/MSD analyses were performed on samples from other clients, and although this practice is acceptable, the results could not be directly applied to the samples reviewed in these data packages due to possible differences in the sample matrix and type. No validation action was taken on this basis.

Laboratory Duplicate Results

No laboratory duplicates were analyzed for perchlorate, total chromium and hexavalent chromium. Precision in the laboratory was demonstrated by the MS/MSD and/or the LCS/LCSD analyses (see discussions above).

Field Duplicate Results

Field duplicate samples were not submitted with the samples in the project numbers under review.

Sample Results/Detection Limits

Analytical dilutions were necessary for most samples due to matrix interferences or to bring the perchlorate and total chromium concentrations within the instrument calibration range.

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Appendix A: Influent and Effluent 4th Quarter 2006

MWH Report #	Sample Collection Date	Analyses
186025	10/1-7/2006	Perchlorate
185496	10/2/2006	Perchlorate, Total Chromium
185718	10/4/2006	Hexavalent Chromium
186726	10/8-14/2006	Perchlorate
186064	10/9/2006	Perchlorate, Total Chromium
186066	10/9/2006	Perchlorate
187210	10/15-21/2006	Perchlorate
186649	10/16/2006	Perchlorate, Total Chromium
186645	10/16/2006	Perchlorate
187757	10/22-28/2006	Perchlorate
187181R	10/23/2006	Perchlorate, Total Chromium
188273	10/29-11/4/2006	Perchlorate
187716	10/30/2006	Perchlorate
187729	10/30/2006	Perchlorate, Total Chromium
188349	11/6/2006	Perchlorate
188350	11/6/2006	Perchlorate, Total Chromium
189353	11/12-18/2006	Perchlorate
188748	11/13/2006	Perchlorate, Total Chromium
188747	11/13/06	Perchlorate
188741	11/5-11/2006	Perchlorate
189368	11/20/2006	Perchlorate, Total Chromium
189636	11/19-25/2006	Perchlorate
189694	11/27/2006	Perchlorate, Total Chromium
190144	11/26-12/2/2006	Perchlorate
190781	12/3-9/2006	Perchlorate
191410	12/10-16/2006	Perchlorate