Appendix E

Data Validation Summary Report and Memorandums

Prepared for:
Tronox LLC
Henderson, Nevada

Appendix E
Data Validation Summary Report

ENSR Corporation
September 2006
Document No.: 04020-023-152

ENSR | AECOM

Prepared for:
Tronox LLC
Henderson, Nevada

Appendix E

Data Validation Summary Report

Prepared By Robert Kennedy
Senior Project Chemist
ENSR

Reviewed By Debra L. Simmons
Quality Assurance Officer
ENSR

ENSR Corporation
September 2006
Document No.: 04020-023-152

Contents

1.0 INTRODUCTION

The purpose of formally validating the Upgradient Investigation laboratory results was to determine the suitability of the data for potential use in the conceptual site model, risk assessment, and other future on-site environmental assessments.

MWH Laboratories in Monrovia, CA was the primary lab contracted by Tronox for the Upgradient Investigation chemical analyses. MWH performed the analysis of selected parameters in groundwater samples only for this project and contracted the remaining analyses to the following laboratories:

- EMAX Laboratories Inc. in Torrance, CA conducted the majority of the soil analyses;
- General Engineering Laboratories, LLC in Charleston, SC (hereafter abbreviated as GEL) performed all the project radiochemical analyses;
- Severn Trent Laboratories facility in Sacramento, CA (hereafter abbreviated as STL) conducted the dioxin analyses;
- Frontier GeoSciences Inc. in Seattle, WA (hereafter abbreviated as FGS) performed the methylmercury analyses; and
- EMS Laboratories, Inc. in Pasadena, CA performed the asbestos analysis in soil.

The specific analyses performed by each laboratory are identified in Table 7 of the Upgradient Investigation Workplan Addendum (ENSR February 2006)

2.0 DATA VALIDATION PROCESS

The laboratory results for the Upgradient Investigation were subjected to formal data validation as described in the Workplan Section 5.1 and following the guidance on data validation provided by NDEP for the BMI Plant Sites (NDEP, 2006). The data from each laboratory were submitted as Contract Laboratory Program (CLP)-like data packages in pdf format and EQuIS format electronic data deliverables (EDDs). The EDDs were imported into an EQuIS database at Tronox specifically created for this project. ENSR validated the data using the hard copy data package and subsequently entered the qualifiers into the database. Results were compared to the goals stated in the Upgradient Investigation Workplan Addendum (ENSR February 2006), hereafter referred to as “the Workplan”, and the Draft Quality Assurance Project Plan (ENSR November 2005, revised August 2006) hereafter referred to as “the QAPP”.

A comprehensive (”full”) data validation was performed on 9 of the 46 laboratory Sample Delivery Groups (SDGs) and the remainder underwent a more limited validation as described below. The goal of 10% full validation that was established for the project was exceeded by 10% in order to cover the complete set of

samples analyzed for the extended SRC list. This ensured that some data for every analytical method utilized during the Upgradient Investigation were subjected to full data validation.

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
- Initial and continuing calibrations
- Laboratory blanks/equipment blanks/ field blanks
- Surrogate recoveries
- 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

Full validation consisted of reviewing to the level of raw data all of the elements covered in the limited validation plus the following elements where applicable as defined by the analytical methods.

- Mass spectrometer tuning
- GC/MS performance checks
- Interference check sample (ICS) results
- ICP serial dilution results
- Internal standard performance
- Compound or element identification
- Peak integration and mass spectral matches
- Chemical yield (tracers and carriers)
- Calculation and transcription verifications

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 specified in the Quality Assurance Project Plan (QAPP), and Upgradient Investigation Work Plan Addendum (ENSR, 2006). 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)

- Organic analytical data were evaluated with reference to the "USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review" (EPA,1999)

- Dioxin data were evaluated with reference to "USEPA Analytical Services Branch (ASB) National Functional Guidelines for Chlorinated Dibenzo-p-Dioxins (CDDs) and Chlorinated Dibenzofurans (CDFs) Data Review", EPA-540-R-05-001 (EPA, 2005)

- Radiochemical analytical data were evaluated with reference to the Department of Energy "Evaluation of Radiochemical Data Usability" (DOE, 1997) and the "Multi-Agency Radiological Laboratory Analytical Protocols Manual (MARLAP)", (NUREG, 2004).

In general, the validation qualifiers and definitions employed were based on those used by EPA in the documents mentioned above. The "B" and "JB" qualifiers used exclusively for the radiochemical data were based on the radiochemical documents (DOE, 1997 and EPA, 2004) cited above and professional judgment. An additional qualifier Z was added to denote probable false positive results in the fuel alcohol data. 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 flag 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 discussed in this report.

Data validation was organized by laboratory report SDG and analytical fraction. For each separate SDG/fraction combination a data validation memorandum was written by a validator and reviewed by a peer at ENSR's Westford office. These memoranda are included on CD-ROM as pdf documents and sorted by ENSR Identification (ID) which is correlated with the laboratory SDGs listed in **Table E-4**. Table E-4 specifies data validation memo number (ENSR ID) the number of samples in each analysis group by analytical fraction, the laboratory that performed the analyses, and indicates for the metals, wet chemistry, and radiochemical groups whether the analytical list was long or short. The long and short lists of analytes are defined in Table 3-1 and the Work Plan. The relationship between sample ID, matrix, collection date, laboratory ID, SDG numbers, and the level of validation performed is described in **Table E-3** and sorted by sample ID. Table E-3 and Table E-4 are Excel spreadsheets which can be resorted to assist the data user in locating validation information for any particular sample, SDG, or analysis fraction.

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 and this information was sorted by the quality control (QC) review elements listed below:

- Holding times and sample preservation
- Initial and continuing calibrations
- Mass spectrometer tuning
- ICS results
- Laboratory blanks/equipment blanks/ field blanks
- Surrogate recoveries
- Laboratory control sample (LCS)/ laboratory control sample duplicate (LCSD) results
- Matrix spike/matrix spike duplicate (MS/MSD) results
- Internal standard performance
- Laboratory duplicate results
- Field duplicate results
- ICP serial dilution results
- Quantitation limits and sample results
- GC/MS performance checks
- Compound or element identification
- Peak integration and mass spectral matches
- Chemical Yield (Tracers and Carriers)
- Calculation and transcription verifications

Tables E-5 through **E-16** list all the results qualified based on quality control problems identified with regard to holding times, calibrations, interference check sample results, blanks, laboratory control samples results, matrix spike results, internal standard performance, laboratory duplicates, field duplicates, dioxin quantitation, probable false positives, and rejected data points. No QC problems were identified that resulted in qualification of results based on mass spectrometer tuning, surrogate spike recoveries, serial dilution results, compound identification, peak integration, or chemical yield of tracers and carriers. The data validation summary results table contents are sorted by ENSR ID to assist the data user in locating the associated data validation memo. The data validation memos discuss the application of qualifiers in more detail. The results in each table will be summarized separately in sections below.

3.1 Holding Times and Sample Preservation

Holding times were derived from the EPA methods utilized and listed in the QAPP and Work Plan and were calculated beginning at the time of sample collection. The majority of analyses were performed within the method-specified holding times. Exceptions are summarized below and listed in Table E-5. No data were rejected on the basis of holding time exceedances.

The laboratory results for all 17 water samples analyzed for pH were qualified as estimated (J) because the pH was not determined immediately after collection.

The sulfide analysis for water sample M-120 was analyzed outside the method specified holding time of 7 days, but did not grossly exceed the holding time (defined as twice the holding time). Therefore the non-detect result reporting limit was qualified as estimated (UJ).

The nitrate and nitrite analyses of water sample M-121 were reported from diluted reanalyses acquired outside the holding time for these analytes, therefore the results were qualified as estimated with a possible low bias (J-) and an estimated non-detect (UJ), respectively.

Required holding times for hexavalent chromium in soil are not clearly specified in EPA methods 3060A, 7196A, and 7199. After correspondence with NDEP in January 2006, a holding time of 28 days for soil and 24 hours for soil digestates was agreed upon for this project. EMAX was notified of this decision, but exceeded the 24 hour digestate holding time by more than a factor of two (but less than four days) for twenty soil samples from borings M-120 and M-118. After discussion with NDEP about the proper treatment of these data points it was decided that rejecting the data was not necessary and that the suggested 168 hour (seven days) stability of digestates mentioned in EPA 3060A, combined with the good matrix spike recovery data for Cr(VI) in these samples (indicating reduction of any Cr(VI) over time was unlikely), was justification for accepting the non-detect data without qualification.

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

3.2 Instrument Calibration and Tuning

Table E-6 lists the sample results that were qualified based on exceeded calibration criteria. No data required qualification on the basis of instrument tuning.

Calibration criteria for validation were derived from both the analytical methods and the validation references listed in Section 2. In some cases calibration data met the method QC requirements but results were qualified based on professional judgment and the validation guidelines. The compound tert-butyl alcohol did not meet the minimum relative response factor (RRF) requirement applied to all VOC analytes in the

National Functional Guidelines in the associated initial calibrations. Although EPA Method 8260 does not require a minimum RRF for tert-butyl alcohol, the non-detect results reported for this compound were rejected on the basis of professional judgment.

Non-detect results for 2,2-dichloropropane in 17 samples and naphthalene in 10 samples were qualified as estimated (UJ) because the percent difference (%D) in the associated continuing calibration verification standard (CCV) exceeded 25% maximum. Although EPA Method 8260 does not require the %D for these compounds to be less than 25% in the CCV, these data were qualified using professional judgment based on criterion established in the National Functional Guidelines.

The non-detect results for lead-210 in 5 soil samples from boring M120 and the water sample M-120 were qualified as estimated (UJ) because the method for Pb-210 by GFPC requires a minimum of five days for Bi-212 in-growth to occur before analysis and this minimum time requirement was not met. The non-detect result for radium-228 in water sample M-120 was qualified as estimated (UJ) because the GFPC instrument calibration had expired 4 days prior to analysis.

Results for the total tetrachlorodibenzo-p-dioxins and total tetrachlorodibenzofurans in sample M-120- 0.5 and M-120-10 listed in Table E-6 were qualified as estimated (J) by the validator because the reported result was less than the lowest calibration standard but greater than the estimated detection limit and these results had not been qualified by the laboratory.

The non-detect results for the pesticide naled in samples M120-0.5, M-120-10, M120-30, and the equipment blank EB-3 were qualified as estimated (UJ) due to the low recovery of this compound in the associated continuing calibration verification (CCV) standard.

3.3 Interference Check Sample Results

Interference check sample (ICS) results were reviewed during full validation of the metals data for methods SW-846 6010B and SW-6020. **Table E-7** lists the sample results that were qualified based on ICS results. The results for cadmium, copper, and manganese in seven soil samples from the M120 boring analyzed by SW-846 Method 6020 were qualified as estimated with a possible high bias (J+) due the detection of these elements in the associated bracketing ISC A solution data. No data from the SW-846 601B analyses required qualification on the basis of ICS results.

3.4 Blank Contamination

In general, laboratory and field blanks were free of contamination. **Table E-8** lists the sample results that were qualified based on detected contamination in laboratory blanks such as method blanks, initial calibration blanks, and continuing calibration blanks, or equipment blanks. No data required qualification due to trip blank contamination. No data were qualified based on results of the field blank or pump blank because they were determined not to be relevant to the sample results after field collection activities were completed.

Laboratory Blanks

Results for thorium-230 in 13 soil samples were negated (B) based on the normalized absolute difference between the concentration and measurement uncertainty of this radionuclide in the associated method blanks and the samples. These negated results are not rejected but may be false positives totally attributable to blank contamination. The slightly higher result for Th-230 in sample M-117-5 was qualified as estimated (JB) due to the same method blank contamination.

Results for molybdenum in 8 soil samples were negated (U) at the reporting limit or reported concentration due to contamination in the associated laboratory preparation blank at a concentration below the reporting limit but above the method detection limit.

Equipment Blanks

Results for acetone in 16 soil samples were negated (U) at the laboratory reported concentrations due to contamination of the associated equipment blank EB-2. Consistent with EPA guidelines for common contaminants, an action limit (AL) of 10 times the EB-2 acetone concentration was established and used to qualify all the associated soil samples with reported concentrations less than this AL value.

The result for zinc in soil sample M119-40 was qualified as estimated and possibly biased high (J+) due to contamination detected in the associated equipment blank EB-2.

The results for barium in water sample H-11 and for cobalt in water samples TR-9A and M-103A were qualified as estimated and possibly biased high (J+) due to contamination in the associated equipment blank EB-3.

Results for radium-226 in the water samples M-103A and H-11 were negated (B) based on radium contamination in the associated equipment blank EB-3. These negated results are not rejected but may be false positives totally attributable to blank contamination.

3.5 Surrogate Recoveries

No data were rejected or otherwise qualified on the basis of surrogate recovery evaluation**.**

3.6 Laboratory Control Samples

LCS and LCSD recoveries met QC acceptance criteria for the majority of analyses. **Table E-9** lists the results qualified based on LCS and LCSD recoveries that exceeded QC acceptance criteria.

The non-detect results for 3,3'-dichlorobenzidine in water sample M-120 and EB-3 were rejected (R) due to a recovery of less than 10% for this analyte in the LCS and an RPD that exceeded the quality control acceptance criteria in the LCS/LCSD pair.

3.7 Matrix Spikes

MS and MSD recoveries met the QC acceptance criteria for the majority of analyses. **Table E-10** lists the sample results qualified based on MS or MSD recoveries which were outside the laboratory acceptance criteria or required additional qualification per the National Functional Guideline rules.

Ten of the polychlorinated dibenzo-p-dioxin (PCDD) and dibenzofuran (PCDF) congener results and the associated homolog total results for soil sample M120-0.5 were qualified as estimated (J or UJ) based on MS recoveries less than the lower QC limit.

Positive results for antimony in 8 soil samples were qualified as estimated with a possible low bias (J-) and non-detects in 25 soils were qualified as estimated (UJ) due to associated MS/MSD recoveries less than the QC acceptance criteria. Non-detect results for antimony in 6 soils were rejected (R) as unusable due to MS and MSD recoveries less than 30%.

Positive results for aluminum in 19 soil samples were qualified as estimated with a possible high bias (J+) due to recoveries exceeding the QC acceptance criteria upper limit in the associated MS or MSD recoveries.

Results for barium in 19 soil samples were qualified as estimated (J) due to erratic recoveries (outside the QC acceptance criteria both high and low) in the associated MS/MSD results. Barium results for 10 other soil samples were qualified as estimated with a possible low bias (J-) due to recoveries less than the lower QC acceptance criteria in the associated MS/MSD pair.

Results for iron in 19 soil samples were qualified as estimated with a possible high bias (J+) due to an MSD recovery above the QC acceptance criteria in the associated MS/MSD pair.

Results for sodium in 16 water samples were qualified as estimated (J) due to an associated MS recovery less than the QC acceptance criteria in the MS/MSD pair.

Results for titanium in 8 soil samples were qualified as estimated with a possible high bias (J+) due to an associated post digestion spike recovery that exceeded the QC acceptance criteria.

Results for tungsten in 6 soil samples were qualified as estimated with a possible low bias (J-) and non-detect results were qualified as estimated (UJ) in 33 soil samples due to recoveries less than the QC acceptance criteria in the associated MS/MSD.

Results for alkalinity in the water samples M-117 and M-121 were qualified as estimated with a possible low bias (J-) due to associated MS/MSD recoveries less than the QC acceptance criteria and the alkalinity non-detect result for water sample H-11 was qualified as estimated (UJ) for the same reason.

3.8 Internal Standards

Internal standard (IS) performance was reviewed during full validation of the Inductively Coupled Plasma/Mass Spectrometry (ICP/MS) and Gas Chromatography/Mass Spectrometry (GC/MS) data. Table E-10 lists all the results qualified during validation based on IS performance.

Detected and non-detect results for 25 of the PCDD and PCDF congeners and homolog groups in the M-120-10 soil sample were qualified as estimated (J and UJ, respectively) due to 9 IS recoveries below the QC acceptance criteria. Non-detect results for 21 of the PCDD and PCDF congeners and homolog groups in the M-120-30 soil sample were qualified as estimated (UJ) due 7 to internal standard (IS) recoveries below the QC acceptance criteria.

Positive and non-detect results for aluminum, antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, lead, and manganese, molybdenum, nickel, selenium, silver, thallium, tungsten, vanadium, and zinc were qualified as estimated (J and UJ, respectively) in the water samples listed in **Table E-11** due to associated IS recovery nonconformances. No data were rejected on the basis of IS recoveries.

3.9 Laboratory Duplicates

The evaluation of laboratory duplicate precision included an assessment of the agreement between LCS and LSCDs, MS and MSDs, and matrix duplicates, as measured through relative percent difference (RPD). **Table E-12** lists the results qualified during validation based on laboratory duplicate precision.

LCS/LCSD

The RPD for the LCS and LCSD results for dimethoate exceeded the acceptance limit. The non-detected results reported for this analyte in soil samples M120-0.5, M120-10, and M120-30 were qualified as estimated (UJ) on the basis of the RPD.

The non-detect results for all of the organophosphorous pesticides in water sample M-120 were qualified as estimated (UJ) because more than half of all the analytes in the LCS and LCSD exhibited RPDs exceeding the QC acceptance criteria.

The non-detect results for 5 of the organophosphorous pesticides in equipment blank EB-3 were qualified as estimated (UJ) because those analytes in the LCS and LCSD exhibited RPDs exceeding the QC acceptance criteria.

The organophosphorous pesticides LCS/LCSD pairs associated with both water sample M-120 and the equipment blank EB-3 exhibited high RPDs for nearly half or more the target analytes due to high recoveries in the LCS. No data were qualified based on the high recoveries because none of these organophosphorous pesticides were detected in any of the associated samples.

MS/MSD

Positive and non-detect results for 13 PCDD and PCDF congeners and the homolog groups in sample M-120-0.5 were qualified as estimated (J and UJ, respectively) due to RPDs that exceeded the QA acceptance criteria for the associated MS/MSD.

The non-detect result for hexachlorobutadiene in soil sample M-118-50 was qualified as estimated (UJ) because the RPD in the associated MS/MSD exceeded QA acceptance criteria for this compound.

The positive results for barium, magnesium, and sodium in the soil samples identified in Table E-12 were qualified as estimated (J) due to RPD results in the associated MS/MSD that exceeded the QA acceptance criteria.

Matrix Duplicates

Positive and non-detect results for perchlorate in 14 soil samples were qualified as estimated (J and UJ, respectively) due to an RPD that exceeded the QC acceptance criteria in the associated laboratory matrix duplicate.

3.10 Field Duplicates

The results of the six soil field duplicate pairs and one groundwater field duplicate pair collected during the Upgradient investigation were evaluated during validation. RPDs were compared to the objectives established in the QAPP of 30% RPD for aqueous samples and 50% RPD for solid samples. **Table E-13** lists the results qualified during validation based on field duplicate precision nonconformances.

The RPDs for aluminum, barium, iron, manganese, titanium, and zinc exceeded the acceptance limits in the groundwater sample field duplicate pair TR-8/TR-8D. The results for these analytes in the field duplicate pair TR-8/TR-8D and the associated groundwater sample were qualified as estimated (J) on the basis of RPDs.

Results for calcium in the soil sample field duplicate pair M120-40/M120-40D and the associated M120 boring samples were qualified as estimated (J) due to the RPD exceeding the QC acceptance criterion.

The copper and lead results for the soil sample field duplicate pair M117-20/M-117-20D and the associated soil samples were qualified as estimated (J) due to the RPDs for these analytes exceeding the QC acceptance limits.

The RPDs for arsenic, calcium, and copper exceeded the acceptance limits in the soil field duplicate pair M119-0.5/M-119-0.5D. The results for arsenic, calcium, and copper in the field duplicate pair and the associated soil samples were qualified as estimated (J) on this basis.

The results for copper and zinc in the soil field duplicate pair M117-80/M-117-80D and the associated soil samples were qualified as estimated (J) due to RPDs for copper and zinc exceeding the QC acceptance criterion.

3.11 ICP Serial Dilution

Serial dilution results were reviewed during the validation of the ICP and ICP/MS data. No data were estimated or otherwise qualified on the basis of serial dilution results.

3.12 Quantitation

Table E-14 lists the results that were qualified during validation based on quantitation issues. These results were limited to PCDD and PCDF congeners and homologs where reporting limits were elevated during validation for some non-detect results. These results met the compound identification criteria stipulated in the method, but, according to the laboratory's SOP, were not reported as positive results because the concentrations were less than ½ of the lowest calibration standard. The laboratory reported these results as non-detects at the actual sample results levels; however, during validation the detection limits for the sample results listed in the table below were raised to ½ of the lowest calibration standard since the laboratory considers these results to be non-detect at this level.

3.13 Other Issues

Table E-15 lists results for methanol in 28 soil samples that are probably attributable to cross-contamination during shipping. Soil samples for VOC analyses that were field preserved in methanol were shipped to the laboratory in zipper-lock bags containing other soil samples in brass sleeves and caps that were being submitted for the fuel alcohol analyses, including methanol. EMAX alerted ENSR of the suspicious number of methanol detections in the sleeved soil samples before the field operation was complete and the surface soils were recollected and shipped without associated methanol vials. Methanol was not detected in any of these resampled surface soils, indicating that the methanol detected in the original samples was likely attributable to cross-contamination during shipping. The methanol results for the original surface soil results were rejected (R) and all of the subsurface soil samples with methanol detections were qualified as probable contamination during shipping (Z). Some results were also qualified as estimated (J) on the basis of precision in the duplicate analyses. This poor precision is probably attributable to inconsistent levels of cross-contamination between samples in different sleeves and caps and was therefore not discussed in the field duplicate precision section of this report.

3.14 Rejected Results

Table E-16 lists all the sample data points that were rejected as unusable during validation. Rejected results values were removed from the database; hence, the result column appears empty. The reasons these results were rejected were discussed in the previous Sections 3.2, 3.6, 3.7, and 3.13. This information is summarized and discussed in the paragraphs below by analyte.

The data for 3,3'-dichlorbenzidine in water samples M120 and EB-3 were rejected due to very poor recovery for this analyte in the associated LCS. The rejected values were nondetects at the reporting limit. Benzidine related compounds are subject to oxidative loss during extraction and concentration using EPA Method 8270 and frequently exhibit poor chromatographic behavior. 3,3'-dichlorbenzidine has not been identified as a Site Related Chemical (SRC) at the Tronox Henderson facility.

The rejected data for antimony in 6 soil samples from boring M118 were due to a very low matrix spike recovery in the associated M118-50 sample. Matrix spike recovery problems for antimony in soil are common and probably attributable to strong matrix absorption. Antimony is identified as an SRC at the Tronox Henderson facility.

The data points for methanol in surface soils were rejected because these results appeared to be attributable to cross-contamination during shipping and could not be duplicated when the affected samples were recollected. The original methanol results have been replaced by the data from the resampled soil which was not cross-contaminated.

The results for tert-butyl alcohol in soil and water analyses were rejected due to a low RRF in the initial calibration for this compound. All these rejected values were nondetects for tert-butyl alcohol at the reporting limit. This compound is identified in EPA Method 8260 as having poor purging efficiency which frequently causes a low RRF; however, it is not a System Performance Check Compound and therefore the RFF did not result in rejection of the initial calibration by the laboratory. This compound is not identified as a SRC at the Tronox Henderson facility.

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 Henderson Upgradient investigation dataset. 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. The field duplicate RPD results which caused the application of validation qualifiers are discussed in Section 3.10 of this report and listed in Table E-13. In general the field duplicate precision was acceptable for all analytes except a limited set of metals. This limited metals data set was qualified as estimated but usable and represents only 1.3% of the total data points.

Laboratory precision was assessed through the RPD results for matrix duplicates, LSC/LCSD pairs, and MS/MSD pairs. Laboratory precision nonconformances which resulted in the application of validation qualifiers are discussed in Section 3.9 of this report and listed in Table E-12. In general, the laboratory duplicate precision was acceptable. Exceptions included several PCDD/PCDF congeners and hexachlorobutadiene in two MS/MSD pairs; the metals barium, magnesium, and sodium in two MS/MSD pairs; numerous organophosphorous pesticides in two LCS/LCSD pairs, and perchlorate in one matrix duplicate. Results associated with these duplicates were qualified as estimated but usable and represent only 0.89% of the total data points. No data was rejected based on precision.

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 3.6 and 3.7 of this report and listed in Tables E-9 and E-10. In general the laboratory accuracy was acceptable. .Exceptions included twelve PCDD/PCDF congeners associated with one MS/MSD pair; alkalinity associated with one MS/MSD pair; and the metals antimony, aluminum, barium, iron, sodium, titanium, and tungsten in several MS/MSD pairs. Results associated with these recovery nonconformances were qualified as estimated but usable, except for six results for antimony which were rejected. The number of rejected data points based on spike recovery accuracy is 0.09 % of the total number of data points, and the number of qualified points represents 2.5% of the total data points collected.

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 such as method blanks and calibration blanks. Blank results validation resulted in qualifying 44 results as described in Section 3.4

which represents only 0.5% of the total data points collected. No data were rejected based on blank results.

Bias as a component of accuracy is also evaluated with the validation of holding time, calibration, interference check sample, internal standard performance, and quantitation results discussed in Sections 3.1, 3.2, 3.3, 3.8, and 3.12 of this report. Collectively these evaluations resulted in the qualification of 5.6% and the rejection of 0.74% of the total data points.

Evaluation of the remaining QC elements that contribute to accuracy, such as mass spectrometer tuning, serial dilution results, compound or element identification, peak integration and mass spectral matches, chemical yield, and calculation/transcription verifications, did not result in the qualification or rejection of any data points during validation.

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 but did involve resubmittals of data from the laboratories to correct problems that were discovered during the validation process. All of these issues were resolved.. Other aspects of data representativeness such as adherence to recommended holding times, instrument calibration requirements, and field and laboratory precision assessments are discussed in Sections 3.1, 3.2, 3.9, and 3.10 of this report.

One additional issue of representativeness was the probable false positives due to methanol cross-contamination that occurred during shipping of certain soil samples. This issue, including its resolution, is discussed in Section 3.13 above.

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 per the Workplan. The goal stated in the QAPP for this project was greater than 90% field completeness. A comparison of the Workplan sample tables with the database sample IDs indicates that

actual field completeness was 99.1%, exceeding the goal established for the project. This field completeness calculation is based on the total analytical suites planned in Table 2 and Table 4 of the Workplan compared to the COC requests sent to the laboratories. Planned samples from depths that were excluded due to the water table depth were not included in the calculation. All COC requests were faithfully executed by the laboratories.

Laboratory completeness is defined as percentage of valid data points versus the total expected from the laboratory analyses. The objective stated in the QAPP for this project was greater than 95% laboratory completeness. 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% completeness based on valid data (only 1% 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. Because this project was an initial site investigation for most of the parameters, involving new wells and new soil borings, there was no historical data set for comparisons. Comparability of data within the investigation was maximized by using standard methods for sampling and analysis, reporting data, and data validation, In general, standard RCRA program methods from SW-846 were employed for all analyses with the exception of methods for which no SW-846 method exists (e.g. some wet chemistry parameters) or if no laboratory was certified by NDEP for the appropriate SW-846 method. In this event, alternate, EPA or other accepted methods were utilized. To ensure that multiple laboratories did not contribute results for the same analytes on different samples, analyses were distributed amongst the laboratories on both a method and matrix basis. In the few cases where the methods were different then the matrix was also different The other laboratories each had unique analyte sets as explained in the introduction, so no instances of multiple methods for the same analyte/matrix pair occurred in this dataset.

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). Both nominal MDLs and RLs were provided by the laboratories in Table 7 of the Workplan and were verified during validation. Reporting limits in general were adjusted sample quantitation limits based on the low point of calibration and corrected for sample-specific factors such as exact aliquot size, dry weight for soils, dilutions, etc. Some EMAX RLs and MDLs were elevated slightly above the adjusted low point of calibration and statistical MDL values but were in conformity with SOP and Workplan specified values. In general the MWH reporting limits were based on MDLs so no estimated values between the MDL and RL (laboratory J flagged) were provided.

To determine if the adjusted reporting limits for all project analytes were low enough to meet the project sensitivity requirements a comparison of the project Data Quality Levels (DQLs), based on EPA Region 9 Preliminary Remediation Goals (PRGs) for industrial soils, was made with all the laboratory RLs associated with non-detect results. This comparison yielded only three results, for N-nitroso-di-N-propylamine in the M-120 soils, where the reported RL for a non-detect was above the industrial PRG value. Only industrial PRGs were used for comparison because future land use at the site is limited to industrial/commercial, not residential. N-nitroso-di-N-propylamine is not a SRC for this project. Water DQLs for this project were based on the lower of the EPA Region 9 tap water PRGs or the Federal Maximum Contaminant Levels (MCLs) for drinking water. Laboratory RLs for a total of 77 analytes were above the corresponding water DQL for all the water samples analyzed. These analytes met the RL goals stated in the Workplan, The DQLs for these analytes are not routinely achievable using the conventional EPA methods selected for this project.

5.0 CONCLUSIONS

One hundred percent of the laboratory data for the Upgradient Investigation was validated using standardized guidelines and procedures recommended by EPA and NDEP. 90% 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 was qualified during validation and those results are summarized in Tables E-5 to E-16. The qualified data are grouped in these tables based on the reason for qualification (see Table E-2) and the qualifier symbols, or flags applied (see Table E-1). 8.9% of the results of the total analytical dataset for this project were qualified as estimated due to minor QC problems with precision, accuracy, and representativeness. Based on guidance in the U.S. EPA data usability document (EPA, 1992), estimated data are considered usable with the appropriate interpretation (e.g., consideration of the potential bias).

The results that were rejected due to more serious QC problems with spike recoveries and calibrations constituted only 1.1% of the total analytical dataset for this project**.** These rejected results are considered unusable and should not be used for decision making purposes. Details of the rejected results are discussed in Section 3.14 of this report. The overall impact of these rejected results on the usefulness of the project data is minimal. Most of the rejected results pertain to nondetects for two analytes, 3, 3-dichlorobenzidine and tert-butyl alcohol, which were not SRCs for this project. Results for methanol which were rejected on the basis of cross-contamination were replaced by data from acceptable reanalyses after resampling at the same locations. Antimony results for 6 soil samples from one boring (M-118) were rejected and antimony is a SRC for this project The impact of these rejected antimony results is minimal

however, given that the usable antimony results from this same boring were all several orders of magnitude below the industrial soil PRG value.

All the qualified results were evaluated with respect to the data quality indicators and compared to the QAPP and Workplan goals. Details of this evaluation are discussed in Section 4 of this report. Based on the results of data validation the overall goals for data quality were achieved for this project.

6.0 REFERENCES

EPA. 1992. Guidance for Data Useability in Risk Assessment. Part A.

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
Upgradient Investigation, 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.

Table E-2
Data Validation Qualifier Reason Codes
Upgradient Investigation, 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
Sample IDs and Sample Delivery Groups by Laboratory
Upgradient Investigation, Tronox Facility, Henderson, Nevada

Sample_ID	Matrix	Collection Date	Validation	MWH	EMAX	GEL	STL	FGS	EMS
EB-1	WATER	3/9/2006 14:00	Limited	169405	06C096	158277			
EB-2	WATER	3/14/2006 12:15	Limited	169653					
EB-2	WATER	3/14/2006 12:15	Limited		06C127				
EB-3	WATER	3/24/2006 12:00	Limited	170393	06C239	159244			
FB-1	WATER	3/8/2006 15:30	Limited	169286		158276			
FB-1	WATER	3/8/2006 15:30	Limited		06C081				
H-11	WATER	3/23/2006 15:20	Limited	170342	06C222	159242			
M-103	WATER	3/21/2006 14:00	Limited	170190	06C193	158971			
M-103	WATER	3/23/2006 13:30	Limited	170342					
M-103A	WATER	3/20/2006 15:00	Limited	170033	06C199	158783			
M116-0.5	SOIL	3/12/2006 11:55	Limited			158438			
M116-0.5	SOIL	3/12/2006 11:55	Limited		06C120				
M116-0.5D	SOIL	3/12/2006 0:00	Limited			158438			
M116-0.5D	SOIL	3/12/2006 0:00	Limited		06C120				
M116-0.5R	SOIL	3/24/2006 12:27	Limited		06C238				
M116-10	SOIL	3/12/2006 12:15	Limited		06C120				
M116-10 MS	SOIL	3/12/2006 12:15	Limited		06C120				
M116-10 MSD	SOIL	3/12/2006 12:15	Limited		06C120				
M116-20	SOIL	3/12/2006 12:35	Limited		06C120				
M116-30	SOIL	3/12/2006 12:52	Limited		06C120				
M116-40	SOIL	3/12/2006 13:09	Limited		06C120				
M116-5	SOIL	3/12/2006 12:05	Limited			158438			
M116-5	SOIL	3/12/2006 12:05	Limited		06C120				
M116-50	SOIL	3/12/2006 13:31	Limited		06C120				
M-117	WATER	3/23/2006 14:50	Limited	170342	06C222	159242			
M117 30	SOIL	3/11/2006 8:37	Limited		06C120				
M117-0.5	SOIL	3/11/2006 7:38	Limited			158438			
M117-0.5	SOIL	3/12/2006 7:38	Limited		06C120				
M117-0.5R	SOIL	3/24/2006 12:12	Limited		06C238				
M117-10	SOIL	3/11/2006 7:55	Limited			158438			
M117-10	SOIL	3/11/2006 7:55	Limited		06C120				
M117-20	SOIL	3/11/2006 8:08	Limited		06C120				
M117-20D	SOIL	3/11/2006 0:00	Limited		06C120				
M117-40	SOIL	3/11/2006 8:54	Limited		06C120				
M117-5	SOIL	3/11/2006 7:48	Limited			158438			
M117-5	SOIL	3/11/2006 7:48	Limited		06C120				

Table E-3
Sample IDs and Sample Delivery Groups by Laboratory
Upgradient Investigation, Tronox Facility, Henderson, Nevada

Sample_ID	Matrix	Collection Date	Validation	MWH	EMAX	GEL	STL	FGS	EMS
M117-50	SOIL	3/11/2006 9:25	Limited		06C120				
M117-60	SOIL	3/11/2006 9:50	Limited		06C120				
M117-80	SOIL	3/11/2006 10:34	Limited		06C120				
M117-80D	SOIL	3/11/2006 0:00	Limited		06C120				
M-118	WATER	3/22/2006 14:30	Limited	170259	06C204	159243			
M118-0.5	SOIL	3/8/2006 11:10	Limited			158270			
M118-0.5	SOIL	3/8/2006 11:10	Limited		06C081				
M118-0.5R	SOIL	3/24/2006 9:45	Limited		06C238				
M118-10	SOIL	3/8/2006 11:50	Limited			158270			
M118-10	SOIL	3/8/2006 11:50	Limited		06C081				
M118-20	SOIL	3/8/2006 12:15	Limited		06C081				
M118-20D	SOIL	3/8/2006 0:00	Limited		06C081				
M118-30	SOIL	3/8/2006 13:05	Limited		06C081				
M118-40	SOIL	3/8/2006 13:30	Limited		06C081				
M118-5	SOIL	3/8/2006 11:20	Limited			158270			
M118-5	SOIL	3/8/2006 11:20	Limited		06C081				
M118-50	SOIL	3/8/2006 13:55	Limited		06C081				
M118-50 MS	SOIL	3/8/2006 0:00	Limited		06C081				
M118-50 MSD	SOIL	3/8/2006 0:00	Limited		06C081				
M118-60	SOIL	3/8/2006 14:15	Limited		06C081				
M118-80	SOIL	3/8/2006 15:12	Limited		06C081				
M119-0.5	SOIL	3/14/2006 7:30	Limited			158437			
M119-0.5	SOIL	3/14/2006 7:30	Limited		06C127				
M119-0.5D	SOIL	3/14/2006 0:00	Limited			158437			
M119-0.5D	SOIL	3/14/2006 0:00	Limited		06C127				
M119-10	SOIL	3/14/2006 7:39	Limited		06C127				
M119-20	SOIL	3/14/2006 7:54	Limited		06C127				
M119-32	SOIL	3/14/2006 8:30	Limited		06C127				
M119-40	SOIL	3/14/2006 8:40	Limited		06C127				
M119-5	SOIL	3/14/2006 7:35	Limited			158437			
M119-5	SOIL	3/14/2006 7:35	Limited		06C127				
M119-50	SOIL	3/14/2006 9:00	Limited			158437			
M119-50	SOIL	3/14/2006 9:00	Limited		06C127				
M-120	WATER	5/3/2006 0:00	Full				G6E120362		
M-120	WATER	3/22/2006 10:20	Full	170226	06C204	159247			

Table E-3
Sample IDs and Sample Delivery Groups by Laboratory
Upgradient Investigation, Tronox Facility, Henderson, Nevada

Sample_ID	Matrix	Collection Date	Validation	MWH	EMAX	GEL	STL	FGS	EMS
M-120	WATER	3/22/2006 15:00	Full	170226					
M-120	WATER	3/22/2006 15:15	Full	170226				170226	
M120-0.5	SOIL	3/7/2006 9:10	Full			158048	G6C100424	169215	169215
M120-0.5	SOIL	3/7/2006 9:10	Full		06C071				
M120-0.5R	SOIL	3/24/2006 9:10	Limited		06C238				
M120-10	SOIL	3/7/2006 10:10	Full			158048	G6C100424	169215	169215
M120-10	SOIL	3/7/2006 10:10	Full		06C071				
M120-20	SOIL	3/7/2006 10:45	Full		06C071				
M120-30	SOIL	3/7/2006 11:45	Full			158048	G6C100424	169215	169215
M120-30	SOIL	3/7/2006 11:45	Full		06C071				
M120-40	SOIL	3/7/2006 12:15	Full		06C071				
M120-40D	SOIL	3/7/2006 0:00	Full		06C071				
M120-5	SOIL	3/7/2006 9:30	Full			158048			
M120-5	SOIL	3/7/2006 9:30	Full		06C071				
M120-50	SOIL	3/7/2006 12:45	Full			158048			
M120-50	SOIL	3/7/2006 12:45	Full		06C071				
M120-50 MS	SOIL	3/7/2006 12:45	Full		06C071				
M120-50 MSD	SOIL	3/7/2006 12:45	Full		06C071				
M120-60	SOIL	3/7/2006 13:50	Full		06C071				
M120-80	SOIL	3/7/2006 14:56	Full		06C071				
M-121	WATER	3/23/2006 8:30	Limited	170342	06C222	159242			
M-121	WATER	3/23/2006 14:00	Limited	170342					
M-121 MS	WATER	3/23/2006 8:55	Limited	170342	06C222				
M-121 MS	WATER	3/23/2006 14:00	Limited	170342					
M-121 MSD	WATER	3/23/2006 8:55	Limited	170342	06C222				
M-121 MSD	WATER	3/23/2006 14:00	Limited	170342					
M121-0.5	SOIL	3/10/2006 7:46	Limited		06C106				
M121-0.5	SOIL	3/10/2006 7:46	Limited			158269			
M121-0.5R	SOIL	3/24/2006 9:25	Limited		06C238				
M121-10	SOIL	3/10/2006 8:05	Limited		06C106				
M121-10	SOIL	3/10/2006 8:05	Limited			158269			
M121-20	SOIL	3/10/2006 8:20	Limited		06C106				
M121-30	SOIL	3/10/2006 9:25	Limited		06C106				
M121-40	SOIL	3/10/2006 9:37	Limited		06C106				
M121-5	SOIL	3/10/2006 7:55	Limited		06C106				

Table E-3
Sample IDs and Sample Delivery Groups by Laboratory
Upgradient Investigation, Tronox Facility, Henderson, Nevada

Sample_ID	Matrix	Collection Date	Validation	MWH	EMAX	GEL	STL	FGS	EMS
M121-5	SOIL	3/10/2006 7:55	Limited			158269			
M121-50	SOIL	3/10/2006 10:40	Limited		06C106				
M121-5D	SOIL	3/10/2006 0:00	Limited		06C106				
M121-5D	SOIL	3/10/2006 0:00	Limited			158269			
M121-60	SOIL	3/10/2006 11:08	Limited		06C106				
M121-70	SOIL	3/10/2006 11:45	Limited		06C106				
M121-80	SOIL	3/10/2006 12:00	Limited		06C106				
M121-80	SOIL	3/10/2006 12:00	Limited			158269			
PUMP BLANK	WATER	3/13/2006 10:45	Limited	169585		158275			
TR-10	WATER	3/21/2006 10:20	Limited	170190	06C193	158971			
TR-10	WATER	3/21/2006 13:50	Limited	170190					
TR-10	WATER	3/23/2006 12:45	Limited	170342					
TR-10A	WATER	3/13/2006 14:35	Limited	169580	06C119	158272			
TR-7	WATER	3/21/2006 12:00	Limited	170190	06C193	158971			
TR-7	WATER	3/23/2006 13:00	Limited	170342					
TR-7A	WATER	3/20/2006 10:00	Limited	170033	06C187	158783			
TR-7A	WATER	3/20/2006 11:45	Limited	170033					
TR-8	WATER	3/20/2006 14:00	Limited	170033	06C187	158783			
TR-8A	WATER	3/20/2006 8:00	Limited	170033	06C187	158783			
TR-8A	WATER	3/20/2006 13:15	Limited	170033					
TR-8D	WATER	3/20/2006 0:00	Limited	170033	06C187	158783			
TR-9	WATER	3/21/2006 9:00	Limited	170190	06C193	158971			
TR-9	WATER	3/21/2006 13:40	Limited	170190					
TR-9	WATER	3/23/2006 12:30	Limited	170342					
TR-9A	WATER	3/14/2006 14:45	Limited	169653		158436			
TR-9A	WATER	3/14/2006 14:45	Limited		06C127				
TRIP BLANK	WATER	3/8/2006 0:00	Limited		06C081				

Note:
MWH, EMAX, GEL, STL, FGS, EMS - designations for participating analytical laboratories

Table E-4
Sample Delivery Groups and Analyses
Upgradient Investigation, Tronox Facility, Henderson, Nevada

			Metals		WetChem				TPH		Fuel Alcohols		OCP	PCB	OPP	Dioxin	Rad		VOC	SVOC	MeHg	Asbestos
SDG ID	**ENSR ID**	**LAB**	**LL**	**SL**	**ClO4**	**Cr+6**	**LL**	**SL**	**GRO**	**DRO**	**M+EOH**	**EG**					**LL**	**SL**				
158048	**TH015**	GEL															**3**	**2**				
158269	TH001	GEL																4				
158270	TH002	GEL																2				
158272	TH003	GEL																1				
158275	TH004	GEL																1				
158276	TH005	GEL																1				
158277	TH006	GEL																1				
158436	TH007	GEL																1				
158437	TH008	GEL																4				
158438	TH009	GEL																5				
158783	TH010	GEL																	5			
158971	TH011	GEL																	4			
159242	TH012	GEL																3				
159243	TH013	GEL																1				
159244	TH014	GEL																1				
159247	**TH016**	GEL															**1**					
169215	**TH033**	FGS																			**3**	
169215	**TH053**	EMS																				**3**
169286	TH035	MWH		1	1	1																
169405	TH036	MWH		1	1	1																
169580	TH037	MWH		1	1	1		1														
169585	TH038	MWH		1	1	1		1														
169653	TH039	MWH		2	2	1		1														
170033	TH040	MWH		5	5	5		5														
170190	TH042	MWH		4	4			4														
170226	TH034	FGS																			**1**	
170226	**TH041**	MWH	**1**		**1**	**1**	**1**										**1**					**1**
170259	TH043	MWH	1		1	1	1															
170342	TH044	MWH		3	3	7		3														
170393	TH045	MWH		1	1	1		1														
06C071	**TH018**	EMAX		**10**	**10**	**10**	**3**		**6**	**6**	**6**	**6**	**3**	**3**	**3**				**6**	**3**		
06C081	TH019	EMAX		10	10	10		2	7	7	7	9							8			
06C096	TH020	EMAX							1	1	1	1							1			
06C106	TH021	EMAX		10	10	10		2	9	9	7	7							9			
06C119	TH022	EMAX							1	1	1	1							1			
06C120	TH023	EMAX		19	17	19		2	13	13	13	13							13			
06C127	TH024	EMAX		8	8	5		1	8	8	8	8							8			
06C187	TH026	EMAX							4	4	4	4							4			
06C193	TH027	EMAX							4	4	4	4							4			
06C199	TH025	EMAX							1	1	1	1							1			
06C204	**TH028**	EMAX							**2**	**2**	**2**	**2**	**1**	**1**	**1**				**2**	**1**		
06C222	TH029	EMAX							3	3	3	3							3			
06C238	TH031	EMAX									5											
06C239	TH030	EMAX							1	1	1	1	1	1	1				1	1		
06D012	TH032	EMAX									2											
G6C100424	**TH017**	STL														**3**						
G6E120362	**TH052**	STL														**1**						

Notes:
SDGs in bold indicate full data validation
LL = Long List of analytes
SL = Short List of analytes
ClO4 = Perchlorate
Cr+6 = Hexavalent chromium
M+EOH = Methanol and Ethanol
EG = Ethylene glycol
OCP = Organochlorine pesticides
OPP = Organophosphorous pesticides
Rad = radionuclides
MeHg = Methylmercury

Table E-5
Qualifications Based on Holding Time Exceedances
Upgradient Investigation, Tronox Facility - Henderson, Nevada

Sample ID	SDG	ENSR ID	Method	Matrix	Analyte	Result	Units	Qualifier[1]	Reason[2]
TR-10A_03/13/2006	169580	TH037	SW 846 9040B	W	Laboratory pH	8.3	s.u.	J	j-h
TR-9A_03/14/2006	169653	TH039	SW 846 9040B	W	Laboratory pH	8.0	s.u.	J	j-h
M-103A_03/20/2006	170033	TH040	SW 846 9040B	W	Laboratory pH	7.9	s.u.	J	j-h
TR-8A_03/20/2006	170033	TH040	SW 846 9040B	W	Laboratory pH	8.0	s.u.	J	j-h
TR-8_03/20/2006	170033	TH040	SW 846 9040B	W	Laboratory pH	8.0	s.u.	J	j-h
TR-7A_03/20/2006	170033	TH040	SW 846 9040B	W	Laboratory pH	8.0	s.u.	J	j-h
TR-8D_03/20/2006	170033	TH040	SW 846 9040B	W	Laboratory pH	7.9	s.u.	J	j-h
M-103_03/21/2006	170190	TH042	SW 846 9040B	W	Laboratory pH	6.7	s.u.	J	j-h
TR-9_03/21/2006	170190	TH042	SW 846 9040B	W	Laboratory pH	8.0	s.u.	J	j-h
TR-7_03/21/2006	170190	TH042	SW 846 9040B	W	Laboratory pH	7.9	s.u.	J	j-h
TR-10_03/21/2006	170190	TH042	SW 846 9040B	W	Laboratory pH	7.9	s.u.	J	j-h
M-118_03/22/2006	170259	TH043	SW 846 9040B	W	Laboratory pH	8.2	s.u.	J	j-h
M-120_03/22/2006	170226	TH041	SW 846 9030	W	Sulfide	0.05	mg/l	UJ	j-h
M-120_03/22/2006	170226	TH041	SW 846 9040B	W	Laboratory pH	7.6	s.u.	J	j-h
M-121_03/23/2006	170342	TH044	SW 846 9056	W	Nitrite	1.0	mg/l	UJ	j-h
M-121_03/23/2006	170342	TH044	SW 846 9040B	W	Laboratory pH	7.7	s.u.	J	j-h
M-121_03/23/2006	170342	TH044	SW 846 9056	W	Nitrate (as N)	7.9	mg/l	J-	j-h
H-11_03/23/2006	170342	TH044	SW 846 9040B	W	Laboratory pH	5.0	s.u.	J	j-h
M-117_03/23/2006	170342	TH044	SW 846 9040B	W	Laboratory pH	8.0	s.u.	J	j-h
EB-3_03/24/2006	170393	TH045	SW 846 9040B	W	Laboratory pH	6.3	s.u.	J	j-h

Notes

[1]See Table E-1 for Data Validation Qualifiers

[2]See Table E-2 for reason code definitions

mg/L - milligram /liter

S.U. - standard units

W - water

Table E-6
Qualifications Based on Calibration Criteria Exceeded
Upgradient Investigation, Tronox Facility, Henderson, Nevada

Sample ID	SDG	ENSR ID	Method	Matrix	Analyte	Result	Units	Qualifier[1]	Reason[2]
M120-5_03/07/2006	158048	TH015	DOE RP 280 mod	SO	Lead - 210 total	0.0735	pCi/g	UJ	uj-cp
M120-0.5_03/07/2006	158048	TH015	DOE RP 280 mod	SO	Lead - 210 total	0.462	pCi/g	UJ	uj-cp
M120-10_03/07/2006	158048	TH015	DOE RP 280 mod	SO	Lead - 210 total	-0.0593	pCi/g	UJ	uj-cp
M120-30_03/07/2006	158048	TH015	DOE RP 280 mod	SO	Lead - 210 total	0.0294	pCi/g	UJ	uj-cp
M120-50_03/07/2006	158048	TH015	DOE RP 280 mod	SO	Lead - 210 total	0.533	pCi/g	UJ	uj-cp
M-120_03/22/2006	159247	TH016	DOE RP 280 mod	W	Lead - 210 total	-0.346	pCi/L	UJ	uj-cp
M-120_03/22/2006	159247	TH016	EPA 904.0 mod	W	Ra-228 - total	0.381	pCi/L	UJ	uj-c
M120-0.5_03/07/2006	G6C100424	TH017	SW 846 8290	SO	Total Tetrachlorodibenzo-p-dioxin	0.55	pg/g	J	j-c
M120-0.5_03/07/2006	G6C100424	TH017	SW 846 8290	SO	Total Tetrachlorodibenzofuran	20	pg/g	J	j-c
M120-0.5_03/07/2006	G6C100424	TH017	SW 846 8290	SO	Total Pentachlorodibenzofuran	22	pg/g	J	j-c
M120-10_03/07/2006	G6C100424	TH017	SW 846 8290	SO	Total Tetrachlorodibenzofuran	0.74	pg/g	J	j-c, j-i
M120-30_03/07/2006	06C071	TH018	SW 846 8260B	SO	t-Butyl alcohol		UG/KG	R	r-c
M120-0.5_03/07/2006	06C071	TH018	SW 846 8260B	SO	t-Butyl alcohol		UG/KG	R	r-c
M120-0.5_03/07/2006	06C071	TH018	SW 846 8141A	SO	Naled	0.037	MG/KG	UJ	uj-c
M120-10_03/07/2006	06C071	TH018	SW 846 8141A	SO	Naled	0.035	MG/KG	UJ	uj-c
M120-5_03/07/2006	06C071	TH018	SW 846 8260B	SO	t-Butyl alcohol		UG/KG	R	r-c
M120-30_03/07/2006	06C071	TH018	SW 846 8141A	SO	Naled	0.037	MG/KG	UJ	uj-c
M120-50_03/07/2006	06C071	TH018	SW 846 8260B	SO	t-Butyl alcohol		UG/KG	R	r-c
M120-80_03/07/2006	06C071	TH018	SW 846 8260B	SO	t-Butyl alcohol		UG/KG	R	r-c
M120-10_03/07/2006	06C071	TH018	SW 846 8260B	SO	t-Butyl alcohol		UG/KG	R	r-c
M118-5_03/08/2006	06C081	TH019	SW 846 8260B	SO	t-Butyl alcohol		UG/KG	R	r-c
FB-1_03/08/2006	06C081	TH019	SW 846 8260B	W	t-Butyl alcohol		UG/L	R	r-c
BLANK_03/08/2006	06C081	TH019	SW 846 8260B	W	t-Butyl alcohol		UG/L	R	r-c
M118-50_03/08/2006	06C081	TH019	SW 846 8260B	SO	t-Butyl alcohol		UG/KG	R	r-c
M118-0.5_03/08/2006	06C081	TH019	SW 846 8260B	SO	t-Butyl alcohol		UG/KG	R	r-c
M118-30_03/08/2006	06C081	TH019	SW 846 8260B	SO	t-Butyl alcohol		UG/KG	R	r-c
M118-10_03/08/2006	06C081	TH019	SW 846 8260B	SO	t-Butyl alcohol		UG/KG	R	r-c
M118-80_03/08/2006	06C081	TH019	SW 846 8260B	SO	t-Butyl alcohol		UG/KG	R	r-c
EB-1_03/09/2006	06C096	TH020	SW 846 8260B	W	t-Butyl alcohol		UG/L	R	r-c
M121-10_03/10/2006	06C106	TH021	SW 846 8260B	SO	t-Butyl alcohol		UG/KG	R	r-c
M121-80_03/10/2006	06C106	TH021	SW 846 8260B	SO	t-Butyl alcohol		UG/KG	R	r-c
M121-30_03/10/2006	06C106	TH021	SW 846 8260B	SO	t-Butyl alcohol		UG/KG	R	r-c

Table E-6
Qualifications Based on Calibration Criteria Exceeded
Upgradient Investigation, Tronox Facility, Henderson, Nevada

(continued)

Sample ID	SDG	ENSR ID	Method	Matrix	Analyte	Result	Units	Qualifier[1]	Reason[2]
M121-5_03/10/2006	06C106	TH021	SW 846 8260B	SO	t-Butyl alcohol		UG/KG	R	r-c
M121-70_03/10/2006	06C106	TH021	SW 846 8260B	SO	t-Butyl alcohol		UG/KG	R	r-c
M121-0.5_03/10/2006	06C106	TH021	SW 846 8260B	SO	t-Butyl alcohol		UG/KG	R	r-c
M121-60_03/10/2006	06C106	TH021	SW 846 8260B	SO	t-Butyl alcohol		UG/KG	R	r-c
M121-50_03/10/2006	06C106	TH021	SW 846 8260B	SO	t-Butyl alcohol		UG/KG	R	r-c
M121-5D_03/10/2006	06C106	TH021	SW 846 8260B	SO	t-Butyl alcohol		UG/KG	R	r-c
TR-10A_03/13/2006	06C119	TH022	SW 846 8260B	W	t-Butyl alcohol		UG/L	R	r-c
M117-50_03/11/2006	06C120	TH023	SW 846 8260B	SO	2,2-Dichloropropane	6.7	UG/KG	UJ	uj-c
M117-5_03/11/2006	06C120	TH023	SW 846 8260B	SO	2,2-Dichloropropane	5.2	UG/KG	UJ	uj-c
M117-30_03/11/2006	06C120	TH023	SW 846 8260B	SO	t-Butyl alcohol		UG/KG	R	r-c
M117-5_03/11/2006	06C120	TH023	SW 846 8260B	SO	t-Butyl alcohol		UG/KG	R	r-c
M117-50_03/11/2006	06C120	TH023	SW 846 8260B	SO	t-Butyl alcohol		UG/KG	R	r-c
M117-80_03/11/2006	06C120	TH023	SW 846 8260B	SO	t-Butyl alcohol		UG/KG	R	r-c
M117-80_03/11/2006	06C120	TH023	SW 846 8260B	SO	2,2-Dichloropropane	5	UG/KG	UJ	uj-c
M116-0.5D_03/12/2006	06C120	TH023	SW 846 8260B	SO	2,2-Dichloropropane	5.9	UG/KG	UJ	uj-c
M117-80D_03/11/2006	06C120	TH023	SW 846 8260B	SO	t-Butyl alcohol		UG/KG	R	r-c
M116-30_03/12/2006	06C120	TH023	SW 846 8260B	SO	t-Butyl alcohol		UG/KG	R	r-c
M117-80D_03/11/2006	06C120	TH023	SW 846 8260B	SO	2,2-Dichloropropane	5.2	UG/KG	UJ	uj-c
M116-50_03/12/2006	06C120	TH023	SW 846 8260B	SO	2,2-Dichloropropane	5.9	UG/KG	UJ	uj-c
M117-0.5_03/11/2006	06C120	TH023	SW 846 8260B	SO	2,2-Dichloropropane	4.8	UG/KG	UJ	uj-c
M117-10_03/11/2006	06C120	TH023	SW 846 8260B	SO	2,2-Dichloropropane	5.1	UG/KG	UJ	uj-c
M116-0.5_03/12/2006	06C120	TH023	SW 846 8260B	SO	t-Butyl alcohol		UG/KG	R	r-c
M117-0.5_03/11/2006	06C120	TH023	SW 846 8260B	SO	t-Butyl alcohol		UG/KG	R	r-c
M116-0.5_03/12/2006	06C120	TH023	SW 846 8260B	SO	2,2-Dichloropropane	4.9	UG/KG	UJ	uj-c
M116-10_03/12/2006	06C120	TH023	SW 846 8260B	SO	t-Butyl alcohol		UG/KG	R	r-c
M116-50_03/12/2006	06C120	TH023	SW 846 8260B	SO	t-Butyl alcohol		UG/KG	R	r-c
M117-30_03/11/2006	06C120	TH023	SW 846 8260B	SO	2,2-Dichloropropane	7.4	UG/KG	UJ	uj-c
M116-5_03/12/2006	06C120	TH023	SW 846 8260B	SO	2,2-Dichloropropane	7.8	UG/KG	UJ	uj-c
M116-5_03/12/2006	06C120	TH023	SW 846 8260B	SO	t-Butyl alcohol		UG/KG	R	r-c
M116-30_03/12/2006	06C120	TH023	SW 846 8260B	SO	2,2-Dichloropropane	7.9	UG/KG	UJ	uj-c
M116-10_03/12/2006	06C120	TH023	SW 846 8260B	SO	2,2-Dichloropropane	7	UG/KG	UJ	uj-c
M117-10_03/11/2006	06C120	TH023	SW 846 8260B	SO	t-Butyl alcohol		UG/KG	R	r-c

Table E-6
Qualifications Based on Calibration Criteria Exceeded
Upgradient Investigation, Tronox Facility, Henderson, Nevada

(continued)

Sample ID	SDG	ENSR ID	Method	Matrix	Analyte	Result	Units	Qualifier[1]	Reason[2]
M116-0.5D_03/12/2006	06C120	TH023	SW 846 8260B	SO	t-Butyl alcohol		UG/KG	R	r-c
M119-5_03/14/2006	06C127	TH024	SW 846 8260B	SO	t-Butyl alcohol		UG/KG	R	r-c
EB-2_03/14/2006	06C127	TH024	SW 846 8260B	W	t-Butyl alcohol		UG/L	R	r-c
M119-32_03/14/2006	06C127	TH024	SW 846 8260B	SO	t-Butyl alcohol		UG/KG	R	r-c
M119-10_03/14/2006	06C127	TH024	SW 846 8260B	SO	2,2-Dichloropropane	5.3	UG/KG	UJ	uj-c
TR-9A_03/14/2006	06C127	TH024	SW 846 8260B	W	t-Butyl alcohol		UG/L	R	r-c
M119-50_03/14/2006	06C127	TH024	SW 846 8260B	SO	t-Butyl alcohol		UG/KG	R	r-c
M119-5_03/14/2006	06C127	TH024	SW 846 8260B	SO	2,2-Dichloropropane	6.6	UG/KG	UJ	uj-c
M119-10_03/14/2006	06C127	TH024	SW 846 8260B	SO	t-Butyl alcohol		UG/KG	R	r-c
M119-0.5D_03/14/2006	06C127	TH024	SW 846 8260B	SO	2,2-Dichloropropane	5.5	UG/KG	UJ	uj-c
M119-0.5D_03/14/2006	06C127	TH024	SW 846 8260B	SO	t-Butyl alcohol		UG/KG	R	r-c
M119-0.5_03/14/2006	06C127	TH024	SW 846 8260B	SO	t-Butyl alcohol		UG/KG	R	r-c
M119-0.5_03/14/2006	06C127	TH024	SW 846 8260B	SO	2,2-Dichloropropane	5.5	UG/KG	UJ	uj-c
M-103A_03/20/2006	06C199	TH025	SW 846 8260B	W	Naphthalene	5	UG/L	UJ	uj-c
M-103A_03/20/2006	06C199	TH025	SW 846 8260B	W	t-Butyl alcohol		UG/L	R	r-c
TR-7A_03/20/2006	06C187	TH026	SW 846 8260B	W	t-Butyl alcohol		UG/L	R	r-c
TR-8_03/20/2006	06C187	TH026	SW 846 8260B	W	t-Butyl alcohol		UG/L	R	r-c
BLANK_03/20/2006	06C187	TH026	SW 846 8260B	W	t-Butyl alcohol		UG/L	R	r-c
TR-8D_03/20/2006	06C187	TH026	SW 846 8260B	W	t-Butyl alcohol		UG/L	R	r-c
TR-8A_03/20/2006	06C187	TH026	SW 846 8260B	W	t-Butyl alcohol		UG/L	R	r-c
M-103_03/21/2006	06C193	TH027	SW 846 8260B	W	t-Butyl alcohol		UG/L	R	r-c
TR-7_03/21/2006	06C193	TH027	SW 846 8260B	W	t-Butyl alcohol		UG/L	R	r-c
TR-10_03/21/2006	06C193	TH027	SW 846 8260B	W	t-Butyl alcohol		UG/L	R	r-c
TR-9_03/21/2006	06C193	TH027	SW 846 8260B	W	t-Butyl alcohol		UG/L	R	r-c
BLANK_03/21/2006	06C193	TH027	SW 846 8260B	W	t-Butyl alcohol		UG/L	R	r-c
BLANK_03/22/2006	06C204	TH028	SW 846 8260B	W	t-Butyl alcohol		UG/L	R	r-c
M-118_03/22/2006	06C204	TH028	SW 846 8260B	W	Naphthalene	5	UG/L	UJ	uj-c
BLANK_03/22/2006	06C204	TH028	SW 846 8260B	W	Naphthalene	5	UG/L	UJ	uj-c
M-120_03/22/2006	06C204	TH028	SW 846 8260B	W	t-Butyl alcohol		UG/L	R	r-c
M-120_03/22/2006	06C204	TH028	SW 846 8260B	W	Naphthalene	5	UG/L	UJ	uj-c
M-118_03/22/2006	06C204	TH028	SW 846 8260B	W	t-Butyl alcohol		UG/L	R	r-c

Table E-6
Qualifications Based on Calibration Criteria Exceeded
Upgradient Investigation, Tronox Facility, Henderson, Nevada

(continued)

Sample ID	SDG	ENSR ID	Method	Matrix	Analyte	Result	Units	Qualifier[1]	Reason[2]
M-117_03/23/2006	06C222	TH029	SW 846 8260B	W	Naphthalene	5	UG/L	UJ	uj-c
BLANK_03/23/2006	06C222	TH029	SW 846 8260B	W	Naphthalene	5	UG/L	UJ	uj-c
BLANK_03/23/2006	06C222	TH029	SW 846 8260B	W	t-Butyl alcohol		UG/L	R	r-c
H-11_03/23/2006	06C222	TH029	SW 846 8260B	W	Naphthalene	5	UG/L	UJ	uj-c
M-121_03/23/2006	06C222	TH029	SW 846 8260B	W	t-Butyl alcohol		UG/L	R	r-c
M-121_03/23/2006	06C222	TH029	SW 846 8260B	W	Naphthalene	5	UG/L	UJ	uj-c
M-117_03/23/2006	06C222	TH029	SW 846 8260B	W	t-Butyl alcohol		UG/L	R	r-c
H-11_03/23/2006	06C222	TH029	SW 846 8260B	W	t-Butyl alcohol		UG/L	R	r-c
BLANK_03/24/2006	06C239	TH030	SW 846 8260B	W	t-Butyl alcohol		UG/L	R	r-c
EB-3_03/24/2006	06C239	TH030	SW 846 8260B	W	t-Butyl alcohol		UG/L	R	r-c
EB-3_03/24/2006	06C239	TH030	SW 846 8260B	W	Naphthalene	5	UG/L	UJ	uj-c
EB-3_03/24/2006	06C239	TH030	SW 846 8141A	W	Naled	1.2	UG/L	UJ	uj-c,
BLANK_03/24/2006	06C239	TH030	SW 846 8260B	W	Naphthalene	5	UG/L	UJ	uj-c

Notes:

[1] See Table E-1 for Data Validation Qualifiers

[2] See Table E-2 for reason code definitions

SO - soil

W - water

pg/g - picogram/gram

ug/kg - microgram/kilogram

mg/kg - milligram/kilogram

ug/l - microgram/liter

pCi/g - picoCuries/gram

Table E-7
Qualifications Based on Interference Check Sample Results
Upgradient Investigation, Tronox Facility, Henderson, Nevada

Sample ID	SDG	ENSR ID	Method	Matrix	Analyte	Result	Units	Qualifier[1]	Reason Code[2]
M120-0.5_03/07/2006	06C071	TH018	SW 846 6020A	SO	Cadmium	0.687	mg/kg	J+	j-z
M120-0.5_03/07/2006	06C071	TH018	SW 846 6020A	SO	Copper	56.2	mg/kg	J+	j-z
M120-0.5_03/07/2006	06C071	TH018	SW 846 6020A	SO	Manganese	479		J+	j-z
M120-10_03/07/2006	06C071	TH018	SW 846 6020A	SO	Cadmium	0.502	mg/kg	J+	j-z
M120-10_03/07/2006	06C071	TH018	SW 846 6020A	SO	Copper	76.8	mg/kg	J+	j-z
M120-10_03/07/2006	06C071	TH018	SW 846 6020A	SO	Manganese	544	mg/kg	J+	j-z
M120-20_03/07/2006	06C071	TH018	SW 846 6020A	SO	Cadmium	0.429	mg/kg	J+	j-z
M120-20_03/07/2006	06C071	TH018	SW 846 6020A	SO	Copper	27.1	mg/kg	J+	j-z
M120-20_03/07/2006	06C071	TH018	SW 846 6020A	SO	Manganese	327	mg/kg	J+	j-z
M120-30_03/07/2006	06C071	TH018	SW 846 6020A	SO	Cadmium	0.613	mg/kg	J+	j-z
M120-30_03/07/2006	06C071	TH018	SW 846 6020A	SO	Copper	29.2	mg/kg	J+	j-z
M120-30_03/07/2006	06C071	TH018	SW 846 6020A	SO	Manganese	149	mg/kg	J+	j-z
M120-40D_03/07/2006	06C071	TH018	SW 846 6020A	SO	Cadmium	0.696	mg/kg	J+	j-z
M120-40D_03/07/2006	06C071	TH018	SW 846 6020A	SO	Manganese	288	mg/kg	J+	j-z
M120-60_03/07/2006	06C071	TH018	SW 846 6020A	SO	Cadmium	0.473	mg/kg	J+	j-z
M120-60_03/07/2006	06C071	TH018	SW 846 6020A	SO	Copper	11.1	mg/kg	J+	j-z
M120-60_03/07/2006	06C071	TH018	SW 846 6020A	SO	Manganese	253	mg/kg	J+	j-z
M120-80_03/07/2006	06C071	TH018	SW 846 6020A	SO	Cadmium	0.361	mg/kg	J+	j-z
M120-80_03/07/2006	06C071	TH018	SW 846 6020A	SO	Copper	21.3	mg/kg	J+	j-z
M120-80_03/07/2006	06C071	TH018	SW 846 6020A	SO	Manganese	336	mg/kg	J+	j-z

Notes:

[1] See Table E-1 for Data Validation Qualifiers

[2]See Table E-2 for reason code definitions

SO - soil

mg/kg - milligram/kilogram

Table E-8
Qualifications Based on Blank Contamination
Upgradient Investigation, Tronox Facility, Henderson, Nevada

Sample ID	SDG	ENSR ID	Method	Matrix	Analyte	Result	Units	Qualifier[1]	Reason Code[2]
M121-0.5_03/10/2006	158269	TH001	HASL-300 Th mod	SO	Th-230 - total	0.824	pCi/g	B	u-b
M121-80_03/10/2006	158269	TH001	HASL-300 Th mod	SO	Th-230 - total	1.13	pCi/g	B	u-b
M121-5D_03/10/2006	158269	TH001	HASL-300 Th mod	SO	Th-230 - total	1.26	pCi/g	B	u-b
M121-5_03/10/2006	158269	TH001	HASL-300 Th mod	SO	Th-230 - total	1.32	pCi/g	B	u-b
M118-0.5_03/08/2006	158270	TH002	HASL-300 Th mod	SO	Th-230 - total	0.892	pCi/g	B	u-b
M118-5_03/08/2006	158270	TH002	HASL-300 Th mod	SO	Th-230 - total	1.18	pCi/g	B	u-b
M119-5_03/14/2006	158437	TH008	HASL-300 Th mod	SO	Th-230 - total	0.687	pCi/g	B	u-b
0.5D_03/14/2006	158437	TH008	HASL-300 Th mod	SO	Th-230 - total	1.12	pCi/g	B	u-b
M119-0.5_03/14/2006	158437	TH008	HASL-300 Th mod	SO	Th-230 - total	0.948	pCi/g	B	u-b
M117-5_03/11/2006	158438	TH009	HASL-300 Th mod	SO	Th-230 - total	1.33	pCi/g	JB	j-b
M117-0.5_03/11/2006	158438	TH009	HASL-300 Th mod	SO	Th-230 - total	1.15	pCi/g	B	u-b
M116-5_03/12/2006	158438	TH009	HASL-300 Th mod	SO	Th-230 - total	0.873	pCi/g	B	u-b
0.5D_03/12/2006	158438	TH009	HASL-300 Th mod	SO	Th-230 - total	1.24	pCi/g	B	u-b
M116-0.5_03/12/2006	158438	TH009	HASL-300 Th mod	SO	Th-230 - total	0.704	pCi/g	B	u-b
M-103A_03/20/2006	158783	TH010	EPA 903.1 mod	W	Ra-226 - total	0.969	pCi/L	B	u-be
H-11_03/23/2006	159242	TH012	EPA 903.1 mod	W	Ra-226 - total	0.422	pCi/L	B	u-be
M120-50_03/07/2006	06C071	TH018	SW 846 8260B	SO	Acetone	42	ug/kg	U	u-be
M120-10_03/07/2006	06C071	TH018	SW 846 8260B	SO	Acetone	10	ug/kg	U	u-be
M118-50_03/08/2006	06C081	TH019	SW 846 8260B	SO	Acetone	15	ug/kg	U	u-be
M118-0.5_03/08/2006	06C081	TH019	SW 846 8260B	SO	Acetone	9.2	ug/kg	U	u-be
M121-5_03/10/2006	06C106	TH021	SW 846 6020A	SO	Molybdenum	0.557	ug/kg	U	u-bl
M121-80_03/10/2006	06C106	TH021	SW 846 8260B	SO	Acetone	18	ug/kg	U	u-be
M121-10_03/10/2006	06C106	TH021	SW 846 8260B	SO	Acetone	9.7	ug/kg	U	u-be
M121-10_03/10/2006	06C106	TH021	SW 846 6020A	SO	Molybdenum	0.604	mg/kg	U	u-bl
M121-20_03/10/2006	06C106	TH021	SW 846 6020A	SO	Molybdenum	0.549	mg/kg	U	u-bl
M121-30_03/10/2006	06C106	TH021	SW 846 6020A	SO	Molybdenum	0.665	mg/kg	U	u-bl
M121-30_03/10/2006	06C106	TH021	SW 846 8260B	SO	Acetone	14	mg/kg	U	u-be
M121-40_03/10/2006	06C106	TH021	SW 846 6020A	SO	Molybdenum	0.549	mg/kg	U	u-bl
M121-80_03/10/2006	06C106	TH021	SW 846 6020A	SO	Molybdenum	0.69	mg/kg	U	u-bl
M121-5D_03/10/2006	06C106	TH021	SW 846 6020A	SO	Molybdenum	0.552	mg/kg	U	u-bl

Table E-8
Qualifications Based on Blank Contamination
Upgradient Investigation, Tronox Facility, Henderson, Nevada

(continued)

Sample ID	SDG	ENSR ID	Method	Matrix	Analyte	Result	Units	Qualifier[1]	Reason Code[2]
M121-50_03/10/2006	06C106	TH021	SW 846 6020A	SO	Molybdenum	0.532	mg/kg	U	u-bl
M116-0.5_03/12/2006	06C120	TH023	SW 846 8260B	SO	Acetone	12	ug/kg	U	u-be
0.5D_03/12/2006	06C120	TH023	SW 846 8260B	SO	Acetone	22	ug/kg	U	u-be
M116-10_03/12/2006	06C120	TH023	SW 846 8260B	SO	Acetone	14	ug/kg	U	u-be
M117-0.5_03/11/2006	06C120	TH023	SW 846 8260B	SO	Acetone	9.6	ug/kg	U	u-be
M117-10_03/11/2006	06C120	TH023	SW 846 8260B	SO	Acetone	27	ug/kg	U	u-be
M117-5_03/11/2006	06C120	TH023	SW 846 8260B	SO	Acetone	15	ug/kg	U	u-be
M117-50_03/11/2006	06C120	TH023	SW 846 8260B	SO	Acetone	13	ug/kg	U	u-be
M116-50_03/12/2006	06C120	TH023	SW 846 8260B	SO	Acetone	12	ug/kg	U	u-be
M119-0.5_03/14/2006	06C127	TH024	SW 846 8260B	SO	Acetone	11	ug/kg	U	u-be
M119-40_03/14/2006	06C127	TH024	SW 846 6020A	SO	Zinc	44.3	mg/kg	J+	j-be
TR-9A_03/14/2006	169653	TH039	SW 846 6020	W	Cobalt	7.0	ug/l	J+	j-be, j-i
M-103A_03/20/2006	170033	TH040	SW 846 6020	W	Cobalt	4.6	ug/l	J+	j-be, j-i
H-11_03/23/2006	170342	TH044	SW 846 6020	W	Barium	22	ug/l	J+	j-be, j-i

Notes:
[1]See Table E-1 for Data Validation Qualifiers
[2]See Table E-2 for reason code definitions
SO - soil
W - water
ug/kg - microgram/kilogram
mg/kg - milligram/kilogram
ug/L - microgram/liter
pCi/L - picoCuries/gram

Table E-9
Qualifications Based on Laboratory Control Samples
Upgradient Investigation, Tronox Facility, Henderson, Nevada

Sample ID	SDG	ENSR ID	Method	Matrix	Analyte	Result	Units	Qualifier[1]	Reason Code[2]
M-120_03/22/2006	06C204	TH028	SW 846 8270C	W	3,3-Dichlorobenzidine		ug/l	R	r-l
EB-3_03/24/2006	06C239	TH030	SW 846 8270C	W	3,3-Dichlorobenzidine		ug/l	R	r-l

Notes:
W - water
ug/L - microgram/liter
[1]See Table E-1 for Data Validation Qualifiers
[2]See Table E-2 for reason code definitions

Table E-10
Qualifications Based on Matrix Spike Recoveries
Upgradient Investigation, Tronox Facility, Henderson, Nevada

Sample ID	SDG	ENSR ID	Method	Matrix	Analyte	Result	Units	Qualifier[1]	Reason Code[2]
M120-0.5_03/07/2006	G6C100424	TH017	SW 846 8290	SO	1,2,3,4,5,6,7,8-Octachlorodibenzo-p-dioxin	33	pg/g	J	j-m, j-d
M120-0.5_03/07/2006	G6C100424	TH017	SW 846 8290	SO	1,2,3,4,6,7,8-Heptachlorodibenzofuran	30	pg/g	J	j-m, j-d
M120-0.5_03/07/2006	G6C100424	TH017	SW 846 8290	SO	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	6.7	pg/g	J	j-m, j-d
M120-0.5_03/07/2006	G6C100424	TH017	SW 846 8290	SO	1,2,3,4,7,8-Hexachlorodibenzofuran	11	pg/g	J	j-m, j-d
M120-0.5_03/07/2006	G6C100424	TH017	SW 846 8290	SO	1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	2.7	pg/g	UJ	j-m, j-d,
M120-0.5_03/07/2006	G6C100424	TH017	SW 846 8290	SO	1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	2.7	pg/g	UJ	j-m, j-d
M120-0.5_03/07/2006	G6C100424	TH017	SW 846 8290	SO	1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	2.7	pg/g	UJ	j-m, j-d
M120-0.5_03/07/2006	G6C100424	TH017	SW 846 8290	SO	1,2,3,7,8-Pentachlorodibenzo-p-dioxin	0.62	pg/g	UJ	j-m, j-d
M120-0.5_03/07/2006	G6C100424	TH017	SW 846 8290	SO	2,3,7,8-Tetrachlorodibenzofuran	2.9	pg/g	J	j-m, j-d
M120-0.5_03/07/2006	G6C100424	TH017	SW 846 8290	SO	2,3,7,8-Tetrachlorodibenzo-p-dioxin	0.53	pg/g	UJ	uj-m, uj-d
M120-0.5_03/07/2006	G6C100424	TH017	SW 846 8290	SO	Total Heptachlorodibenzofuran	52	pg/g	J	j-m
M120-0.5_03/07/2006	G6C100424	TH017	SW 846 8290	SO	Total Heptachlorodibenzo-p-dioxin	12	pg/g	J	j-m
M120-0.5_03/07/2006	G6C100424	TH017	SW 846 8290	SO	Total Hexachlorodibenzofuran	51	pg/g	J	j-m
M120-0.5_03/07/2006	G6C100424	TH017	SW 846 8290	SO	Total Hexachlorodibenzo-p-dioxin	2.7	pg/g	UJ	uj-m
M120-0.5_03/07/2006	G6C100424	TH017	SW 846 8290	SO	Total Pentachlorodibenzo-p-dioxin	2.7	pg/g	UJ	uj-m, uj-q
M120-50_03/07/2006	06C071	TH018	SW 846 6020A	SO	Antimony	0.17	mg/kg	J-	uj-m
M120-20_03/07/2006	06C071	TH018	SW 846 6020A	SO	Antimony	0.529	mg/kg	UJ	uj-m
M120-60_03/07/2006	06C071	TH018	SW 846 6020A	SO	Antimony	0.599	mg/kg	UJ	uj-m
M120-80_03/07/2006	06C071	TH018	SW 846 6020A	SO	Antimony	0.602	mg/kg	UJ	uj-m
M120-0.5_03/07/2006	06C071	TH018	SW 846 6020A	SO	Antimony	0.559	mg/kg	UJ	uj-m
M120-30_03/07/2006	06C071	TH018	SW 846 6020A	SO	Antimony	0.558	mg/kg	UJ	uj-m
M120-40_03/07/2006	06C071	TH018	SW 846 6020A	SO	Antimony	0.548	mg/kg	UJ	uj-m
M120-40D_03/07/2006	06C071	TH018	SW 846 6020A	SO	Antimony	0.561	mg/kg	UJ	uj-m
M120-5_03/07/2006	06C071	TH018	SW 846 6020A	SO	Antimony	0.539	mg/kg	UJ	uj-m
M120-10_03/07/2006	06C071	TH018	SW 846 6020A	SO	Antimony	0.537	mg/kg	UJ	uj-m
M120-0.5_03/07/2006	06C071	TH018	SW 846 6020A	SO	Tungsten	2.23	mg/kg	UJ	uj-m
M120-80_03/07/2006	06C071	TH018	SW 846 6020A	SO	Tungsten	2.41	mg/kg	UJ	uj-m
M120-10_03/07/2006	06C071	TH018	SW 846 6020A	SO	Tungsten	2.15	mg/kg	UJ	uj-m
M120-20_03/07/2006	06C071	TH018	SW 846 6020A	SO	Tungsten	2.11	mg/kg	UJ	uj-m
M120-60_03/07/2006	06C071	TH018	SW 846 6020A	SO	Tungsten	2.4	mg/kg	UJ	uj-m
M120-30_03/07/2006	06C071	TH018	SW 846 6020A	SO	Tungsten	2.23	mg/kg	UJ	uj-m

Table E-10
Qualifications Based on Matrix Spike Recoveries
Upgradient Investigation, Tronox Facility, Henderson, Nevada

(continued)

Sample ID	SDG	ENSR ID	Method	Matrix	Analyte	Result	Units	Qualifier[1]	Reason Code[2]
M120-40_03/07/2006	06C071	TH018	SW 846 6020A	SO	Tungsten	2.19	mg/kg	UJ	uj-m
M120-40D_03/07/2006	06C071	TH018	SW 846 6020A	SO	Tungsten	2.24	mg/kg	UJ	uj-m
M120-5_03/07/2006	06C071	TH018	SW 846 6020A	SO	Tungsten	2.16	mg/kg	UJ	uj-m
M120-50_03/07/2006	06C071	TH018	SW 846 6020A	SO	Tungsten	3.07	mg/kg	UJ	uj-m
M118-5_03/08/2006	06C081	TH019	SW 846 6020A	SO	Antimony	0.125	mg/kg	J-	j-m
M118-0.5_03/08/2006	06C081	TH019	SW 846 6020A	SO	Antimony	0.184	mg/kg	J-	j-m
M118-20_03/08/2006	06C081	TH019	SW 846 6020A	SO	Antimony	0.11	mg/kg	J-	j-m
M118-50_03/08/2006	06C081	TH019	SW 846 6020A	SO	Antimony	0.19	mg/kg	J-	j-m
M118-40_03/08/2006	06C081	TH019	SW 846 6020A	SO	Antimony		mg/kg	R	r-m
M118-30_03/08/2006	06C081	TH019	SW 846 6020A	SO	Antimony		mg/kg	R	r-m
M118-20D_03/08/2006	06C081	TH019	SW 846 6020A	SO	Antimony		mg/kg	R	r-m
M118-10_03/08/2006	06C081	TH019	SW 846 6020A	SO	Antimony		mg/kg	R	r-m
M118-80_03/08/2006	06C081	TH019	SW 846 6020A	SO	Antimony		mg/kg	R	r-m
M118-60_03/08/2006	06C081	TH019	SW 846 6020A	SO	Antimony		mg/kg	R	r-m
M118-30_03/08/2006	06C081	TH019	SW 846 6020A	SO	Barium	49.3	mg/kg	J-	j-m
M118-40_03/08/2006	06C081	TH019	SW 846 6020A	SO	Barium	52.5	mg/kg	J-	j-m
M118-5_03/08/2006	06C081	TH019	SW 846 6020A	SO	Barium	232	mg/kg	J-	j-m
M118-20_03/08/2006	06C081	TH019	SW 846 6020A	SO	Barium	189	mg/kg	J-	j-m
M118-50_03/08/2006	06C081	TH019	SW 846 6020A	SO	Barium	78.6	mg/kg	J-	j-m
M118-0.5_03/08/2006	06C081	TH019	SW 846 6020A	SO	Barium	190	mg/kg	J-	j-m
M118-10_03/08/2006	06C081	TH019	SW 846 6020A	SO	Barium	139	mg/kg	J-	j-m
M118-20D_03/08/2006	06C081	TH019	SW 846 6020A	SO	Barium	181	MG/KG	J-	j-m
M118-60_03/08/2006	06C081	TH019	SW 846 6020A	SO	Barium	79.8	mg/kg	J-	j-m
M118-80_03/08/2006	06C081	TH019	SW 846 6020A	SO	Barium	94.9	mg/kg	J-	j-m
M118-5_03/08/2006	06C081	TH019	SW 846 6020A	SO	Tungsten	0.65	mg/kg	J-	j-m
M118-50_03/08/2006	06C081	TH019	SW 846 6020A	SO	Tungsten	0.8	mg/kg	J-	j-m
M118-20D_03/08/2006	06C081	TH019	SW 846 6020A	SO	Tungsten	0.553	mg/kg	J-	j-m
M118-0.5_03/08/2006	06C081	TH019	SW 846 6020A	SO	Tungsten	0.665	mg/kg	J-	j-m
M118-30_03/08/2006	06C081	TH019	SW 846 6020A	SO	Tungsten	2.27	mg/kg	UJ	uj-m
M118-40_03/08/2006	06C081	TH019	SW 846 6020A	SO	Tungsten	2.29	mg/kg	UJ	uj-m
M118-10_03/08/2006	06C081	TH019	SW 846 6020A	SO	Tungsten	2.32	mg/kg	UJ	uj-m

Table E-10
Qualifications Based on Matrix Spike Recoveries
Upgradient Investigation, Tronox Facility, Henderson, Nevada

(continued)

Sample ID	SDG	ENSR ID	Method	Matrix	Analyte	Result	Units	Qualifier[1]	Reason Code[2]
M118-20_03/08/2006	06C081	TH019	SW 846 6020A	SO	Tungsten	2.11	mg/kg	UJ	uj-m
M118-60_03/08/2006	06C081	TH019	SW 846 6020A	SO	Tungsten	2.17	mg/kg	UJ	uj-m
M118-80_03/08/2006	06C081	TH019	SW 846 6020A	SO	Tungsten	2.34	mg/kg	UJ	uj-m
M116-5_03/12/2006	06C120	TH023	SW 846 6020A	SO	Aluminum	9380	mg/kg	J+	j-m
M116-50_03/12/2006	06C120	TH023	SW 846 6020A	SO	Aluminum	10600	mg/kg	J+	j-m
M117-10_03/11/2006	06C120	TH023	SW 846 6020A	SO	Aluminum	9030	mg/kg	J+	j-m
M117-20D_03/11/2006	06C120	TH023	SW 846 6020A	SO	Aluminum	12900	mg/kg	J+	j-m
M117-20_03/11/2006	06C120	TH023	SW 846 6020A	SO	Aluminum	10400	mg/kg	J+	j-m
M117-0.5_03/11/2006	06C120	TH023	SW 846 6020A	SO	Aluminum	8670	mg/kg	J+	j-m
M116-20_03/12/2006	06C120	TH023	SW 846 6020A	SO	Aluminum	10200	mg/kg	J+	j-m
M116-10_03/12/2006	06C120	TH023	SW 846 6020A	SO	Aluminum	7700	mg/kg	J+	j-m
M116-0.5D_03/12/2006	06C120	TH023	SW 846 6020A	SO	Aluminum	10800	mg/kg	J+	j-m
M116-0.5_03/12/2006	06C120	TH023	SW 846 6020A	SO	Aluminum	9020	mg/kg	J+	j-m
M116-30_03/12/2006	06C120	TH023	SW 846 6020A	SO	Aluminum	14800	mg/kg	J+	j-m
M116-40_03/12/2006	06C120	TH023	SW 846 6020A	SO	Aluminum	10900	mg/kg	J+	j-m
M117-80_03/11/2006	06C120	TH023	SW 846 6020A	SO	Aluminum	12300	mg/kg	J+	j-m
M117-60_03/11/2006	06C120	TH023	SW 846 6020A	SO	Aluminum	11600	mg/kg	J+	j-m
M117-80D_03/11/2006	06C120	TH023	SW 846 6020A	SO	Aluminum	11500	mg/kg	J+	j-m
M117-30_03/11/2006	06C120	TH023	SW 846 6020A	SO	Aluminum	12500	mg/kg	J+	j-m
M117-50_03/11/2006	06C120	TH023	SW 846 6020A	SO	Aluminum	11800	mg/kg	J+	j-m
M117-40_03/11/2006	06C120	TH023	SW 846 6020A	SO	Aluminum	14300	mg/kg	J+	j-m
M117-5_03/11/2006	06C120	TH023	SW 846 6020A	SO	Aluminum	8830	mg/kg	J+	j-m
M116-10_03/12/2006	06C120	TH023	SW 846 6020A	SO	Antimony	0.205	mg/kg	J-	uj-m
M116-0.5_03/12/2006	06C120	TH023	SW 846 6020A	SO	Antimony	0.157	mg/kg	J-	j-m
M117-20D_03/11/2006	06C120	TH023	SW 846 6020A	SO	Antimony	0.217	mg/kg	J-	j-m
M116-50_03/12/2006	06C120	TH023	SW 846 6020A	SO	Antimony	0.62	mg/kg	UJ	uj-m
M117-0.5_03/11/2006	06C120	TH023	SW 846 6020A	SO	Antimony	0.527	mg/kg	UJ	uj-m
M116-5_03/12/2006	06C120	TH023	SW 846 6020A	SO	Antimony	0.557	mg/kg	UJ	uj-m
M117-10_03/11/2006	06C120	TH023	SW 846 6020A	SO	Antimony	0.54	mg/kg	UJ	uj-m
M116-40_03/12/2006	06C120	TH023	SW 846 6020A	SO	Antimony	0.584	mg/kg	UJ	uj-m
M117-20_03/11/2006	06C120	TH023	SW 846 6020A	SO	Antimony	0.541	mg/kg	UJ	uj-m

Table E-10
Qualifications Based on Matrix Spike Recoveries
Upgradient Investigation, Tronox Facility, Henderson, Nevada

(continued)

Sample ID	SDG	ENSR ID	Method	Matrix	Analyte	Result	Units	Qualifier[1]	Reason Code[2]
M116-20_03/12/2006	06C120	TH023	SW 846 6020A	SO	Antimony	0.528	mg/kg	UJ	uj-m
M116-0.5D_03/12/2006	06C120	TH023	SW 846 6020A	SO	Antimony	0.54	mg/kg	UJ	uj-m
M116-30_03/12/2006	06C120	TH023	SW 846 6020A	SO	Antimony	0.608	mg/kg	UJ	uj-m
M117-50_03/11/2006	06C120	TH023	SW 846 6020A	SO	Antimony	0.613	mg/kg	UJ	uj-m
M117-60_03/11/2006	06C120	TH023	SW 846 6020A	SO	Antimony	0.635	mg/kg	UJ	uj-m
M117-80_03/11/2006	06C120	TH023	SW 846 6020A	SO	Antimony	0.621	mg/kg	UJ	uj-m
M117-80D_03/11/2006	06C120	TH023	SW 846 6020A	SO	Antimony	0.572	mg/kg	UJ	uj-m
M117-30_03/11/2006	06C120	TH023	SW 846 6020A	SO	Antimony	0.568	mg/kg	UJ	uj-m
M117-40_03/11/2006	06C120	TH023	SW 846 6020A	SO	Antimony	0.56	mg/kg	UJ	uj-m
M117-5_03/11/2006	06C120	TH023	SW 846 6020A	SO	Antimony	0.549	mg/kg	UJ	uj-m
M116-50_03/12/2006	06C120	TH023	SW 846 6020A	SO	Barium	46	mg/kg	J	j-m, j-d
M116-5_03/12/2006	06C120	TH023	SW 846 6020A	SO	Barium	150	mg/kg	J	j-m, j-d
M116-40_03/12/2006	06C120	TH023	SW 846 6020A	SO	Barium	58.8	mg/kg	J	j-m, j-d
M117-20_03/11/2006	06C120	TH023	SW 846 6020A	SO	Barium	156	mg/kg	J	j-m, j-d
M117-10_03/11/2006	06C120	TH023	SW 846 6020A	SO	Barium	219	mg/kg	J	j-m, j-d
M116-30_03/12/2006	06C120	TH023	SW 846 6020A	SO	Barium	107	mg/kg	J	j-m, j-d
M117-0.5_03/11/2006	06C120	TH023	SW 846 6020A	SO	Barium	167	mg/kg	J	j-m, j-d
M116-0.5D_03/12/2006	06C120	TH023	SW 846 6020A	SO	Barium	201	mg/kg	J	j-m, j-d
M116-20_03/12/2006	06C120	TH023	SW 846 6020A	SO	Barium	272	mg/kg	J	j-m, j-d
M116-10_03/12/2006	06C120	TH023	SW 846 6020A	SO	Barium	173	mg/kg	J	j-m, j-d
M116-0.5_03/12/2006	06C120	TH023	SW 846 6020A	SO	Barium	178	mg/kg	J	j-m, j-d
M117-50_03/11/2006	06C120	TH023	SW 846 6020A	SO	Barium	125	mg/kg	J	j-m, j-d
M117-60_03/11/2006	06C120	TH023	SW 846 6020A	SO	Barium	58.3	mg/kg	J	j-m, j-d
M117-80_03/11/2006	06C120	TH023	SW 846 6020A	SO	Barium	116	mg/kg	J	j-m, j-d
M117-80D_03/11/2006	06C120	TH023	SW 846 6020A	SO	Barium	90	mg/kg	J	j-m, j-d
M117-20D_03/11/2006	06C120	TH023	SW 846 6020A	SO	Barium	211	mg/kg	J	j-m, j-d
M117-30_03/11/2006	06C120	TH023	SW 846 6020A	SO	Barium	167	mg/kg	J	j-m, j-d
M117-5_03/11/2006	06C120	TH023	SW 846 6020A	SO	Barium	171	mg/kg	J	j-m, j-d
M117-40_03/11/2006	06C120	TH023	SW 846 6020A	SO	Barium	249	mg/kg	J	j-m, j-d
M116-50_03/12/2006	06C120	TH023	SW 846 6020A	SO	Iron	8330	mg/kg	J+	j-m
M116-5_03/12/2006	06C120	TH023	SW 846 6020A	SO	Iron	9690	mg/kg	J+	j-m

Table E-10
Qualifications Based on Matrix Spike Recoveries
Upgradient Investigation, Tronox Facility, Henderson, Nevada

(continued)

Sample ID	SDG	ENSR ID	Method	Matrix	Analyte	Result	Units	Qualifier[1]	Reason Code[2]
M117-0.5_03/11/2006	06C120	TH023	SW 846 6020A	SO	Iron	9500	mg/kg	J+	j-m
M117-20_03/11/2006	06C120	TH023	SW 846 6020A	SO	Iron	9640	mg/kg	J+	j-m
M117-10_03/11/2006	06C120	TH023	SW 846 6020A	SO	Iron	9530	mg/kg	J+	j-m
M117-80_03/11/2006	06C120	TH023	SW 846 6020A	SO	Iron	12000	mg/kg	J+	j-m
M117-20D_03/11/2006	06C120	TH023	SW 846 6020A	SO	Iron	12900	mg/kg	J+	j-m
M116-20_03/12/2006	06C120	TH023	SW 846 6020A	SO	Iron	13700	mg/kg	J+	j-m
M116-10_03/12/2006	06C120	TH023	SW 846 6020A	SO	Iron	7390	mg/kg	J+	j-m
M116-0.5D_03/12/2006	06C120	TH023	SW 846 6020A	SO	Iron	12600	mg/kg	J+	j-m
M116-40_03/12/2006	06C120	TH023	SW 846 6020A	SO	Iron	8210	mg/kg	J+	j-m
M116-0.5_03/12/2006	06C120	TH023	SW 846 6020A	SO	Iron	9120	mg/kg	J+	j-m
M116-30_03/12/2006	06C120	TH023	SW 846 6020A	SO	Iron	11400	mg/kg	J+	j-m
M117-50_03/11/2006	06C120	TH023	SW 846 6020A	SO	Iron	11200	mg/kg	J+	j-m
M117-80D_03/11/2006	06C120	TH023	SW 846 6020A	SO	Iron	12400	mg/kg	J+	j-m
M117-60_03/11/2006	06C120	TH023	SW 846 6020A	SO	Iron	11400	mg/kg	J+	j-m
M117-30_03/11/2006	06C120	TH023	SW 846 6020A	SO	Iron	12300	mg/kg	J+	j-m
M117-5_03/11/2006	06C120	TH023	SW 846 6020A	SO	Iron	9480	mg/kg	J+	j-m
M117-40_03/11/2006	06C120	TH023	SW 846 6020A	SO	Iron	14300	mg/kg	J+	j-m
M116-0.5_03/12/2006	06C120	TH023	SW 846 6020A	SO	Tungsten	0.708	mg/kg	J-	j-m
M116-0.5D_03/12/2006	06C120	TH023	SW 846 6020A	SO	Tungsten	0.582	mg/kg	J-	j-m
M116-50_03/12/2006	06C120	TH023	SW 846 6020A	SO	Tungsten	2.48	mg/kg	UJ	uj-m
M116-5_03/12/2006	06C120	TH023	SW 846 6020A	SO	Tungsten	2.23	mg/kg	UJ	uj-m
M117-20_03/11/2006	06C120	TH023	SW 846 6020A	SO	Tungsten	2.16	mg/kg	UJ	uj-m
M117-0.5_03/11/2006	06C120	TH023	SW 846 6020A	SO	Tungsten	2.11	mg/kg	UJ	uj-m
M117-10_03/11/2006	06C120	TH023	SW 846 6020A	SO	Tungsten	2.16	mg/kg	UJ	uj-m
M116-10_03/12/2006	06C120	TH023	SW 846 6020A	SO	Tungsten	2.16	mg/kg	UJ	uj-m
M116-40_03/12/2006	06C120	TH023	SW 846 6020A	SO	Tungsten	2.34	mg/kg	UJ	uj-m
M116-20_03/12/2006	06C120	TH023	SW 846 6020A	SO	Tungsten	2.11	mg/kg	UJ	uj-m
M116-30_03/12/2006	06C120	TH023	SW 846 6020A	SO	Tungsten	2.43	mg/kg	UJ	uj-m
M117-20D_03/11/2006	06C120	TH023	SW 846 6020A	SO	Tungsten	2.37	mg/kg	UJ	uj-m
M117-60_03/11/2006	06C120	TH023	SW 846 6020A	SO	Tungsten	2.54	mg/kg	UJ	uj-m
M117-50_03/11/2006	06C120	TH023	SW 846 6020A	SO	Tungsten	2.45	mg/kg	UJ	uj-m

Table E-10
Qualifications Based on Matrix Spike Recoveries
Upgradient Investigation, Tronox Facility, Henderson, Nevada

(continued)

Sample ID	SDG	ENSR ID	Method	Matrix	Analyte	Result	Units	Qualifier[1]	Reason Code[2]
M117-80_03/11/2006	06C120	TH023	SW 846 6020A	SO	Tungsten	2.48	mg/kg	UJ	uj-m
M117-80D_03/11/2006	06C120	TH023	SW 846 6020A	SO	Tungsten	2.29	mg/kg	UJ	uj-m
M117-40_03/11/2006	06C120	TH023	SW 846 6020A	SO	Tungsten	2.24	mg/kg	UJ	uj-m
M117-30_03/11/2006	06C120	TH023	SW 846 6020A	SO	Tungsten	2.27	mg/kg	UJ	uj-m
M117-5_03/11/2006	06C120	TH023	SW 846 6020A	SO	Tungsten	2.2	mg/kg	UJ	uj-m
M119-32_03/14/2006	06C127	TH024	SW 846 6020A	SO	Titanium	594	mg/kg	J+	j-m
M119-50_03/14/2006	06C127	TH024	SW 846 6020A	SO	Titanium	691	mg/kg	J+	j-m
M119-5_03/14/2006	06C127	TH024	SW 846 6020A	SO	Titanium	598	mg/kg	J+	j-m
M119-40_03/14/2006	06C127	TH024	SW 846 6020A	SO	Titanium	739	mg/kg	J+	j-m
M119-0.5_03/14/2006	06C127	TH024	SW 846 6020A	SO	Titanium	536	mg/kg	J+	j-m
M119-0.5D_03/14/2006	06C127	TH024	SW 846 6020A	SO	Titanium	622	mg/kg	J+	j-m
M119-10_03/14/2006	06C127	TH024	SW 846 6020A	SO	Titanium	728	mg/kg	J+	j-m
M119-20_03/14/2006	06C127	TH024	SW 846 6020A	SO	Titanium	553	mg/kg	J+	j-m
TR-10A_03/13/2006	169580	TH037	SW 846 6010B	W	Sodium	300	mg/l	J	j-m, j-d,
TR-9A_03/14/2006	169653	TH039	SW 846 6010B	W	Sodium	170	mg/l	J	j-m, j-d
TR-7A_03/20/2006	170033	TH040	SW 846 6010B	W	Sodium	160	mg/l	J	j-m, j-d
M-103A_03/20/2006	170033	TH040	SW 846 6010B	W	Sodium	320	mg/l	J	j-m, j-d
TR-8D_03/20/2006	170033	TH040	SW 846 6010B	W	Sodium	220	mg/l	J	j-m, j-d
TR-8A_03/20/2006	170033	TH040	SW 846 6010B	W	Sodium	230	mg/l	J	j-m, j-d
TR-8_03/20/2006	170033	TH040	SW 846 6010B	W	Sodium	230	mg/l	J	j-m, j-d
TR-10_03/21/2006	170190	TH042	SW 846 6010B	W	Sodium	310	mg/l	J	j-m, j-d
TR-9_03/21/2006	170190	TH042	SW 846 6010B	W	Sodium	170	mg/l	J	j-m, j-d
M-103_03/21/2006	170190	TH042	SW 846 6010B	W	Sodium	330	mg/l	J	d-m, j-d
TR-7_03/21/2006	170190	TH042	SW 846 6010B	W	Sodium	160	mg/l	J	j-m, j-d
M-118_03/22/2006	170259	TH043	SW 846 6010B	W	Sodium	160	mg/l	J	j-m, j-d
M-120_03/22/2006	170259	TH043	SW 846 6010B	W	Sodium	250	mg/l	J	j-m, j-d
H-11_03/23/2006	170342	TH044	SM 2320B	W	Alkalinity (as CaCO3)	2.000	mg/l	UJ	j-m
M-121_03/23/2006	170342	TH044	SM 2320B	W	Alkalinity (as CaCO3)	93	mg/l	J-	j-m
M-117_03/23/2006	170342	TH044	SM 2320B	W	Alkalinity (as CaCO3)	76	mg/l	J-	j-m

Table E-10
Qualifications Based on Matrix Spike Recoveries
Upgradient Investigation, Tronox Facility, Henderson, Nevada

(continued)

Sample ID	SDG	ENSR ID	Method	Matrix	Analyte	Result	Units	Qualifier[1]	Reason Code[2]
M-117_03/23/2006	170342	TH044	SW 846 6010B	W	Sodium	170	mg/l	J	j-m, j-d
M-121_03/23/2006	170342	TH044	SW 846 6010B	W	Sodium	420	mg/l	J	j-m, j-d
H-11_03/23/2006	170342	TH044	SW 846 6010B	W	Sodium	150	mg/l	J	j-m, j-d

Notes:

[1]See Table E-1 for Data Validation Qualifiers

[2]See Table E-2 for reason code definition

SO - soil

W - water

pg/g - picogram/gram

mg/kg - milligram/kilogram

mg/L - milligram/liter

Table E-11
Qualification Based on Internal Standard Performance
Upgradient Investigation, Tronox Facility, Henderson, Nevada

Sample ID	SDG	ENSR ID	Method	Matrix	Analyte	Result	Units	Qualifier[1]	Reason Code[2]
M120-10_03/07/2006	G6C100424	TH017	SW 846 8290	SO	1,2,3,4,5,6,7,8-Octachlorodibenzofuran	1.3	pg/g	UJ	uj-i
M120-10_03/07/2006	G6C100424	TH017	SW 846 8290	SO	1,2,3,4,5,6,7,8-Octachlorodibenzo-p-dioxin	1.4	pg/g	UJ	uj-i
M120-10_03/07/2006	G6C100424	TH017	SW 846 8290	SO	1,2,3,4,6,7,8-Heptachlorodibenzofuran	2.8	pg/g	UJ	uj-i
M120-10_03/07/2006	G6C100424	TH017	SW 846 8290	SO	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	0.84	pg/g	UJ	uj-i
M120-10_03/07/2006	G6C100424	TH017	SW 846 8290	SO	1,2,3,4,7,8,9-Heptachlorodibenzofuran	0.59	pg/g	UJ	uj-i
M120-10_03/07/2006	G6C100424	TH017	SW 846 8290	SO	1,2,3,4,7,8-Hexachlorodibenzofuran	2.8	pg/g	UJ	uj-i
M120-10_03/07/2006	G6C100424	TH017	SW 846 8290	SO	1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	0.56	pg/g	UJ	uj-i
M120-10_03/07/2006	G6C100424	TH017	SW 846 8290	SO	1,2,3,6,7,8-Hexachlorodibenzofuran	0.65	pg/g	UJ	uj-i
M120-10_03/07/2006	G6C100424	TH017	SW 846 8290	SO	1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	2.8	pg/g	UJ	uj-i
M120-10_03/07/2006	G6C100424	TH017	SW 846 8290	SO	1,2,3,7,8,9-Hexachlorodibenzofuran	0.74	pg/g	UJ	uj-i
M120-10_03/07/2006	G6C100424	TH017	SW 846 8290	SO	1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	2.8	pg/g	UJ	uj-i
M120-10_03/07/2006	G6C100424	TH017	SW 846 8290	SO	1,2,3,7,8-Pentachlorodibenzofuran	0.48	pg/g	UJ	uj-i
M120-10_03/07/2006	G6C100424	TH017	SW 846 8290	SO	1,2,3,7,8-Pentachlorodibenzo-p-dioxin	1.2	pg/g	UJ	uj-i
M120-10_03/07/2006	G6C100424	TH017	SW 846 8290	SO	2,3,4,6,7,8-Hexachlorodibenzofuran	0.71	pg/g	UJ	uj-i
M120-10_03/07/2006	G6C100424	TH017	SW 846 8290	SO	2,3,4,7,8-Pentachlorodibenzofuran	0.47	pg/g	UJ	uj-i
M120-10_03/07/2006	G6C100424	TH017	SW 846 8290	SO	2,3,7,8-Tetrachlorodibenzofuran	0.55	pg/g	UJ	uj-i
M120-10_03/07/2006	G6C100424	TH017	SW 846 8290	SO	2,3,7,8-Tetrachlorodibenzo-p-dioxin	0.27	pg/g	UJ	uj-i
M120-10_03/07/2006	G6C100424	TH017	SW 846 8290	SO	Total Heptachlorodibenzofuran	2.8	pg/g	UJ	uj-i
M120-10_03/07/2006	G6C100424	TH017	SW 846 8290	SO	Total Heptachlorodibenzo-p-dioxin	0.84	pg/g	UJ	uj-i
M120-10_03/07/2006	G6C100424	TH017	SW 846 8290	SO	Total Hexachlorodibenzofuran	0.87	pg/g	UJ	uj-i
M120-10_03/07/2006	G6C100424	TH017	SW 846 8290	SO	Total Hexachlorodibenzo-p-dioxin	2.8	pg/g	UJ	uj-i
M120-10_03/07/2006	G6C100424	TH017	SW 846 8290	SO	Total Pentachlorodibenzofuran	2.8	pg/g	UJ	uj-i
M120-10_03/07/2006	G6C100424	TH017	SW 846 8290	SO	Total Pentachlorodibenzo-p-dioxin	2.8	pg/g	UJ	uj-i
M120-10_03/07/2006	G6C100424	TH017	SW 846 8290	SO	Total Tetrachlorodibenzofuran	0.74	pg/g	J	j-c, j-i
M120-10_03/07/2006	G6C100424	TH017	SW 846 8290	SO	Total Tetrachlorodibenzo-p-dioxin	0.27	pg/g	UJ	uj-i
M120-30_03/07/2006	G6C100424	TH017	SW 846 8290	SO	1,2,3,4,5,6,7,8-Octachlorodibenzofuran	1.4	pg/g	UJ	uj-i
M120-30_03/07/2006	G6C100424	TH017	SW 846 8290	SO	1,2,3,4,5,6,7,8-Octachlorodibenzo-p-dioxin	5.6	pg/g	UJ	uj-i
M120-30_03/07/2006	G6C100424	TH017	SW 846 8290	SO	1,2,3,4,6,7,8-Heptachlorodibenzofuran	0.56	pg/g	UJ	uj-i
M120-30_03/07/2006	G6C100424	TH017	SW 846 8290	SO	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	0.81	pg/g	UJ	uj-i

Table E-11
Qualification Based on Internal Standard Performance
Upgradient Investigation, Tronox Facility, Henderson, Nevada

(continued)

Sample ID	SDG	ENSR ID	Method	Matrix	Analyte	Result	Units	Qualifier[1]	Reason Code[2]
M120-30_03/07/2006	G6C100424	TH017	SW 846 8290	SO	1,2,3,4,7,8,9-Heptachlorodibenzofuran	0.63	pg/g	UJ	uj-i
M120-30_03/07/2006	G6C100424	TH017	SW 846 8290	SO	1,2,3,4,7,8-Hexachlorodibenzofuran	0.54	pg/g	UJ	uj-i
M120-30_03/07/2006	G6C100424	TH017	SW 846 8290	SO	1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	0.56	pg/g	UJ	uj-i
M120-30_03/07/2006	G6C100424	TH017	SW 846 8290	SO	1,2,3,6,7,8-Hexachlorodibenzofuran	0.51	pg/g	UJ	uj-i
M120-30_03/07/2006	G6C100424	TH017	SW 846 8290	SO	1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	0.51	pg/g	UJ	uj-i
M120-30_03/07/2006	G6C100424	TH017	SW 846 8290	SO	1,2,3,7,8,9-Hexachlorodibenzofuran	0.56	pg/g	UJ	uj-i
M120-30_03/07/2006	G6C100424	TH017	SW 846 8290	SO	1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	0.5	pg/g	UJ	uj-i
M120-30_03/07/2006	G6C100424	TH017	SW 846 8290	SO	1,2,3,7,8-Pentachlorodibenzofuran	0.34	pg/g	UJ	uj-i
M120-30_03/07/2006	G6C100424	TH017	SW 846 8290	SO	1,2,3,7,8-Pentachlorodibenzo-p-dioxin	0.79	pg/g	UJ	uj-i
M120-30_03/07/2006	G6C100424	TH017	SW 846 8290	SO	2,3,4,6,7,8-Hexachlorodibenzofuran	0.55	pg/g	UJ	uj-i
M120-30_03/07/2006	G6C100424	TH017	SW 846 8290	SO	2,3,4,7,8-Pentachlorodibenzofuran	0.33	pg/g	UJ	uj-i
M120-30_03/07/2006	G6C100424	TH017	SW 846 8290	SO	Total Heptachlorodibenzofuran	0.63	pg/g	UJ	uj-i
M120-30_03/07/2006	G6C100424	TH017	SW 846 8290	SO	Total Heptachlorodibenzo-p-dioxin	0.81	pg/g	UJ	uj-i
M120-30_03/07/2006	G6C100424	TH017	SW 846 8290	SO	Total Hexachlorodibenzofuran	0.56	pg/g	UJ	uj-i
M120-30_03/07/2006	G6C100424	TH017	SW 846 8290	SO	Total Hexachlorodibenzo-p-dioxin	0.56	pg/g	UJ	uj-i
M120-30_03/07/2006	G6C100424	TH017	SW 846 8290	SO	Total Pentachlorodibenzofuran	2.8	pg/g	UJ	uj-i
M120-30_03/07/2006	G6C100424	TH017	SW 846 8290	SO	Total Pentachlorodibenzo-p-dioxin	2.8	pg/g	UJ	uj-i
FB-1_03/08/2006	169286	TH035	SW 846 6020	W	Aluminum	25.000	ug/l	UJ	uj-i
FB-1_03/08/2006	169286	TH035	SW 846 6020	W	Antimony	1.000	ug/l	UJ	uj-i
FB-1_03/08/2006	169286	TH035	SW 846 6020	W	Arsenic	2.4	ug/l	J	j-i
FB-1_03/08/2006	169286	TH035	SW 846 6020	W	Barium	175	ug/l	J	j-i
FB-1_03/08/2006	169286	TH035	SW 846 6020	W	Beryllium	1.000	ug/l	UJ	uj-i
FB-1_03/08/2006	169286	TH035	SW 846 6020	W	Chromium	1.000	ug/l	UJ	uj-i
FB-1_03/08/2006	169286	TH035	SW 846 6020	W	Cobalt	2.000	ug/l	UJ	uj-i
FB-1_03/08/2006	169286	TH035	SW 846 6020	W	Copper	2.0	ug/l	J	j-i
FB-1_03/08/2006	169286	TH035	SW 846 6020	W	Manganese	3.7	ug/l	J	j-i
TR-10A_03/13/2006	169580	TH037	SW 846 6020	W	Nickel	6.1	ug/l	J	j-i
FB-1_03/08/2006	169286	TH035	SW 846 6020	W	Selenium	5.000	ug/l	UJ	uj-i
FB-1_03/08/2006	169286	TH035	SW 846 6020	W	Vanadium	3.000	ug/l	UJ	uj-i

Table E-11
Qualification Based on Internal Standard Performance
Upgradient Investigation, Tronox Facility, Henderson, Nevada

(continued)

Sample ID	SDG	ENSR ID	Method	Matrix	Analyte	Result	Units	Qualifier[1]	Reason Code[2]
FB-1_03/08/2006	169286	TH035	SW 846 6020	W	Zinc	5.1	ug/l	J	j-i
EB-1_03/09/2006	169405	TH036	SW 846 6020	W	Aluminum	41	ug/l	J	j-i
EB-1_03/09/2006	169405	TH036	SW 846 6020	W	Antimony	1.000	ug/l	UJ	uj-i
EB-1_03/09/2006	169405	TH036	SW 846 6020	W	Arsenic	1.000	ug/l	UJ	uj-i
EB-1_03/09/2006	169405	TH036	SW 846 6020	W	Barium	2.000	ug/l	UJ	uj-i
EB-1_03/09/2006	169405	TH036	SW 846 6020	W	Beryllium	1.000	ug/l	UJ	uj-i
EB-1_03/09/2006	169405	TH036	SW 846 6020	W	Chromium	1.000	ug/l	UJ	uj-i
EB-1_03/09/2006	169405	TH036	SW 846 6020	W	Cobalt	2.000	ug/l	UJ	uj-i
EB-1_03/09/2006	169405	TH036	SW 846 6020	W	Copper	4.4	ug/l	J	j-i
EB-1_03/09/2006	169405	TH036	SW 846 6020	W	Manganese	6.6	ug/l	J	j-i
TR-9A_03/14/2006	169653	TH039	SW 846 6020	W	Nickel	35	ug/l	J	j-i
EB-1_03/09/2006	169405	TH036	SW 846 6020	W	Selenium	5.000	ug/l	UJ	uj-i
EB-1_03/09/2006	169405	TH036	SW 846 6020	W	Vanadium	3.000	ug/l	UJ	uj-i
EB-1_03/09/2006	169405	TH036	SW 846 6020	W	Zinc	11	ug/l	J	j-i
TR-10A_03/13/2006	169580	TH037	SW 846 6020	W	Aluminum	2000	ug/l	J	j-i
TR-10A_03/13/2006	169580	TH037	SW 846 6020	W	Arsenic	63	ug/l	J	j-i
TR-10A_03/13/2006	169580	TH037	SW 846 6020	W	Beryllium	1.000	ug/l	UJ	uj-i
TR-10A_03/13/2006	169580	TH037	SW 846 6020	W	Chromium	51	ug/l	J	j-i
TR-10A_03/13/2006	169580	TH037	SW 846 6020	W	Cobalt	2.000	ug/l	UJ	uj-i
TR-10A_03/13/2006	169580	TH037	SW 846 6020	W	Copper	4.9	ug/l	J	j-i
TR-10A_03/13/2006	169580	TH037	SW 846 6020	W	Manganese	61	ug/l	J	j-i
M-103A_03/20/2006	170033	TH040	SW 846 6020	W	Nickel	14	ug/l	J	j-i
TR-10A_03/13/2006	169580	TH037	SW 846 6020	W	Selenium	5.000	ug/l	UJ	uj-i
TR-10A_03/13/2006	169580	TH037	SW 846 6020	W	Vanadium	35	ug/l	J	j-i
TR-10A_03/13/2006	169580	TH037	SW 846 6020	W	Zinc	39	ug/l	J	j-i
TR-9A_03/14/2006	169653	TH039	SW 846 6020	W	Aluminum	13000	ug/l	J	j-i
TR-9A_03/14/2006	169653	TH039	SW 846 6020	W	Arsenic	65	ug/l	J	j-i
TR-9A_03/14/2006	169653	TH039	SW 846 6020	W	Beryllium	1.000	ug/l	UJ	uj-i
TR-9A_03/14/2006	169653	TH039	SW 846 6020	W	Chromium	44	ug/l	J	j-i

Table E-11
Qualification Based on Internal Standard Performance
Upgradient Investigation, Tronox Facility, Henderson, Nevada

(continued)

Sample ID	SDG	ENSR ID	Method	Matrix	Analyte	Result	Units	Qualifier[1]	Reason Code[2]
TR-9A_03/14/2006	169653	TH039	SW 846 6020	W	Cobalt	7.0	ug/l	J	j-be, j-i
TR-9A_03/14/2006	169653	TH039	SW 846 6020	W	Copper	37	ug/l	J	j-i
TR-9A_03/14/2006	169653	TH039	SW 846 6020	W	Manganese	530	ug/l	J	j-i
TR-8_03/20/2006	170033	TH040	SW 846 6020	W	Nickel	5.1	ug/l	J	j-i
TR-9A_03/14/2006	169653	TH039	SW 846 6020	W	Selenium	5.000	ug/l	UJ	uj-i
TR-9A_03/14/2006	169653	TH039	SW 846 6020	W	Vanadium	70	ug/l	J	j-i
TR-9A_03/14/2006	169653	TH039	SW 846 6020	W	Zinc	4000	ug/l	J	j-i
TR-8D_03/20/2006	170033	TH040	SW 846 6020	W	Aluminum	1500	ug/l	J	j-f, j-i
M-103A_03/20/2006	170033	TH040	SW 846 6020	W	Aluminum	15000	ug/l	J	j-f, j-i
TR-7A_03/20/2006	170033	TH040	SW 846 6020	W	Aluminum	630	ug/l	J	j-f, j-i
TR-8A_03/20/2006	170033	TH040	SW 846 6020	W	Aluminum	1800	ug/l	J	j-f, j-i
TR-8_03/20/2006	170033	TH040	SW 846 6020	W	Aluminum	2800	ug/l	J	j-f, j-i
TR-7A_03/20/2006	170033	TH040	SW 846 6020	W	Antimony	1.000	ug/l	UJ	uj-i
TR-8D_03/20/2006	170033	TH040	SW 846 6020	W	Antimony	1.000	ug/l	UJ	uj-i
M-103A_03/20/2006	170033	TH040	SW 846 6020	W	Antimony	1.000	ug/l	UJ	uj-i
TR-8_03/20/2006	170033	TH040	SW 846 6020	W	Antimony	1.000	ug/l	UJ	uj-i
TR-7A_03/20/2006	170033	TH040	SW 846 6020	W	Arsenic	44	ug/l	J	j-f, j-i
TR-8D_03/20/2006	170033	TH040	SW 846 6020	W	Arsenic	74	ug/l	J	j-i
M-103A_03/20/2006	170033	TH040	SW 846 6020	W	Arsenic	125	ug/l	J	j-i
TR-8_03/20/2006	170033	TH040	SW 846 6020	W	Arsenic	75	ug/l	J	j-i
TR-8A_03/20/2006	170033	TH040	SW 846 6020	W	Arsenic	73	ug/l	J	j-i
TR-8D_03/20/2006	170033	TH040	SW 846 6020	W	Barium	58	ug/l	J	j-f, j-i
M-103A_03/20/2006	170033	TH040	SW 846 6020	W	Barium	265	ug/l	J	j-f, j-i
TR-8_03/20/2006	170033	TH040	SW 846 6020	W	Barium	85	ug/l	J	j-f, j-i
TR-8A_03/20/2006	170033	TH040	SW 846 6020	W	Barium	75	ug/l	J	j-f, j-i
TR-7A_03/20/2006	170033	TH040	SW 846 6020	W	Barium	51	ug/l	J	j-f, j-i
TR-7A_03/20/2006	170033	TH040	SW 846 6020	W	Beryllium	1.000	ug/l	UJ	uj-i
TR-8D_03/20/2006	170033	TH040	SW 846 6020	W	Beryllium	1.000	ug/l	UJ	uj-i
M-103A_03/20/2006	170033	TH040	SW 846 6020	W	Beryllium	1.000	ug/l	UJ	uj-i

Table E-11
Qualification Based on Internal Standard Performance
Upgradient Investigation, Tronox Facility, Henderson, Nevada

(continued)

Sample ID	SDG	ENSR ID	Method	Matrix	Analyte	Result	Units	Qualifier[1]	Reason Code[2]
TR-8A_03/20/2006	170033	TH040	SW 846 6020	W	Beryllium	1.000	ug/l	UJ	uj-i
TR-8_03/20/2006	170033	TH040	SW 846 6020	W	Beryllium	1.000	ug/l	UJ	uj-i
TR-8D_03/20/2006	170033	TH040	SW 846 6020	W	Cadmium	0.500	ug/l	UJ	uj-i
TR-7A_03/20/2006	170033	TH040	SW 846 6020	W	Cadmium	0.500	ug/l	UJ	uj-i
TR-8_03/20/2006	170033	TH040	SW 846 6020	W	Cadmium	0.500	ug/l	UJ	uj-i
M-103A_03/20/2006	170033	TH040	SW 846 6020	W	Cadmium	0.500	ug/l	UJ	uj-i
TR-8A_03/20/2006	170033	TH040	SW 846 6020	W	Chromium	16	ug/l	J	j-i
TR-8D_03/20/2006	170033	TH040	SW 846 6020	W	Chromium	15	ug/l	J	j-i
TR-7A_03/20/2006	170033	TH040	SW 846 6020	W	Chromium	11	ug/l	J	j-i
M-103A_03/20/2006	170033	TH040	SW 846 6020	W	Chromium	29	ug/l	J	j-i
TR-8_03/20/2006	170033	TH040	SW 846 6020	W	Chromium	17	ug/l	J	j-i
TR-8D_03/20/2006	170033	TH040	SW 846 6020	W	Cobalt	2.000	ug/l	UJ	uj-i
M-103A_03/20/2006	170033	TH040	SW 846 6020	W	Cobalt	4.6	ug/l	J	j-be, j-i
TR-8_03/20/2006	170033	TH040	SW 846 6020	W	Cobalt	2.000	ug/l	UJ	uj-i
TR-7A_03/20/2006	170033	TH040	SW 846 6020	W	Cobalt	2.000	ug/l	UJ	uj-i
TR-8A_03/20/2006	170033	TH040	SW 846 6020	W	Cobalt	2.000	ug/l	UJ	uj-i
TR-8D_03/20/2006	170033	TH040	SW 846 6020	W	Copper	2.5	ug/l	J	j-i
M-103A_03/20/2006	170033	TH040	SW 846 6020	W	Copper	50	ug/l	J	j-i
TR-8_03/20/2006	170033	TH040	SW 846 6020	W	Copper	4.3	ug/l	J	j-i
TR-8A_03/20/2006	170033	TH040	SW 846 6020	W	Copper	9.8	ug/l	J	j-i
TR-7A_03/20/2006	170033	TH040	SW 846 6020	W	Copper	7.4	ug/l	J	j-i
TR-8D_03/20/2006	170033	TH040	SW 846 6020	W	Manganese	26	ug/l	J	j-f, j-i
M-103A_03/20/2006	170033	TH040	SW 846 6020	W	Manganese	470	ug/l	J	j-f, j-i
TR-7A_03/20/2006	170033	TH040	SW 846 6020	W	Manganese	145	ug/l	J	j-f, j-i
TR-8A_03/20/2006	170033	TH040	SW 846 6020	W	Manganese	56	ug/l	J	j-f, j-i
TR-8_03/20/2006	170033	TH040	SW 846 6020	W	Manganese	53	ug/l	J	j-f, j-i
TR-7A_03/20/2006	170033	TH040	SW 846 6020	W	Molybdenum	5.3	ug/l	J	j-i
TR-8D_03/20/2006	170033	TH040	SW 846 6020	W	Molybdenum	13	ug/l	J	j-i
M-103A_03/20/2006	170033	TH040	SW 846 6020	W	Molybdenum	42	ug/l	J	j-i

Table E-11
Qualification Based on Internal Standard Performance
Upgradient Investigation, Tronox Facility, Henderson, Nevada

(continued)

Sample ID	SDG	ENSR ID	Method	Matrix	Analyte	Result	Units	Qualifier[1]	Reason Code[2]
TR-8_03/20/2006	170033	TH040	SW 846 6020	W	Molybdenum	13	ug/l	J	j-i
M-120_03/22/2006	170259	TH043	SW 846 6020	W	Nickel	6	ug/l	J	j-i
M-121_03/23/2006	170342	TH044	SW 846 6020	W	Nickel	5.3	ug/l	J	j-i
M-117_03/23/2006	170342	TH044	SW 846 6020	W	Nickel	33	ug/l	J	j-i
FB-1_03/08/2006	169286	TH035	SW 846 6020	W	Nickel	5.000	ug/l	UJ	uj-i
EB-1_03/09/2006	169405	TH036	SW 846 6020	W	Nickel	5.000	ug/l	UJ	uj-i
TR-7A_03/20/2006	170033	TH040	SW 846 6020	W	Selenium	5.000	ug/l	UJ	uj-i
TR-8D_03/20/2006	170033	TH040	SW 846 6020	W	Selenium	5.000	ug/l	UJ	uj-i
TR-8_03/20/2006	170033	TH040	SW 846 6020	W	Selenium	5.000	ug/l	UJ	uj-i
TR-8A_03/20/2006	170033	TH040	SW 846 6020	W	Selenium	5.000	ug/l	UJ	uj-i
TR-7A_03/20/2006	170033	TH040	SW 846 6020	W	Silver	0.500	ug/l	UJ	uj-i
TR-8D_03/20/2006	170033	TH040	SW 846 6020	W	Silver	0.500	ug/l	UJ	uj-i
M-103A_03/20/2006	170033	TH040	SW 846 6020	W	Silver	0.500	ug/l	UJ	uj-i
TR-8_03/20/2006	170033	TH040	SW 846 6020	W	Silver	0.500	ug/l	UJ	uj-i
TR-8D_03/20/2006	170033	TH040	SW 846 6020	W	Vanadium	30	ug/l	J	j-i
M-103A_03/20/2006	170033	TH040	SW 846 6020	W	Vanadium	38	ug/l	J	j-i
TR-8_03/20/2006	170033	TH040	SW 846 6020	W	Vanadium	33	ug/l	J	j-i
TR-7A_03/20/2006	170033	TH040	SW 846 6020	W	Vanadium	28	ug/l	J	j-i
TR-8A_03/20/2006	170033	TH040	SW 846 6020	W	Vanadium	33	ug/l	J	j-i
TR-7A_03/20/2006	170033	TH040	SW 846 6020	W	Zinc	58	ug/l	J	j-f, j-i
TR-8A_03/20/2006	170033	TH040	SW 846 6020	W	Zinc	58	ug/l	J	j-f, j-i
TR-8D_03/20/2006	170033	TH040	SW 846 6020	W	Zinc	41	ug/l	J	j-f, j-i
M-103A_03/20/2006	170033	TH040	SW 846 6020	W	Zinc	77	ug/l	J	j-f, j-i
TR-8_03/20/2006	170033	TH040	SW 846 6020	W	Zinc	75	ug/l	J	j-f, j-i
M-103_03/21/2006	170190	TH042	SW 846 6020	W	Aluminum	1600	ug/l	J	j-i
TR-7_03/21/2006	170190	TH042	SW 846 6020	W	Aluminum	640	ug/l	J	j-i
TR-9_03/21/2006	170190	TH042	SW 846 6020	W	Aluminum	185	ug/l	J	j-i
TR-10_03/21/2006	170190	TH042	SW 846 6020	W	Aluminum	115	ug/l	J	j-i
M-103_03/21/2006	170190	TH042	SW 846 6020	W	Antimony	1.000	ug/l	UJ	uj-i

Table E-11
Qualification Based on Internal Standard Performance
Upgradient Investigation, Tronox Facility, Henderson, Nevada

(continued)

Sample ID	SDG	ENSR ID	Method	Matrix	Analyte	Result	Units	Qualifier[1]	Reason Code[2]
TR-7_03/21/2006	170190	TH042	SW 846 6020	W	Antimony	1.000	ug/l	UJ	uj-i
TR-9_03/21/2006	170190	TH042	SW 846 6020	W	Antimony	1.000	ug/l	UJ	uj-i
TR-10_03/21/2006	170190	TH042	SW 846 6020	W	Antimony	1.000	ug/l	UJ	uj-i
TR-10_03/21/2006	170190	TH042	SW 846 6020	W	Arsenic	63	ug/l	J	j-i
TR-7_03/21/2006	170190	TH042	SW 846 6020	W	Arsenic	50	ug/l	J	j-i
M-103_03/21/2006	170190	TH042	SW 846 6020	W	Arsenic	115	ug/l	J	j-i
TR-9_03/21/2006	170190	TH042	SW 846 6020	W	Arsenic	39	ug/l	J	j-i
M-103_03/21/2006	170190	TH042	SW 846 6020	W	Barium	50	ug/l	J	j-i
TR-7_03/21/2006	170190	TH042	SW 846 6020	W	Barium	38	ug/l	J	j-i
TR-10_03/21/2006	170190	TH042	SW 846 6020	W	Barium	53	ug/l	J	j-i
TR-9_03/21/2006	170190	TH042	SW 846 6020	W	Barium	29	ug/l	J	j-i
TR-7_03/21/2006	170190	TH042	SW 846 6020	W	Beryllium	1.000	ug/l	UJ	uj-i
M-103_03/21/2006	170190	TH042	SW 846 6020	W	Beryllium	1.000	ug/l	UJ	uj-i
TR-9_03/21/2006	170190	TH042	SW 846 6020	W	Beryllium	1.000	ug/l	UJ	uj-i
TR-10_03/21/2006	170190	TH042	SW 846 6020	W	Beryllium	1.000	ug/l	UJ	uj-i
M-103_03/21/2006	170190	TH042	SW 846 6020	W	Cadmium	0.500	ug/l	UJ	uj-i
TR-7_03/21/2006	170190	TH042	SW 846 6020	W	Cadmium	0.500	ug/l	UJ	uj-i
TR-9_03/21/2006	170190	TH042	SW 846 6020	W	Cadmium	0.500	ug/l	UJ	uj-i
TR-10_03/21/2006	170190	TH042	SW 846 6020	W	Cadmium	0.500	ug/l	UJ	uj-i
TR-7_03/21/2006	170190	TH042	SW 846 6020	W	Chromium	31	ug/l	J	j-i
M-103_03/21/2006	170190	TH042	SW 846 6020	W	Chromium	16	ug/l	J	j-i
TR-9_03/21/2006	170190	TH042	SW 846 6020	W	Chromium	11	ug/l	J	j-i
TR-10_03/21/2006	170190	TH042	SW 846 6020	W	Chromium	41	ug/l	J	j-i
M-103_03/21/2006	170190	TH042	SW 846 6020	W	Cobalt	2.000	ug/l	UJ	uj-i
TR-7_03/21/2006	170190	TH042	SW 846 6020	W	Cobalt	2.000	ug/l	UJ	uj-i
TR-9_03/21/2006	170190	TH042	SW 846 6020	W	Cobalt	2.000	ug/l	UJ	uj-i
TR-10_03/21/2006	170190	TH042	SW 846 6020	W	Cobalt	2.000	ug/l	UJ	uj-i
M-103_03/21/2006	170190	TH042	SW 846 6020	W	Copper	7.0	ug/l	J	j-i
TR-7_03/21/2006	170190	TH042	SW 846 6020	W	Copper	2.1	ug/l	J	j-i

Table E-11
Qualification Based on Internal Standard Performance
Upgradient Investigation, Tronox Facility, Henderson, Nevada

(continued)

Sample ID	SDG	ENSR ID	Method	Matrix	Analyte	Result	Units	Qualifier[1]	Reason Code[2]
TR-9_03/21/2006	170190	TH042	SW 846 6020	W	Copper	2.000	ug/l	UJ	uj-i
TR-10_03/21/2006	170190	TH042	SW 846 6020	W	Copper	2.0	ug/l	J	j-i
TR-7_03/21/2006	170190	TH042	SW 846 6020	W	Manganese	25	ug/l	J	j-i
M-103_03/21/2006	170190	TH042	SW 846 6020	W	Manganese	56	ug/l	J	j-i
TR-10_03/21/2006	170190	TH042	SW 846 6020	W	Manganese	4.6	ug/l	J	j-i
TR-9_03/21/2006	170190	TH042	SW 846 6020	W	Manganese	10	ug/l	J	j-i
M-103_03/21/2006	170190	TH042	SW 846 6020	W	Molybdenum	49	ug/l	J	j-i
TR-7_03/21/2006	170190	TH042	SW 846 6020	W	Molybdenum	5.2	ug/l	J	j-i
TR-10_03/21/2006	170190	TH042	SW 846 6020	W	Molybdenum	21	ug/l	J	j-i
TR-9_03/21/2006	170190	TH042	SW 846 6020	W	Molybdenum	5.2	ug/l	J	j-i
TR-8D_03/20/2006	170033	TH040	SW 846 6020	W	Nickel	5.000	ug/l	UJ	uj-i
TR-8A_03/20/2006	170033	TH040	SW 846 6020	W	Nickel	5.000	ug/l	UJ	uj-i
TR-7A_03/20/2006	170033	TH040	SW 846 6020	W	Nickel	5.000	ug/l	UJ	uj-i
TR-7_03/21/2006	170190	TH042	SW 846 6020	W	Nickel	5.000	ug/l	UJ	uj-i
TR-7_03/21/2006	170190	TH042	SW 846 6020	W	Selenium	5.000	ug/l	UJ	uj-i
TR-10_03/21/2006	170190	TH042	SW 846 6020	W	Selenium	5.000	ug/l	UJ	uj-i
TR-9_03/21/2006	170190	TH042	SW 846 6020	W	Selenium	5.000	ug/l	UJ	uj-i
M-103_03/21/2006	170190	TH042	SW 846 6020	W	Silver	0.500	ug/l	UJ	uj-i
TR-7_03/21/2006	170190	TH042	SW 846 6020	W	Silver	0.500	ug/l	UJ	uj-i
TR-9_03/21/2006	170190	TH042	SW 846 6020	W	Silver	0.500	ug/l	UJ	uj-i
TR-10_03/21/2006	170190	TH042	SW 846 6020	W	Silver	0.500	ug/l	UJ	uj-i
M-103_03/21/2006	170190	TH042	SW 846 6020	W	Vanadium	26	ug/l	J	j-i
TR-7_03/21/2006	170190	TH042	SW 846 6020	W	Vanadium	28	ug/l	J	j-i
TR-9_03/21/2006	170190	TH042	SW 846 6020	W	Vanadium	25	ug/l	J	j-i
TR-10_03/21/2006	170190	TH042	SW 846 6020	W	Vanadium	27	ug/l	J	j-i
TR-7_03/21/2006	170190	TH042	SW 846 6020	W	Zinc	43	ug/l	J	j-i
M-103_03/21/2006	170190	TH042	SW 846 6020	W	Zinc	11	ug/l	J	j-i
TR-9_03/21/2006	170190	TH042	SW 846 6020	W	Zinc	52	ug/l	J	j-i
TR-10_03/21/2006	170190	TH042	SW 846 6020	W	Zinc	5.0	ug/l	J	j-i

Table E-11
Qualification Based on Internal Standard Performance
Upgradient Investigation, Tronox Facility, Henderson, Nevada

(continued)

Sample ID	SDG	ENSR ID	Method	Matrix	Analyte	Result	Units	Qualifier[1]	Reason Code[2]
M-120_03/22/2006	170259	TH043	SW 846 6020	W	Aluminum	38	ug/l	J	j-i
M-118_03/22/2006	170259	TH043	SW 846 6020	W	Aluminum	1100	ug/l	J	j-i
M-118_03/22/2006	170259	TH043	SW 846 6020	W	Antimony	1.000	ug/l	UJ	uj-i
M-120_03/22/2006	170259	TH043	SW 846 6020	W	Antimony	1	ug/l	UJ	uj-i
M-118_03/22/2006	170259	TH043	SW 846 6020	W	Arsenic	36	ug/l	J	j-i
M-120_03/22/2006	170259	TH043	SW 846 6020	W	Arsenic	155	ug/l	J	j-i
M-118_03/22/2006	170259	TH043	SW 846 6020	W	Barium	37	ug/l	J	j-i
M-120_03/22/2006	170259	TH043	SW 846 6020	W	Barium	37	ug/l	J	j-i
M-120_03/22/2006	170259	TH043	SW 846 6020	W	Beryllium	1	ug/l	UJ	uj-i
M-118_03/22/2006	170259	TH043	SW 846 6020	W	Beryllium	1.000	ug/l	UJ	uj-i
M-118_03/22/2006	170259	TH043	SW 846 6020	W	Cadmium	0.500	ug/l	UJ	uj-i
M-118_03/22/2006	170259	TH043	SW 846 6020	W	Chromium	9.1	ug/l	J	j-i
M-120_03/22/2006	170259	TH043	SW 846 6020	W	Chromium	2.5	ug/l	J	j-i
M-118_03/22/2006	170259	TH043	SW 846 6020	W	Cobalt	2.000	ug/l	UJ	uj-i
M-120_03/22/2006	170259	TH043	SW 846 6020	W	Cobalt	2	ug/l	UJ	uj-i
M-120_03/22/2006	170259	TH043	SW 846 6020	W	Copper	2.6	ug/l	J	j-i
M-118_03/22/2006	170259	TH043	SW 846 6020	W	Copper	2.000	ug/l	UJ	uj-i
M-120_03/22/2006	170259	TH043	SW 846 6020	W	Manganese	82	ug/l	J	j-i
M-118_03/22/2006	170259	TH043	SW 846 6020	W	Manganese	55	ug/l	J	j-i
M-118_03/22/2006	170259	TH043	SW 846 6020	W	Molybdenum	13	ug/l	J	j-i
M-103_03/21/2006	170190	TH042	SW 846 6020	W	Nickel	5.000	ug/l	UJ	uj-i
TR-9_03/21/2006	170190	TH042	SW 846 6020	W	Nickel	5.000	ug/l	UJ	uj-i
M-118_03/22/2006	170259	TH043	SW 846 6020	W	Selenium	5.000	ug/l	UJ	uj-i
M-120_03/22/2006	170259	TH043	SW 846 6020	W	Selenium	5	ug/l	UJ	uj-i
M-118_03/22/2006	170259	TH043	SW 846 6020	W	Silver	0.500	ug/l	UJ	uj-i
M-120_03/22/2006	170259	TH043	SW 846 6020	W	Vanadium	12	ug/l	J	j-i
M-118_03/22/2006	170259	TH043	SW 846 6020	W	Vanadium	21	ug/l	J	j-i
M-120_03/22/2006	170259	TH043	SW 846 6020	W	Zinc	5	ug/l	UJ	uj-i
M-118_03/22/2006	170259	TH043	SW 846 6020	W	Zinc	10	ug/l	J	j-i

Table E-11
Qualification Based on Internal Standard Performance
Upgradient Investigation, Tronox Facility, Henderson, Nevada

(continued)

Sample ID	SDG	ENSR ID	Method	Matrix	Analyte	Result	Units	Qualifier[1]	Reason Code[2]
M-121_03/23/2006	170342	TH044	SW 846 6020	W	Aluminum	250	ug/l	J	j-i
H-11_03/23/2006	170342	TH044	SW 846 6020	W	Aluminum	78	ug/l	J	j-i
M-121_03/23/2006	170342	TH044	SW 846 6020	W	Antimony	1.000	ug/l	UJ	uj-i
M-117_03/23/2006	170342	TH044	SW 846 6020	W	Antimony	1.000	ug/l	UJ	uj-i
H-11_03/23/2006	170342	TH044	SW 846 6020	W	Antimony	1.000	ug/l	UJ	uj-i
M-121_03/23/2006	170342	TH044	SW 846 6020	W	Arsenic	88	ug/l	J	j-i
M-117_03/23/2006	170342	TH044	SW 846 6020	W	Arsenic	58	ug/l	J	j-i
H-11_03/23/2006	170342	TH044	SW 846 6020	W	Arsenic	3.5	ug/l	J	j-i
M-121_03/23/2006	170342	TH044	SW 846 6020	W	Barium	39	ug/l	J	j-i
M-117_03/23/2006	170342	TH044	SW 846 6020	W	Barium	310	ug/l	J	j-i
H-11_03/23/2006	170342	TH044	SW 846 6020	W	Barium	22	ug/l	J	j-be, j-i
M-121_03/23/2006	170342	TH044	SW 846 6020	W	Beryllium	1.000	ug/l	UJ	uj-i
H-11_03/23/2006	170342	TH044	SW 846 6020	W	Beryllium	1.000	ug/l	UJ	uj-i
M-117_03/23/2006	170342	TH044	SW 846 6020	W	Beryllium	1.5	ug/l	J	j-i
M-121_03/23/2006	170342	TH044	SW 846 6020	W	Cadmium	0.500	ug/l	UJ	uj-i
M-117_03/23/2006	170342	TH044	SW 846 6020	W	Cadmium	0.500	ug/l	UJ	uj-i
H-11_03/23/2006	170342	TH044	SW 846 6020	W	Cadmium	0.500	ug/l	UJ	uj-i
M-121_03/23/2006	170342	TH044	SW 846 6020	W	Chromium	23	ug/l	J	j-i
M-117_03/23/2006	170342	TH044	SW 846 6020	W	Chromium	54	ug/l	J	j-i
H-11_03/23/2006	170342	TH044	SW 846 6020	W	Chromium	2.2	ug/l	J	j-i
M-121_03/23/2006	170342	TH044	SW 846 6020	W	Cobalt	2.000	ug/l	UJ	uj-i
M-117_03/23/2006	170342	TH044	SW 846 6020	W	Cobalt	9.4	ug/l	J	j-i
H-11_03/23/2006	170342	TH044	SW 846 6020	W	Cobalt	2.000	ug/l	UJ	uj-i
M-121_03/23/2006	170342	TH044	SW 846 6020	W	Copper	2.9	ug/l	J	j-i
M-117_03/23/2006	170342	TH044	SW 846 6020	W	Copper	24	ug/l	J	j-i
H-11_03/23/2006	170342	TH044	SW 846 6020	W	Copper	2.000	ug/l	UJ	uj-i
M-121_03/23/2006	170342	TH044	SW 846 6020	W	Manganese	84	ug/l	J	j-i
M-117_03/23/2006	170342	TH044	SW 846 6020	W	Manganese	530	ug/l	J	j-i
H-11_03/23/2006	170342	TH044	SW 846 6020	W	Manganese	4000	ug/l	J	j-i

Table E-11
Qualification Based on Internal Standard Performance
Upgradient Investigation, Tronox Facility, Henderson, Nevada

(continued)

Sample ID	SDG	ENSR ID	Method	Matrix	Analyte	Result	Units	Qualifier[1]	Reason Code[2]
M-121_03/23/2006	170342	TH044	SW 846 6020	W	Molybdenum	125	ug/l	J	j-i
M-117_03/23/2006	170342	TH044	SW 846 6020	W	Molybdenum	13	ug/l	J	j-i
H-11_03/23/2006	170342	TH044	SW 846 6020	W	Molybdenum	2.000	ug/l	UJ	uj-i
TR-10_03/21/2006	170190	TH042	SW 846 6020	W	Nickel	5.000	ug/l	UJ	uj-i
M-118_03/22/2006	170259	TH043	SW 846 6020	W	Nickel	5.000	ug/l	UJ	uj-i
H-11_03/23/2006	170342	TH044	SW 846 6020	W	Nickel	5.000	ug/l	UJ	uj-i
M-121_03/23/2006	170342	TH044	SW 846 6020	W	Selenium	5.000	ug/l	UJ	uj-i
H-11_03/23/2006	170342	TH044	SW 846 6020	W	Selenium	5.000	ug/l	UJ	uj-i
M-121_03/23/2006	170342	TH044	SW 846 6020	W	Silver	0.500	ug/l	UJ	uj-i
M-117_03/23/2006	170342	TH044	SW 846 6020	W	Silver	0.500	ug/l	UJ	j-i
H-11_03/23/2006	170342	TH044	SW 846 6020	W	Silver	0.500	ug/l	UJ	uj-i
M-121_03/23/2006	170342	TH044	SW 846 6020	W	Vanadium	14	ug/l	J	j-i
M-117_03/23/2006	170342	TH044	SW 846 6020	W	Vanadium	55	ug/l	J	j-i
H-11_03/23/2006	170342	TH044	SW 846 6020	W	Vanadium	3.000	ug/l	UJ	uj-i
M-121_03/23/2006	170342	TH044	SW 846 6020	W	Zinc	5.000	ug/l	UJ	uj-i
H-11_03/23/2006	170342	TH044	SW 846 6020	W	Zinc	290	ug/l	J	j-i
M-117_03/23/2006	170342	TH044	SW 846 6020	W	Zinc	105	ug/l	J	j-i
EB-3_03/24/2006	170393	TH045	SW 846 6020	W	Aluminum	25.000	ug/l	UJ	uj-i
EB-3_03/24/2006	170393	TH045	SW 846 6020	W	Antimony	1.000	ug/l	UJ	uj-i
EB-3_03/24/2006	170393	TH045	SW 846 6020	W	Arsenic	1.000	ug/l	UJ	uj-i
EB-3_03/24/2006	170393	TH045	SW 846 6020	W	Barium	5.5	ug/l	J	j-i
EB-3_03/24/2006	170393	TH045	SW 846 6020	W	Beryllium	1.000	ug/l	UJ	uj-i
EB-3_03/24/2006	170393	TH045	SW 846 6020	W	Cadmium	0.500	ug/l	UJ	uj-i
EB-3_03/24/2006	170393	TH045	SW 846 6020	W	Chromium	1.000	ug/l	UJ	uj-i
EB-3_03/24/2006	170393	TH045	SW 846 6020	W	Cobalt	3.5	ug/l	J	j-i
EB-3_03/24/2006	170393	TH045	SW 846 6020	W	Copper	2.000	ug/l	UJ	uj-i
EB-3_03/24/2006	170393	TH045	SW 846 6020	W	Lead	0.500	ug/l	UJ	uj-i
EB-3_03/24/2006	170393	TH045	SW 846 6020	W	Manganese	2.000	ug/l	UJ	uj-i
EB-3_03/24/2006	170393	TH045	SW 846 6020	W	Molybdenum	2.000	ug/l	UJ	uj-i

Table E-11
Qualification Based on Internal Standard Performance
Upgradient Investigation, Tronox Facility, Henderson, Nevada

(continued)

Sample ID	SDG	ENSR ID	Method	Matrix	Analyte	Result	Units	Qualifier[1]	Reason Code[2]
EB-3_03/24/2006	170393	TH045	SW 846 6020	W	Nickel	5.000	ug/l	UJ	uj-i
EB-3_03/24/2006	170393	TH045	SW 846 6020	W	Selenium	5.000	ug/l	UJ	uj-i
EB-3_03/24/2006	170393	TH045	SW 846 6020	W	Silver	0.500	ug/l	UJ	uj-i
EB-3_03/24/2006	170393	TH045	SW 846 6020	W	Thallium	1.000	ug/l	UJ	uj-i
EB-3_03/24/2006	170393	TH045	SW 846 6020	W	Tungsten	2.000	ug/l	UJ	uj-i
EB-3_03/24/2006	170393	TH045	SW 846 6020	W	Vanadium	3.000	ug/l	UJ	uj-i
EB-3_03/24/2006	170393	TH045	SW 846 6020	W	Zinc	8.3	ug/l	J	j-i

Notes:
[1]See Table E-1 for Data Validation Qualifiers
[2]See Table E-2 for reason code definitions
SO - soil
W - water
pg/g - picogram/gram
ug/l

Table E-12
Qualifications Based on Laboratory Duplicate Precision
Upgradient Investigation, Tronox Facility, Henderson, Nevada

Sample ID	SDG	ENSR ID	Method	Matrix	Analyte	Result	Units	Qualifier[1]	Reason [2]
M120-0.5_03/07/2006	G6C100424	TH017	SW 846 8290	SO	1,2,3,4,5,6,7,8-Octachlorodibenzo-p-dioxin	33	pg/g	J	j-m, j-d
M120-0.5_03/07/2006	G6C100424	TH017	SW 846 8290	SO	1,2,3,7,8,9-Hexachlorodibenzofuran	2.7	pg/g	UJ	uj-d
M120-0.5_03/07/2006	G6C100424	TH017	SW 846 8290	SO	2,3,7,8-Tetrachlorodibenzo-p-dioxin	0.53	pg/g	UJ	uj-m, uj-d
M120-0.5_03/07/2006	G6C100424	TH017	SW 846 8290	SO	1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	2.7	pg/g	UJ	j-m, j-d
M120-0.5_03/07/2006	G6C100424	TH017	SW 846 8290	SO	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	6.7	pg/g	J	j-m, j-d
M120-0.5_03/07/2006	G6C100424	TH017	SW 846 8290	SO	1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	2.7	pg/g	UJ	j-m, j-d,
M120-0.5_03/07/2006	G6C100424	TH017	SW 846 8290	SO	1,2,3,7,8-Pentachlorodibenzo-p-dioxin	0.62	pg/g	UJ	j-m, j-d
M120-0.5_03/07/2006	G6C100424	TH017	SW 846 8290	SO	1,2,3,4,7,8-Hexachlorodibenzofuran	11	pg/g	J	j-m, j-d
M120-0.5_03/07/2006	G6C100424	TH017	SW 846 8290	SO	1,2,3,6,7,8-Hexachlorodibenzofuran	7.7	pg/g	J	j-d
M120-0.5_03/07/2006	G6C100424	TH017	SW 846 8290	SO	1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	2.7	pg/g	UJ	j-m, j-d
M120-0.5_03/07/2006	G6C100424	TH017	SW 846 8290	SO	1,2,3,4,6,7,8-Heptachlorodibenzofuran	30	pg/g	J	j-m, j-d
M120-0.5_03/07/2006	G6C100424	TH017	SW 846 8290	SO	1,2,3,4,5,6,7,8-Octachlorodibenzofuran	54	pg/g	J	j-d
M120-0.5_03/07/2006	G6C100424	TH017	SW 846 8290	SO	2,3,7,8-Tetrachlorodibenzofuran	2.9	pg/g	J	j-m, j-d
M118-50_03/08/2006	06C081	TH019	SW 846 8260B	SO	Hexachlorobutadiene	7.3	ug/kg	UJ	uj-d
M116-20_03/12/2006	06C120	TH023	SW 846 6020A	SO	Barium	272	mg/kg	J	j-m, j-d
M117-50_03/11/2006	06C120	TH023	EPA 314.0	SO	Perchlorate	49	ug/kg	UJ	uj-d
M117-50_03/11/2006	06C120	TH023	SW 846 6020A	SO	Barium	125	mg/kg	J	j-m, j-d
M117-5_03/11/2006	06C120	TH023	SW 846 6020A	SO	Barium	171	mg/kg	J	j-m, j-d
M117-40_03/11/2006	06C120	TH023	SW 846 6020A	SO	Barium	249	mg/kg	J	j-m, j-d
M117-40_03/11/2006	06C120	TH023	EPA 314.0	SO	Perchlorate	44.8	ug/kg	UJ	uj-d
M117-30_03/11/2006	06C120	TH023	SW 846 6020A	SO	Barium	167	mg/kg	J	j-m, j-d
M117-30_03/11/2006	06C120	TH023	EPA 314.0	SO	Perchlorate	45.5	ug/kg	UJ	uj-d
M117-20D_03/11/2006	06C120	TH023	SW 846 6020A	SO	Barium	211	mg/kg	J	j-m, j-d
M116-0.5_03/12/2006	06C120	TH023	EPA 314.0	SO	Perchlorate	600	ug/kg	J	j-d
M116-0.5_03/12/2006	06C120	TH023	SW 846 6020A	SO	Barium	178	mg/kg	J	j-m, j-d
M116-0.5D_03/12/2006	06C120	TH023	EPA 314.0	SO	Perchlorate	803	ug/kg	J	j-d
M116-0.5D_03/12/2006	06C120	TH023	SW 846 6020A	SO	Barium	201	mg/kg	J	j-m, j-d
M116-10_03/12/2006	06C120	TH023	EPA 314.0	SO	Perchlorate	202	ug/kg	J	j-d
M116-5_03/12/2006	06C120	TH023	SW 846 6020A	SO	Barium	150	mg/kg	J	j-m, j-d
M116-30_03/12/2006	06C120	TH023	EPA 314.0	SO	Perchlorate	48.7	ug/kg	UJ	uj-d
M116-30_03/12/2006	06C120	TH023	SW 846 6020A	SO	Barium	107	mg/kg	J	j-m, j-d
M116-40_03/12/2006	06C120	TH023	EPA 314.0	SO	Perchlorate	46.7	ug/kg	UJ	uj-d

(continued)

Table E-12
Qualifications Based on Laboratory Duplicate Precision
Upgradient Investigation, Tronox Facility, Henderson, Nevada

(continued)

Sample ID	SDG	ENSR ID	Method	Matrix	Analyte	Result	Units	Qualifier[1]	Reason [2]
M117-60_03/11/2006	06C120	TH023	EPA 314.0	SO	Perchlorate	50.8	ug/kg	UJ	uj-d
M116-40_03/12/2006	06C120	TH023	SW 846 6020A	SO	Barium	58.8	mg/kg	J	j-m, j-d
M117-80D_03/11/2006	06C120	TH023	SW 846 6020A	SO	Barium	90	mg/kg	J	j-m, j-d
M117-20_03/11/2006	06C120	TH023	SW 846 6020A	SO	Barium	156	mg/kg	J	j-m, j-d
M117-10_03/11/2006	06C120	TH023	SW 846 6020A	SO	Barium	219	mg/kg	J	j-m, j-d
M117-0.5_03/11/2006	06C120	TH023	EPA 314.0	SO	Perchlorate	42.1	ug/kg	UJ	uj-d
M117-0.5_03/11/2006	06C120	TH023	SW 846 6020A	SO	Barium	167	mg/kg	J	j-m, j-d
M116-50_03/12/2006	06C120	TH023	EPA 314.0	SO	Perchlorate	273	ug/kg	J	j-d
M116-50_03/12/2006	06C120	TH023	SW 846 6020A	SO	Barium	46	mg/kg	J	j-m, j-d
M116-5_03/12/2006	06C120	TH023	EPA 314.0	SO	Perchlorate	1340	ug/kg	J	j-d
M116-10_03/12/2006	06C120	TH023	SW 846 6020A	SO	Barium	173	mg/kg	J	j-m, j-d
M117-80_03/11/2006	06C120	TH023	EPA 314.0	SO	Perchlorate	94.7	ug/kg	J	j-d
M117-80D_03/11/2006	06C120	TH023	EPA 314.0	SO	Perchlorate	83.1	ug/kg	J	j-d
M117-80_03/11/2006	06C120	TH023	SW 846 6020A	SO	Barium	116	mg/kg	J	j-m, j-d
M117-60_03/11/2006	06C120	TH023	SW 846 6020A	SO	Barium	58.3	mg/kg	J	j-m, j-d
TR-10A_03/13/2006	169580	TH037	SW 846 6010B	W	Magnesium	54	mg/l	J	j-d
TR-10A_03/13/2006	169580	TH037	SW 846 6010B	W	Sodium	300	mg/l	J	j-m, j-d,
TR-9A_03/14/2006	169653	TH039	SW 846 6010B	W	Magnesium	59	mg/l	J	j-d
TR-9A_03/14/2006	169653	TH039	SW 846 6010B	W	Sodium	170	mg/l	J	j-m, j-d
TR-8D_03/20/2006	170033	TH040	SW 846 6010B	W	Magnesium	46	mg/l	J	j-d
TR-7A_03/20/2006	170033	TH040	SW 846 6010B	W	Sodium	160	mg/l	J	j-m, j-d
TR-8_03/20/2006	170033	TH040	SW 846 6010B	W	Magnesium	51	mg/l	J	j-d
TR-8A_03/20/2006	170033	TH040	SW 846 6010B	W	Magnesium	47	mg/l	J	j-d
TR-8A_03/20/2006	170033	TH040	SW 846 6010B	W	Sodium	230	mg/l	J	j-m, j-d
TR-8_03/20/2006	170033	TH040	SW 846 6010B	W	Sodium	230	mg/l	J	j-m, j-d
TR-8D_03/20/2006	170033	TH040	SW 846 6010B	W	Sodium	220	mg/l	J	j-m, j-d
TR-7A_03/20/2006	170033	TH040	SW 846 6010B	W	Magnesium	26	mg/l	J	j-d
M-103A_03/20/2006	170033	TH040	SW 846 6010B	W	Sodium	320	mg/l	J	j-m, j-d
M-103A_03/20/2006	170033	TH040	SW 846 6010B	W	Magnesium	82	mg/l	J	j-d
TR-9_03/21/2006	170190	TH042	SW 846 6010B	W	Sodium	170	mg/l	J	j-m, j-d
M-103_03/21/2006	170190	TH042	SW 846 6010B	W	Sodium	330	mg/l	J	j-m, j-d
M-103_03/21/2006	170190	TH042	SW 846 6010B	W	Magnesium	69	mg/l	J	j-d

Table E-12
Qualifications Based on Laboratory Duplicate Precision
Upgradient Investigation, Tronox Facility, Henderson, Nevada

(continued)

Sample ID	SDG	ENSR ID	Method	Matrix	Analyte	Result	Units	Qualifier[1]	Reason [2]
TR-9_03/21/2006	170190	TH042	SW 846 6010B	W	Magnesium	23	mg/l	J	j-d
TR-7_03/21/2006	170190	TH042	SW 846 6010B	W	Magnesium	26	mg/l	J	j-d
TR-10_03/21/2006	170190	TH042	SW 846 6010B	W	Magnesium	53	mg/l	J	j-d
TR-10_03/21/2006	170190	TH042	SW 846 6010B	W	Sodium	310	mg/l	J	j-m, j-d
TR-7_03/21/2006	170190	TH042	SW 846 6010B	W	Sodium	160	mg/l	J	j-m, j-d
M-120_03/22/2006	170259	TH043	SW 846 6010B	W	Magnesium	140	mg/l	J	j-d
M-120_03/22/2006	170259	TH043	SW 846 6010B	W	Sodium	250	mg/l	J	j-m, j-d
M-118_03/22/2006	170259	TH043	SW 846 6010B	W	Sodium	160	mg/l	J	j-m, j-d
M-118_03/22/2006	170259	TH043	SW 846 6010B	W	Magnesium	23	mg/l	J	j-d
M-117_03/23/2006	170342	TH044	SW 846 6010B	W	Sodium	170	mg/l	J	j-m, j-d
M-117_03/23/2006	170342	TH044	SW 846 6010B	W	Magnesium	95	mg/l	J	j-d
M-121_03/23/2006	170342	TH044	SW 846 6010B	W	Magnesium	120	mg/l	J	j-d
M-121_03/23/2006	170342	TH044	SW 846 6010B	W	Sodium	420	mg/l	J	j-m, j-d
H-11_03/23/2006	170342	TH044	SW 846 6010B	W	Magnesium	22	mg/l	J	j-d
H-11_03/23/2006	170342	TH044	SW 846 6010B	W	Sodium	150	mg/l	J	j-m, j-d
M120-30_03/07/2006	06C071	TH018	SW 846 8141A	SO	Dimethoate	0.037	mg/kg	UJ	uj-d
M120-10_03/07/2006	06C071	TH018	SW 846 8141A	SO	Dimethoate	0.035	mg/kg	UJ	uj-d
M120-0.5_03/07/2006	06C071	TH018	SW 846 8141A	SO	Dimethoate	0.037	mg/kg	UJ	uj-d
M-120_03/22/2006	06C204	TH028	SW 846 8141A	W	Stirophos	0.94	ug/l	UJ	uj-d
M-120_03/22/2006	06C204	TH028	SW 846 8141A	W	Parathion	0.94	ug/l	UJ	uj-d
M-120_03/22/2006	06C204	TH028	SW 846 8141A	W	Thionazin	1.9	ug/l	UJ	uj-d
M-120_03/22/2006	06C204	TH028	SW 846 8141A	W	Methyl parathion	0.94	ug/l	UJ	uj-d
M-120_03/22/2006	06C204	TH028	SW 846 8141A	W	Mevinphos	0.94	ug/l	UJ	uj-d
M-120_03/22/2006	06C204	TH028	SW 846 8141A	W	Azinphos-methyl	0.94	ug/l	UJ	uj-d
M-120_03/22/2006	06C204	TH028	SW 846 8141A	W	Epn	0.94	ug/l	UJ	uj-d
M-120_03/22/2006	06C204	TH028	SW 846 8141A	W	Ethoprop	0.94	ug/l	UJ	uj-d
M-120_03/22/2006	06C204	TH028	SW 846 8141A	W	Demeton-s	0.94	ug/l	UJ	uj-d
M-120_03/22/2006	06C204	TH028	SW 846 8141A	W	Demeton-o	0.94	ug/l	UJ	uj-d
M-120_03/22/2006	06C204	TH028	SW 846 8141A	W	Merphos	0.94	ug/l	UJ	uj-d
M-120_03/22/2006	06C204	TH028	SW 846 8141A	W	Malathion	0.94	ug/l	UJ	uj-d
M-120_03/22/2006	06C204	TH028	SW 846 8141A	W	Dichlorvos	0.94	ug/l	UJ	uj-d

Table E-12
Qualifications Based on Laboratory Duplicate Precision
Upgradient Investigation, Tronox Facility, Henderson, Nevada

(continued)

Sample ID	SDG	ENSR ID	Method	Matrix	Analyte	Result	Units	Qualifier[1]	Reason [2]
M-120_03/22/2006	06C204	TH028	SW 846 8141A	W	Chlorpyrifos	0.94	ug/l	UJ	uj-d
M-120_03/22/2006	06C204	TH028	SW 846 8141A	W	Fensulfothion	0.94	ug/l	UJ	uj-d
M-120_03/22/2006	06C204	TH028	SW 846 8141A	W	Fenthion	0.94	ug/l	UJ	uj-d
M-120_03/22/2006	06C204	TH028	SW 846 8141A	W	Bolstar	0.94	ug/l	UJ	uj-d
M-120_03/22/2006	06C204	TH028	SW 846 8141A	W	Disulfoton	0.94	ug/l	UJ	uj-d
M-120_03/22/2006	06C204	TH028	SW 846 8141A	W	Coumaphos	0.94	ug/l	UJ	uj-d
M-120_03/22/2006	06C204	TH028	SW 846 8141A	W	Ronnel	0.94	ug/l	UJ	uj-d
M-120_03/22/2006	06C204	TH028	SW 846 8141A	W	Famphur	0.94	ug/l	UJ	uj-d
M-120_03/22/2006	06C204	TH028	SW 846 8141A	W	Sulfotep	0.94	ug/l	UJ	uj-d
M-120_03/22/2006	06C204	TH028	SW 846 8141A	W	Tokuthion	0.94	ug/l	UJ	uj-d
M-120_03/22/2006	06C204	TH028	SW 846 8141A	W	Diazinon	0.94	ug/l	UJ	uj-d
M-120_03/22/2006	06C204	TH028	SW 846 8141A	W	Trichloronate	0.94	ug/l	UJ	uj-d
M-120_03/22/2006	06C204	TH028	SW 846 8141A	W	Naled	0.94	ug/l	UJ	uj-d
M-120_03/22/2006	06C204	TH028	SW 846 8141A	W	Dimethoate	0.94	ug/l	UJ	uj-d
M-120_03/22/2006	06C204	TH028	SW 846 8141A	W	Phorate	0.94	ug/l	UJ	uj-d
EB-3_03/24/2006	06C239	TH030	SW 846 8141A	W	Dimethoate	1.2	ug/l	UJ	uj-d
EB-3_03/24/2006	06C239	TH030	SW 846 8141A	W	Fensulfothion	1.2	ug/l	UJ	uj-d
EB-3_03/24/2006	06C239	TH030	SW 846 8141A	W	Demeton-s	1.2	ug/l	UJ	uj-d
EB-3_03/24/2006	06C239	TH030	SW 846 8141A	W	Demeton-o	1.2	ug/l	UJ	uj-d
EB-3_03/24/2006	06C239	TH030	SW 846 8141A	W	Disulfoton	1.2	ug/l	UJ	uj-d

Notes:
[1]See Table E-1 for Dtaa Validation Qualifiers
[2]See Table E-2 for reason code definitions
SO - soil
W - water
pg/g - picogram/gram
ug/kg - microgram/kilogram
mg/kg - milligram/kilogram
mg/l - milligram/liter
ug/l - microgram/liter

Table E-13
Qualifications Based on Field Duplicate Precision
Upgradient Investigation, Tronox Facility, Henderson, Nevada

Qualifier1	SDG	ENSR ID	Method	Matrix	Analyte	Result	Units	Qualifier[1]	Reason Code[2]
M-103A_03/20/2006	170033	TH040	SW 846 6020	W	Aluminum	15000	ug/l	J	j-f, j-i
TR-7A_03/20/2006	170033	TH040	SW 846 6020	W	Aluminum	630	ug/l	J	j-f, j-i
TR-8_03/20/2006	170033	TH040	SW 846 6020	W	Aluminum	2800	ug/l	J	j-f, j-i
TR-8A_03/20/2006	170033	TH040	SW 846 6020	W	Aluminum	1800	ug/l	J	j-f, j-i
TR-8D_03/20/2006	170033	TH040	SW 846 6020	W	Aluminum	1500	ug/l	J	j-f, j-i
M119-0.5_03/14/2006	06C127	TH024	SW 846 6020A	SO	Arsenic	2.54	mg/kg	J	j-f
M119-0.5D_03/14/2006	06C127	TH024	SW 846 6020A	SO	Arsenic	4.7	mg/kg	J	j-f
M119-10_03/14/2006	06C127	TH024	SW 846 6020A	SO	Arsenic	3.51	mg/kg	J	j-f
M119-20_03/14/2006	06C127	TH024	SW 846 6020A	SO	Arsenic	3.4	mg/kg	J	j-f
M119-32_03/14/2006	06C127	TH024	SW 846 6020A	SO	Arsenic	25.2	mg/kg	J	j-f
M119-40_03/14/2006	06C127	TH024	SW 846 6020A	SO	Arsenic	16.8	mg/kg	J	j-f
M119-5_03/14/2006	06C127	TH024	SW 846 6020A	SO	Arsenic	3.61	mg/kg	J	j-f
M119-50_03/14/2006	06C127	TH024	SW 846 6020A	SO	Arsenic	11.8	mg/kg	J	j-f
M-103A_03/20/2006	170033	TH040	SW 846 6020	W	Barium	265	ug/l	J	j-f, j-i
TR-7A_03/20/2006	170033	TH040	SW 846 6020	W	Barium	51	ug/l	J	j-f, j-i
TR-8_03/20/2006	170033	TH040	SW 846 6020	W	Barium	85	ug/l	J	j-f, j-i
TR-8A_03/20/2006	170033	TH040	SW 846 6020	W	Barium	75	ug/l	J	j-f, j-i
TR-8D_03/20/2006	170033	TH040	SW 846 6020	W	Barium	58	ug/l	J	j-f, j-i
M119-0.5_03/14/2006	06C127	TH024	SW 846 6020A	SO	Calcium	21500	mg/kg	J	j-f
M119-0.5D_03/14/2006	06C127	TH024	SW 846 6020A	SO	Calcium	36700	mg/kg	J	j-f
M119-10_03/14/2006	06C127	TH024	SW 846 6020A	SO	Calcium	29200	mg/kg	J	j-f
M119-20_03/14/2006	06C127	TH024	SW 846 6020A	SO	Calcium	18200	mg/kg	J	j-f
M119-32_03/14/2006	06C127	TH024	SW 846 6020A	SO	Calcium	68300	mg/kg	J	j-f
M119-40_03/14/2006	06C127	TH024	SW 846 6020A	SO	Calcium	4080	mg/kg	J	j-f
M119-5_03/14/2006	06C127	TH024	SW 846 6020A	SO	Calcium	34300	mg/kg	J	j-f
M119-50_03/14/2006	06C127	TH024	SW 846 6020A	SO	Calcium	4770	mg/kg	J	j-f
M120-0.5_03/07/2006	06C071	TH018	SW 846 6020A	SO	Calcium	35500	mg/kg	J	j-f
M120-10_03/07/2006	06C071	TH018	SW 846 6020A	SO	Calcium	28300	mg/kg	J	j-f
M120-20_03/07/2006	06C071	TH018	SW 846 6020A	SO	Calcium	22200	mg/kg	J	j-f
M120-30_03/07/2006	06C071	TH018	SW 846 6020A	SO	Calcium	7790	mg/kg	J	j-f
M120-40_03/07/2006	06C071	TH018	SW 846 6020A	SO	Calcium	31400	mg/kg	J	j-f
M120-40D_03/07/2006	06C071	TH018	SW 846 6020A	SO	Calcium	109000	mg/kg	J	j-f
M120-5_03/07/2006	06C071	TH018	SW 846 6020A	SO	Calcium	11400	mg/kg	J	j-f
M120-50_03/07/2006	06C071	TH018	SW 846 6020A	SO	Calcium	5660	mg/kg	J	j-f
M120-60_03/07/2006	06C071	TH018	SW 846 6020A	SO	Calcium	129000	mg/kg	J	j-f

Table E-13
Qualifications Based on Field Duplicate Precision
Upgradient Investigation, Tronox Facility, Henderson, Nevada

(continued)

Qualifier1	SDG	ENSR ID	Method	Matrix	Analyte	Result	Units	Qualifier[1]	Reason Code[2]
M120-80_03/07/2006	06C071	TH018	SW 846 6020A	SO	Calcium	10500	mg/kg	J	j-f
M116-10_03/12/2006	06C120	TH023	SW 846 6020A	SO	Copper	140	mg/kg	J	j-f
M116-20_03/12/2006	06C120	TH023	SW 846 6020A	SO	Copper	26.9	mg/kg	J	j-f
M116-30_03/12/2006	06C120	TH023	SW 846 6020A	SO	Copper	23.6	mg/kg	J	j-f
M116-40_03/12/2006	06C120	TH023	SW 846 6020A	SO	Copper	16.3	mg/kg	J	j-f
M116-5_03/12/2006	06C120	TH023	SW 846 6020A	SO	Copper	46.7	mg/kg	J	j-f
M116-50_03/12/2006	06C120	TH023	SW 846 6020A	SO	Copper	105	mg/kg	J	j-f
M117-0.5_03/11/2006	06C120	TH023	SW 846 6020A	SO	Copper	30.8	mg/kg	J	j-f
M117-10_03/11/2006	06C120	TH023	SW 846 6020A	SO	Copper	25.9	mg/kg	J	j-f
M117-20_03/11/2006	06C120	TH023	SW 846 6020A	SO	Copper	48.4	mg/kg	J	j-f
M117-20D_03/11/2006	06C120	TH023	SW 846 6020A	SO	Copper	21.9	mg/kg	J	j-f
M117-30_03/11/2006	06C120	TH023	SW 846 6020A	SO	Copper	42.2	mg/kg	J	j-f
M117-40_03/11/2006	06C120	TH023	SW 846 6020A	SO	Copper	21.8	mg/kg	J	j-f
M117-5_03/11/2006	06C120	TH023	SW 846 6020A	SO	Copper	13.9	mg/kg	J	j-f
M117-50_03/11/2006	06C120	TH023	SW 846 6020A	SO	Copper	60.3	mg/kg	J	j-f
M117-60_03/11/2006	06C120	TH023	SW 846 6020A	SO	Copper	17.1	mg/kg	J	j-f
M117-80_03/11/2006	06C120	TH023	SW 846 6020A	SO	Copper	228	mg/kg	J	j-f
M117-80D_03/11/2006	06C120	TH023	SW 846 6020A	SO	Copper	30.5	mg/kg	J	j-f
M119-0.5_03/14/2006	06C127	TH024	SW 846 6020A	SO	Copper	30.8	mg/kg	J	j-f
M119-0.5D_03/14/2006	06C127	TH024	SW 846 6020A	SO	Copper	17.4	mg/kg	J	j-f
M119-10_03/14/2006	06C127	TH024	SW 846 6020A	SO	Copper	26.1	mg/kg	J	j-f
M119-20_03/14/2006	06C127	TH024	SW 846 6020A	SO	Copper	23.6	mg/kg	J	j-f
M119-32_03/14/2006	06C127	TH024	SW 846 6020A	SO	Copper	15.2	mg/kg	J	j-f
M119-40_03/14/2006	06C127	TH024	SW 846 6020A	SO	Copper	29.7	mg/kg	J	j-f
M119-5_03/14/2006	06C127	TH024	SW 846 6020A	SO	Copper	14.8	mg/kg	J	j-f
M119-50_03/14/2006	06C127	TH024	SW 846 6020A	SO	Copper	24.9	mg/kg	J	j-f
M-103A_03/20/2006	170033	TH040	SW 846 6010B	W	Iron	12	mg/l	J	j-f
TR-7A_03/20/2006	170033	TH040	SW 846 6010B	W	Iron	0.78	mg/l	J	j-f
TR-8_03/20/2006	170033	TH040	SW 846 6010B	W	Iron	3.0	mg/l	J	j-f
TR-8A_03/20/2006	170033	TH040	SW 846 6010B	W	Iron	1.9	mg/l	J	j-f
TR-8D_03/20/2006	170033	TH040	SW 846 6010B	W	Iron	1.2	mg/l	J	j-f
M116-10_03/12/2006	06C120	TH023	SW 846 6020A	SO	Lead	6.02	mg/kg	J	j-f
M116-20_03/12/2006	06C120	TH023	SW 846 6020A	SO	Lead	5.81	mg/kg	J	j-f
M116-30_03/12/2006	06C120	TH023	SW 846 6020A	SO	Lead	8.13	mg/kg	J	j-f
M116-40_03/12/2006	06C120	TH023	SW 846 6020A	SO	Lead	6.18	mg/kg	J	j-f

Table E-13
Qualifications Based on Field Duplicate Precision
Upgradient Investigation, Tronox Facility, Henderson, Nevada

(continued)

Qualifier1	SDG	ENSR ID	Method	Matrix	Analyte	Result	Units	Qualifier[1]	Reason Code[2]
M116-5_03/12/2006	06C120	TH023	SW 846 6020A	SO	Lead	6.85	mg/kg	J	j-f
M116-50_03/12/2006	06C120	TH023	SW 846 6020A	SO	Lead	4.87	mg/kg	J	j-f
M117-0.5_03/11/2006	06C120	TH023	SW 846 6020A	SO	Lead	6.1	mg/kg	J	j-f
M117-10_03/11/2006	06C120	TH023	SW 846 6020A	SO	Lead	6.75	mg/kg	J	j-f
M117-20_03/11/2006	06C120	TH023	SW 846 6020A	SO	Lead	5.69	mg/kg	J	j-f
M117-20D_03/11/2006	06C120	TH023	SW 846 6020A	SO	Lead	9.71	mg/kg	J	j-f
M117-30_03/11/2006	06C120	TH023	SW 846 6020A	SO	Lead	7.8	mg/kg	J	j-f
M117-40_03/11/2006	06C120	TH023	SW 846 6020A	SO	Lead	6.81	mg/kg	J	j-f
M117-5_03/11/2006	06C120	TH023	SW 846 6020A	SO	Lead	6.06	mg/kg	J	j-f
M117-50_03/11/2006	06C120	TH023	SW 846 6020A	SO	Lead	7.77	mg/kg	J	j-f
M117-60_03/11/2006	06C120	TH023	SW 846 6020A	SO	Lead	8.59	mg/kg	J	j-f
M117-80_03/11/2006	06C120	TH023	SW 846 6020A	SO	Lead	7.35	mg/kg	J	j-f
M117-80D_03/11/2006	06C120	TH023	SW 846 6020A	SO	Lead	8.1	mg/kg	J	j-f
M-103A_03/20/2006	170033	TH040	SW 846 6020	W	Manganese	470	ug/l	J	j-f, j-i
TR-7A_03/20/2006	170033	TH040	SW 846 6020	W	Manganese	145	ug/l	J	j-f, j-i
TR-8_03/20/2006	170033	TH040	SW 846 6020	W	Manganese	53	ug/l	J	j-f, j-i
TR-8A_03/20/2006	170033	TH040	SW 846 6020	W	Manganese	56	ug/l	J	j-f, j-i
TR-8D_03/20/2006	170033	TH040	SW 846 6020	W	Manganese	26	ug/l	J	j-f, j-i
M117-80_03/11/2006	06C120	TH023	SW 846 8015B	SO	Methanol	12	mg/kg	JZ	j-f, z-p
M117-80D_03/11/2006	06C120	TH023	SW 846 8015B	SO	Methanol	5	mg/kg	JZ	j-f, z-p
M-103A_03/20/2006	170033	TH040	SW 846 6010B	W	Titanium	0.39	mg/l	J	j-f
TR-7A_03/20/2006	170033	TH040	SW 846 6010B	W	Titanium	0.039	mg/l	J	j-f
TR-8_03/20/2006	170033	TH040	SW 846 6010B	W	Titanium	0.16	mg/l	J	j-f
TR-8A_03/20/2006	170033	TH040	SW 846 6010B	W	Titanium	0.11	mg/l	J	j-f
TR-8D_03/20/2006	170033	TH040	SW 846 6010B	W	Titanium	0.064	mg/l	J	j-f
M-103A_03/20/2006	170033	TH040	SW 846 6020	W	Zinc	77	ug/l	J	j-f, j-i
TR-7A_03/20/2006	170033	TH040	SW 846 6020	W	Zinc	58	ug/l	J	j-f, j-i
TR-8_03/20/2006	170033	TH040	SW 846 6020	W	Zinc	75	ug/l	J	j-f, j-i
TR-8A_03/20/2006	170033	TH040	SW 846 6020	W	Zinc	58	ug/l	J	j-f, j-i
TR-8D_03/20/2006	170033	TH040	SW 846 6020	W	Zinc	41	ug/l	J	j-f, j-i
M116-10_03/12/2006	06C120	TH023	SW 846 6020A	SO	Zinc	72.1	mg/kg	J	j-f
M116-20_03/12/2006	06C120	TH023	SW 846 6020A	SO	Zinc	33.2	mg/kg	J	j-f
M116-30_03/12/2006	06C120	TH023	SW 846 6020A	SO	Zinc	48.8	mg/kg	J	j-f
M116-40_03/12/2006	06C120	TH023	SW 846 6020A	SO	Zinc	31.8	mg/kg	J	j-f
M116-5_03/12/2006	06C120	TH023	SW 846 6020A	SO	Zinc	43.8	mg/kg	J	j-f

Table E-13
Qualifications Based on Field Duplicate Precision
Upgradient Investigation, Tronox Facility, Henderson, Nevada

(continued)

Qualifier1	SDG	ENSR ID	Method	Matrix	Analyte	Result	Units	Qualifier[1]	Reason Code[2]
M116-50_03/12/2006	06C120	TH023	SW 846 6020A	SO	Zinc	75.7	mg/kg	J	j-f
M117-0.5_03/11/2006	06C120	TH023	SW 846 6020A	SO	Zinc	34.9	mg/kg	J	j-f
M117-10_03/11/2006	06C120	TH023	SW 846 6020A	SO	Zinc	35.5	mg/kg	J	j-f
M117-20_03/11/2006	06C120	TH023	SW 846 6020A	SO	Zinc	42.1	mg/kg	J	j-f
M117-20D_03/11/2006	06C120	TH023	SW 846 6020A	SO	Zinc	41.1	mg/kg	J	j-f
M117-30_03/11/2006	06C120	TH023	SW 846 6020A	SO	Zinc	51.6	mg/kg	J	j-f
M117-40_03/11/2006	06C120	TH023	SW 846 6020A	SO	Zinc	37.3	mg/kg	J	j-f
M117-5_03/11/2006	06C120	TH023	SW 846 6020A	SO	Zinc	26.6	mg/kg	J	j-f
M117-50_03/11/2006	06C120	TH023	SW 846 6020A	SO	Zinc	93.6	mg/kg	J	j-f
M117-60_03/11/2006	06C120	TH023	SW 846 6020A	SO	Zinc	32.3	mg/kg	J	j-f
M117-80_03/11/2006	06C120	TH023	SW 846 6020A	SO	Zinc	227	mg/kg	J	j-f
M117-80D_03/11/2006	06C120	TH023	SW 846 6020A	SO	Zinc	46.7	mg/kg	J	j-f

Notes:
[1]See Table E-1 for Data Validation Qualifiers
[2]See Table E-2 for reason code definitions
SO - soil
W - water
mg/kg - milligram/kilogram
mg/l - milligrams/liter
ug/l - microgram/liter

Table E-14
Qualifications Based on Quantitation Problems
Upgradient Investigation, Tronox Facility, Henderson, Nevada

Sample ID	SDG	ENSR ID	Method	Matrix	Analyte	Result	Units	Qualifier[1]	Reason Code[2]
M-120_03/22/2006	G6E120362	TH052	SW 846 8290	W	1,2,3,4,5,6,7,8-Octachlorodibenzofuran	50	pg/L	U	u-q
M-120_03/22/2006	G6E120362	TH052	SW 846 8290	W	1,2,3,4,6,7,8-Heptachlorodibenzofuran	25	pg/L	U	u-q
M-120_03/22/2006	G6E120362	TH052	SW 846 8290	W	1,2,3,4,7,8,9-Heptachlorodibenzofuran	25	pg/L	U	u-q
M-120_03/22/2006	G6E120362	TH052	SW 846 8290	W	Total Heptachlorodibenzofuran	25	pg/L	U	u-q
0.5_03/07/2006	G6C100424	TH017	SW 846 8290	SO	1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	2.7	pg/g	UJ	j-m, j-d,uj-q
0.5_03/07/2006	G6C100424	TH017	SW 846 8290	SO	1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	2.7	pg/g	UJ	j-m, j-d,uj-q
0.5_03/07/2006	G6C100424	TH017	SW 846 8290	SO	1,2,3,7,8,9-Hexachlorodibenzofuran	2.7	pg/g	UJ	uj-d,uj-q
0.5_03/07/2006	G6C100424	TH017	SW 846 8290	SO	1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	2.7	pg/g	UJ	j-m, j-d,uj-q
0.5_03/07/2006	G6C100424	TH017	SW 846 8290	SO	2,3,7,8-Tetrachlorodibenzo-p-dioxin	0.53	pg/g	UJ	uj-m, uj-d,uj-q
0.5_03/07/2006	G6C100424	TH017	SW 846 8290	SO	Total Hexachlorodibenzo-p-dioxin	2.7	pg/g	UJ	uj-m,uj-q
10_03/07/2006	G6C100424	TH017	SW 846 8290	SO	1,2,3,4,6,7,8-Heptachlorodibenzofuran	2.8	pg/g	UJ	uj-l,uj-q
10_03/07/2006	G6C100424	TH017	SW 846 8290	SO	1,2,3,4,7,8-Hexachlorodibenzofuran	2.8	pg/g	UJ	uj-l,uj-q
10_03/07/2006	G6C100424	TH017	SW 846 8290	SO	2,3,7,8-Tetrachlorodibenzofuran	0.55	pg/g	UJ	uj-l,uj-q
10_03/07/2006	G6C100424	TH017	SW 846 8290	SO	Total Heptachlorodibenzofuran	2.8	pg/g	UJ	uj-l,uj-q
10_03/07/2006	G6C100424	TH017	SW 846 8290	SO	Total Hexachlorodibenzofuran	0.87	pg/g	UJ	uj-l,uj-q
10_03/07/2006	G6C100424	TH017	SW 846 8290	SO	Total Hexachlorodibenzo-p-dioxin	2.8	pg/g	UJ	uj-l,uj-q
10_03/07/2006	G6C100424	TH017	SW 846 8290	SO	Total Pentachlorodibenzofuran	2.8	pg/g	UJ	uj-l,uj-q
10_03/07/2006	G6C100424	TH017	SW 846 8290	SO	Total Pentachlorodibenzo-p-dioxin	2.8	pg/g	UJ	uj-l,uj-q
30_03/07/2006	G6C100424	TH017	SW 846 8290	SO	1,2,3,4,5,6,7,8-Octachlorodibenzo-p-dioxin	5.6	pg/g	UJ	uj-l,uj-q
30_03/07/2006	G6C100424	TH017	SW 846 8290	SO	Total Pentachlorodibenzofuran	2.8	pg/g	UJ	uj-l,uj-q
30_03/07/2006	G6C100424	TH017	SW 846 8290	SO	Total Pentachlorodibenzo-p-dioxin	2.8	pg/g	UJ	uj-l,uj-q

Notes:
[1]See Table E-1 for Data Validation Qualifiers
[2]See Table E-2 for reason code definitions
SO - soil
W - water
pg/g - picogram/gram
pg/l - picogram/liter

Table E-15
Qualifications Based on Probable Contamination
Upgradient Investigation, Tronox Facility, Henderson Nevada

Sample ID	SDG	ENSR ID	Method	Matrix	Analyte	Result	Units	Qualifier[1]	Reason Code[2]
M120-80_03/07/2006	06C071	TH018	SW 846 8015B	SO	Methanol	0.86	mg/kg	JZ	z-p
M120-0.5_03/07/2006	06C071	TH018	SW 846 8015B	SO	Methanol		mg/kg	R	r-p
M120-10_03/07/2006	06C071	TH018	SW 846 8015B	SO	Methanol	1.3	mg/kg	Z	z-p
M118-10_03/08/2006	06C081	TH019	SW 846 8015B	SO	Methanol	0.62	mg/kg	JZ	z-p
M118-50_03/08/2006	06C081	TH019	SW 846 8015B	SO	Methanol	0.77	mg/kg	JZ	z-p
M118-0.5_03/08/2006	06C081	TH019	SW 846 8015B	SO	Methanol		mg/kg	R	r-p
M118-30_03/08/2006	06C081	TH019	SW 846 8015B	SO	Methanol	3.1	mg/kg	Z	z-p
M118-5_03/08/2006	06C081	TH019	SW 846 8015B	SO	Methanol	6.6	mg/kg	Z	z-p
M118-80_03/08/2006	06C081	TH019	SW 846 8015B	SO	Methanol	2.9	mg/kg	Z	z-p
M121-30_03/10/2006	06C106	TH021	SW 846 8015B	SO	Methanol	0.92	mg/kg	JZ	z-p
M121-5_03/10/2006	06C106	TH021	SW 846 8015B	SO	Methanol	0.72	mg/kg	JZ	z-p
M121-10_03/10/2006	06C106	TH021	SW 846 8015B	SO	Methanol	2.3	mg/kg	Z	z-p
M121-50_03/10/2006	06C106	TH021	SW 846 8015B	SO	Methanol	23	mg/kg	Z	z-p
M121-5D_03/10/2006	06C106	TH021	SW 846 8015B	SO	Methanol	3.7	mg/kg	Z	z-p
M121-80_03/10/2006	06C106	TH021	SW 846 8015B	SO	Methanol	3.8	mg/kg	Z	z-p
M117-80_03/11/2006	06C120	TH023	SW 846 8015B	SO	Methanol	12	mg/kg	JZ	j-f, z-p
M117-80D_03/11/2006	06C120	TH023	SW 846 8015B	SO	Methanol	5	mg/kg	JZ	j-f, z-p
M116-0.5_03/12/2006	06C120	TH023	SW 846 8015B	SO	Methanol		mg/kg	R	r-p
M116-0.5D_03/12/2006	06C120	TH023	SW 846 8015B	SO	Methanol		mg/kg	R	r-p
M117-0.5_03/11/2006	06C120	TH023	SW 846 8015B	SO	Methanol		mg/kg	R	r-p
M116-10_03/12/2006	06C120	TH023	SW 846 8015B	SO	Methanol	1.2	mg/kg	Z	z-p
M116-30_03/12/2006	06C120	TH023	SW 846 8015B	SO	Methanol	11	mg/kg	Z	z-p
M116-5_03/12/2006	06C120	TH023	SW 846 8015B	SO	Methanol	2.4	mg/kg	Z	z-p
M116-50_03/12/2006	06C120	TH023	SW 846 8015B	SO	Methanol	2.1	mg/kg	Z	z-p
M117-10_03/11/2006	06C120	TH023	SW 846 8015B	SO	Methanol	14	mg/kg	Z	z-p
M117-30_03/11/2006	06C120	TH023	SW 846 8015B	SO	Methanol	16	mg/kg	Z	z-p
M117-5_03/11/2006	06C120	TH023	SW 846 8015B	SO	Methanol	47	mg/kg	Z	z-p
M117-50_03/11/2006	06C120	TH023	SW 846 8015B	SO	Methanol	20	mg/kg	Z	z-p

Notes:
[1]See Table E-1 for Data Validation Qualifiers
[2]See Table E-2 for reason code definitions
SO - soil
W - water
mg/kg - milligram/kilogram

Table E-16
Rejected Results
Upgradient Investigation, Tronox Facility, Henderson, Nevada

Sample ID	SDG	ENSR ID	Method	Matrix	Analyte	Result	Units	Qualifier[1]	Reason Code[2]
M-120_03/22/2006	06C204	TH028	SW 846 8270C	W	3,3-Dichlorobenzidine		ug/l	R	r-l
EB-3_03/24/2006	06C239	TH030	SW 846 8270C	W	3,3-Dichlorobenzidine		ug/l	R	r-l
M118-80_03/08/2006	06C081	TH019	SW 846 6020A	SO	Antimony		mg/kg	R	r-m
M118-40_03/08/2006	06C081	TH019	SW 846 6020A	SO	Antimony		mg/kg	R	r-m
M118-60_03/08/2006	06C081	TH019	SW 846 6020A	SO	Antimony		mg/kg	R	r-m
M118-10_03/08/2006	06C081	TH019	SW 846 6020A	SO	Antimony		mg/kg	R	r-m
M118-30_03/08/2006	06C081	TH019	SW 846 6020A	SO	Antimony		mg/kg	R	r-m
M118-20D_03/08/2006	06C081	TH019	SW 846 6020A	SO	Antimony		mg/kg	R	r-m
M120-0.5_03/07/2006	06C071	TH018	SW 846 8015B	SO	Methanol		mg/kg	R	r-p
M118-0.5_03/08/2006	06C081	TH019	SW 846 8015B	SO	Methanol		mg/kg	R	r-p
M117-0.5_03/11/2006	06C120	TH023	SW 846 8015B	SO	Methanol		mg/kg	R	r-p
M116-0.5D_03/12/2006	06C120	TH023	SW 846 8015B	SO	Methanol		mg/kg	R	r-p
M116-0.5_03/12/2006	06C120	TH023	SW 846 8015B	SO	Methanol		mg/kg	R	r-p
M120-80_03/07/2006	06C071	TH018	SW 846 8260B	SO	t-Butyl alcohol		ug/kg	R	r-c
M120-50_03/07/2006	06C071	TH018	SW 846 8260B	SO	t-Butyl alcohol		ug/kg	R	r-c
M120-30_03/07/2006	06C071	TH018	SW 846 8260B	SO	t-Butyl alcohol		ug/kg	R	r-c
M120-10_03/07/2006	06C071	TH018	SW 846 8260B	SO	t-Butyl alcohol		ug/kg	R	r-c
M120-0.5_03/07/2006	06C071	TH018	SW 846 8260B	SO	t-Butyl alcohol		ug/kg	R	r-c
M120-5_03/07/2006	06C071	TH018	SW 846 8260B	SO	t-Butyl alcohol		ug/kg	R	r-c
BLANK_03/08/2006	06C081	TH019	SW 846 8260B	W	t-Butyl alcohol		ug/l	R	r-c
M118-5_03/08/2006	06C081	TH019	SW 846 8260B	SO	t-Butyl alcohol		ug/kg	R	r-c
FB-1_03/08/2006	06C081	TH019	SW 846 8260B	W	t-Butyl alcohol		ug/l	R	r-c
M118-80_03/08/2006	06C081	TH019	SW 846 8260B	SO	t-Butyl alcohol		ug/kg	R	r-c
M118-0.5_03/08/2006	06C081	TH019	SW 846 8260B	SO	t-Butyl alcohol		ug/kg	R	r-c
M118-50_03/08/2006	06C081	TH019	SW 846 8260B	SO	t-Butyl alcohol		ug/kg	R	r-c
M118-10_03/08/2006	06C081	TH019	SW 846 8260B	SO	t-Butyl alcohol		ug/kg	R	r-c
M118-30_03/08/2006	06C081	TH019	SW 846 8260B	SO	t-Butyl alcohol		ug/kg	R	r-c
EB-1_03/09/2006	06C096	TH020	SW 846 8260B	W	t-Butyl alcohol		ug/l	R	r-c
M121-60_03/10/2006	06C106	TH021	SW 846 8260B	SO	t-Butyl alcohol		ug/kg	R	r-c
M121-5D_03/10/2006	06C106	TH021	SW 846 8260B	SO	t-Butyl alcohol		ug/kg	R	r-c
M121-50_03/10/2006	06C106	TH021	SW 846 8260B	SO	t-Butyl alcohol		ug/kg	R	r-c

Table E-16
Rejected Results
Upgradient Investigation, Tronox Facility, Henderson, Nevada

(continued)									
Sample ID	**SDG**	**ENSR ID**	**Method**	**Matrix**	**Analyte**	**Result**	**Units**	**Qualifier[1]**	**Reason Code[2]**
M121-5_03/10/2006	06C106	TH021	SW 846 8260B	SO	t-Butyl alcohol		ug/kg	R	r-c
M121-30_03/10/2006	06C106	TH021	SW 846 8260B	SO	t-Butyl alcohol		ug/kg	R	r-c
M121-10_03/10/2006	06C106	TH021	SW 846 8260B	SO	t-Butyl alcohol		ug/kg	R	r-c
M121-0.5_03/10/2006	06C106	TH021	SW 846 8260B	SO	t-Butyl alcohol		ug/kg	R	r-c
M121-70_03/10/2006	06C106	TH021	SW 846 8260B	SO	t-Butyl alcohol		ug/kg	R	r-c
M121-80_03/10/2006	06C106	TH021	SW 846 8260B	SO	t-Butyl alcohol		ug/kg	R	r-c
TR-10A_03/13/2006	06C119	TH022	SW 846 8260B	W	t-Butyl alcohol		ug/l	R	r-c
M117-30_03/11/2006	06C120	TH023	SW 846 8260B	SO	t-Butyl alcohol		ug/kg	R	r-c
M116-0.5D_03/12/2006	06C120	TH023	SW 846 8260B	SO	t-Butyl alcohol		ug/kg	R	r-c
M117-10_03/11/2006	06C120	TH023	SW 846 8260B	SO	t-Butyl alcohol		ug/kg	R	r-c
M117-0.5_03/11/2006	06C120	TH023	SW 846 8260B	SO	t-Butyl alcohol		ug/kg	R	r-c
M116-50_03/12/2006	06C120	TH023	SW 846 8260B	SO	t-Butyl alcohol		ug/kg	R	r-c
M116-5_03/12/2006	06C120	TH023	SW 846 8260B	SO	t-Butyl alcohol		ug/kg	R	r-c
M117-50_03/11/2006	06C120	TH023	SW 846 8260B	SO	t-Butyl alcohol		ug/kg	R	r-c
M116-10_03/12/2006	06C120	TH023	SW 846 8260B	SO	t-Butyl alcohol		ug/kg	R	r-c
M117-80D_03/11/2006	06C120	TH023	SW 846 8260B	SO	t-Butyl alcohol		ug/kg	R	r-c
M116-0.5_03/12/2006	06C120	TH023	SW 846 8260B	SO	t-Butyl alcohol		ug/kg	R	r-c
M117-5_03/11/2006	06C120	TH023	SW 846 8260B	SO	t-Butyl alcohol		ug/kg	R	r-c
M117-80_03/11/2006	06C120	TH023	SW 846 8260B	SO	t-Butyl alcohol		ug/kg	R	r-c
M116-30_03/12/2006	06C120	TH023	SW 846 8260B	SO	t-Butyl alcohol		ug/kg	R	r-c
EB-2_03/14/2006	06C127	TH024	SW 846 8260B	W	t-Butyl alcohol		ug/l	R	r-c
M119-0.5D_03/14/2006	06C127	TH024	SW 846 8260B	SO	t-Butyl alcohol		ug/kg	R	r-c
M119-10_03/14/2006	06C127	TH024	SW 846 8260B	SO	t-Butyl alcohol		ug/kg	R	r-c
M119-32_03/14/2006	06C127	TH024	SW 846 8260B	SO	t-Butyl alcohol		ug/kg	R	r-c
M119-5_03/14/2006	06C127	TH024	SW 846 8260B	SO	t-Butyl alcohol		ug/kg	R	r-c
M119-50_03/14/2006	06C127	TH024	SW 846 8260B	SO	t-Butyl alcohol		ug/kg	R	r-c
TR-9A_03/14/2006	06C127	TH024	SW 846 8260B	W	t-Butyl alcohol		ug/l	R	r-c
M119-0.5_03/14/2006	06C127	TH024	SW 846 8260B	SO	t-Butyl alcohol		ug/kg	R	r-c
M-103A_03/20/2006	06C199	TH025	SW 846 8260B	W	t-Butyl alcohol		ug/l	R	r-c
TR-7A_03/20/2006	06C187	TH026	SW 846 8260B	W	t-Butyl alcohol		ug/l	R	r-c

Table E-16
Rejected Results
Upgradient Investigation, Tronox Facility, Henderson, Nevada

(continued)

Sample ID	SDG	ENSR ID	Method	Matrix	Analyte	Result	Units	Qualifier[1]	Reason Code[2]
BLANK_03/20/2006	06C187	TH026	SW 846 8260B	W	t-Butyl alcohol		ug/l	R	r-c
TR-8D_03/20/2006	06C187	TH026	SW 846 8260B	W	t-Butyl alcohol		ug/l	R	r-c
TR-8_03/20/2006	06C187	TH026	SW 846 8260B	W	t-Butyl alcohol		ug/l	R	r-c
TR-8A_03/20/2006	06C187	TH026	SW 846 8260B	W	t-Butyl alcohol		ug/l	R	r-c
BLANK_03/21/2006	06C193	TH027	SW 846 8260B	W	t-Butyl alcohol		ug/l	R	r-c
M-103_03/21/2006	06C193	TH027	SW 846 8260B	W	t-Butyl alcohol		ug/l	R	r-c
TR-9_03/21/2006	06C193	TH027	SW 846 8260B	W	t-Butyl alcohol		ug/l	R	r-c
TR-10_03/21/2006	06C193	TH027	SW 846 8260B	W	t-Butyl alcohol		ug/l	R	r-c
TR-7_03/21/2006	06C193	TH027	SW 846 8260B	W	t-Butyl alcohol		ug/l	R	r-c
M-120_03/22/2006	06C204	TH028	SW 846 8260B	W	t-Butyl alcohol		ug/l	R	r-c
M-118_03/22/2006	06C204	TH028	SW 846 8260B	W	t-Butyl alcohol		ug/l	R	r-c
BLANK_03/22/2006	06C204	TH028	SW 846 8260B	W	t-Butyl alcohol		ug/l	R	r-c
M-121_03/23/2006	06C222	TH029	SW 846 8260B	W	t-Butyl alcohol		ug/l	R	r-c
M-117_03/23/2006	06C222	TH029	SW 846 8260B	W	t-Butyl alcohol		ug/l	R	r-c
H-11_03/23/2006	06C222	TH029	SW 846 8260B	W	t-Butyl alcohol		ug/l	R	r-c
BLANK_03/23/2006	06C222	TH029	SW 846 8260B	W	t-Butyl alcohol		ug/l	R	r-c
EB-3_03/24/2006	06C239	TH030	SW 846 8260B	W	t-Butyl alcohol		ug/l	R	r-c
BLANK_03/24/2006	06C239	TH030	SW 846 8260B	W	t-Butyl alcohol		ug/l	R	r-c

Notes:
[1]See Table E-1 for Data Validation Qualifiers
[2]See Table E-2 for reason code definitions
SO - soil
W - water
ug/kg - microgram/kilogram
ug/l - microgram/liter

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date:	June 29, 2006 Revised September 14, 2006
To:	David Gerry/Camarillo
From:	Lisa Krowitz/Westford
Subject:	Data Validation, Radiological Analyses Henderson Upgradient Investigation Tronox LLC Henderson, Nevada GEL SDG Number 158269
Distribution:	R. Kennedy/Westford

04020-023-152
TH001rad.lkk.rev

SUMMARY

Limited validation was performed on the data for four soil samples analyzed for various radionuclides by DOE EML HASL and ASTM methods. The samples were collected at the Henderson site in Henderson, NV on March 10, 2006 and submitted to MWH in Monrovia, CA for analysis. MWH subcontracted the analysis to General Engineering Laboratories (GEL) in Charleston, South Carolina. GEL processed these samples under sample delivery group (SDG) number 158269.

The analytical data were evaluated with reference to the Department of Energy "Evaluation of Radiochemical Data Usability" (1997) and the *Multi-Agency Radiological Laboratory Analytical Protocols Manual (MARLAP),* July 2004.

In general, the data are valid as reported and may be used for decision making purposes. No data were rejected. The Th-230 results in all the samples in this data set were qualified with a B to indicate that the results may have been false positives due to blank contamination.

SAMPLES

The samples included in this review along with the parameters and analytical methods are listed below.

Sample ID	Parameter/Analytical Method
M121-0.5	Uranium-233/234 (U-233/234) by DOE EML HASL-300 Uranium-235/236 (U-235/236) by DOE EML HASL-300 Uranium-238 (U-238) by DOE EML HASL-300 Thorium-228 (Th-228) by DOE EML HASL-300 Thorium-230 (Th-230) by DOE EML HASL-300 Thorium-232 (Th-232) by DOE EML HASL-300 Lead-210 (Pb-210) by DOE RP280 Lead-212 (Pb-212), Radium-226 (Ra-226), Radium-228 (Ra-228) by EML HASL 300 Total U by ASTM D5174
M121-5	
M121-5D (Field Duplicate of M121-5)	
M121-80	

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

Sample data were reviewed for the following parameters:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times/sample preservation
- Laboratory method blanks/equipment blanks
- Chemical Yield (Tracers and Carriers)
- Laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) results
- Matrix spike (MS) results
- Laboratory duplicate results
- Field duplicate results
- Sample quantitation/detection limit results

DISCUSSION

Agreement of Analyses Conducted With COC Requests

Sample reports were reviewed against the analytical requests as designated on the chain-of-custody (COC) and subsequent communications between ENSR and the laboratory. The MWH COC used to transfer the samples to GEL did not have a relinquished by signature upon receipt at GEL and there was no collection time listed for sample M121-5D. No action was taken except to note these discrepancies.

When MWH transferred the sample to GEL, they added their laboratory ID to the front of the ENSR field ID. Thus, sample M121-0.5 on the ENSR COC was changed to 2603140361 M121-0.5 by MWH. During validation, the MWH sample ID was removed, leaving the original ENSR field sample ID.

Holding Times/Sample Preservation

All samples were prepared and analyzed within the method-specified holding times. No issues with sample preservation were noted upon receipt in the laboratory.

Laboratory Method Blanks and Equipment Blanks

There was no equipment blank submitted that was associated with samples M121-5 and M121-5D. However, the equipment blank associated with samples M121-0.5 and M121-80, was EB1 submitted in SDG 158272. There were no target analytes detected in EB1. However, Th-230 was detected in the method blank associated with the samples in this data set. The presence of blank contamination indicates that false positive results may exist for this nuclide in the associated samples. The following table summarizes the positive blank contamination detected in the method blank.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Blank Type	Nuclide	Result (units)
MB	Th-230	0.350 ± 0.191 pCi/g
Associated Samples: M121-0.5, M121-5, M121-5D, M121-80		

Sample results were qualified as follows:

- If normalized absolute difference > 2.58, no qualification
- If normalized absolute difference between 1.96 and 2.58, sample results > detection limit (DL) and/or reporting limit (RL) were qualified as estimated (JB).
- If normalized absolute difference between 0 and 1.96, professional judgment was used to negate (B) or reject (R).

The normalized absolute differences for the positive Th-230 results in samples M121-0.5, M121-5, M121-5D, and M121-80 were between 0 and 1.96. Thus, the Th-230 results in these samples were qualified as B to indicate the results may have been false positives due to blank contamination.

Chemical Yield (Tracers and Carriers)

The tracer recoveries for all applicable parameters met the QC acceptance limits of 25-125%.

LCS/LCSD Results

All LCS and/or LCSD percent recoveries (%Rs) met the acceptance criteria for all parameters.

MS Results

The table below indicates the samples used for MS analyses and the associated parameters.

Sample ID	Parameter
M121-0.5	Total U, Thorium isotopes, U isotopes
Batch QC 2603090020	Pb-210

The %Rs met the QC acceptance criteria of 75-125% for all MS analyses.

Laboratory Duplicate Results

The table below indicates the samples used for laboratory duplicate analyses and the associated parameters.

Sample ID	Parameter
M121-0.5	Thorium isotopes, U isotopes, Total U, Pb-212, Ra-226, Ra-228
Batch QC 2603090020	Pb-210

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

The relative percent differences (RPDs) met the QC acceptance criteria of 35% RPD for soil samples (if both results were greater than five times the RL) or the difference was less than the RL (if the results were less than five times the RL). Precision was deemed acceptable.

Field Duplicate Results

The field duplicate samples submitted with this data set were samples M121-5 and M121-5D. The following table summarizes the relative percent differences (RPDs) of the detected analytes in the field duplicate pair. The RPDs were within the acceptance criteria of 50% for a solid matrix (if the sample results were >10xRL), thus precision was deemed acceptable.

Analyte	M121-5 (pCi/g)	M121-5D (pCi/g)	% RPD	Action
Th-228	1.21 ± 0.408	1.71 ± 0.665	34	None
Th-230	1.32 ± 0.424	1.26 ± 0.523	5	None
Th-232	1.23 ± 0.402	1.37 ± 0.554	11	None
U-233/234	1.79 ± 0.505	1.47 ± 0.444	20	None
U-238	1.22 ± 0.418	0.689 ± 0.328	56	None, sample results <10xRL and difference <8xRL
Pb-212	1.34 ± 0.141	1.55 ± 0.169	15	None
Ra-226	1.39 ± 0.146	1.28 ± 0.159	8	None
Ra-228	1.24 ± 0.210	1.35 ± 0.262	8	None
Total U	3.02 ± 0.101 μg/L	2.62 ± 0.0898 μg/L	14	None

Sample Quantitation/Detection Limit Results

The total uranium results greater than the RL were reanalyzed to verify the initial results. All results were verified and the initial results were reported.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date:	June 29, 2006 Revised September 14, 2006
To:	David Gerry/Camarillo
From:	Lisa Krowitz/Westford
Subject:	Data Validation, Radiological Analyses Henderson Upgradient Investigation Tronox LLC Henderson, Nevada GEL SDG Number 158270
Distribution:	R. Kennedy/Westford

04020-023-152
TH002rad.lkk.rev

SUMMARY

Limited validation was performed on the data for two soil samples analyzed for various radionuclides by DOE EML HASL and ASTM methods. The samples were collected at the Henderson site in Henderson, NV on March 8, 2006 and submitted to MWH in Monrovia, CA for analysis. MWH subcontracted the analysis to General Engineering Laboratories (GEL) in Charleston, South Carolina. GEL processed these samples under sample delivery group (SDG) number 158270.

The analytical data were evaluated with reference to the Department of Energy "Evaluation of Radiochemical Data Usability" (1997) and the *Multi-Agency Radiological Laboratory Analytical Protocols Manual (MARLAP),* July 2004.

In general, the data are valid as reported and may be used for decision making purposes. No data were rejected. The Th-230 results in all the samples in this data set were qualified with a B to indicate that the results may have been false positives due to blank contamination.

SAMPLES

The samples included in this review along with the parameters and analytical methods are listed below.

Sample ID	Parameter/Analytical Method
M118-0.5	Uranium-233/234 (U-233/234) by DOE EML HASL-300 Uranium-235/236 (U-235/236) by DOE EML HASL-300 Uranium-238 (U-238) by DOE EML HASL-300 Thorium-228 (Th-228) by DOE EML HASL-300 Thorium-230 (Th-230) by DOE EML HASL-300 Thorium-232 (Th-232) by DOE EML HASL-300 Lead-210 (Pb-210) by DOE RP280 Lead-212 (Pb-212), Radium-226 (Ra-226), Radium-228 (Ra-228) by EML HASL 300 Total U by ASTM D5174
M118-5	

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

Sample data were reviewed for the following parameters:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times/sample preservation
- Laboratory method blanks/equipment blanks
- Chemical Yield (Tracers and Carriers)
- Laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) results
- Matrix spike (MS) results
- Laboratory duplicate results
- Field duplicate results
- Sample quantitation/detection limit results

DISCUSSION

Agreement of Analyses Conducted With COC Requests

Sample reports were reviewed against the analytical requests as designated on the chain-of-custody (COC) and subsequent communications between ENSR and the laboratory. The ENSR COC used to transfer the samples to MWH did not have a relinquished by signature upon receipt at MWH. In addition, the MWH COC used to transfer the samples to GEL did not have a relinquished by signature upon receipt at GEL. No action was taken except to note these discrepancies.

When MWH transferred the sample to GEL, they added their laboratory ID to the front of the ENSR field ID. Thus, sample M118-0.5 on the ENSR COC was changed to 2603100106 M118-0.5 by MWH. During validation, the MWH sample ID was removed, leaving the original ENSR field sample ID.

Holding Times/Sample Preservation

All samples were prepared and analyzed within the method-specified holding times. No issues with sample preservation were noted upon receipt in the laboratory.

Laboratory Method Blanks and Equipment Blanks

There was no equipment blank submitted that was associated with sample M118-5. However, the equipment blank associated with sample M118-0.5 was EB1 submitted in SDG 158272. There were no target analytes detected in EB1. However, Th-230 was detected in the method blank. The presence of blank contamination indicates that false positive results may exist for this nuclide in the associated samples.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

The following table summarizes the positive blank contamination detected in the method blank.

Blank Type	Nuclide	Result (units)
MB	Th-230	0.350 ± 0.191 pCi/g
Associated Samples: M118-0.5, M118-5		

Sample results were qualified as follows:

- If normalized absolute difference > 2.58, no qualification
- If normalized absolute difference between 1.96 and 2.58, sample results > detection limit (DL) and/or reporting limit (RL) were qualified as estimated (JB).
- If normalized absolute difference between 0 and 1.96, professional judgment was used to negate (B) or reject (R).

The normalized absolute differences for the positive Th-230 result in samples M118-0.5 and M118-5 were between 0 and 1.96. Thus, the Th-230 results in these samples were qualified as B to indicate the results may have been false positives due to blank contamination.

Chemical Yield (Tracers and Carriers)

The tracer recoveries for all applicable parameters met the QC acceptance limits of 25-125%.

LCS/LCSD Results

All LCS and/or LCSD percent recoveries (%Rs) met the acceptance criteria for all parameters.

MS Results

The table below indicates the samples used for MS analyses and the associated parameters.

Sample ID	Parameter
M121-0.5 in SDG 158269	Total U, Thorium isotopes, U isotopes
M116-5 in SDG 158438	Pb-210

The %Rs met the QC acceptance criteria of 75-125% for all MS analyses.

Laboratory Duplicate Results

The table below indicates the samples used for laboratory duplicate analyses and the associated parameters.

Sample ID	Parameter
M121-0.5 in SDG 158269	Thorium isotopes, U isotopes, Total U, Pb-212, Ra-226, Ra-228
M116-5 in SDG in 158438	Pb-210

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

The relative percent differences (RPDs) met the QC acceptance criteria of 35% RPD for soil samples (if both results were greater than five times the RL) or the difference was less than the RL (if the results were less than five times the RL). Precision was deemed acceptable.

Field Duplicate Results

There were no field duplicate samples submitted with this data set.

Sample Quantitation/Detection Limit Results

The total uranium results greater than the RL were reanalyzed to verify the initial results. All results were verified and the initial results were reported.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date:	June 30, 2006 Revised September 14, 2006
To:	David Gerry/Camarillo
From:	Lisa Krowitz/Westford
Subject:	Data Review Radiological Analyses March 2006 Sampling Tronox Henderson, Henderson, NV GEL SDG Number 158272
Distribution:	R. Kennedy/Westford

04020-023-152
TH003rad.lkk.rev

SUMMARY

Limited validation was performed on the data for one aqueous sample analyzed for various radionuclides by DOE EML HASL, ASTM, and EPA methods. The sample was collected at the Henderson site in Henderson, NV on March 13, 2006 and submitted to MWH in Monrovia, CA for analysis. MWH subcontracted the analysis to General Engineering Laboratories (GEL) in Charleston, South Carolina. GEL processed this sample under sample delivery group (SDG) number 158272.

The analytical data were evaluated with reference to the Department of Energy "Evaluation of Radiochemical Data Usability" (1997) and the *Multi-Agency Radiological Laboratory Analytical Protocols Manual (MARLAP),* July 2004.

In general, the data are valid as reported and may be used for decision making purposes. No data were rejected. The Pb-212 result in sample TR-10A was reported as nondetect at the reporting limit.

SAMPLES

The sample included in this review along with the parameters and analytical methods are listed below.

Sample ID	Parameter/Analytical Method
TR-10A	Uranium-233/234 (U-233/234) by DOE EML HASL-300 Uranium-235/236 (U-235/236) by DOE EML HASL-300 Uranium-238 (U-238) by DOE EML HASL-300 Thorium-228 (Th-228) by DOE EML HASL-300 Thorium-230 (Th-230) by DOE EML HASL-300 Thorium-232 (Th-232) by DOE EML HASL-300 Lead-210 (Pb-210) by DOE RP280 Lead-212 (Pb-212) by EPA 901.1 Radium-226 (Ra-226) by EPA 903.1 Radium-228 (Ra-228) by EPA 904.0 Total U by ASTM D5174

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

Sample data were reviewed for the following parameters:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times/sample preservation
- Laboratory method blanks/equipment blanks
- Chemical Yield (Tracers and Carriers)
- Laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) results
- Matrix spike (MS) results
- Laboratory duplicate results
- Field duplicate results
- Sample quantitation/detection limit results

DISCUSSION

Agreement of Analyses Conducted With COC Requests

Sample reports were reviewed against the analytical requests as designated on the chain-of-custody (COC) and subsequent communications between ENSR and the laboratory. The MWH COC used to transfer the sample to GEL did not have a relinquished by signature upon receipt at GEL. No action was taken except to note this discrepancy.

When MWH transferred the sample to GEL, they added their laboratory ID to the front of the ENSR field ID. Thus, sample TR-10A on the ENSR COC was changed to 2603140436 TR-10A by MWH. During validation, the MWH sample ID was removed, leaving the original ENSR field sample ID.

Holding Times/Sample Preservation

The sample was prepared and analyzed within the method-specified holding times. No issues with sample preservation were noted upon receipt in the laboratory.

Laboratory Method Blanks/Equipment Blanks

Sample EB-3 (in SDG 159244) was submitted as the equipment blank associated with the sample in this data set. Ra-226 was detected in the equipment blank. The presence of blank contamination indicates that false positive results may exist for this parameter in the associated sample. There were no contaminants detected above the minimum detectable concentrations (MDCs)/detection limits (DLs) for all the parameters in the laboratory method blanks.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

The following table summarizes the positive blank contamination detected in the associated equipment blank.

Blank Type	Nuclide	Result (µg/L)
EB-3	Ra-226	0.591 ± 0.386
Associated Sample: TR-10A		

Sample results were qualified as follows:

- If normalized absolute difference > 2.58, no qualification
- If normalized absolute difference between 1.96 and 2.58, sample results > detection limit (DL) and/or reporting limit (RL) were qualified as estimated (JB).
- If normalized absolute difference between 0 and 1.96, professional judgment was used to negate (B) or reject (R).

Ra-226 was not detected in the associated sample; therefore, no qualification was necessary due to blank contamination.

Chemical Yield (Tracers and Carriers)

The tracer recoveries for all applicable parameters met the QC acceptance limits of 25-125%.

LCS/LCSD Results

All LCS and/or LCSD percent recoveries (%Rs) met the acceptance criteria for all parameters.

MS Results

The table below indicates the samples used for MS analyses and the associated parameters.

Sample ID	Parameter
TR-10A	Ra-228
M-120 in SDG 159247	Ra-226
M-121 in SDG 159242	Thorium isotopes, U isotopes, Total uranium, Pb-210

The %Rs met the QC acceptance criteria of 75-125% for all MS analyses.

Laboratory Duplicate Results

The table below indicates the samples used for laboratory duplicate analyses and the associated parameters.

Sample ID	Parameter
TR-10A	Ra-228
M-120 in SDG 159247	Ra-226, Pb-212
M-121 in SDG 159242	Thorium isotopes, U isotopes, Total uranium, Pb-210

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

The relative percent differences (RPDs) met the QC acceptance criteria of 20% RPD for aqueous samples (if both results were greater than five times the RL) or the difference was less than the RL (if the results were less than five times the RL). Precision was deemed acceptable.

Field Duplicate Results

There were no field duplicate samples submitted with this data set.

Sample Quantitation/Detection Limit Results

The total uranium result greater than the RL was reanalyzed to verify the initial result. The result was verified and the initial result was reported.

The Pb-212 results in sample TR-10A, the method blank, and the associated laboratory duplicate were reported by the laboratory as 0.00 UUI with an explanation that the results were rejected due to low abundance. Upon further discussion with the laboratory, it was determined that the results were not detected above the reporting limits; therefore, the Pb-212 result in sample TR-10A was qualified as nondetect (U) at the RL.

The following laboratory qualifier(s) were removed during the data review in order to avoid confusion with the reviewed results.

Laboratory Qualifiers	Laboratory Definition
UI	Data rejected due to low abundance

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date:	July 1, 2006 Revised September 14, 2006
To:	David Gerry/Camarillo
From:	Lisa Krowitz/Westford
Subject:	Data Validation, Radiological Analyses Henderson Upgradient Investigation Tronox LLC Henderson, Nevada GEL SDG Number 158275
Distribution:	R. Kennedy/Westford

04020-023-152
TH004rad.lkk.rev

SUMMARY

Limited validation was performed on the data for one aqueous sample analyzed for various radionuclides by DOE EML HASL, ASTM, and EPA methods. The sample was collected at the Henderson site in Henderson, NV on March 13, 2006 and submitted to MWH in Monrovia, CA for analysis. MWH subcontracted the analysis to General Engineering Laboratories (GEL) in Charleston, South Carolina. GEL processed this sample under sample delivery group (SDG) number 158275.

The analytical data were evaluated with reference to the Department of Energy "Evaluation of Radiochemical Data Usability" (1997) and the *Multi-Agency Radiological Laboratory Analytical Protocols Manual (MARLAP),* July 2004.

In general, the data are valid as reported and may be used for decision making purposes. No data were rejected. The Pb-212 result in sample PUMP BLANK was reported as nondetect at the reporting limit.

SAMPLES

The sample included in this review along with the parameters and analytical methods are listed below.

Sample ID	Parameter/Analytical Method
PUMP BLANK	Uranium-233/234 (U-233/234) by DOE EML HASL-300 Uranium-235/236 (U-235/236) by DOE EML HASL-300 Uranium-238 (U-238) by DOE EML HASL-300 Thorium-228 (Th-228) by DOE EML HASL-300 Thorium-230 (Th-230) by DOE EML HASL-300 Thorium-232 (Th-232) by DOE EML HASL-300 Lead-210 (Pb-210) by DOE RP280 Lead-212 (Pb-212) by EPA 901.1 Radium-226 (Ra-226) by EPA 903.1 Radium-228 (Ra-228) by EPA 904.0 Total U by ASTM D5174

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

Sample data were reviewed for the following parameters:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times/sample preservation
- Laboratory method blanks/equipment blanks
- Chemical Yield (Tracers and Carriers)
- Laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) results
- Matrix spike (MS) results
- Laboratory duplicate results
- Field duplicate results
- Sample quantitation/detection limit results

DISCUSSION

Agreement of Analyses Conducted With COC Requests

Sample reports were reviewed against the analytical requests as designated on the chain-of-custody (COC) and subsequent communications between ENSR and the laboratory. The MWH COC used to transfer the sample to GEL did not have a relinquished by signature upon receipt at GEL. No action was taken except to note this discrepancy.

When MWH transferred the sample to GEL, they added their laboratory ID to the front of the ENSR field ID. Thus, sample PUMP BLANK on the ENSR COC was changed to 2603140472 PUMP BLANK by MWH. During validation, the MWH sample ID was removed, leaving the original ENSR field sample ID.

Holding Times/Sample Preservation

The sample was prepared and analyzed within the method-specified holding times. No issues with sample preservation were noted upon receipt in the laboratory.

Laboratory Method Blanks/Equipment Blanks

There was no equipment blank associated with the sample in this data set. There were no contaminants detected above the minimum detectable concentrations (MDCs)/detection limits (DLs) for all the parameters in the laboratory method blanks.

Chemical Yield (Tracers and Carriers)

The tracer recoveries for all applicable parameters met the QC acceptance limits of 25-125%.

LCS/LCSD Results

All LCS and/or LCSD percent recoveries (%Rs) met the acceptance criteria for all parameters.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

MS Results

The table below indicates the samples used for MS analyses and the associated parameters.

Sample ID	Parameter
TR-10A in SDG 158272	Ra-228
M-121 in SDG in SDG 159242	Thorium isotopes, U isotopes, Total uranium, Pb-210, Ra-226

The %Rs met the QC acceptance criteria of 75-125% for all MS analyses.

Laboratory Duplicate Results

The table below indicates the samples used for laboratory duplicate analyses and the associated parameters.

Sample ID	Parameter
TR-10A in SDG 158272	Ra-228
M-120 in SDG 159247	Pb-212
M-121 in SDG in SDG 159242	Thorium isotopes, U isotopes, Total uranium, Pb-210, Ra-226

The relative percent differences (RPDs) met the QC acceptance criteria of 20% RPD for aqueous samples (if both results were greater than five times the RL) or the difference was less than the RL (if the results were less than five times the RL). Precision was deemed acceptable.

Field Duplicate Results

There were no field duplicate samples submitted with this data set.

Sample Quantitation/Detection Limit Results

The total uranium result greater than the RL was reanalyzed to verify the initial result. The result was verified and the initial result was reported.

The Pb-212 results in sample PUMP BLANK and the method blank were reported by the laboratory as 0.00 UUI with an explanation that the results were rejected due to low abundance. Upon further discussion with the laboratory, it was determined that the results were not detected above the reporting limits; therefore, the Pb-212 result in sample PUMP BLANK was qualified as nondetect (U) at the RL.

The following laboratory qualifier(s) were removed during the data review in order to avoid confusion with the reviewed results.

Laboratory Qualifiers	Laboratory Definition
UI	Data rejected due to low abundance

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date:	July 1, 2006 Revised September 14, 2006
To:	David Gerry/Camarillo
From:	Lisa Krowitz/Westford
Subject:	Data Validation, Radiological Analyses Henderson Upgradient Investigation Tronox LLC Henderson, Nevada GEL SDG Number 158276
Distribution:	R. Kennedy/Westford

04020-023-152
TH005rad.lkk.rev

SUMMARY

Limited validation was performed on the data for one aqueous sample analyzed for various radionuclides by DOE EML HASL, ASTM, and EPA methods. The sample was collected at the Henderson site in Henderson, NV on March 8, 2006 and submitted to MWH in Monrovia, CA for analysis. MWH subcontracted the analysis to General Engineering Laboratories (GEL) in Charleston, South Carolina. GEL processed this sample under sample delivery group (SDG) number 158276.

The analytical data were evaluated with reference to the Department of Energy "Evaluation of Radiochemical Data Usability" (1997) and the *Multi-Agency Radiological Laboratory Analytical Protocols Manual (MARLAP),* July 2004.

In general, the data are valid as reported and may be used for decision making purposes. No data were rejected. The Pb-212 result in sample FB-1 was reported as nondetect at the reporting limit.

SAMPLES

The sample included in this review along with the parameters and analytical methods are listed below.

Sample ID	Parameter/Analytical Method
FB-1	Uranium-233/234 (U-233/234) by DOE EML HASL-300 Uranium-235/236 (U-235/236) by DOE EML HASL-300 Uranium-238 (U-238) by DOE EML HASL-300 Thorium-228 (Th-228) by DOE EML HASL-300 Thorium-230 (Th-230) by DOE EML HASL-300 Thorium-232 (Th-232) by DOE EML HASL-300 Lead-210 (Pb-210) by DOE RP280 Lead-212 (Pb-212) by EPA 901.1 Radium-226 (Ra-226) by EPA 903.1 Radium-228 (Ra-228) by EPA 904.0 Total U by ASTM D5174

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

Sample data were reviewed for the following parameters:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times/sample preservation
- Laboratory method blanks/equipment blanks/field blanks
- Chemical Yield (Tracers and Carriers)
- Laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) results
- Matrix spike (MS) results
- Laboratory duplicate results
- Field duplicate results
- Sample quantitation/detection limit results

DISCUSSION

Agreement of Analyses Conducted With COC Requests

Sample reports were reviewed against the analytical requests as designated on the chain-of-custody (COC) and subsequent communications between ENSR and the laboratory. The ENSR COC used to transfer the sample to MWH did not have a relinquished by signature upon receipt at MWH. No action was taken except to note this discrepancy.

When MWH transferred the sample to GEL, they added their laboratory ID to the front of the ENSR field ID. Thus, sample FB-1 on the ENSR COC was changed to 2603090347 FB-1 by MWH. During validation, the MWH sample ID was removed, leaving the original ENSR field sample ID.

Holding Times/Sample Preservation

The sample was prepared and analyzed within the method-specified holding times. No issues with sample preservation were noted upon receipt in the laboratory.

Laboratory Method Blanks/Equipment Blanks/Field Blanks

There were no contaminants detected above the minimum detectable concentrations (MDCs)/detection limits (DLs) for all the parameters in the laboratory method. The only sample in this SDG was field blank FB-1. Total uranium was detected in the field blank (FB-1); however, the samples collected during the March 2006 sampling round were not qualified due to contaminants present in the field blank.

The following table summarizes the positive blank contamination detected in the field blank.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Blank Type	Nuclide	Result (µg/L)
FB	U-233/234	2.86 ± 0.625
	U235/236	1.78 ± 0.493
	Total Uranium	5.35 ± 0.120

Chemical Yield (Tracers and Carriers)

The tracer recoveries for all applicable parameters met the QC acceptance limits of 25-125%.

LCS/LCSD Results

All LCS and/or LCSD percent recoveries (%Rs) met the acceptance criteria for all parameters.

MS Results

The table below indicates the samples used for MS analyses and the associated parameters.

Sample ID	Parameter
TR-10A in SDG 158272	Ra-228
M-121 in SDG 159242	Thorium isotopes, U isotopes, Total uranium, Pb-210, Ra-226

The %Rs met the QC acceptance criteria of 75-125% for all MS analyses.

Laboratory Duplicate Results

The table below indicates the samples used for laboratory duplicate analyses and the associated parameters.

Sample ID	Parameter
TR-10A in SDG 158272	Ra-228
M-120 in SDG 159247	Pb-212
M-121 in SDG in SDG 159242	Thorium isotopes, U isotopes, Total uranium, Pb-210, Ra-226

The relative percent differences (RPDs) met the QC acceptance criteria of 20% RPD for aqueous samples (if both results were greater than five times the RL) or the difference was less than the RL (if the results were less than five times the RL). Precision was deemed acceptable.

Field Duplicate Results

There were no field duplicate samples submitted with this data set.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Sample Quantitation/Detection Limit Results

The total uranium result greater than the RL was reanalyzed to verify the initial result. The result was verified and the initial result was reported.

The Pb-212 results in sample FB-1 and the method blank were reported by the laboratory as 0.00 UUI with an explanation that the results were rejected due to low abundance. Upon further discussion with the laboratory, it was determined that the results were not detected above the reporting limits; therefore, the Pb-212 result in sample FB-1 was qualified as nondetect (U) at the RL. The following laboratory qualifier(s) were removed during the data review in order to avoid confusion with the reviewed results.

Laboratory Qualifiers	Laboratory Definition
UI	Data rejected due to low abundance

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date:	July 1, 2006 Revised September 14, 2006
To:	David Gerry/Camarillo
From:	Lisa Krowitz/Westford
Subject:	Data Validation, Radiological Analyses Henderson Upgradient Investigation Tronox LLC Henderson, Nevada GEL SDG Number 158277
Distribution:	R. Kennedy/Westford

04020-023-152
TH006rad.lkk.rev

SUMMARY

Limited validation was performed on the data for one aqueous sample analyzed for various radionuclides by DOE EML HASL, ASTM, and EPA methods. The sample was collected at the Henderson site in Henderson, NV on March 9, 2006 and submitted to MWH in Monrovia, CA for analysis. MWH subcontracted the analysis to General Engineering Laboratories (GEL) in Charleston, South Carolina. GEL processed this sample under sample delivery group (SDG) number 158277.

The analytical data were evaluated with reference to the Department of Energy "Evaluation of Radiochemical Data Usability" (1997) and the *Multi-Agency Radiological Laboratory Analytical Protocols Manual (MARLAP),* July 2004.

In general, the data are valid as reported and may be used for decision making purposes. No data were rejected or estimated.

SAMPLES

The sample included in this review along with the parameters and analytical methods are listed below.

Sample ID	Parameter/Analytical Method
EB-1	Uranium-233/234 (U-233/234) by DOE EML HASL-300 Uranium-235/236 (U-235/236) by DOE EML HASL-300 Uranium-238 (U-238) by DOE EML HASL-300 Thorium-228 (Th-228) by DOE EML HASL-300 Thorium-230 (Th-230) by DOE EML HASL-300 Thorium-232 (Th-232) by DOE EML HASL-300 Lead-210 (Pb-210) by DOE RP280 Lead-212 (Pb-212) by EPA 901.1 Radium-226 (Ra-226) by EPA 903.1 Radium-228 (Ra-228) by EPA 904.0 Total U by ASTM D5174

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

Sample data were reviewed for the following parameters:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times/sample preservation
- Laboratory method blanks/equipment blanks
- Chemical Yield (Tracers and Carriers)
- Laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) results
- Matrix spike (MS) results
- Laboratory duplicate results
- Field duplicate results
- Sample quantitation/detection limit results

DISCUSSION

Agreement of Analyses Conducted With COC Requests

Sample reports were reviewed against the analytical requests as designated on the chain-of-custody (COC) and subsequent communications between ENSR and the laboratory. The MWH COC used to transfer the sample to GEL did not have a relinquished by signature upon receipt at GEL. No action was taken except to note this discrepancy.

When MWH transferred the sample to GEL, they added their laboratory ID to the front of the ENSR field ID. Thus, sample EB-1 on the ENSR COC was changed to 2603100260 EB-1 by MWH. During validation, the MWH sample ID was removed, leaving the original ENSR field sample ID.

Holding Times/Sample Preservation

The sample was prepared and analyzed within the method-specified holding times. No issues with sample preservation were noted upon receipt in the laboratory.

Laboratory Method Blanks/Equipment Blanks

The only sample in this SDG was equipment blank EB-1. There were no contaminants detected above the minimum detectable concentrations (MDCs)/detection limits (DLs) for all the parameters in the laboratory method blanks or equipment blank.

Chemical Yield (Tracers and Carriers)

The tracer recoveries for all applicable parameters met the QC acceptance limits of 25-125%.

LCS/LCSD Results

All LCS and/or LCSD percent recoveries (%Rs) met the acceptance criteria for all parameters.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

MS Results

The table below indicates the samples used for MS analyses and the associated parameters.

Sample ID	Parameter
TR-10A in SDG 158272	Ra-228
M-121 in SDG 159242	Thorium isotopes, U isotopes, Total uranium, Pb-210, Ra-226

The %Rs met the QC acceptance criteria of 75-125% for all MS analyses.

Laboratory Duplicate Results

The table below indicates the samples used for laboratory duplicate analyses and the associated parameters.

Sample ID	Parameter
TR-10A in SDG 158272	Ra-228
M-120 in SDG 159247	Pb-212
M-121 in SDG in SDG 159242	Thorium isotopes, U isotopes, Total uranium, Pb-210, Ra-226

The relative percent differences (RPDs) met the QC acceptance criteria of 20% RPD for aqueous samples (if both results were greater than five times the RL) or the difference was less than the RL (if the results were less than five times the RL). Precision was deemed acceptable.

Field Duplicate Results

There were no field duplicate samples submitted with this data set.

Sample Quantitation/Detection Limit Results

The total uranium result greater than the RL was reanalyzed to verify the initial result. The result was verified and the initial result was reported.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date:	July 1, 2006 Revised September 14, 2006
To:	David Gerry/Camarillo
From:	Lisa Krowitz/Westford
Subject:	Data Validation, Radiological Analyses Henderson Upgradient Investigation Tronox LLC Henderson, Nevada GEL SDG Number 159436
Distribution:	R. Kennedy/Westford

04020-023-152
TH007rad.lkk.rev

SUMMARY

Limited validation was performed on the data for one aqueous sample analyzed for various radionuclides by DOE EML HASL, ASTM, and EPA methods. The sample was collected at the Henderson site in Henderson, NV on March 22, 2006 and submitted to MWH in Monrovia, CA for analysis. MWH subcontracted the analysis to General Engineering Laboratories (GEL) in Charleston, South Carolina. GEL processed this sample under sample delivery group (SDG) number 159436.

The analytical data were evaluated with reference to the Department of Energy "Evaluation of Radiochemical Data Usability" (1997) and the *Multi-Agency Radiological Laboratory Analytical Protocols Manual (MARLAP),* July 2004.

In general, the data are valid as reported and may be used for decision making purposes. The Pb-212 result in sample TR-9A was reported as nondetect at the reporting limit.

SAMPLES

The sample included in this review along with the parameters and analytical methods are listed below.

Sample ID	Parameter/Analytical Method
TR-9A	Uranium-233/234 (U-233/234) by DOE EML HASL-300 Uranium-235/236 (U-235/236) by DOE EML HASL-300 Uranium-238 (U-238) by DOE EML HASL-300 Thorium-228 (Th-228) by DOE EML HASL-300 Thorium-230 (Th-230) by DOE EML HASL-300 Thorium-232 (Th-232) by DOE EML HASL-300 Lead-210 (Pb-210) by DOE RP280 Lead-212 (Pb-212) by EPA 901.1 Radium-226 (Ra-226) by EPA 903.1 Radium-228 (Ra-228) by EPA 904.0 Total U by ASTM D5174

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

Sample data were reviewed for the following parameters:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times/sample preservation
- Laboratory method blanks/equipment blanks
- Chemical Yield (Tracers and Carriers)
- Laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) results
- Matrix spike (MS) results
- Laboratory duplicate results
- Field duplicate results
- Sample quantitation/detection limit results

DISCUSSION

Agreement of Analyses Conducted With COC Requests

Sample reports were reviewed against the analytical requests as designated on the chain-of-custody (COC) and subsequent communications between ENSR and the laboratory. The MWH COC used to transfer the sample to GEL did not have a relinquished by signature upon receipt at GEL. No action was taken except to note this discrepancy.

When MWH transferred the sample to GEL, they added their laboratory ID to the front of the ENSR field ID. Thus, sample TR-9A on the ENSR COC was changed to 2603150120 TR-9A by MWH. During validation, the MWH sample ID was removed, leaving the original ENSR field sample ID.

Holding Times/Sample Preservation

The sample was prepared and analyzed within the method-specified holding times. No issues with sample preservation were noted upon receipt in the laboratory.

Laboratory Method Blanks/Equipment Blanks

Sample EB-3 (in SDG 159244) was submitted as the equipment blank associated with the sample in this data set. Ra-226 was detected in the equipment blank. The presence of blank contamination indicates that false positive results may exist for this parameter in the associated sample. There were no contaminants detected above the minimum detectable concentrations (MDCs)/detection limits (DLs) for all the parameters in the laboratory method blanks.

The following table summarizes the positive blank contamination detected in the associated equipment blank.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Blank Type	Nuclide	Result (µg/L)
EB-3	Ra-226	0.591 ± 0.386
Associated Sample: TR-9A		

Sample results were qualified as follows:

- If normalized absolute difference > 2.58, no qualification
- If normalized absolute difference between 1.96 and 2.58, sample results > detection limit (DL) and/or reporting limit (RL) were qualified as estimated (JB).
- If normalized absolute difference between 0 and 1.96, professional judgment was used to negate (B) or reject (R).

Ra-226 was not detected in the associated sample; therefore, no qualification was necessary due to blank contamination.

Chemical Yield (Tracers and Carriers)

The tracer recoveries for all applicable parameters met the QC acceptance limits of 25-125%.

LCS/LCSD Results

All LCS and/or LCSD percent recoveries (%Rs) met the acceptance criteria for all parameters.

MS Results

The table below indicates the samples used for MS analyses and the associated parameters.

Sample ID	Parameter
M-121 in SDG in 159242	Thorium isotopes, U isotopes, Total uranium, Pb-210, Ra-226
M-120 in SDG 159247	Ra-226
Batch QC 060301600-001	Ra-228

The %Rs met the QC acceptance criteria of 75-125% for all MS analyses.

Laboratory Duplicate Results

The table below indicates the samples used for laboratory duplicate analyses and the associated parameters.

Sample ID	Parameter
M-121 in SDG in 159242	Thorium isotopes, U isotopes, Total uranium, Pb-210, Ra-226
M-120 in SDG 159247	Pb-212
Batch QC 060301600-001	Ra-228

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

The relative percent differences (RPDs) met the QC acceptance criteria of 20% RPD for aqueous samples (if both results were greater than five times the RL) or the difference was less than the RL (if the results were less than five times the RL). Precision was deemed acceptable.

Field Duplicate Results

There were no field duplicate samples submitted with this data set.

Sample Quantitation/Detection Limit Results

The total uranium result greater than the RL was reanalyzed to verify the initial result. The result was verified and the initial result was reported.

The Pb-212 results in sample TR-9A, the method blank, and the associated laboratory duplicate were reported by the laboratory as 0.00 UUI with an explanation that the results were rejected due to low abundance. Upon further discussion with the laboratory, it was determined that the results were not detected above the reporting limits; therefore, the Pb-212 result in sample TR-9A was qualified as nondetect (U) at the RL.

The following laboratory qualifier(s) were removed during the data review in order to avoid confusion with the reviewed results.

Laboratory Qualifiers	Laboratory Definition
UI	Data rejected due to low abundance

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date:	July 1, 2006 Revised September 14, 2006
To:	David Gerry/Camarillo
From:	Lisa Krowitz/Westford
Subject:	Data Validation, Radiological Analyses Henderson Upgradient Investigation Tronox LLC Henderson, Nevada GEL SDG Number 158437
Distribution:	R. Kennedy/Westford

04020-023-152
TH008rad.lkk.rev

SUMMARY

Limited validation was performed on the data for four soil samples analyzed for various radionuclides by DOE EML HASL and ASTM methods. The samples were collected at the Henderson site in Henderson, NV on March 14, 2006 and submitted to MWH in Monrovia, CA for analysis. MWH subcontracted the analysis to General Engineering Laboratories (GEL) in Charleston, South Carolina. GEL processed these samples under sample delivery group (SDG) number 158437.

The analytical data were evaluated with reference to the Department of Energy "Evaluation of Radiochemical Data Usability" (1997) and the *Multi-Agency Radiological Laboratory Analytical Protocols Manual (MARLAP),* July 2004.

In general, the data are valid as reported and may be used for decision making purposes. No data were rejected. The Th-230 results in samples M119-0.5, M119-0.5D, and M119-5 were qualified with a B to indicate that the results may have been false positives due to blank contamination.

SAMPLES

The samples included in this review along with the parameters and analytical methods are listed below.

Sample ID	Parameter/Analytical Method
M119-0.5	Uranium-233/234 (U-233/234) by DOE EML HASL-300 Uranium-235/236 (U-235/236) by DOE EML HASL-300 Uranium-238 (U-238) by DOE EML HASL-300 Thorium-228 (Th-228) by DOE EML HASL-300 Thorium-230 (Th-230) by DOE EML HASL-300 Thorium-232 (Th-232) by DOE EML HASL-300 Lead-210 (Pb-210) by DOE RP280 Lead-212 (Pb-212), Radium-226 (Ra-226), Radium-228 (Ra-228) by EML HASL 300 Total U by ASTM D5174
M119-0.5D (Field duplicate of M119-0.5)	
M119-5	
M119-50	

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

Sample data were reviewed for the following parameters:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times/sample preservation
- Laboratory method blanks/equipment blanks
- Chemical Yield (Tracers and Carriers)
- Laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) results
- Matrix spike (MS) results
- Laboratory duplicate results
- Field duplicate results
- Sample quantitation/detection limit results

DISCUSSION

Agreement of Analyses Conducted With COC Requests

Sample reports were reviewed against the analytical requests as designated on the chain-of-custody (COC) and subsequent communications between ENSR and the laboratory. The MWH COC used to transfer the samples to GEL did not have a relinquished by signature upon receipt at GEL. No action was taken except to note these discrepancies.

When MWH transferred the sample to GEL, they added their laboratory ID to the front of the ENSR field ID. Thus, sample M119-0.5 on the ENSR COC was changed to 2603150347 M119-0.5 by MWH. During validation, the MWH sample ID was removed, leaving the original ENSR field sample ID.

Holding Times/Sample Preservation

All samples were prepared and analyzed within the method-specified holding times. No issues with sample preservation were noted upon receipt in the laboratory.

Laboratory Method Blanks/Equipment Blanks

There was no equipment blank submitted that was associated with sample M119-5. However, the equipment blank associated with samples M119-0.5, M119-0.5D, and M119-50, was EB1 submitted in SDG 158272. There were no target analytes detected in EB1. However, Th-230 was detected in the method blank. The presence of blank contamination indicates that false positive results may exist for this nuclide in the associated samples. The following table summarizes the positive blank contamination detected in the method blank.

Blank Type	Nuclide	Result (units)
MB	Th-230	0.350 $\pm$ 0.191 pCi/g
Associated Samples: M119-0.5, M119-0.5D, M119-50		

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Sample results were qualified as follows:

- If normalized absolute difference > 2.58, no qualification
- If normalized absolute difference between 1.96 and 2.58, sample results > detection limit (DL) and/or reporting limit (RL) were qualified as estimated (JB).
- If normalized absolute difference between 0 and 1.96, professional judgment was used to negate (B) or reject (R).

The normalized absolute differences for the positive Th-230 results in samples M119-0.5, M119-0.5D, and M119-5 were between 0 and 1.96. Thus, the Th-230 results in samples M119-0.5, M119-0.5D, and M119-5 were qualified as B to indicate the results may have been false positives due to blank contamination.

Chemical Yield (Tracers and Carriers)

The tracer recoveries for all applicable parameters met the QC acceptance limits of 25-125%.

LCS/LCSD Results

All LCS and/or LCSD percent recoveries (%Rs) met the acceptance criteria for all parameters.

MS Results

The table below indicates the samples used for MS analyses and the associated parameters.

Sample ID	Parameter
M121-0.5 in SDG 158269	Total U, Thorium isotopes, U isotopes
M116-5 in SDG 158438	Pb-210

The %Rs met the QC acceptance criteria of 75-125% for all MS analyses.

Laboratory Duplicate Results

The table below indicates the samples used for laboratory duplicate analyses and the associated parameters.

Sample ID	Parameter
M121-0.5 in SDG 158269	Thorium isotopes, U isotopes, Total U
M116-5 in SDG 158438	Pb-210, Pb-212, Ra-226, Ra-228

The relative percent differences (RPDs) met the QC acceptance criteria of 35% RPD for soil samples (if both results were greater than five times the RL) or the difference was less than the RL (if the results were less than five times the RL). Precision was deemed acceptable.

Field Duplicate Results

The field duplicate samples submitted with this data set were samples M119-0.5 and M119-0.5D. The following table summarizes the relative percent differences (RPDs) of the detected analytes in the field

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

duplicate pair. The RPDs were within the acceptance criteria of 50% for a solid matrix (if the sample results are >10xRL).

Analyte	M119-0.5 (pCi/g)	M119-0.5D (pCi/g)	% RPD	Action
Th-228	1.77 ± 0.598	1.51 ± 0.478	16	None
Th-230	0.948 ± 0.403	1.12 ± 0.387	17	None
Th-232	1.32 ± 0.482	1.30 ± 0.425	2	None
U-233/234	0.782 ± 0.357	0.426 ± 0.353	17	None
U-238	0.944 ± 0.378	1.04 ± 0.374	1	None
Pb-212	1.77 ± 0.163	1.65 ± 0.161	7	None
Ra-226	0.950 ± 0.132	1.07 ± 0.148	12	None
Ra-228	1.75 ± 0.285	1.65 ± 0.268	6	None
Total U	1.74 ± 0.144 μg/L	2.33 ± 0.122 μg/L	29	None

Sample Quantitation/Detection Limit Results

The total uranium results greater than the RL were reanalyzed to verify the initial results. All results were verified and the initial results were reported.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date:	July 11, 2006 Revised September 14, 2006
To:	David Gerry/Camarillo
From:	Lisa Krowitz/Westford
Subject:	Data Validation, Radiological Analyses Henderson Upgradient Investigation Tronox LLC Henderson, Nevada GEL SDG Number 158438
Distribution:	R. Kennedy/Westford

04020-023-152
TH009rad.lkk.rev

SUMMARY

Limited validation was performed on the data for five soil samples analyzed for various radionuclides by DOE EML HASL and ASTM methods. The samples were collected at the Henderson site in Henderson, NV on March 11 and 12, 2006 and submitted to MWH in Monrovia, CA for analysis. MWH subcontracted the analysis to General Engineering Laboratories (GEL) in Charleston, South Carolina. GEL processed these samples under sample delivery group (SDG) number 158438.

The analytical data were evaluated with reference to the Department of Energy "Evaluation of Radiochemical Data Usability" (1997) and the *Multi-Agency Radiological Laboratory Analytical Protocols Manual (MARLAP),* July 2004.

In general, the data are valid as reported and may be used for decision making purposes. No data were rejected. The Th-230 results in samples M116-0.5, M116-0.5D, M116-5, and M117-0.5 were qualified with a B to indicate that the results may be false positives due to blank contamination. The Th-230 result in sample M117-5 was qualified with JB to indicate that part of the result may have been due to blank contamination.

SAMPLES

The samples included in this review along with the parameters and analytical methods are listed below.

Sample ID	Parameter/Analytical Method
M116-0.5	Uranium-233/234 (U-233/234) by DOE EML HASL-300 Uranium-235/236 (U-235/236) by DOE EML HASL-300 Uranium-238 (U-238) by DOE EML HASL-300 Thorium-228 (Th-228) by DOE EML HASL-300 Thorium-230 (Th-230) by DOE EML HASL-300 Thorium-232 (Th-232) by DOE EML HASL-300 Lead-210 (Pb-210) by DOE RP280 Lead-212 (Pb-212), Radium-226 (Ra-226), Radium-228 (Ra-228) by EML HASL 300 Total U by ASTM D5174
M116-0.5D (Field duplicate of M116-0.5)	
M116-5	
M117-0.5	
M117-5	

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

Sample data were reviewed for the following parameters:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times/sample preservation
- Laboratory method blanks/equipment blanks
- Chemical Yield (Tracers and Carriers)
- Laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) results
- Matrix spike (MS) results
- Laboratory duplicate results
- Field duplicate results
- Sample quantitation/detection limit results

DISCUSSION

Agreement of Analyses Conducted With COC Requests

Sample reports were reviewed against the analytical requests as designated on the chain-of-custody (COC) and subsequent communications between ENSR and the laboratory. The MWH COC used to transfer the samples to GEL did not have a relinquished by signature upon receipt at GEL. No action was taken except to note these discrepancies.

When MWH transferred the sample to GEL, they added their laboratory ID to the front of the ENSR field ID. Thus, sample M116-0.5 on the ENSR COC was changed to 2603150303 M116-0.5 by MWH. During validation, the MWH sample ID was removed, leaving the original ENSR field sample ID.

Holding Times/Sample Preservation

All samples were prepared and analyzed within the method-specified holding times. No issues with sample preservation were noted upon receipt in the laboratory.

Laboratory Method Blanks/Equipment Blanks

There was no equipment blank submitted that was associated with samples M116-5 and M117-5. However, the equipment blank associated with samples M116-0.5, M116-0.5D, and M117-0.5, was EB1 submitted in SDG 158272. There were no target analytes detected in EB1. However, Th-230 was detected in the method blank (MB) associated with the samples in this data set. The presence of blank contamination indicates that false positive results may exist for this nuclide in the associated samples. The following table summarizes the positive blank contamination detected in the method blank.

Blank Type	Nuclide	Result (units)
MB	Th-230	0.350 $\pm$ 0.191 pCi/g
Associated Samples: M116-0.5, M116-0.5D, M116-5, M117-0.5, M117-5		

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Sample results were qualified as follows:

- If normalized absolute difference > 2.58, no qualification
- If normalized absolute difference between 1.96 and 2.58, sample results > detection limit (DL) and/or reporting limit (RL) were qualified as estimated (JB).
- If normalized absolute difference between 0 and 1.96, professional judgment was used to negate (B) or reject (R).

The normalized absolute differences for the positive Th-230 results in samples M116-0.5, M116-0.5D, M116-5, and M117-0.5 were between 0 and 1.96. Thus, the Th-230 results in these samples were qualified as B to indicate the results may have been false positives due to blank contamination.

The normalized absolute differences for the positive Th-230 result in sample M117-5 was between 1.96 and 2.58. Thus, the Th-230 result in this sample was qualified as JB to indicate that part of the result may have been due to blank contamination.

Chemical Yield (Tracers and Carriers)

The tracer recoveries for all applicable parameters met the QC acceptance limits of 25-125%.

LCS/LCSD Results

All LCS and/or LCSD percent recoveries (%Rs) met the acceptance criteria for all parameters.

MS Results

The table below indicates the samples used for MS analyses and the associated parameters.

Sample ID	Parameter
M121-0.5 in SDG 158269	Total U, Th isotopes, U isotopes
M116-5 in SDG 158438	Pb-210

The %Rs met the QC acceptance criteria of 75-125% for all MS analyses.

Laboratory Duplicate Results

The table below indicates the samples used for laboratory duplicate analyses and the associated parameters.

Sample ID	Parameter
M121-0.5 in SDG 158269	Th isotopes, U isotopes, Total U
M116-5 in SDG 158438	Pb-210, Pb-212, Ra-226, Ra-228

The relative percent differences (RPDs) met the QC acceptance criteria of 35% RPD for soil samples (if both results were greater than five times the RL) or the difference was less than the RL (if the results were less than five times the RL). Precision was deemed acceptable.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Field Duplicate Results

The field duplicate samples submitted with this data set were samples M116-0.5 and M116-0.5D. The following table summarizes the relative percent differences (RPDs) of the detected analytes in the field duplicate pair. The RPDs were within the acceptance criteria of 50% for a solid matrix (if the sample results are >10xRL). For the Th-230 results, which were < 10xRL, precision was deemed acceptable because the difference between the field duplicate results was <8xRL.

Analyte	M116-0.5 (pCi/g)	M116-0.5D (pCi/g)	% RPD	Action
Th-228	2.11 ± 0.808	1.81 ± 0.588	15	None
Th-230	0.704 ± 0.397	1.24 ± 0.433	55	None, SR <10xRL and difference <8xRL
Th-232	1.90 ± 0.706	1.56 ± 0.502	20	None
U-233/234	1.36 ± 0.432	1.18 ± 0.468	20	None
U-238	0.805 ± 0.337	1.16 ± 0.453	36	None
Pb-212	1.78 ± 0.174	1.91 ± 0.198	7	None
Ra-226	0.791 ± 0.133	1.04 ± 0.171	27	None
Ra-228	1.78 ± 0.361	1.98 ± 0.345	11	None
Total U	3.64 ± 0.101 µg/L	3.57 ± 0.0904 µg/L	2	None

Sample Quantitation/Detection Limit Results

The total uranium results greater than the RL were reanalyzed to verify the initial results. All results were verified and the initial results were reported.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date:	July 1, 2006 Revised September 14, 2006
To:	David Gerry/Camarillo
From:	Lisa Krowitz/Westford
Subject:	Data Validation, Radiological Analyses Henderson Upgradient Investigation Tronox LLC Henderson, Nevada GEL SDG Number 158783
Distribution:	R. Kennedy/Westford

04020-023-152
TH010rad.lkk.rev

SUMMARY

Limited validation was performed on the data for five aqueous samples analyzed for various radionuclides by DOE EML HASL, ASTM, and EPA methods. The samples were collected at the Henderson site in Henderson, NV on March 20, 2006 and submitted to MWH in Monrovia, CA for analysis. MWH subcontracted the analysis to General Engineering Laboratories (GEL) in Charleston, South Carolina. GEL processed these samples under sample delivery group (SDG) number 158783.

The analytical data were evaluated with reference to the Department of Energy "Evaluation of Radiochemical Data Usability" (1997) and the *Multi-Agency Radiological Laboratory Analytical Protocols Manual (MARLAP),* July 2004.

In general, the data are valid as reported and may be used for decision making purposes. No data were rejected. The Ra-226 result in sample M103A was qualified with a B to indicate that the result may have been a false positive due to blank contamination.

SAMPLES

The samples included in this review along with the parameters and analytical methods are listed below.

Sample ID	Parameter/Analytical Method
TR-7A	Uranium-233/234 (U-233/234) by DOE EML HASL-300 Uranium-235/236 (U-235/236) by DOE EML HASL-300 Uranium-238 (U-238) by DOE EML HASL-300 Thorium-228 (Th-228) by DOE EML HASL-300 Thorium-230 (Th-230) by DOE EML HASL-300 Thorium-232 (Th-232) by DOE EML HASL-300 Lead-210 (Pb-210) by DOE RP280 Lead-212 (Pb-212) by EPA 901.1 Radium-226 (Ra-226) by EPA 903.1 Radium-228 (Ra-228) by EPA 904.0 Total U by ASTM D5174
TR-8	
TR-8A	
TR-8D (Field Duplicate of TR-8)	
M103A	

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

Sample data were reviewed for the following parameters:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times/sample preservation
- Laboratory method blanks/equipment blanks
- Chemical Yield (Tracers and Carriers)
- Laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) results
- Matrix spike (MS) results
- Laboratory duplicate results
- Field duplicate results
- Sample quantitation/detection limit results

DISCUSSION

Agreement of Analyses Conducted With COC Requests

Sample reports were reviewed against the analytical requests as designated on the chain-of-custody (COC) and subsequent communications between ENSR and the laboratory. When MWH transferred the sample to GEL, they used their laboratory ID rather than the ENSR field ID. Thus, sample TR-8A on the ENSR COC was changed to 2603210144 by MWH. During validation, the MWH sample ID was removed and replaced with the original ENSR field sample ID. The table below indicates the MWH ID versus the ENSR ID.

MWH ID	ENSR Field ID
2603210144	TR-8A
2603210150	TR-7A
2603210153	M103A
2603210155	TR-8
2603210156	TR-8D

Holding Times/Sample Preservation

All samples were prepared and analyzed within the method-specified holding times. No issues with sample preservation were noted upon receipt in the laboratory.

Laboratory Method Blanks/Equipment Blanks

There was no equipment blank submitted that was associated with samples TR-8 and T-8D. However, the equipment blank associated with samples TR-7A, TR-8A, and M103A was EB3 submitted in SDG 159242. Ra-226 was detected in the equipment blank. The presence of blank contamination indicates that false positive results may exist for this parameter in the associated sample. There were no contaminants detected above the minimum detectable concentrations (MDCs)/detection limits (DLs) for all the parameters in the laboratory method blanks.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

The following table summarizes the positive blank contamination detected in the associated equipment blank.

Blank Type	Nuclide	Result (µg/L)
EB-3	Ra-226	0.591 ± 0.386
Associated Sample: TR-7A, TR-8A, M103A		

Sample results were qualified as follows:

- If normalized absolute difference > 2.58, no qualification
- If normalized absolute difference between 1.96 and 2.58, sample results > detection limit (DL) and/or reporting limit (RL) were qualified as estimated (JB).
- If normalized absolute difference between 0 and 1.96, professional judgment was used to negate (B) or reject (R).

The normalized absolute difference for the positive Ra-226 result in sample M103A was between 0 and 1.96. Thus, the Ra-226 result in this sample was qualified as B to indicate the result may have been a false positive due to blank contamination.

Chemical Yield (Tracers and Carriers)

The tracer recoveries for all applicable parameters met the QC acceptance limits of 25-125%.

LCS/LCSD Results

All LCS and/or LCSD percent recoveries (%Rs) met the acceptance criteria for all parameters.

MS Results

The table below indicates the samples used for MS analyses and the associated parameters.

Sample ID	Parameter
M-121 in SDG 159242	Ra-226, Ra-228
Batch QC 060301600-001	Ra-228
Batch QC 2603210144	Pb-210, Total U
Batch QC 2603210156	Thorium isotopes, U isotopes

The %Rs met the QC acceptance criteria of 75-125% for all MS analyses.

Laboratory Duplicate Results

The table below indicates the samples used for laboratory duplicate analyses and the associated parameters.

Sample ID	Parameter
M-121 in SDG 159242	Ra-226, Ra-228
Batch QC 060301600-001	Ra-228
Batch QC 2603210144	Pb-210, Pb-212, Total U
Batch QC 2603210156	Thorium isotopes, U isotopes

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

The relative percent differences (RPDs) met the QC acceptance criteria of 20% RPD for aqueous samples (if both results were greater than five times the RL) or the difference was less than the RL (if the results were less than five times the RL). Precision was deemed acceptable in all laboratory duplicates, except the batch QC laboratory duplicate for Pb-210. Laboratory duplicate analysis was not performed on an aqueous sample from this sample set for Pb-210, but rather from a batch QC sample. Although this practice was acceptable, the results could not be directly applied to the samples analyzed in this data package because of possible differences in the sample matrix and type. No validation action was taken on this basis.

Field Duplicate Results

The field duplicate samples submitted with this data set were samples TR-8 and TR-8D. The following table summarizes the relative percent differences (RPDs) of the detected analytes in the field duplicate pair. The RPDs were within the acceptance criteria of 30% for an aqueous matrix (if the sample results are >10xRL). For the Th-230, U-233/234, and U235-236 results, which were < 10xRLs, precision was deemed acceptable because the differences between the field duplicate results for all three parameters were <8xRL. The Th-232 RPD was not calculable since Th-232 was not detected in field duplicate sample TR-8; however, precision was deemed acceptable.

Analyte	TR-8 (pCi/L)	TR-8D (pCi/L)	% RPD	Action
Th-228	0.181 ± 0.139	0.232 ± 0.167	25	None
Th-230	0.192 ± 0.139	0.190 ± 0.110	55	None, sample results <10xRL and difference <4xRL
Th-232	0.0847 U	0.0814 ± 0.0947	Not calculable	None
U-233/234	3.06 ± 0.651	3.93 ± 0.759	37	None, sample results <10xRL and difference <4xRL
U-235/236	0.132 ± 0.149	0.524 ± 0.317	120	None, sample results <10xRL and difference <4xRL
U-238	1.58 ± 0.474	1.83 ± 0.522	15	None
Total U	5.29 ± 0.111	5.25 ± 0.111	1	None

Sample Quantitation/Detection Limit Results

The total uranium results greater than the RL were reanalyzed to verify the initial results. All results were verified and the initial results were reported.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date:	July 1, 2006 Revised September 14, 2006
To:	David Gerry/Camarillo
From:	Lisa Krowitz/Westford
Subject:	Data Validation, Radiological Analyses Henderson Upgradient Investigation Tronox LLC Henderson, Nevada GEL SDG Number 158971
Distribution:	R. Kennedy/Westford

04020-023-152
TH011rad.lkk.rev

SUMMARY

Limited validation was performed on the data for four aqueous samples analyzed for various radionuclides by DOE EML HASL, ASTM, and EPA methods. The samples were collected at the Henderson site in Henderson, NV on March 21, 2006 and submitted to MWH in Monrovia, CA for analysis. MWH subcontracted the analysis to General Engineering Laboratories (GEL) in Charleston, South Carolina. GEL processed these samples under sample delivery group (SDG) number 158971.

The analytical data were evaluated with reference to the Department of Energy "Evaluation of Radiochemical Data Usability" (1997) and the *Multi-Agency Radiological Laboratory Analytical Protocols Manual (MARLAP),* July 2004.

In general, the data are valid as reported and may be used for decision making purposes. No data were rejected. The Pb-212 result in sample TR-10 was reported as nondetect at the reporting limit.

SAMPLES

The samples included in this review along with the parameters and analytical methods are listed below.

Sample ID	Parameter/Analytical Method
M-103	Uranium-233/234 (U-233/234) by DOE EML HASL-300 Uranium-235/236 (U-235/236) by DOE EML HASL-300 Uranium-238 (U-238) by DOE EML HASL-300 Thorium-228 (Th-228) by DOE EML HASL-300 Thorium-230 (Th-230) by DOE EML HASL-300 Thorium-232 (Th-232) by DOE EML HASL-300 Lead-210 (Pb-210) by DOE RP280 Lead-212 (Pb-212) by EPA 901.1 Radium-226 (Ra-226) by EPA 903.1 Radium-228 (Ra-228) by EPA 904.0 Total U by ASTM D5174
TR-7	
TR-9	
TR-10	

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

Sample data were reviewed for the following parameters:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times/sample preservation
- Laboratory method blanks/equipment blanks
- Chemical Yield (Tracers and Carriers)
- Laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) results
- Matrix spike (MS) results
- Laboratory duplicate results
- Field duplicate results
- Sample quantitation/detection limit results

DISCUSSION

Agreement of Analyses Conducted With COC Requests

Sample reports were reviewed against the analytical requests as designated on the chain-of-custody (COC) and subsequent communications between ENSR and the laboratory. When MWH transferred the sample to GEL, they added their laboratory ID to the front of the ENSR field ID. Thus, sample TR-7 on the ENSR COC was changed to 2603220348 TR-7 by MWH. During validation, the MWH sample ID was removed, leaving the original ENSR field sample ID.

Holding Times/Sample Preservation

All samples were prepared and analyzed within the method-specified holding times. No issues with sample preservation were noted upon receipt in the laboratory.

Laboratory Method Blanks/Equipment Blanks

There was no equipment blank submitted that was associated with the samples in this data set. There were no contaminants detected above the minimum detectable concentrations (MDCs)/detection limits (DLs) for all the parameters in the laboratory method blanks.

Chemical Yield (Tracers and Carriers)

The tracer recoveries for all applicable parameters met the QC acceptance limits of 25-125%.

LCS/LCSD Results

All LCS and/or LCSD percent recoveries (%Rs) met the acceptance criteria for all parameters.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

MS Results

The table below indicates the samples used for MS analyses and the associated parameters.

Sample ID	Parameter
M-121 in SDG 159242	Ra-226, Ra-228, Pb-210, Total U, Thorium isotopes, U isotopes

The %Rs met the QC acceptance criteria of 75-125% for all MS analyses.

Laboratory Duplicate Results

The table below indicates the samples used for laboratory duplicate analyses and the associated parameters.

Sample ID	Parameter
M-120 in SDG 159247	Pb-212
M-121 in SDG 159242	Thorium isotopes, U isotopes, Total U, Ra-226, Ra-228

The relative percent differences (RPDs) met the QC acceptance criteria of 20% RPD for aqueous samples (if both results were greater than five times the RL) or the difference was less than the RL (if the results were less than five times the RL). Precision was deemed acceptable.

Field Duplicate Results

There were no field duplicate samples submitted with this data set.

Sample Quantitation/Detection Limit Results

The total uranium results greater than the RL were reanalyzed to verify the initial results. All results were verified and the initial results were reported.

The Pb-212 results in sample TR-10, the method blank, and the associated laboratory duplicate were reported by the laboratory as 0.00 UUI with an explanation that the results were rejected due to low abundance. Upon further discussion with the laboratory, it was determined that the results were not detected above the reporting limits; therefore, the Pb-212 result in sample TR-10 has been qualified as nondetect (U) at the RL.

The following laboratory qualifier(s) were removed during the data review in order to avoid confusion with the reviewed results.

Laboratory Qualifiers	Laboratory Definition
UI	Data rejected due to low abundance

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date:	July 1, 2006 Revised September 14, 2006	
To:	David Gerry/Camarillo	
From:	Lisa Krowitz/Westford	
Subject:	Data Validation, Radiological Analyses Henderson Upgradient Investigation Tronox LLC Henderson, Nevada GEL SDG Number 159242	
Distribution:	R. Kennedy/Westford	04020-023-152 TH012rad.lkk.rev

SUMMARY

Limited validation was performed on the data for three aqueous samples analyzed for various radionuclides by DOE EML HASL, ASTM, and EPA methods. The samples were collected at the Henderson site in Henderson, NV on March 23, 2006 and submitted to MWH in Moravia, CA for analysis. MWH subcontracted the analysis to General Engineering Laboratories (GEL) in Charleston, South Carolina. GEL processed these samples under sample delivery group (SDG) number 159242.

The analytical data were evaluated with reference to the Department of Energy "Evaluation of Radiochemical Data Usability" (1997) and the *Multi-Agency Radiological Laboratory Analytical Protocols Manual (MARLAP),* July 2004.

In general, the data are valid as reported and may be used for decision making purposes. No data were rejected. The Pb-212 result in sample TR-10A was reported as nondetect at the reporting limit. The Ra-226 result in sample H-11 was qualified with a B to indicate that the result may have been a false positive due to blank contamination.

SAMPLES

The samples included in this review along with the parameters and analytical methods are listed below.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Sample ID	Parameter/Analytical Method
H-11	Uranium-233/234 (U-233/234) by DOE EML HASL-300 Uranium-235/236 (U-235/236) by DOE EML HASL-300 Uranium-238 (U-238) by DOE EML HASL-300 Thorium-228 (Th-228) by DOE EML HASL-300 Thorium-230 (Th-230) by DOE EML HASL-300 Thorium-232 (Th-232) by DOE EML HASL-300 Lead-210 (Pb-210) by DOE RP280 Lead-212 (Pb-212) by EPA 901.1 Radium-226 (Ra-226) by EPA 903.1 Radium-228 (Ra-228) by EPA 904.0 Total U by ASTM D5174
M-117	
M-121	

REVIEW ELEMENTS

Sample data were reviewed for the following parameters:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times/sample preservation
- Laboratory method blanks/equipment blanks
- Chemical Yield (Tracers and Carriers)
- Laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) results
- Matrix spike (MS) results
- Laboratory duplicate results
- Field duplicate results
- Sample quantitation/detection limit results

DISCUSSION

Agreement of Analyses Conducted With COC Requests

Sample reports were reviewed against the analytical requests as designated on the chain-of-custody (COC) and subsequent communications between ENSR and the laboratory. When MWH transferred the sample to GEL, they added their laboratory ID to the front of the ENSR field ID. Thus, sample H-11 on the ENSR COC was changed to 2603240118 H-11 by MWH. During validation, the MWH sample ID was removed, leaving the original ENSR field sample ID.

Holding Times/Sample Preservation

All samples were prepared and analyzed within the method-specified holding times. No issues with sample preservation were noted upon receipt in the laboratory.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Laboratory Method Blanks/Equipment Blanks

There was no equipment blank submitted that was associated with samples M-117 and M-121. However, the equipment blank associated with sample H-11 was EB-3 submitted in SDG 159242. Ra-226 was detected in the equipment blank. The presence of blank contamination indicates that false positive results may exist for this parameter in the associated sample. There were no contaminants detected above the minimum detectable concentrations (MDCs)/detection limits (DLs) for all the parameters in the laboratory method blanks. The following table summarizes the positive blank contamination detected in the associated equipment blank.

Blank Type	Nuclide	Result (µg/L)
EB-3	Ra-226	0.591 ± 0.386
Associated Sample: H-11		

Sample results were qualified as follows:

- If normalized absolute difference > 2.58, no qualification
- If normalized absolute difference between 1.96 and 2.58, sample results > detection limit (DL) and/or reporting limit (RL) were qualified as estimated (JB).
- If normalized absolute difference between 0 and 1.96, professional judgment was used to negate (B) or reject (R).

The normalized absolute difference for the positive Ra-226 result in sample H-11 was between 0 and 1.96. Thus, the Ra-226 result in this sample was qualified as B to indicate the result may have been a false positive due to blank contamination.

Chemical Yield (Tracers and Carriers)

The tracer recoveries for all applicable parameters met the QC acceptance limits of 25-125%.

LCS/LCSD Results

All LCS and/or LCSD percent recoveries (%Rs) met the acceptance criteria for all parameters.

MS Results

The table below indicates the samples used for MS analyses and the associated parameters.

Sample ID	Parameter
M-120 in SDG 159247	Ra-226
M-121 in SDG 159242	Ra-226, Ra-228, Pb-210, Total U, Thorium isotopes, U isotopes

The %Rs met the QC acceptance criteria of 75-125% for all MS analyses.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Laboratory Duplicate Results

The table below indicates the samples used for laboratory duplicate analyses and the associated parameters.

Sample ID	Parameter
M-120 in SDG 159247	Pb-212, Ra-226
M-121 in SDG 159242	Thorium isotopes, U isotopes, Total U, Ra-226, Ra-228

The relative percent differences (RPDs) met the QC acceptance criteria of 20% RPD for aqueous samples (if both results were greater than five times the RL) or the difference was less than the RL (if the results were less than five times the RL). Precision was deemed acceptable.

Field Duplicate Results

There were no field duplicate samples submitted with this data set.

Sample Quantitation/Detection Limit Results

The total uranium results greater than the RL were reanalyzed to verify the initial results. All results were verified and the initial results were reported.

The Pb-212 results in samples M-117, the method blank, and the associated laboratory duplicate were reported by the laboratory as 0.00 UUI with an explanation that the results were rejected due to low abundance. Upon further discussion with the laboratory, it was determined that the results were not detected above the reporting limits; therefore, the Pb-212 result in sample M-117 was qualified as nondetect (U) at the RL.

The following laboratory qualifier(s) were removed during the data review in order to avoid confusion with the reviewed results.

Laboratory Qualifiers	Laboratory Definition
UI	Data rejected due to low abundance

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date:	July 1, 2006 Revised September 18, 2006
To:	David Gerry/Camarillo
From:	Lisa Krowitz/Westford
Subject:	Data Validation, Radiological Analyses Henderson Upgradient Investigation Tronox LLC Henderson, Nevada GEL SDG Number 158243
Distribution:	R. Kennedy/Westford

04020-023-152
TH013rad.lkk.rev

SUMMARY

Limited validation was performed on the data for one aqueous sample analyzed for various radionuclides by DOE EML HASL, ASTM, and EPA methods. The sample was collected at the Henderson site in Henderson, NV on March 14, 2006 and submitted to MWH in Moravia, CA for analysis. MWH subcontracted the analysis to General Engineering Laboratories (GEL) in Charleston, South Carolina. GEL processed this sample under sample delivery group (SDG) number 159243.

The analytical data were evaluated with reference to the Department of Energy "Evaluation of Radiochemical Data Usability" (1997) and the *Multi-Agency Radiological Laboratory Analytical Protocols Manual (MARLAP),* July 2004.

In general, the data are valid as reported and may be used for decision making purposes. No data were rejected or estimated.

SAMPLES

The sample included in this review along with the parameters and analytical methods are listed below.

Sample ID	Parameter/Analytical Method
M-118	Uranium-233/234 (U-233/234) by DOE EML HASL-300 Uranium-235/236 (U-235/236) by DOE EML HASL-300 Uranium-238 (U-238) by DOE EML HASL-300 Thorium-228 (Th-228) by DOE EML HASL-300 Thorium-230 (Th-230) by DOE EML HASL-300 Thorium-232 (Th-232) by DOE EML HASL-300 Lead-210 (Pb-210) by DOE RP280 Lead-212 (Pb-212) by EPA 901.1 Radium-226 (Ra-226) by EPA 903.1 Radium-228 (Ra-228) by EPA 904.0 Total U by ASTM D5174

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

Sample data were reviewed for the following parameters:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times/sample preservation
- Laboratory method blanks/equipment blanks
- Chemical Yield (Tracers and Carriers)
- Laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) results
- Matrix spike (MS) results
- Laboratory duplicate results
- Field duplicate results
- Sample quantitation/detection limit results

DISCUSSION

Agreement of Analyses Conducted With COC Requests

Sample reports were reviewed against the analytical requests as designated on the chain-of-custody (COC) and subsequent communications between ENSR and the laboratory. The MWH COC used to transfer the sample to GEL did not have a relinquished by signature upon receipt at GEL. No action was taken except to note this discrepancy.

When MWH transferred the sample to GEL, they added their laboratory ID to the front of the ENSR field ID. Thus, sample M-118 on the ENSR COC was changed to 2603230197 M-118 by MWH. During validation, the MWH sample ID was removed, leaving the original ENSR field sample ID.

Holding Times/Sample Preservation

The sample was prepared and analyzed within the method-specified holding times. No issues with sample preservation were noted upon receipt in the laboratory.

Laboratory Method Blanks/Equipment Blanks

There was no equipment blank submitted that was associated with the sample in this data set. There were no contaminants detected above the minimum detectable concentrations (MDCs)/detection limits (DLs) for all the parameters in the laboratory method blanks.

Chemical Yield (Tracers and Carriers)

The tracer recoveries for all applicable parameters met the QC acceptance limits of 25-125%.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

LCS/LCSD Results

All LCS and/or LCSD percent recoveries (%Rs) met the acceptance criteria for all parameters.

MS Results

The table below indicates the samples used for MS analyses and the associated parameters.

Sample ID	Parameter
M-121 in SDG 159242	Thorium isotopes, U isotopes, Total uranium, Pb-210, Ra-228
M-120 in SDG 159247	Ra-226

The %Rs met the QC acceptance criteria of 75-125% for all MS analyses.

Laboratory Duplicate Results

The table below indicates the samples used for laboratory duplicate analyses and the associated parameters.

Sample ID	Parameter
M-121 in SDG 159242	Thorium isotopes, U isotopes, Total uranium, Pb-210, Ra-228
M-120 in SDG 159247	Pb-212, Ra-226

The relative percent differences (RPDs) met the QC acceptance criteria of 20% RPD for aqueous samples (if both results were greater than five times the RL) or the difference was less than the RL (if the results were less than five times the RL). Precision was deemed acceptable.

Field Duplicate Results

There were no field duplicate samples submitted with this data set.

Sample Quantitation/Detection Limit Results

The total uranium result greater than the RL was reanalyzed to verify the initial result. The result was verified and the initial result was reported.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date:	July 1, 2006 Revised September 18, 2006
To:	David Gerry/Camarillo
From:	Lisa Krowitz/Westford
Subject:	Data Validation, Radiological Analyses Henderson Upgradient Investigation Tronox LLC Henderson, Nevada GEL SDG Number 159244
Distribution:	R. Kennedy/Westford

04020-023-152
TH014rad.lkk.rev

SUMMARY

Limited validation was performed on the data for one aqueous sample analyzed for various radionuclides by DOE EML HASL, ASTM, and EPA methods. The sample was collected at the Henderson site in Henderson, NV on March 24, 2006 and submitted to MWH in Monrovia, CA for analysis. MWH subcontracted the analysis to General Engineering Laboratories (GEL) in Charleston, South Carolina. GEL processed this sample under sample delivery group (SDG) number 159244.

The analytical data were evaluated with reference to the Department of Energy "Evaluation of Radiochemical Data Usability" (1997) and the *Multi-Agency Radiological Laboratory Analytical Protocols Manual (MARLAP),* July 2004.

In general, the data were valid as reported and may be used for decision making purposes. No data were rejected. The Pb-212 result in sample EB-3 was reported as nondetect at the reporting limit.

SAMPLES

The sample included in this review along with the parameters and analytical methods are listed below.

Sample ID	Parameter/Analytical Method
EB-3	Uranium-233/234 (U-233/234) by DOE EML HASL-300 Uranium-235/236 (U-235/236) by DOE EML HASL-300 Uranium-238 (U-238) by DOE EML HASL-300 Thorium-228 (Th-228) by DOE EML HASL-300 Thorium-230 (Th-230) by DOE EML HASL-300 Thorium-232 (Th-232) by DOE EML HASL-300 Lead-210 (Pb-210) by DOE RP280 Lead-212 (Pb-212) by EPA 901.1 Radium-226 (Ra-226) by EPA 903.1 Radium-228 (Ra-228) by EPA 904.0 Total U by ASTM D5174

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

Sample data were reviewed for the following parameters:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times/sample preservation
- Laboratory method blanks/equipment blanks
- Chemical Yield (Tracers and Carriers)
- Laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) results
- Matrix spike (MS) results
- Laboratory duplicate results
- Field duplicate results
- Sample quantitation/detection limit results

DISCUSSION

Agreement of Analyses Conducted With COC Requests

Sample reports were reviewed against the analytical requests as designated on the chain-of-custody (COC) and subsequent communications between ENSR and the laboratory. The MWH COC used to transfer the sample to GEL did not have a relinquished by signature upon receipt at GEL. No action was taken except to note this discrepancy.

When MWH transferred the sample to GEL, they added their laboratory ID to the front of the ENSR field ID. Thus, sample EB-3 on the ENSR COC was changed to 2603250005 EB-3 by MWH. During validation, the MWH sample ID was removed, leaving the original ENSR field sample ID.

Holding Times/Sample Preservation

The sample was prepared and analyzed within the method-specified holding times. No issues with sample preservation were noted upon receipt in the laboratory.

Laboratory Method Blanks/Equipment Blanks

The only sample in this SDG was equipment blank EB-3. There were no contaminants detected above the minimum detectable concentrations (MDCs)/detection limits (DLs) for all the parameters in the laboratory method blanks.

Chemical Yield (Tracers and Carriers)

The tracer recoveries for all applicable parameters met the QC acceptance limits of 25-125%.

LCS/LCSD Results

All LCS and/or LCSD percent recoveries (%Rs) met the acceptance criteria for all parameters.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

MS Results

The table below indicates the samples used for MS analyses and the associated parameters.

Sample ID	Parameter
M-120 in SDG 159247	Ra-226
M-121 in SDG 159242	Thorium isotopes, U isotopes, Total uranium, Pb-210, Ra-228

The %Rs met the QC acceptance criteria of 75-125% for all MS analyses.

Laboratory Duplicate Results

The table below indicates the samples used for laboratory duplicate analyses and the associated parameters.

Sample ID	Parameter
M-120 in SDG 159247	Pb-212, Ra-226
M-121 in SDG 159242	Thorium isotopes, U isotopes, Total uranium, Pb-210, Ra-228

The relative percent differences (RPDs) met the QC acceptance criteria of 20% RPD for aqueous samples (if both results were greater than five times the RL) or the difference was less than the RL (if the results were less than five times the RL). Precision was deemed acceptable.

Field Duplicate Results

There were no field duplicate samples submitted with this data set.

Sample Quantitation/Detection Limit Results

The Pb-212 results in samples EB-3 and the method blank were reported by the laboratory as 0.00 UUI with an explanation that the results were rejected due to low abundance. Upon further discussion with the laboratory, it was determined that the results were not detected above the reporting limits; therefore, the Pb-212 result in sample EB-3 was qualified as nondetect (U) at the RL.

The following laboratory qualifier(s) were removed during the data review in order to avoid confusion with the reviewed results.

Laboratory Qualifiers	Laboratory Definition
UI	Data rejected due to low abundance

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date:	July 1, 2006 Revised September 18, 2006
To:	David Gerry/Camarillo
From:	Lisa Krowitz/Westford
Subject:	Data Validation, Radiological Analyses Henderson Upgradient Investigation Tronox LLC Henderson, Nevada GEL SDG Number 159244
Distribution:	R. Kennedy/Westford

04020-023-152
TH014rad.lkk.rev

SUMMARY

Limited validation was performed on the data for one aqueous sample analyzed for various radionuclides by DOE EML HASL, ASTM, and EPA methods. The sample was collected at the Henderson site in Henderson, NV on March 24, 2006 and submitted to MWH in Monrovia, CA for analysis. MWH subcontracted the analysis to General Engineering Laboratories (GEL) in Charleston, South Carolina. GEL processed this sample under sample delivery group (SDG) number 159244.

The analytical data were evaluated with reference to the Department of Energy "Evaluation of Radiochemical Data Usability" (1997) and the *Multi-Agency Radiological Laboratory Analytical Protocols Manual (MARLAP),* July 2004.

In general, the data were valid as reported and may be used for decision making purposes. No data were rejected. The Pb-212 result in sample EB-3 was reported as nondetect at the reporting limit.

SAMPLES

The sample included in this review along with the parameters and analytical methods are listed below.

Sample ID	Parameter/Analytical Method
EB-3	Uranium-233/234 (U-233/234) by DOE EML HASL-300 Uranium-235/236 (U-235/236) by DOE EML HASL-300 Uranium-238 (U-238) by DOE EML HASL-300 Thorium-228 (Th-228) by DOE EML HASL-300 Thorium-230 (Th-230) by DOE EML HASL-300 Thorium-232 (Th-232) by DOE EML HASL-300 Lead-210 (Pb-210) by DOE RP280 Lead-212 (Pb-212) by EPA 901.1 Radium-226 (Ra-226) by EPA 903.1 Radium-228 (Ra-228) by EPA 904.0 Total U by ASTM D5174

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

Sample data were reviewed for the following parameters:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times/sample preservation
- Laboratory method blanks/equipment blanks
- Chemical Yield (Tracers and Carriers)
- Laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) results
- Matrix spike (MS) results
- Laboratory duplicate results
- Field duplicate results
- Sample quantitation/detection limit results

DISCUSSION

Agreement of Analyses Conducted With COC Requests

Sample reports were reviewed against the analytical requests as designated on the chain-of-custody (COC) and subsequent communications between ENSR and the laboratory. The MWH COC used to transfer the sample to GEL did not have a relinquished by signature upon receipt at GEL. No action was taken except to note this discrepancy.

When MWH transferred the sample to GEL, they added their laboratory ID to the front of the ENSR field ID. Thus, sample EB-3 on the ENSR COC was changed to 2603250005 EB-3 by MWH. During validation, the MWH sample ID was removed, leaving the original ENSR field sample ID.

Holding Times/Sample Preservation

The sample was prepared and analyzed within the method-specified holding times. No issues with sample preservation were noted upon receipt in the laboratory.

Laboratory Method Blanks/Equipment Blanks

The only sample in this SDG was equipment blank EB-3. There were no contaminants detected above the minimum detectable concentrations (MDCs)/detection limits (DLs) for all the parameters in the laboratory method blanks.

Chemical Yield (Tracers and Carriers)

The tracer recoveries for all applicable parameters met the QC acceptance limits of 25-125%.

LCS/LCSD Results

All LCS and/or LCSD percent recoveries (%Rs) met the acceptance criteria for all parameters.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

MS Results

The table below indicates the samples used for MS analyses and the associated parameters.

Sample ID	Parameter
M-120 in SDG 159247	Ra-226
M-121 in SDG 159242	Thorium isotopes, U isotopes, Total uranium, Pb-210, Ra-228

The %Rs met the QC acceptance criteria of 75-125% for all MS analyses.

Laboratory Duplicate Results

The table below indicates the samples used for laboratory duplicate analyses and the associated parameters.

Sample ID	Parameter
M-120 in SDG 159247	Pb-212, Ra-226
M-121 in SDG 159242	Thorium isotopes, U isotopes, Total uranium, Pb-210, Ra-228

The relative percent differences (RPDs) met the QC acceptance criteria of 20% RPD for aqueous samples (if both results were greater than five times the RL) or the difference was less than the RL (if the results were less than five times the RL). Precision was deemed acceptable.

Field Duplicate Results

There were no field duplicate samples submitted with this data set.

Sample Quantitation/Detection Limit Results

The Pb-212 results in samples EB-3 and the method blank were reported by the laboratory as 0.00 UUI with an explanation that the results were rejected due to low abundance. Upon further discussion with the laboratory, it was determined that the results were not detected above the reporting limits; therefore, the Pb-212 result in sample EB-3 was qualified as nondetect (U) at the RL.

The following laboratory qualifier(s) were removed during the data review in order to avoid confusion with the reviewed results.

Laboratory Qualifiers	Laboratory Definition
UI	Data rejected due to low abundance

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date:	July 1, 2006 Revised September 18, 2006
To:	David Gerry/Camarillo
From:	Lisa Krowitz/Westford
Subject:	Data Validation, Radiological Analyses Henderson Upgradient Investigation Tronox LLC Henderson, Nevada GEL SDG Number 158048
Distribution:	R. Kennedy/Westford

04020-023-152
TH015rad.lkk.rev

SUMMARY

Full validation was performed on the data for five soil samples analyzed for various radionuclides by DOE EML HASL, ASTM, and EPA methods. The samples were collected at the Henderson site in Henderson, NV on March 7, 2006 and submitted to MWH in Monrovia, CA for analysis. MWH subcontracted the analysis to General Engineering Laboratories (GEL) in Charleston, South Carolina. GEL processed these samples under sample delivery group (SDG) number 158048.

The analytical data were evaluated with reference to the Department of Energy "Evaluation of Radiochemical Data Usability" (1997) and the *Multi-Agency Radiological Laboratory Analytical Protocols Manual (MARLAP),* July 2004.

In general, the data are valid as reported and may be used for decision making purposes. No data were rejected. The Pb-210 results in samples M120-0.5, M120-5, M120-10, M120-30, and M120-50 were qualified as estimated (J/UJ) due to insufficient Bi-212 in-growth time.

SAMPLES

The samples included in this review along with the parameters and analytical methods are listed below.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Sample ID	Parameter/Analytical Method
M120-0.5 M120-10 M120-30	Polonium-210 (Po-210) by DOE EML HASL-300 Uranium-233/234 (U-233/234) by DOE EML HASL-300 Uranium-235/236 (U-235/236) by DOE EML HASL-300 Uranium-238 (U-238) by DOE EML HASL-300 Thorium-228 (Th-228) by DOE EML HASL-300 Thorium-230 (Th-230) by DOE EML HASL-300 Thorium-232 (Th-232) by DOE EML HASL-300 Actinium-228 (Ac-228), Bismuth-212 (Bi-212), Lead-212 (Pb-212), Protactinium-231 (Pa-231), Radium-226 (Ra-226), Radium-228 (Ra-228) by EPA 901.1 Gross Alpha by EPA 900.0 Lead-210 (Pb-210) by DOE RP280 Total U by ASTM D5174
M120-5 M120-50	Uranium-233/234 (U-233/234) by DOE EML HASL-300 Uranium-235/236 (U-235/236) by DOE EML HASL-300 Uranium-238 (U-238) by DOE EML HASL-300 Thorium-228 (Th-228) by DOE EML HASL-300 Thorium-230 (Th-230) by DOE EML HASL-300 Thorium-232 (Th-232) by DOE EML HASL-300 Lead-212 (Pb-212), Radium-226 (Ra-226), Radium-228 (Ra-228) by EPA 901.1 Lead-210 (Pb-210) by DOE RP280 Total U by ASTM D5174

REVIEW ELEMENTS

Sample data were reviewed for the following parameters:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times/sample preservation
- Calibrations
- Laboratory method blanks/equipment blanks
- Chemical Yield (Tracers and Carriers)
- Laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) results
- Matrix spike (MS) results
- Laboratory duplicate results
- Field duplicate results
- Sample quantitation/detection limit results

DISCUSSION

Agreement of Analyses Conducted With COC Requests

Sample reports were reviewed against the analytical requests as designated on the chain-of-custody (COC) and subsequent communications between ENSR and the laboratory. No discrepancies were noted.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

When MWH transferred the sample to GEL, they changed the ENSR field ID to their laboratory ID. Thus, sample M120-0.5 on the ENSR COC was changed to 2603090024 by MWH. During validation, the MWH sample ID was removed and replaced with the original ENSR field sample ID.

The table below indicates the MWH ID versus the ENSR ID.

MWH ID	ENSR Field ID
2603090024	M120-0.5
2603090027	M120-10
2603090028	M120-30
2603090026	M120-5
2603090029	M120-50

Holding Times/Sample Preservation

All samples were prepared and analyzed within the method-specified holding times. No issues with sample preservation were noted upon receipt in the laboratory.

Calibrations

All criteria were met for the daily calibrations for all parameters, except for Pb-210. The method for Pb-210 by GFPC requires a minimum of five days for Bi-212 in-growth to occur. The Bi-212 in-growth started on 4/5/06 at 1350 and the samples were counted on 4/9/06 at 0957, which was less than the required five days for adequate in-growth to occur. Therefore, the Pb-210 results in samples M120-0.5, M120-5, M120-10, M120-30, and M120-50 were qualified as estimated (J/UJ) due to insufficient Bi-212 in-growth.

Laboratory Method Blanks/Equipment Blanks

There was no equipment blank submitted that was associated with sample M120-5. However, the equipment blank associated with samples M120-0.5, M120-10, M120-30, and M121-50, was EB-1 submitted in SDG 158277. There were no contaminants detected above the minimum detectable concentrations (MDCs)/detection limits (DLs) for all the parameters in the laboratory method blanks or equipment blank.

Chemical Yield (Tracers and Carriers)

The tracer recoveries for all applicable parameters met the QC acceptance limits of 25-125%.

LCS/LCSD Results

All LCS and/or LCSD percent recoveries (%Rs) met the acceptance criteria for all parameters.

MS Results

The table below indicates the samples used for MS analyses and the associated parameters.

Sample ID	Parameter
M120-0.5	Gross alpha

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Sample ID	Parameter
M-120-10	Po-210
M-120-50	Thorium isotopes, U isotopes, Total uranium, Pb-210

The %Rs met the QC acceptance criteria of 75-125% for all MS analyses.

Laboratory Duplicate Results

The table below indicates the samples used for laboratory duplicate analyses and the associated parameters. .

Sample ID	Parameter
M120-0.5	Gross alpha
M-120-10	Po-210
M-120-50	Thorium isotopes, U isotopes, Total uranium, Pb-210, gamma spec nuclides (Ac-228, Bi-212, Pb-212, Pa-231, Ra-226, Ra-228)

The relative percent differences (RPDs) met the QC acceptance criteria of 35% RPD for soil samples (if both results were greater than five times the RL) or the difference was less than the RL (if the results were less than five times the RL). Precision was deemed acceptable.

Field Duplicate Results

The field duplicate samples submitted with this data set were samples M116-0.5 and M116-0.5D. The following table summarizes the relative percent differences (RPDs) of the detected analytes in the field duplicate pair. The RPDs were within the acceptance criteria of 50% for a solid matrix (if the sample results were >10xRL). For the Th-230 results, which were < 10xRL, precision was deemed acceptable because the difference between the field duplicate results was <8xRL.

Analyte	M116-0.5 (pCi/g)	M116-0.5D (pCi/g)	% RPD	Action
Th-228	2.11 $\pm$ 0.808	1.81 $\pm$ 0.588	15	None
Th-230	0.704 $\pm$ 0.397	1.24 $\pm$ 0.433	55	None, SR <10xRL and difference <8xRL
Th-232	1.90 $\pm$ 0.706	1.56 $\pm$ 0.502	20	None
U-233/234	1.36 $\pm$ 0.432	1.18 $\pm$ 0.468	20	None
U-238	0.805 $\pm$ 0.337	1.16 $\pm$ 0.453	36	None
Pb-212	1.78 $\pm$ 0.174	1.91 $\pm$ 0.198	7	None
Ra-226	0.791 $\pm$ 0.133	1.04 $\pm$ 0.171	27	None
Ra-228	1.78 $\pm$ 0.361	1.98 $\pm$ 0.345	11	None
Total U	3.64 $\pm$ 0.101 μg/L	3.57 $\pm$ 0.0904 μg/L	2	None

Sample Quantitation/Detection Limit Results

The total uranium results greater than the RL were reanalyzed to verify the initial results. All results were verified and the initial results were reported.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date:	July 1, 2006 Revised September 18, 2006
To:	David Gerry/Camarillo
From:	Lisa Krowitz/Westford
Subject:	Data Validation, Radiological Analyses Henderson Upgradient Investigation Tronox LLC Henderson, Nevada GEL SDG Number 159247
Distribution:	R. Kennedy/Westford

04020-023-152
TH016rad.lkk.rev

SUMMARY

Full validation was performed on the data for one aqueous sample analyzed for various radionuclides by DOE EML HASL, ASTM, and EPA methods. The sample was collected at the Henderson site in Henderson, NV on March 22, 2006 and submitted to MWH in Monrovia, CA for analysis. MWH subcontracted the analysis to General Engineering Laboratories (GEL) in Charleston, South Carolina. GEL processed this sample under sample delivery group (SDG) number 159247.

The analytical data were evaluated with reference to the Department of Energy "Evaluation of Radiochemical Data Usability" (1997) and the *Multi-Agency Radiological Laboratory Analytical Protocols Manual (MARLAP),* July 2004.

In general, the data are valid as reported and may be used for decision making purposes. No data were rejected. The Bi-212 and Pb-212 results in sample M-120 were qualified as nondetect at the reporting limit. The nondetect Ra-228 result in sample M-120 was qualified as estimated (UJ) due to a non-compliant calibration. The nondetect Pb-210 result in sample M-120 was qualified as estimated (UJ) due to insufficient Bi-212 in-growth time.

SAMPLES

The sample included in this review along with the parameters and analytical methods are listed below.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Sample ID	Parameter/Analytical Method
M-120	Polonium-210 (Po-210) by DOE EML HASL-300 Uranium-233/234 (U-233/234) by DOE EML HASL-300 Uranium-235/236 (U-235/236) by DOE EML HASL-300 Uranium-238 (U-238) by DOE EML HASL-300 Thorium-228 (Th-228) by DOE EML HASL-300 Thorium-230 (Th-230) by DOE EML HASL-300 Thorium-232 (Th-232) by DOE EML HASL-300 Actinium-228 (Ac-228), Bismuth-212 (Bi-212), Lead-212 (Pb-212), Protactinium-231 (Pa-231) by EPA 901.1 Gross Alpha by EPA 900.0 Radium-226 (Ra-226) by EPA 903.1 Radium-228 (Ra-228) by EPA 904.0 Lead-210 (Pb-210) by DOE RP280 Total U by ASTM D5174

REVIEW ELEMENTS

Sample data were reviewed for the following parameters:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times/sample preservation
- Calibrations
- Laboratory method blanks/equipment blanks
- Chemical Yield (Tracers and Carriers)
- Laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) results
- Matrix spike (MS) results
- Laboratory duplicate results
- Field duplicate results
- Sample quantitation/detection limit results

DISCUSSION

Agreement of Analyses Conducted With COC Requests

Sample reports were reviewed against the analytical requests as designated on the chain-of-custody (COC) and subsequent communications between ENSR and the laboratory. When MWH transferred the sample to GEL, they added their laboratory ID to the front of the ENSR field ID. Thus, sample M120 on the ENSR COC was changed to 2603230069 M120 by MWH. During validation, the MWH sample ID was removed, leaving the original ENSR field sample ID.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Holding Times/Sample Preservation

The sample was prepared and analyzed within the method-specified holding times. No issues with sample preservation were noted upon receipt in the laboratory.

Calibrations

All criteria were met for the daily calibrations for all parameters, except for Ra-228 and Pb-210.

The calibration for Ra-228 by gas flow proportional counter (GFPC) expired on 4/22/06. However, the sample was analyzed on 4/26/06, which was 4 days after the calibration expiration date. The nondetect Ra-228 result in sample M-120 was qualified as estimated (UJ) due to a non-compliant calibration.

The method for Pb-210 by GFPC requires a minimum of five days for the Bi-212 in-growth to occur. The Bi-212 in-growth started on 4/20/06 at 1830 and the samples were counted on 4/25/06 at 1103, which was less than the required five days for adequate in-growth to occur. Therefore, the nondetect Pb-210 result in sample M-120 was qualified as estimated (UJ) due to insufficient Bi-212 in-growth.

Laboratory Method Blanks/Equipment Blanks

There was no equipment blank sample associated with the sample in this data set. There were no contaminants detected above the minimum detectable concentrations (MDCs)/detection limits (DLs) for all the parameters in the laboratory method blanks.

Chemical Yield (Tracers and Carriers)

The tracer recoveries for all applicable parameters met the QC acceptance limits of 25-125%.

LCS/LCSD Results

All LCS and/or LCSD percent recoveries (%Rs) met the acceptance criteria for all parameters.

MS Results

The table below indicates the samples used for MS analyses and the associated parameters.

Sample ID	Parameter
M-120	Po-210, Gross alpha, Ra-226
M-121 in SDG 159242	Thorium isotopes, U isotopes, Total uranium, Pb-210, Ra-228, Total Uranium

The %Rs met the QC acceptance criteria of 75-125% for all MS analyses.

Laboratory Duplicate Results

The table below indicates the samples used for laboratory duplicate analyses and the associated parameters.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Sample ID	Parameter
M-120	Po-210, Ac-228, Bi-212, Pb-212, Pa-231, Ra-226
M-121 in SDG 159242	Thorium isotopes, U isotopes, Total uranium, Pb-210, Ra-228, Total Uranium

The relative percent differences (RPDs) met the QC acceptance criteria of 20% RPD for aqueous samples (if both results were greater than five times the RL), or the difference was less than the RL (if the results were less than five times the RL). Precision was deemed acceptable.

Field Duplicate Results

There were no field duplicate samples submitted with this data set.

Sample Quantitation/Detection Limit Results

The Bi-212 and Pb-212 results in sample M-120 were reported by the laboratory as 0.00 UUI with an explanation that the results were rejected due to low abundance. Upon further discussion with the laboratory, it was determined that the results were not detected above the reporting limits; therefore, the Bi-212 and Pb-212 results in sample M-120 were qualified as nondetect (U) at the RL.

The following laboratory qualifier(s) were removed during the data review in order to avoid confusion with the reviewed results.

Laboratory Qualifiers	Laboratory Definition
UI	Data rejected due to low abundance

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date: July 18, 2006

To: Dave Gerry/Camarillo

From: Deborah Truini/Westford

Subject: Data Validation, PCDD/PCDF Analyses
Tronox Henderson Upgradient
Henderson, NV
STL SDG G6C100424

Distribution: R. Kennedy/Westford 04020-023-152 File

TH017dioxindat

SUMMARY

Full validation was performed on the data for three soil samples analyzed for polychlorinated dibenzodioxins (PCDD) and polychlorinated dibenzofurans (PCDF) by SW-846 method 8290. The samples were collected at the Tronox LLC (Tronox) facility, formerly Kerr-McGee Chemical LLC site in Henderson, NV on March 7, 2006 and were submitted to EMAX Laboratories, Inc. (EMAX) in Torrance, CA. EMAX then sent the samples to MWH Laboratories in Monrovia, CA where the samples were subsequently sent to Severn Trent Laboratories in Sacramento, CA (STL-Sacramento) for analysis. STL-Sacramento processed and reported these samples under sample delivery group (SDG) G6C100424.

The analytical data were evaluated with reference to the "USEPA Analytical Services Branch (ASB) National Functional Guidelines for Chlorinated Dibenzo-p-Dioxins (CDDs) and Chlorinated Dibenzofurans (CDFs) Data Review", EPA-540-R-05-001 (September 2005) and the quality control (QC) criteria specified in the analytical method and/or the site specific Quality Assurance Project Plan (QAPP). Modification of the Functional Guidelines was performed to accommodate the SW-846 methodologies.

In general, the data are valid as reported and may be used for decision making purposes. No data were rejected. Selected data points were qualified due to nonconformances of certain QC criteria (see discussion below).

SAMPLES

The samples included in this review are listed below.

Sample IDs
M120-0.5
M120-10
M120-30

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

Sample data were reviewed for the following parameters:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times/sample preservation
- Initial and continuing calibrations
- Laboratory blanks/equipment blanks/field blanks
- Matrix spike/matrix spike duplicate (MS/MSD) results
- Internal and clean-up standard recoveries
- Field duplicate results
- Laboratory control sample/laboratory control sample duplicate (LCS/LCSD) results
- Sample quantitation/detection limit results

DISCUSSION

Agreement of Analyses Conducted With COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. No discrepancies were found.

Holding Times/Sample Preservation

The cooler temperatures upon sample receipt at EMAX and MWH Laboratories, were within the acceptance criteria of 4± 2°C. However, when received at STL-Sacramento, the cooler temperature (13˚C) was above the QC acceptance criteria. No validation action was taken due to the persistence of dioxins and furans.

The samples were extracted and analyzed within the method specified holding times.

Initial and Continuing Calibrations

The percent relative standard deviations of all target compounds were within the QC acceptance criteria for the initial calibrations associated with the sample analyses. All target compounds met the retention time, ion abundance ratios, and signal-to-noise (S/N) acceptance criteria specified in the method.

The percent differences of all target compounds were within the QC acceptance criteria in the continuing calibrations associated with the sample analyses. All target compounds met the retention time, ion abundance ratios, and S/N acceptance criteria specified in the method.

Chromatographic resolution for the $^{13}C_{12}$-2,3,7,8-TCDD and the $^{13}C_{12}$-1,2,3,4-TCDD peaks met the QC acceptance criteria of 25 percent (%) resolution as specified in the method for the DB-5 column. Chromatographic resolution for the $^{13}C_{12}$-2,3,7,8-TCDF and the $^{13}C_{12}$-2,3,4,7-TCDF peaks met the QC acceptance criteria of 25 % resolution as specified in the method for the DB-225 column.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Laboratory Blanks/Equipment Blanks/Field Blanks

Field and equipment blank samples were not collected with this sample set.

There were no target compounds detected in the laboratory method blank associated with the samples in this data set.

MS/MSD Results

Sample M120-0.5 was selected for matrix spike/matrix spike duplicate analysis in association with this data set. The percent recoveries (%Rs) and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria for the MS and MSD samples with the following exceptions.

Compound	MSD %R	QC Limits	RPD	RPD Limits	Actions
2,3,7,8-TCDD	63	71-128	35	25	All positive and nondetect compounds in sample M120-0.5, with the exception of 1,2,3,4,7,8,9-HpCDF, were qualified as estimated (J and UJ, respectively) due to low MSD recoveries and/or RPD exceedances
1,2,3,7,8-PeCDD	68	73-134	34	25	
1,2,3,4,7,8-HxCDD	61	66-137	46	25	
1,2,3,6,7,8-HxCDD	67	75-131	38	25	
1,2,3,7,8,9-HxCDD	66	74-135	43	25	
1,2,3,4,6,7,8-HpCDD	67	76-130	35	25	
OCDD	67	74-133	51	25	
2,3,7,8-TCDF	64	71-134	39	25	
1,2,3,7,8-PeCDF	66	74-130	32	25	
2,3,4,7,8-PeCDF	64	71-133	28	25	
1,2,3,4,7,8-HxCDF	OK	OK	39	25	
1,2,3,6,7,8-HxCDF	OK	OK	39	25	
2,3,4,6,7,8-HxCDF	OK	OK	35	25	
1,2,3,7,8,9-HxCDF	OK	OK	28	25	
1,2,3,4,6,7,8-HpCDF	61	75-131	46	25	
OCDF	74	68-142	46	25	

Internal and Clean-up Standard Recoveries

Internal standard and clean-up standard %Rs were within QC acceptance criteria of 40-135% for all sample analyses with the following exceptions.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Sample	Internal Standard	% Recovery	Action
MW120-10	^{13}C-2,3,7,8-TCDD	33	Qualify as estimated (UJ) the nondetect results for 2,3,7,8-TCDD and total TCDD in sample M120-10.
	^{13}C-1,2,3,7,8-PeCDD	27	Qualify as estimated (UJ) the nondetect results for 1,2,3,7,8-PeCDD and total PeCDD in sample M120-10.
	^{13}C-1,2,3,6,7,8-HxCDD	30	Qualify as estimated (UJ) the nondetect results for 1,2,3,4,7,8-HxCDD; 1,2,3,6,7,8-HxCDD; 1,2,3,7,8,9-HxCDD; and total HxCDD in sample M120-10.
	^{13}C-1,2,3,4,6,7,8-HpCDD	30	Qualify as estimated (UJ) the nondetect results for 1,2,3,4,6,7,8-HpCDD and total HpCDD in sample M120-10.
	^{13}C-OCDD	24	Qualify as estimated (UJ) the nondetect results for OCDD and OCDF in sample M120-10.
	^{13}C-2,3,7,8-TCDF	34	Qualify as estimated (J and UJ) the positive and nondetect results for 2,3,7,8-TCDF and total TCDF in sample M120-10.
	^{13}C-1,2,3,7,8-PeCDF	28	Qualify as estimated (UJ) the nondetect results for 1,2,3,7,8-PeCDF; 2,3,4,7,8-PeCDF; and total PeCDF in sample M120-10.
	^{13}C-1,2,3,4,7,8-HxCDF	30	Qualify as estimated (UJ) the nondetect results for 1,2,3,4,7,8-HxCDF; 1,2,3,6,7,8-HxCDF; 2,3,4,6,7,8-HxCDF; 1,2,3,7,8,9-HxCDF; and total HxCDF in sample M120-10.
	^{13}C-1,2,3,4,6,7,8-HpCDF	33	Qualify as estimated (UJ) the nondetect results for 1,2,3,4,6,7,8-HpCDF; 1,2,3,4,7,8,9-HpCDFl and total HpCDF in sample M120-10.
M120-30	^{13}C-1,2,3,7,8-PeCDD	37	Qualify as estimated (UJ) the nondetect results for 1,2,3,7,8-PeCDD and total PeCDD in sample M120-30.
	^{13}C-1,2,3,6,7,8-HxCDD	34	Qualify as estimated (UJ) the nondetect results for 1,2,3,4,7,8-HxCDD; 1,2,3,6,7,8-HxCDD; 1,2,3,7,8,9-HxCDD; and total HxCDD in sample M120-30.
	^{13}C-1,2,3,4,6,7,8-HpCDD	27	Qualify as estimated (UJ) the nondetect results for 1,2,3,4,6,7,8-HpCDD and total HpCDD in sample M120-30.
	^{13}C-OCDD	21	Qualify as estimated (UJ) the nondetect results for OCDD and OCDF in sample M120-30.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Sample	Internal Standard	% Recovery	Action
	^{13}C-1,2,3,7,8-PeCDF	39	Qualify as estimated (UJ) the nondetect results for 1,2,3,7,8-PeCDF; 2,3,4,7,8-PeCDF; and total PeCDF in sample M120-30.
	^{13}C-1,2,3,4,7,8-HxCDF	33	Qualify as estimated (UJ) the nondetect results for 1,2,3,4,7,8-HxCDF; 1,2,3,6,7,8-HxCDF; 2,3,4,6,7,8-HxCDF; 1,2,3,7,8,9-HxCDF; and total HxCDF in sample M120-30.
	^{13}C-1,2,3,4,6,7,8-HpCDF	29	Qualify as estimated (UJ) the nondetect results for 1,2,3,4,6,7,8-HpCDF; 1,2,3,4,7,8,9-HpCDF and total HpCDF in sample M120-30.

Field Duplicate Results

A field duplicate pair was not submitted for this data set. No data validation actions were taken on this basis.

LCS/LCSD Results

The %Rs of all spiked compounds were within the QC acceptance criteria for the LCS.

Sample Quantitation/Detection Limit Results

Dilutions were not performed on any samples in this data set.

The following 2,3,7,8-substituted compounds in the samples listed below were flagged as estimated (J) by the laboratory due to quantitation of the results at concentrations less than the lowest calibration standard but greater than the estimated detection limit; no further validation action was necessary:

M120-0.5: 1,2,3,7,8-PeCDF; 2,3,4,7,8-PeCDF; 2,3,4,6,7,8-HxCDF

The positive total results (total isomers within a level of chlorination) for several samples were qualified as estimated (J) by the validator due to quantitation of the results at concentrations less than the lowest calibration standard but greater than the estimated detection limit.

M120-0.5: total TCDD
M120-10: total TCDF

The table below lists sample results which were considered to be non-detect by the laboratory but which did meet the compound identification criteria stipulated in the method. According to the laboratory's SOP, these results were not reported as positive results because the concentrations were less than ½ of the lowest calibration standard. However, the laboratory reported these results as nondetects at the actual sample results. Consequently, the detection limits for the sample results listed in the table below were raised to ½ of the lowest calibration standard since the laboratory considers these results to be nondetect at this level.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Sample ID	Compound	Raised Detection Limit (pg/g)
M120-0.5	2,3,7,8-TCDD	0.53
	Total PeCDD	2.7
	1,2,3,4,7,8-HxCDD	2.7
	1,2,3,6,7,8-HxCDD	2.7
	1,2,3,7,8,9-HxCDD	2.7
	Total HxCDD	2.7
	1,2,3,7,8,9-HxCDF	2.7
M120-10	2,3,7,8-TCDF	0.55
	Total PeCDD	2.8
	1,2,3,6,7,8-HxCDD	2.8
	1,2,3,7,8,9-HxCDD	2.8
	Total HxCDD	2.8
	Total PeCDF	2.8
	1,2,3,4,7,8-HxCDF	2.8
	Total HxCDF	2.8
	1,2,3,4,6,7,8-HpCDF	2.8
	Total HpCDF	2.8
M120-30	2,3,7,8-TCDF	0.56
	Total TCDF	0.56
	Total PeCDD	2.8
	Total PeCDF	2.8
	OCDD	5.6

The laboratory included some peaks in the total homolog concentrations which did not meet ion abundance ratios [*i.e.* Estimated Maximum Possible Concentrations (EMPCs)]. The dioxin and furan NFGs state that "If ion abundance criteria are not satisfied, qualify the detects as unusable "R" and use professional judgment to qualify non-detects." It also states that "professional judgment should be used in determining the proper identification of analytes". Rather than deem the results as unusable "R", the validator took a conservative approach and using professional judgment included these EMPC results since the method allows for compounds that do not meet ion abundance ratios to be reported as EMPCs. For the total homolog concentrations, these EMPCs consisted of non-2,3,7,8-substituted PCDDs and/or PCDFs. Professional judgment was used to qualify as estimated (J) the total homolog results for which the EMPC concentration accounted for >10% of the total concentration (see table below).

Sample ID	Compound	Percentage of Total Result
M120-0.5	Total TCDF	31
	Total PeCDF	14

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date: July 18, 2006 Revised October 10, 2006

To: Dave Gerry/Camarillo

From: Deborah Truini/Westford

Subject: Data Validation, PCDD/PCDF Analyses
Tronox Henderson Upgradient
Henderson, NV
STL SDG G6C100424

Distribution: R. Kennedy/Westford 04020-023-152 File

TH017dioxindat.rev

SUMMARY

Full validation was performed on the data for three soil samples analyzed for polychlorinated dibenzodioxins (PCDD) and polychlorinated dibenzofurans (PCDF) by SW-846 method 8290. The samples were collected at the Tronox LLC (Tronox) facility, formerly Kerr-McGee Chemical LLC site in Henderson, NV on March 7, 2006 and were submitted to EMAX Laboratories, Inc. (EMAX) in Torrance, CA. EMAX then sent the samples to MWH Laboratories in Monrovia, CA where the samples were subsequently sent to Severn Trent Laboratories in Sacramento, CA (STL-Sacramento) for analysis. STL-Sacramento processed and reported these samples under sample delivery group (SDG) G6C100424.

The analytical data were evaluated with reference to the "USEPA Analytical Services Branch (ASB) National Functional Guidelines for Chlorinated Dibenzo-p-Dioxins (CDDs) and Chlorinated Dibenzofurans (CDFs) Data Review", EPA-540-R-05-001 (September 2005) and the quality control (QC) criteria specified in the analytical method and/or the site specific Quality Assurance Project Plan (QAPP). Modification of the Functional Guidelines was performed to accommodate the SW-846 methodologies.

In general, the data are valid as reported and may be used for decision making purposes. No data were rejected. Selected data points were qualified due to nonconformances of certain QC criteria (see discussion below).

SAMPLES

The samples included in this review are listed below.

Sample IDs
M120-0.5
M120-10
M120-30

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

Sample data were reviewed for the following parameters:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times/sample preservation
- Initial and continuing calibrations
- Laboratory blanks/equipment blanks/field blanks
- Matrix spike/matrix spike duplicate (MS/MSD) results
- Internal and clean-up standard recoveries
- Field duplicate results
- Laboratory control sample/laboratory control sample duplicate (LCS/LCSD) results
- Sample quantitation/detection limit results

DISCUSSION

Agreement of Analyses Conducted With COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. No discrepancies were found.

Holding Times/Sample Preservation

The cooler temperatures upon sample receipt at EMAX and MWH Laboratories, were within the acceptance criteria of 4± 2°C. However, when received at STL-Sacramento, the cooler temperature (13˚C) was above the QC acceptance criteria. No validation action was taken due to the persistence of dioxins and furans.

The samples were extracted and analyzed within the method specified holding times.

Initial and Continuing Calibrations

The percent relative standard deviations of all target compounds were within the QC acceptance criteria for the initial calibrations associated with the sample analyses. All target compounds met the retention time, ion abundance ratios, and signal-to-noise (S/N) acceptance criteria specified in the method.

The percent differences of all target compounds were within the QC acceptance criteria in the continuing calibrations associated with the sample analyses. All target compounds met the retention time, ion abundance ratios, and S/N acceptance criteria specified in the method.

Chromatographic resolution for the $^{13}C_{12}$-2,3,7,8-TCDD and the $^{13}C_{12}$-1,2,3,4-TCDD peaks met the QC acceptance criteria of 25 percent (%) resolution as specified in the method for the DB-5 column. Chromatographic resolution for the $^{13}C_{12}$-2,3,7,8-TCDF and the $^{13}C_{12}$-2,3,4,7-TCDF peaks met the QC acceptance criteria of 25 % resolution as specified in the method for the DB-225 column.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Laboratory Blanks/Equipment Blanks/Field Blanks

Field and equipment blank samples were not collected with this sample set.

There were no target compounds detected in the laboratory method blank associated with the samples in this data set.

MS/MSD Results

Sample M120-0.5 was selected for matrix spike/matrix spike duplicate analysis in association with this data set. The percent recoveries (%Rs) and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria for the MS and MSD samples with the following exceptions.

Compound	MSD %R	QC Limits	RPD	RPD Limits	Actions
2,3,7,8-TCDD	63	71-128	35	25	All positive and nondetect compounds in sample M120-0.5, with the exception of 1,2,3,4,7,8,9-HpCDF, were qualified as estimated (J and UJ, respectively) due to low MSD recoveries and/or RPD exceedances
1,2,3,7,8-PeCDD	68	73-134	34	25	
1,2,3,4,7,8-HxCDD	61	66-137	46	25	
1,2,3,6,7,8-HxCDD	67	75-131	38	25	
1,2,3,7,8,9-HxCDD	66	74-135	43	25	
1,2,3,4,6,7,8-HpCDD	67	76-130	35	25	
OCDD	67	74-133	51	25	
2,3,7,8-TCDF	64	71-134	39	25	
1,2,3,7,8-PeCDF	66	74-130	32	25	
2,3,4,7,8-PeCDF	64	71-133	28	25	
1,2,3,4,7,8-HxCDF	OK	OK	39	25	
1,2,3,6,7,8-HxCDF	OK	OK	39	25	
2,3,4,6,7,8-HxCDF	OK	OK	35	25	
1,2,3,7,8,9-HxCDF	OK	OK	28	25	
1,2,3,4,6,7,8-HpCDF	61	75-131	46	25	
OCDF	74	68-142	46	25	

Internal and Clean-up Standard Recoveries

Internal standard and clean-up standard %Rs were within QC acceptance criteria of 40-135% for all sample analyses with the following exceptions.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Sample	Internal Standard	% Recovery	Action
MW120-10	^{13}C-2,3,7,8-TCDD	33	Qualify as estimated (UJ) the nondetect results for 2,3,7,8-TCDD and total TCDD in sample M120-10.
	^{13}C-1,2,3,7,8-PeCDD	27	Qualify as estimated (UJ) the nondetect results for 1,2,3,7,8-PeCDD and total PeCDD in sample M120-10.
	^{13}C-1,2,3,6,7,8-HxCDD	30	Qualify as estimated (UJ) the nondetect results for 1,2,3,4,7,8-HxCDD; 1,2,3,6,7,8-HxCDD; 1,2,3,7,8,9-HxCDD; and total HxCDD in sample M120-10.
	^{13}C-1,2,3,4,6,7,8-HpCDD	30	Qualify as estimated (UJ) the nondetect results for 1,2,3,4,6,7,8-HpCDD and total HpCDD in sample M120-10.
	^{13}C-OCDD	24	Qualify as estimated (UJ) the nondetect results for OCDD and OCDF in sample M120-10.
	^{13}C-2,3,7,8-TCDF	34	Qualify as estimated (J and UJ) the positive and nondetect results for 2,3,7,8-TCDF and total TCDF in sample M120-10.
	^{13}C-1,2,3,7,8-PeCDF	28	Qualify as estimated (UJ) the nondetect results for 1,2,3,7,8-PeCDF; 2,3,4,7,8-PeCDF; and total PeCDF in sample M120-10.
	^{13}C-1,2,3,4,7,8-HxCDF	30	Qualify as estimated (UJ) the nondetect results for 1,2,3,4,7,8-HxCDF; 1,2,3,6,7,8-HxCDF; 2,3,4,6,7,8-HxCDF; 1,2,3,7,8,9-HxCDF; and total HxCDF in sample M120-10.
	^{13}C-1,2,3,4,6,7,8-HpCDF	33	Qualify as estimated (UJ) the nondetect results for 1,2,3,4,6,7,8-HpCDF; 1,2,3,4,7,8,9-HpCDFl and total HpCDF in sample M120-10.
M120-30	^{13}C-1,2,3,7,8-PeCDD	37	Qualify as estimated (UJ) the nondetect results for 1,2,3,7,8-PeCDD and total PeCDD in sample M120-30.
	^{13}C-1,2,3,6,7,8-HxCDD	34	Qualify as estimated (UJ) the nondetect results for 1,2,3,4,7,8-HxCDD; 1,2,3,6,7,8-HxCDD; 1,2,3,7,8,9-HxCDD; and total HxCDD in sample M120-30.
	^{13}C-1,2,3,4,6,7,8-HpCDD	27	Qualify as estimated (UJ) the nondetect results for 1,2,3,4,6,7,8-HpCDD and total HpCDD in sample M120-30.
	^{13}C-OCDD	21	Qualify as estimated (UJ) the nondetect results for OCDD and OCDF in sample M120-30.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Sample	Internal Standard	% Recovery	Action
	^{13}C-1,2,3,7,8-PeCDF	39	Qualify as estimated (UJ) the nondetect results for 1,2,3,7,8-PeCDF; 2,3,4,7,8-PeCDF; and total PeCDF in sample M120-30.
	^{13}C-1,2,3,4,7,8-HxCDF	33	Qualify as estimated (UJ) the nondetect results for 1,2,3,4,7,8-HxCDF; 1,2,3,6,7,8-HxCDF; 2,3,4,6,7,8-HxCDF; 1,2,3,7,8,9-HxCDF; and total HxCDF in sample M120-30.
	^{13}C-1,2,3,4,6,7,8-HpCDF	29	Qualify as estimated (UJ) the nondetect results for 1,2,3,4,6,7,8-HpCDF; 1,2,3,4,7,8,9-HpCDF and total HpCDF in sample M120-30.

Field Duplicate Results

A field duplicate pair was not submitted for this data set. No data validation actions were taken on this basis.

LCS/LCSD Results

The %Rs of all spiked compounds were within the QC acceptance criteria for the LCS.

Sample Quantitation/Detection Limit Results

Dilutions were not performed on any samples in this data set.

The following 2,3,7,8-substituted compounds in the samples listed below were flagged as estimated (J) by the laboratory due to quantitation of the results at concentrations less than the lowest calibration standard but greater than the estimated detection limit; no further validation action was necessary:

M120-0.5: 1,2,3,7,8-PeCDF; 2,3,4,7,8-PeCDF; 2,3,4,6,7,8-HxCDF

The positive total results (total isomers within a level of chlorination) for several samples were qualified as estimated (J) by the validator due to quantitation of the results at concentrations less than the lowest calibration standard but greater than the estimated detection limit.

M120-0.5: total TCDD
M120-10: total TCDF

The table below lists sample results which were considered to be non-detect by the laboratory but which did meet the compound identification criteria stipulated in the method. According to the laboratory's SOP, these results were not reported as positive results because the concentrations were less than ½ of the lowest calibration standard. However, the laboratory reported these results as nondetects at the actual sample results. Consequently, the detection limits for the sample results listed in the table below were raised to ½ of the lowest calibration standard since the laboratory considers these results to be nondetect at this level.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Sample ID	Compound	Raised Detection Limit (pg/g)
M120-0.5	2,3,7,8-TCDD	0.53
	Total PeCDD	2.7
	1,2,3,4,7,8-HxCDD	2.7
	1,2,3,6,7,8-HxCDD	2.7
	1,2,3,7,8,9-HxCDD	2.7
	Total HxCDD	2.7
	1,2,3,7,8,9-HxCDF	2.7
M120-10	2,3,7,8-TCDF	0.55
	Total PeCDD	2.8
	1,2,3,6,7,8-HxCDD	2.8
	1,2,3,7,8,9-HxCDD	2.8
	Total HxCDD	2.8
	Total PeCDF	2.8
	1,2,3,4,7,8-HxCDF	2.8
	Total HxCDF	2.8
	1,2,3,4,6,7,8-HpCDF	2.8
	Total HpCDF	2.8
M120-30	2,3,7,8-TCDF	0.56
	Total TCDF	0.56
	Total PeCDD	2.8
	Total PeCDF	2.8
	OCDD	5.6

The laboratory included some peaks in the total homolog concentrations which did not meet ion abundance ratios [*i.e.* Estimated Maximum Possible Concentrations (EMPCs)]. The dioxin and furan NFGs state that "If ion abundance criteria are not satisfied, qualify the detects as unusable "R" and use professional judgment to qualify non-detects." It also states that "professional judgment should be used in determining the proper identification of analytes". Rather than deem the results as unusable "R", the validator took a conservative approach and using professional judgment included these EMPC results since the method allows for compounds that do not meet ion abundance ratios to be reported as EMPCs. For the total homolog concentrations, these EMPCs consisted of non-2,3,7,8-substituted PCDDs and/or PCDFs. Professional judgment was used to qualify as estimated (J) the total homolog results for which the EMPC concentration accounted for >10% of the total concentration (see table below).

Sample ID	Compound	Percentage of Total Result
M120-0.5	Total TCDF	31
	Total PeCDF	14

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date:	August 25, 2006 Revised October 5, 2006	
To:	Dave Gerry/Camarillo	
From:	Vinora Nicholls/Westford	
Subject:	Data Validation, DRO Analyses Henderson Upgradient Investigation Tronox LLC Henderson, Nevada EMAX SDG 06C071	
Distribution:	Robert Kennedy/Westford	04020-023-152 TH018DRO.rev

SUMMARY

Full validation was performed on the data for six soil samples analyzed for diesel range organics (DRO) and oil range organics (ORO) by SW-846 method 3550B/8015B. The samples were collected at the Tronox facility in Henderson Nevada on March 7, 2006 and submitted to EMAX Laboratories (EMAX), Inc. in Torrance, California for analysis. EMAX analyzed the samples and reported the results under sample delivery group (SDG) 06C071.

The analytical data were evaluated according to the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (10/99), the Region 9 Superfund Data Evaluation/Validation Guidance, NDEP Guidance on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodology.

In general, the data are valid as reported and may be used for decision making purposes. No data were rejected or qualified as a result of data validation.

SAMPLES

The samples included in this review are listed below:

Sample IDs	Sample IDs
M120-30	M120-0.5
M120-50	M120-5
M120-80	M120-10

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

Sample data were reviewed for the following parameters, where applicable to the method:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Initial and continuing calibrations
- Method blanks/equipment blanks
- Surrogate spike recoveries
- Laboratory control sample (LCS) results
- Matrix spike/matrix spike duplicate (MS/MSD) results
- Field duplicate results
- Compound quantitation
- Quantitation limits and sample results

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. No discrepancies were found

Holding Times and Sample Preservation

The samples were extracted and analyzed within the method specified holding times.

The cooler temperatures upon receipt at the laboratory were 3.2^{o}C and 2.6 ^{o}C, which were within the acceptable range of 4$\pm$ 2^{o}C.

Initial and Continuing Calibrations

The percent relative standard deviations (%RSDs) of all target compounds were within the QC acceptance criteria for the initial calibrations associated with the sample analyses. The percent differences (%Ds) of all target compounds were within the QC acceptance criteria for the continuing calibrations associated with the sample analyses.

The laboratory used hexacosane instead of n-Octacosane for the surrogate. No validation action is required.

Method Blanks/Equipment Blank

No target compounds were detected in the method blank. There were no equipment blanks (EB) or field blanks (FB) reported with the samples in this data package. The associated equipment blanks EB-1 and EB-2 were reported under SDGs 06C096 and 06C127, respectively. No target analytes were detected in these equipment blanks.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Surrogate Spike Recoveries

Surrogate recoveries were within the QC acceptance criteria in all sample analyses.

LCS Results

The percent recoveries (%Rs) and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria for the LCS and LCSD.

MS/MSD Results

MS/MSD analyses were performed on sample M120-50. The %Rs and RPDs of all reported spiked compounds were within QC acceptance criteria.

Field Duplicate Results

Field duplicate samples were not submitted with this sample set. No validation action is required.

Compound Quantitation

The recommended compounds (C_{10} and C_{28}) were used to establish the lower and upper retention time range for DRO and the recommended compounds (C28 and C38) were used to establish lower and upper retention time range for ORO (oil range organics). All peaks contributing to the reported results were within the calculated range.

Quantitation Limits and Sample Results

Calculations were checked. No discrepancies were noted.

No dilution was required for the samples in this data set; therefore the sample quantitation limits (SQL) were unaffected and met the target quantitation limit.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date: August 25, 2006 Revised October 5, 2006

To: Dave Gerry/Camarillo

From: Vinora Nicholls/Westford

Subject: Data Validation, Ethylene Glycol Analyses
Henderson Upgradient Investigation
Tronox LLC Henderson, Nevada
EMAX SDG 06C071

Distribution: Robert Kennedy/Westford

04020-023-152

TH018EG.rev

SUMMARY

Full validation was performed on the data for six soil samples analyzed for ethylene glycol by SW-846 method 8015B. The samples were collected at the Tronox facility in Henderson Nevada on March 7, 2006 and submitted to EMAX Laboratories (EMAX), Inc. in Torrance, California for analysis. EMAX analyzed the samples and reported the results under sample delivery group (SDG) 06C071.

The analytical data were evaluated according to the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (10/99), the Region 9 Superfund Data Evaluation/Validation Guidance, NDEP Guidance on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodology.

In general, the data are valid as reported and may be used for decision making purposes. No data were rejected or qualified as a result of data validation.

SAMPLES

The samples included in this review are listed below:

Sample IDs	Sample IDs
M120-30	M120-0.5
M120-50	M120-5
M120-80	M120-10

REVIEW ELEMENTS

Sample data were reviewed for the following parameters, where applicable to the method:

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Initial and continuing calibrations
- Method blanks/equipment blanks
- Surrogate spike recoveries
- Laboratory control sample (LCS) results
- Matrix spike/matrix spike duplicate (MS/MSD) results
- Field duplicate results
- Compound quantitation
- Quantitation limits and sample results

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. No discrepancies were found.

Holding Times and Sample Preservation

The samples were extracted and analyzed within the method specified holding times.

The cooler temperatures upon receipt at the laboratory were 3.2^{o}C and 2.6 ^{o}C, which were within the acceptable range of 4$\pm$ 2^{o}C.

Initial and Continuing Calibrations

The percent relative standard deviation (%RSD) of ethylene glycol (24.6%) fell outside QC acceptance criteria for the initial calibrations associated with the sample analyses. Quantitation was performed using a linear regression which met the QC acceptance criteria for correlation coefficient. The percent differences (%Ds) of all target compounds were within the QC acceptance criteria for the continuing calibrations associated with the sample analyses.

Method Blanks/Equipment Blank

No target compounds were detected in the method blank. There were no trip blanks (TB), equipment blanks (EB), or field blanks (FB) reported with the project samples in this data package. The associated equipment blanks, EB-1 and EB-2, are in SDG 06C096 and 06C127, respectively. No target compounds were detected in the associated equipment blanks.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Surrogate Spike Recoveries

Surrogate spikes were not performed because the EPA method and the laboratory SOP do not require surrogates for direct injection analysis. No validation action was taken on this basis.

LCS Results

The percent recoveries (%Rs) and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria for the LCS and LCSD.

MS/MSD Results

MS/MSD analyses were performed on sample M120-50. The %Rs and RPDs of all reported spiked compounds were within QC acceptance criteria.

Field Duplicate Results

Field duplicate samples were not submitted with this sample set. No validation action was required.

Compound Quantitation

Retention times were defined during calibration. Retention times fell within acceptance criteria for all associated QC samples.

Quantitation Limits and Sample Results

Calculations were checked. No discrepancies were noted.

No dilutions were required for the samples in this data set; therefore the sample quantitation limits (SQLs) were unaffected and met target quantitation limits.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date: August 25, 2006 Revised October 5, 2006

To: Dave Gerry/Camarillo

From: Vinora Nicholls/Westford

Subject: Data Validation, Alcohols Analyses
Henderson Upgradient Investigation
Tronox LLC Henderson, Nevada
EMAX SDG 06C071

Distribution: Robert Kennedy/Westford

04020-023-152

TH018FA.rev

SUMMARY

Full validation was performed on the data for six soil samples analyzed for methanol and ethanol by SW-846 method 8015B. The samples were collected at the Tronox facility in Henderson Nevada on March 7, 2006 and submitted to EMAX Laboratories (EMAX), Inc. in Torrance, California for analysis. EMAX analyzed the samples and reported the results under sample delivery group (SDG) 06C071.

The analytical data were evaluated according to the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (10/99), the Region 9 Superfund Data Evaluation/Validation Guidance, NDEP Guidance on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodology.

In general, the data appear to be valid as reported and may be used for decision making purposes. Some surface soil results for methanol were rejected (R) because the detections appear to be false positives due to cross-contamination during shipping. Methanol was not detected in the resampled and reanalyzed surface soils in SDG06C238. The subsurface soil methanol results were qualified as probable false positives (Z) due to the same cross-contamination during shipping (see discussion below).

SAMPLES

The samples included in this review are listed below:

Sample IDs	Sample IDs
M120-30	M120-0.5
M120-50	M120-5
M120-80	M120-10

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

Sample data were reviewed for the following parameters, where applicable to the method:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Initial and continuing calibrations
- Method blanks/equipment blanks
- Surrogate spike recoveries
- Laboratory control sample (LCS) results
- Matrix spike/matrix spike duplicate (MS/MSD) results
- Field duplicate results
- Compound quantitation
- Quantitation limits and sample results

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. No discrepancies were found.

Holding Times and Sample Preservation

The samples were extracted and analyzed within the method specified holding times.

The cooler temperatures upon receipt at the laboratory were 3.2^{o}C and 2.6 ^{o}C, which were within the acceptable range of 4$\pm$ 2^{o}C.

Initial and Continuing Calibrations

The percent relative standard deviations (%RSDs) of all target compounds were within the QC acceptance criteria for the initial calibrations associated with the sample analyses. The percent differences (%Ds) of all target compounds were within the QC acceptance criteria for the continuing calibrations associated with the sample analyses.

Method Blanks/Equipment Blank

No target compounds were detected in the method blank. There were no trip blanks (TB), equipment blanks (EB), or field blanks (FB) reported with the samples in this data package. The associated equipment blanks, EB-1 and EB-2, were reported under SDGs 06C096 and 06C127, respectively. No target compounds were detected in the associated equipment blanks.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Surrogate Spike Recoveries

Surrogate spikes were not performed because the EPA method and the laboratory SOP do not require surrogates for direct injection analysis. No validation action was taken on this basis.

LCS Results

The percent recoveries (%Rs) and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria for the LCS and LCSD.

MS/MSD Results

MS/MSD analyses were performed on sample M120-50. The %Rs and RPDs of all reported spiked compounds were within QC acceptance criteria.

Field Duplicate Results

Field duplicate samples were not submitted with this sample set. No validation action is required.

Compound Quantitation

Retention times were defined during calibration. Retention times fell within acceptance criteria for all samples.

Quantitation Limits and Sample Results

Calculations were checked. There were no discrepancies noted.

No dilutions were required for the samples in this data set; therefore the sample quantitation limits (SQLs) were unaffected and met the target quantitation limit.

All subsurface soil methanol results (samples M120-80, and M120-10) were qualified as probable false positives (Z) due to suspected methanol cross contamination from methanol preserved VOC vials. Soil samples for methanol analysis were collected in capped sleeves and stored in the same ziplock bags as the methanol containing VOC vials during shipping.

Surface soil methanol result (sample M120-0.5) was rejected (R) as false positive due to methanol cross-contamination as described above. Resampling and reanalysis of this surface soil sample in SDG 06C238 confirmed that methanol was not detectable when the sample was shipped without methanol containing vials in the same cooler.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date: August 25, 2006 Revised October 9, 2006

To: Dave Gerry/Camarillo

From: Vinora Nicholls/Westford

Subject: Data Validation, GRO Analyses
Henderson Upgradient Investigation
Tronox LLC Henderson, Nevada
EMAX SDG 06C071

Distribution: Robert Kennedy/Westford

04020-023-152

TH018gro.rev.doc

SUMMARY

Full validation was performed on the data for six soil samples analyzed for gasoline range organics (GRO) by SW-846 methods 5035/8015B. The samples were collected at the Tronox LLC site in Henderson, Nevada on March 7, 2006 and submitted to EMAX Laboratories (EMAX), Inc in Torrance, California for analysis. EMAX processed the samples and reported the results under sample delivery group (SDG) 06C071.

The analytical data were evaluated according to the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (10/99), the Region 9 Superfund Data Evaluation/Validation Guidance, NDEP Guidance on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodology.

In general, the data are valid as reported and may be used for decision making purposes. No data were rejected or qualified based on data validation.

SAMPLES

The samples included in this review are listed below:

Sample IDs	Sample IDs
M120-30	M120-0.5
M120-50	M120-5
M120-80	M120-10

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

Sample data were reviewed for the following parameters, where applicable:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Initial and continuing calibrations
- Method blanks/equipment blanks
- Surrogate spike recoveries
- Laboratory control sample (LCS) results
- Matrix spike/matrix spike duplicate (MS/MSD) results
- Field duplicate results
- Compound quantitation
- Quantitation limits and sample results

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. No discrepancies were found.

Holding Times and Sample Preservation

The samples were analyzed within the method specified holding time.

The cooler temperatures upon receipt at the laboratory were 3.2^{o}C and 2.6 ^{o}C, which were within the acceptance criterion of 4$\pm$ 2^{o}C.

Initial and Continuing Calibrations

The percent relative standard deviations (%RSDs) of all target compounds were within the QC acceptance criteria for the initial calibrations associated with the sample analyses. The percent differences (%Ds) of all target compounds were within the QC acceptance criteria for the continuing calibrations associated with the sample analyses.

The laboratory used 1,1,1-trifluorotoluene(1,1,1-TFT) as a surrogate; however results for 1,1,1-TFT were not reported on the sample results data sheet. Data validation actions are not required for this surrogate nonconformance.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Method Blanks/Equipment Blank

GRO was not detected in the method blank. There were no trip blanks (TBs), equipment blanks (EBs), or field blanks (FBs) reported with the samples in this data package. The associated equipment blanks, EB-1 and EB-2, were reported in SDGs 06C096 and 06C127, respectively. GRO was not detected in the associated equipment blanks.

Surrogate Spike Recoveries

Surrogate recoveries were within the QC acceptance criteria in all sample analyses.

LCS Results

The percent recoveries (%Rs) and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria for the LCS and LCSD.

MS/MSD Results

MS/MSD analyses were performed on sample M120-50. The %Rs and RPDs of all reported spiked compounds were within QC acceptance criteria.

Field Duplicate Results

Field duplicate samples were not submitted with this sample set. No validation was taken on this basis.

Compound Quantitation

The recommended compounds n-hexane and n-decane were used to establish the GRO lower and upper retention time range, respectively. All peaks contributing to the reported results were within the calibrated range.

Quantitation Limits and Sample Results

Calculations were checked. There were no discrepancies noted.

All samples except M120-50 were analyzed at minor dilutions due to the sample preparation requirement. Sample results and sample quantitation limits were adjusted accordingly. The project-required reporting limits were not exceeded for any sample in this data set.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date:	August 15, 2006 Revised October 6, 2006
To:	David Gerry/Camarillo
From:	Linda Sulkowski/Westford
Subject:	Data Validation, Metals Analysis Henderson Upgradient Investigation Tronox LLC Henderson, Nevada EMAX SDG 06C071
Distribution:	R. Kennedy/Westford

04020-023-152
TH018inolms.rev

SUMMARY

Full validation was performed on the data for ten soil samples analyzed for a project-specific list of metals by SW-846 methods 6020A and 7471A. The samples were collected at the Tronox LLC site in Henderson, Nevada on March 7, 2006 and were submitted to EMAX Laboratories (EMAX) in Torrance, CA for analysis. EMAX processed the samples and reported the results under sample delivery group (SDG) 06C071.

The analytical data were evaluated with reference 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 on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodologies.

In general, the data are valid as reported and may be used for decision making purposes. No data were rejected. Selected results were qualified as estimated due to nonconformance of certain QC criteria (see discussion below).

SAMPLES

The samples included in this review are listed below.

Sample IDs	
M120-30	M120-40
M120-40D (field duplicate of M120-40)	M120-50
M120-60	M120-80
M120-0.5	M120-5
M120-10	M120-20

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

Sample data were reviewed for the following parameters, where applicable to the method:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Inductively coupled plasma/mass spectrometry (ICP/MS) tuning
- Initial and continuing calibrations
- Interference check sample results
- Method blanks/equipment blanks
- Laboratory control sample (LCS)/laboratory control sample duplicate (LCSD) results
- Matrix spike/matrix spike duplicate (MS/MSD) results
- Internal standard performance (6020 only)
- Field duplicate results
- ICP serial dilution results
- Quantitation limits and sample results

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. No discrepancies were found.

Holding Times and Sample Preservation

The samples were digested and analyzed within the method specified holding times.

The cooler temperatures upon receipt at EMAX were within the acceptance criteria of 4 ± 2°C.

ICP/MS Tuning

A tuning solution (daily performance check) containing elements representing all of the mass regions of interest was analyzed at the beginning of each analytical sequence. The percent relative standard deviations (%RSDs) for elements in the tuning solution met the QC acceptance criteria of <5%.

Initial and Continuing Calibrations

All criteria were met for the calibration curves, and the initial and continuing calibration verification (ICV/CCV) standards.

Interference Check Sample Results

All criteria were met for the analyses of the ICS AB solution. Several analytes (cadmium, copper, iron, and manganese) were detected in the ICS A solution that should not have been present. Cadmium,

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

copper, and manganese were detected as positive interferences in the ICS A solution bracketing the soil samples. Iron was detected as a positive interference in the ICS A solution(s) associated with soil samples M120-30, M120-40D, M120-80, M120-0.5, M120-10, and M120-20. Calcium was detected as a positive interference in the ICS A solution associated with soil sample M120-60. The presence of ICS A interferences indicate that false positives may exist for these analytes in the associated samples. Estimated interferences were calculated for these analytes in samples where the concentration of an interfering element (calcium and/or iron) was greater than that found in the ICS A solution.

These estimated interferences were used to qualify sample result as follows:

For positive interference:

- If an element was detected at $\geq$ MDL and sample concentrations of the interferents (aluminum, calcium, iron, and magnesium) were $\geq$ than those interferents found in the ICS A, detected results were qualified as estimated, biased high (J+) and nondetected results were accepted unqualified.

Method Blanks/Equipment Blanks

Chromium, iron, and strontium were detected in the laboratory preparation blank at concentrations > the method detection limit (MDL), but < the sample quantitation limit (SQL). Calcium was detected in the laboratory preparation blank at a concentration > the SQL. Aluminum, copper, iron, manganese, and/or zinc were detected in the equipment blank samples EB-1 and EB-2, which were reported in SDGs 16C096 and 06C127, respectively. Target analytes were not detected in the bracketing continuing calibration blanks (CCBs) associated with the soil samples. The presence of blank contamination indicated that false positive results may have existed for these analytes in the associated samples. The following tables summarize the highest level of blank contamination and the associated samples.

Type of Blank	Analyte	Maximum Blank Concentration* (mg/Kg)
Preparation Blank	Calcium	38.4
	Chromium	0.165 J
	Iron	9.23 J
	Strontium	0.25 J
Associated samples: All soil samples in this data set. *Adjusted for sample preparation factors and moisture content.		

Type of Blank	Analyte	Maximum Blank Concentration* (µg/L)
Equipment Blank EB-1	Aluminum	41
	Copper	4.4
Equipment Blank EB-2	Iron	0.48 J
	Manganese	8.4
	Zinc	17
Associated samples: All soil samples in this data set. *Adjusted for sample preparation factors and moisture content.		

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Sample results were qualified as follows:

For blank results >the SQL:

- Positive sample results ≥ MDL, but ≤ SQL were qualified as nondetect (U) at the SQL.
- Positive sample results > SQL, but < 10x the blank result were qualified as estimated, biased high (J+).
- Positive sample results that were ≥ 10x the blank result were accepted unqualified.

For blank results ≥ MDL, but ≤ SQL:

- Nondetect results were accepted unqualified.
- Positive sample results ≥ MDL, but ≤ SQL were qualified as nondetect (U) at the SQL.
- Positive sample results > SQL and < the Action Level (AL) of 5x the blank contamination level were qualified as undetected (U) at the reported concentration.

LCS/LCSD Results

The %Rs and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria for the LCS and LCSD.

MS/MSD Results

MS/MSD analyses were performed on sample M120-50 from this sample set. The following table summarizes the %Rs and RPDs of the spiked target analytes that fell outside the QC acceptance criteria.

Analyte	MS/MSD%Rs	RPD	QC Acceptance Range %R (RPD)	Actions (Detects/Nondetects)
Antimony	35/38	ok	75-125% (20)	J-/UJ
Tungsten	62/67	ok	75-125% (20)	J-/UJ
Samples Affected: All samples.				

A post digestion spike analysis for all analytes was subsequently performed on sample M120-50. The %Rs met the QC acceptance criteria.

Internal Standard Performance

The internal standard performance was within the QC acceptance criteria in all sample analyses.

Field Duplicate Results

Samples M120-40 and M120-40D were submitted as the field duplicate pair with this sample set. The following table summarizes the RPDs of the detected analytes in field duplicate samples M120-40 and M120-40D. The RPD for calcium exceeded the QC acceptance criteria. Positive and nondetected results for calcium were qualified as estimated (J/UJ). The remaining RPDs were within the QC acceptance criteria.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Analyte	M120-40 (mg/Kg)	M120-40D (mg/Kg)	RPD
Aluminum	10300	13000	23
Arsenic	9.91	15.6	45
Barium	153	166	8
Beryllium	0.642	0.793	21
Cadmium	0.431	0.696	47
Calcium	31400	109000	111
Chromium	11.7	14.7	23
Cobalt	7.27	7.42	2
Copper	23.3	21.7	7
Iron	10100	11500	13
Lead	5.99	7.11	17
Magnesium	10900	15300	34
Manganese	216	288	29
Molybdenum	0.193	0.251	26
Nickel	15.7	18.3	15
Potassium	2460	3350	31
Selenium	0.164	0.164	0
Sodium	599	634	6
Strontium	269	358	28
Thallium	0.141	0.138	2
Titanium	553	528	5
Uranium	2.04	2.7	28
Vanadium	31.9	34.3	7
Zinc	32.4	38.9	18

ICP Serial Dilution Results

Serial dilution analyses were performed on sample M120-50. The percent differences (%Ds) of all analytes were within the QC acceptance criteria.

Quantitation Limits and Sample Results

Dilutions were not performed on samples in this data set; therefore, the SQLs for these samples were not affected.

It should be noted that the laboratory reported results between the MDL and the SQL as estimated (J).

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date: August 2, 2006 Revised September 5, 2006

To: Dave Gerry/Camarillo

From: Paula DiMattei/Westford

Subject: Data Validation, OC Pesticide, OP Pesticide, and PCB Analyses
Tronox Henderson Upgradient
Henderson, NV
EMAX SDG 06C071

Distribution: R. Kennedy/Westford 04020-023-152 File

TH018.ocp.opp.pcbpld.rev

SUMMARY

Full validation was performed on the data for three soil samples for organochlorine (OC) pesticides by SW-846 method 8081A, for organophosphorus (OP) pesticides by SW-846 method 8141A, and for polychlorinated biphenyls (PCBs) by SW-846 method 8082. The samples were collected at the Tronox LLC (Tronox) facility, formerly Kerr-McGee Chemical LLC site in Henderson, NV on March 7, 2006 and were submitted to EMAX Laboratories, Inc. (EMAX) in Torrance, CA for analysis. EMAX processed the samples and reported the results under sample delivery group (SDG) 06C071.

The analytical data were evaluated with reference to the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (10/99),), the Region 9 Superfund Data Evaluation/Validation Guidance, NDEP Guidance on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The National Functional Guidelines were modified to accommodate the non-CLP methodologies.

In general, the data are valid as reported and may be used for decision making purposes. No data were rejected. Selected data points were qualified due to nonconformances with respect to certain QC criteria (see discussion below).

SAMPLES

The samples included in this review are listed below:

Sample IDs
M120-30
M120-0.5
M120-10

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

Sample data were reviewed for the following parameters, where applicable to the method:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Initial and continuing calibrations
- Pesticide instrument performance (OC Pesticides only)
- Method blanks/equipment blanks
- Surrogate spike recoveries
- Laboratory control sample (LCS) results
- Matrix spike/matrix spike duplicate (MS/MSD) results
- Field duplicate results
- Quantitation limits and sample results

DISCUSSION

Agreement of Analyses Conducted with COC Requests

OC Pesticides/OP Pesticides/PCBs

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. No discrepancies were found.

Holding Times and Sample Preservation

OC Pesticides/OP Pesticides/PCBs

The cooler temperatures upon sample receipt were within the acceptance criteria of 4± 2°C.

The samples were extracted and analyzed within the method specified holding times.

Initial and Continuing Calibrations

OC Pesticides

The percent relative standard deviations (%RSDs) of all target compounds were within the QC acceptance criteria for the initial calibrations associated with the sample analyses. The percent differences (%Ds) of all target compounds were within the QC acceptance criteria for the continuing calibrations associated with the sample analyses with the following exceptions.

Calibration (column)	Compound	%D
CC 3/16/06 21:27 (RTX-CLPEST)	Endrin	20

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Calibration (column)	Compound	%D
Associated samples: All soil samples		
CC 3/16/06 21:27 (RTX-CLPESTII)	Endrin	29
	Methoxychlor	16
Associated samples: All soil samples		
CC 3/17/06 (RTX-CLPESTII)	Endrin	24
Associated samples: All soil samples		

Endrin and methoxychlor were not detected in the associated soil samples and all %D criteria exceeded QC criteria as a result of high recoveries in the continuing calibrations. Therefore, no data validation actions were required on this basis.

OP Pesticides

The percent relative standard deviations (%RSDs) of all target compounds were within the QC acceptance criteria for the initial calibrations associated with the sample analyses. The %Ds of all target compounds were within the QC acceptance criteria for the continuing calibrations associated with the sample analyses with the following exceptions.

Calibration (column)	Compound	%D
CC 3/17/06 (RTX-OPPESTICIDES)	Ethoprop	18
Associated samples: All soil samples		
CC 3/18/06 (RTX-OPPESTICIDES)	Dichlorvos	36
	Ethoprop	21
	Naled	-63
	Disulfoton	19
	Dimethoate	18
	Methyl parathion	17
	Bolstar	19
	Fensulfothion	17
	EPN	16
	Azinphos-methyl	21
	Coumaphos	18
Associated samples: All soil samples		

The nondetect naled results in all samples were qualified as estimated (UJ) as a result of the low recovery of this compound in the associated continuing calibration. Ethoprop, dichlorvos, disulfoton, dimethoate, methyl parathion, bolstar, fensulfothion, EPN, azinphos-methyl, and coumaphos were not detected in the associated soil samples and all %D criteria exceeded QC criteria as a result of high recoveries in the continuing calibrations. Therefore, no data validation actions were required on this basis.

PCBs

The percent relative standard deviations (%RSDs) of all target compounds were within the QC acceptance criteria for the initial calibrations associated with the sample analyses. The %Ds of all

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

target compounds were within the QC acceptance criteria for the continuing calibrations associated with the sample analyses.

Pesticide Instrument Performance (OC Pesticides only)

All instrument performance standards were analyzed at the proper frequency and the percent (%) breakdown of 4,4'-DDT and endrin met the QC acceptance criteria.

Method Blanks/Equipment Blank

OC Pesticides/OP Pesticides/PCBs

Target compounds were not detected in the laboratory method blanks associated with the samples in this data set.

Surrogate Spike Recoveries

OC Pesticides/OP Pesticides/PCBs

Surrogate recoveries (%Rs) were within the QC acceptance criteria in all sample analyses.

LCS Results

OC Pesticides/PCBs

The %Rs of all spiked compounds were within the QC acceptance criteria for the LCS analyses.

OP Pesticides

The %Rs and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria for the LCS and LCSD analyses with the following exception.

Compound	RPD	QC Limit	Action (Detects/Nondetects)
Dimethoate	147	50	J/UJ
Associated samples: All soil samples			

Dimethoate was not detected in all associated soil samples; therefore, these results were qualified as estimated (UJ).

MS/MSD Results

OC Pesticides/OP Pesticides/PCBs

MS/MSD analyses were performed on sample M120-30. The %Rs and RPDs of all reported spiked compounds were within QC acceptance criteria.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Field Duplicate Results

OC Pesticides/OP Pesticides/PCBs

A field duplicate pair was not submitted for this data set. No data validation actions were taken on this basis.

Quantitation Limits and Sample Results

OC Pesticides/OP Pesticides/PCBs

Calculations were spot-checked. There were no discrepancies noted.

Dilutions were not performed on samples in this data set. Sample quantitation limits (SQLs) for these samples were therefore not affected.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date: August 10, 2006 Revised September 5, 2006

To: Dave Gerry/Camarillo

From: Robert Kennedy/Westford

Subject: Data Validation, SVOC Analysis
Henderson Upgradient Investigation
Tronox LLC Henderson, NV
Emax SDG 06C071

Distribution: D. Simmons/Westford 04020-023-152

TH018svocrkk.rev

SUMMARY

Full validation was performed on the data for three soil samples analyzed for modified Target Compound List (TCL) semivolatile organic compounds (SVOCs) by SW-846 method 8270C. Selected ion monitoring (SIM) analysis was performed on a selected target compound set as specified in the Work Plan Addendum. The samples were collected at the Tronox Henderson, NV site on March 7, 2006 and were submitted to EMAX Laboratories in Torrance, CA for analysis. EMAX processed the samples and reported the results under sample delivery group (SDG) 06C071.

The analytical data were evaluated according to the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (10/99), the Region 9 Superfund Data Evaluation/Validation Guidance, NDEP Guidance on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodology

In general, the data are valid as reported and may be used for decision making purposes. No data were rejected or qualified as estimated due to nonconformances of QC criteria (see discussion below).

SAMPLES

The samples included in this review are listed below.

Sample IDs
M120-30
M120-0.5
M120-10

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

Sample data were reviewed for the following parameters:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times/sample preservation
- Gas chromatography/mass spectrometry (GC/MS) tuning
- Initial calibrations and continuing calibration verifications
- Laboratory blanks/equipment blanks/field blanks
- Surrogate spike recoveries
- Matrix spike (MS)/matrix spike duplicate (MSD) results
- Laboratory control sample (LCS)/laboratory control sample duplicate (LCSD) results
- Field duplicate results
- Internal standard performance
- Sample quantitation/detection limit results

DISCUSSION

Agreement of Analyses Conducted With COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. No discrepancies were found.

Holding Times/Sample Preservation

The cooler temperatures of all coolers upon receipt at EMAX were within the acceptance criteria of 4±2°C.

All samples were extracted and analyzed within the method specified holding times.

GC/MS Tuning

The frequency and abundance of the decafluorotriphenylphosphine (DFTPP) tuning results were within the QC acceptance criteria. All samples were analyzed within 12 hours from the DFTPP tuning.

Initial Calibrations and Continuing Calibration Verifications

The percent relative standard deviations (%RSDs), the percent differences (%Ds), and the relative response factors (RRFs) were all within the QC acceptance criteria in the initial and continuing calibrations.

Laboratory Blanks/Equipment Blanks/Field Blanks

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Target compounds were not detected in the laboratory method blanks. No equipment blanks associated with these soil samples were taken for SVOC analysis. No data validation actions were taken on this basis.

Surrogate Spike Recoveries

The surrogate percent recoveries (%Rs) were within the QC acceptance criteria in all sample analyses.

MS/MSD Results

MS/MSD analyses were performed on sample M120-30. All %Rs and relative percent differences (RPDs) were within the QC acceptance criteria.

LCS/LCSD Results

The %R and RPDs of all spiked compounds were within the QC acceptance criteria for the LCS and LCSD analyses.

Field Duplicate Results

No field duplicate samples were provided with this data set. No data validation actions were taken on this basis.

Internal Standard Performance

Internal standard performance met the QC acceptance criteria in all sample analyses.

Sample Quantitation/Detection Limit Results

Dilutions were not performed on samples in this data set. Sample quantitation limits (SQLs) for these samples were therefore not affected.

Calculations were spot-checked. There were no discrepancies noted.

It was noted that the SVOC analyte reporting limits (RL) are not based on the low point of calibration but rather the *second* lowest calibration point and the MDLs reported are not statistically determined but appear to be consistently ½ of the RL. No validation action was taken on this basis.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date: August 16, 2006 Revised October 9, 2006

To: Dave Gerry/Camarillo

From: Linda Sulkowski/Westford

Subject: Data Validation, VOC Analysis
Henderson Upgradient Investigation
Tronox LLC Henderson, Nevada
EMAX SDG 06C071

Distribution: R. Kennedy/Westford

04020-023-152 File

TH018voclms.rev.doc

SUMMARY

Full validation was performed on the data for six soil samples analyzed for a project-specific list of volatile organic compounds (VOCs) by SW-846 methods 5035/8260B. The samples were collected at the Tronox LLC site in Henderson, Nevada on March 7, 2006 and were submitted to EMAX Laboratories (EMAX) in Torrance, CA for analysis. EMAX processed the samples and reported the results under sample delivery group (SDG) 06C071.

The analytical data were evaluated with reference to the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (10/99), the Region 9 Superfund Data Evaluation/Validation Guidance, NDEP Guidance on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodology.

In general, the data are valid as reported and may be used for decision making purposes. Results for tert-butyl alcohol were rejected in all samples since the minimum response factor (RF) criterion was not met. No other qualification of the data was required.

SAMPLES

The samples included in this review are listed below:

Sample IDs	Sample IDs
M120-30	M120-50
M120-80	M120-0.5
M120-5	M120-10

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

Sample data were reviewed for the following parameters, where applicable:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Gas chromatography/mass spectrometry (GC/MS) tuning
- Initial and continuing calibrations
- Method blanks/equipment blanks/trip blanks
- Surrogate spike recoveries
- Laboratory control sample (LCS)/laboratory control sample duplicate (LCSD) results
- Matrix spike/matrix spike duplicate (MS/MSD) results
- Internal standard performance
- Field duplicate results
- Quantitation limits and sample results

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. No discrepancies were found.

Holding Times and Sample Preservation

The samples were analyzed within the method specified holding time.

The cooler temperatures upon receipt at EMAX were within the acceptance criterion of 4±2°C.

GC/MS Tuning

The frequency and abundance of all bromofluorobenzene (BFB) tuning results were within the QC acceptance criteria. The samples were analyzed within the method specified tuning intervals.

Initial and Continuing Calibrations

The percent relative standard deviations (%RSDs), the correlation coefficients, and/or the RFs of all target compounds were within the QC acceptance criteria for the initial calibration associated with the sample analyses with the following exception. Actions were applied as indicated below.

Compound	RF	Action (Detects/Nondetects)
Tert-butyl alcohol	0.027	J/R
Associated Samples:	All samples	

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

The percent differences (%Ds) of all target compounds were within the QC acceptance criteria for the continuing calibration associated with the sample analyses.

Method Blanks/Equipment Blanks/Trip Blanks

Trip blanks were not submitted with this sample set. No validation action was taken on this basis.

Target compounds were not detected in the laboratory method blanks associated with the samples in this data set.

Equipment blank samples EB-1 (reported in SDG 06C096) and EB-2 (reported in SDG 06C127) were associated with selected soil samples in this data set. Acetone was detected in EB-1 and EB-2 at 6.3 and 9.9 μg/L, respectively. The presence of blank contamination indicates that false positives may exist for this compound in the associated samples. An Action Level (AL) was established for the highest reported concentration of acetone at 10x the concentration detected. The following table summarizes the AL and the associated samples.

Blank Type	Compound	Concentration (μg/L)	AL (μg/Kg)	Associated Samples
EB-2 (equipment blank)	Acetone	9.9 J	99	M120-0.5, M120-10, M120-30, M120-50, M120-80

Sample results were qualified as follows:

- If the sample result was ≤ AL and ≤ the sample quantitation limit (SQL), the result was qualified as nondetect (U) at the SQL.
- If the sample result was ≤ AL and > SQL, the result was qualified as nondetect (U) at the reported concentration.
- If the sample result was > AL, the result was not qualified.

Surrogate Spike Recoveries

Surrogate percent recoveries (%Rs) were within the QC acceptance criteria in all sample analyses.

LCS/LCSD Results

The %Rs and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria for the LCS and LCSD.

MS/MSD Results

MS/MSD analyses were performed on sample M120-50 from this sample set. The %R of 1,2,4-trichlorobenzene (132%) exceeded the QC acceptance criteria in the MS analysis. 1,2,4-Trichlorobenzene was not detected in the unspiked sample. Qualification of the data was therefore not required.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Internal Standard Performance

The internal standard performance was within the QC acceptance criteria in all sample analyses.

Field Duplicate Results

Field duplicate samples were not submitted with this sample set. No validation action was taken on this basis.

Quantitation Limits and Sample Results

Calculations were spot-checked. There were no discrepancies noted.

Dilutions were not performed on samples in this data set. Sample quantitation limits (SQLs) for these samples were therefore not affected.

It should be noted that the laboratory reported 2-butanone, 4-methyl-2-pentanone, and 2-hexanone with SQLs of 10 µg/kg each, instead of the QAPP stipulated SQLs of 5 µg/kg for all soil samples. No data validation action was taken other than this notation.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date:	August 11, 2006 Revised October 9, 2006	
To:	David Gerry/Camarillo	
From:	Sheena Blair/Westford	
Subject:	Data Validation, Inorganic Analysis Henderson Upgradient Investigation Tronox LLC Henderson, Nevada EMAX SDG 06C071	
Distribution:	R. Kennedy/Westford	04020-023-152 TH018wc.sb.rev

SUMMARY

Full validation was performed on the data for 10 soil samples analyzed for all or a subset of the following parameters:

- Bromide by SW-846 method 9056
- Chloride by SW-846 method 9056
- Fluoride by SW-846 method 9056
- Nitrate as nitrogen by SW-846 method 9056
- Nitrite as nitrogen by SW-846 method 9056
- Sulfate by SW-846 method 9056
- Orthophosphate by SW-846 method 9056
- Total cyanide by SW-846 method 9014
- pH by SW-846 method 9045C
- Hexavalent chromium by SW-846 method 7199
- Chlorate by EPA 300.0 modified
- Perchlorate by EPA 314.0
- Ammonia as nitrogen by EPA 350.2
- Total alkalinity by EPA 310.1
- Bicarbonate alkalinity by EPA 310.1 (calculated from total and carbonate alkalinity)
- Carbonate alkalinity by EPA 310.1
- Total phosphorous by EPA 365.2
- Silica by EPA 370.1
- Sulfide by EPA 376.2
- Sulfite by EPA 377.1
- MBAS by EPA 425.1
- Specific conductance by SM 2510B
- Residual chlorine by EPA 330.3
- Total organic carbon by the Walkley Black Method, and
- Ignitability by SW-846 method 1010

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

The samples were collected at the Henderson site in Henderson, NV on March 7, 2006 and submitted to EMAX Laboratories, Inc in Torrance, CA for analysis. EMAX processed the samples and reported the results under sample delivery group (SDG) 06C071.

The analytical data were evaluated with reference 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 on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodologies.

In general, the data are valid as reported and may be used for decision making purposes (see discussion below). No data were rejected.

SAMPLES

The samples included in this review are listed below:

Sample IDs	
M120-30	M120-50*
M120-0.5	M120-60*
M120-10	M120-80*
M120-40*	M120-5*
MW120-40D* (field duplicate of M120-40)	M120-20*
*Analyzed for perchlorate and hexavalent chromium only	

REVIEW ELEMENTS

Sample data were reviewed for the following elements, where applicable to the method:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Initial and continuing calibrations
- Laboratory blanks/equipment 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

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. The following discrepancies were found:

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

- Although the label on the container for sample M120-50 listed Wet-Chemistry parameters, the COC did not request these parameters. At ENSR's authorization, the sample was analyzed per the analytical tests listed on the COC. No validation action was required other than this notation.

- At ENSR's authorization, client specific MS/MSD analysis was added to sample M120-50 for perchlorate and hexavalent chromium.

Holding Times and Sample Preservation

All samples were analyzed within the method-specified holdings times for all parameters. The soil digestate holding time for hexavalent chromium was assumed to be 7 days. This holding time was based on the stability of Cr(VI) in digestates as mentioned in EPA Method 3060A Sec.6.4. In addition, the holding time was also based on the discussion of extended digestate stability as documented in EPA's Sample Holding Time Reevaluation (EPA/600/R-05/124, October 2005).

The cooler temperature upon receipt at EMAX was within the acceptance criteria of 4 ± 2°C.

Initial and Continuing Calibrations

All criteria were met for the calibration curves, and the initial and continuing calibration verification (ICV/CCV) standards (where applicable to the methods).

Laboratory Blanks/Equipment Blanks

No equipment blanks were associated with the samples in this data set, except for perchlorate and hexavalent chromium in soils. No validation action was taken on this basis.

Equipment blank sample EB-1 was submitted for perchlorate and hexavalent chromium, and reported under MWH Data Report number 169405R. Perchlorate and hexavalent chromium were not detected in EB-1; therefore no validation action was taken.

Equipment blank sample EB-2 was submitted for perchlorate only and reported under MWH Data Report number 169653R. Perchlorate was not detected in EB-2; therefore no validation action was taken.

Target compounds were not detected in the laboratory blanks associated with the samples in this data set.

LCS/LCSD Results

The percent recoveries (%Rs) and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria for all LCSs and LCSDs.

MS/MSD Results

The laboratory performed MS or MS/MSD on selected samples in this data set. The following table lists the samples and the analytes spiked. The %Rs and RPDs (where applicable) met the QC acceptance criteria.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Sample IDs	Analyte Spiked
M120-30 MS/MSD	Cyanide
	Silica
	Sulfide
M120-50 MS only	Hexavalent Chromium, Perchlorate
M120-30 MS only	Ammonia as Nitrogen
	Total Phosphorous
	MBAS

Batch MS or MS/MSD analyses were performed on samples from other clients for all parameters, except those in the above table. Although this practice is acceptable, the results could not be directly applied to the samples analyzed in this data package because of possible differences in the sample matrix and type. No validation action was taken on this basis.

Laboratory Duplicate Results

Laboratory duplicate analyses were only performed on the following samples and for the following analytes in this data set. The other parameters in this data set did not have associated laboratory duplicate analyses. Thus, for parameters without an associated laboratory duplicate, the LCS/LCSD and/or the MS/MSD demonstrated precision and accuracy in the laboratory (see discussions above).

The following table lists the samples and the analytes. All RPDs met the QC acceptance criteria.

Sample IDs	Analyte
All samples	Hexavalent Chromium
M120-50	Perchlorate
M120-30	Ammonia as Nitrogen
	Total Phosphorous
	Silica
	Sulfide
	Sulfite
	MBAS
	Residual Chlorine
	TOC
	Ignitability

Field Duplicate Results

Samples M120-40 and MW120-40D were submitted as the field duplicate pair for perchlorate and hexavalent chromium analyses. Perchlorate and hexavalent chromium were not detected in the field duplicate samples MW120-40 and MW120-4D; therefore, precision was deemed to be acceptable.

There was no field duplicate pair submitted or associated with the other parameters in this data set.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Quantitation Limits and Sample Results

Calculations were spot checked. There were no discrepancies noted.

No dilutions were required for the samples in this data set for all parameters analyzed; therefore, sample quantitation limits (SQLs) were not affected.

It should be noted that the laboratory reported results between the MDL and the SQL. These results were qualified as estimated (J) by the laboratory. No validation action was taken on this basis.

Selected EMAX reporting limits did not meet the limits stated in the QAPP. No validation action was taken other than this notation.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date: August 25, 2006 Revised October 5, 2006

To: Dave Gerry/Camarillo

From: Vinora Nicholls/Westford

Subject: Data Validation, DRO Analyses
Henderson Upgradient Investigation
Tronox LLC Henderson, Nevada
EMAX SDG 06C081

Distribution: Robert Kennedy/Westford

04020-023-152

TH019DRO.rev

SUMMARY

Limited validation was performed on the data for six soil samples, plus one field blank analyzed for diesel range organics (DRO) and oil range organics (ORO) by SW-846 methods 3520C/3550B/8015B. The samples were collected at the Tronox facility in Henderson Nevada on March 8, 2006 and submitted to EMAX Laboratories (EMAX), Inc. in Torrance, California for analysis. EMAX analyzed the samples and reported the results under sample delivery group (SDG) 06C081.

The analytical data were evaluated according to the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (10/99), the Region 9 Superfund Data Evaluation/Validation Guidance, NDEP Guidance on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodology.

In general, the data are valid as reported and may be used for decision making purposes. No data were rejected or qualified as a result of data validation.

SAMPLES

The samples included in this review are listed below:

Sample IDs	Sample IDs
M118-0.5	M118-50
M118-5	M118-80
M118-10	FB-1
M118-30	

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

Sample data were reviewed for the following parameters, where applicable to the method:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Initial and continuing calibrations
- Method blanks/equipment blanks
- Surrogate spike recoveries
- Laboratory control sample (LCS) results
- Matrix spike/matrix spike duplicate (MS/MSD) results
- Field duplicate results
- Compound quantitation
- Quantitation limits and sample results

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. No discrepancies were found

Holding Times and Sample Preservation

The samples were extracted and analyzed within the method specified holding times.

The cooler temperatures upon receipt at the laboratory were 2.8^{o}C and 2.5 ^{o}C, which were within the acceptable range of 4$\pm$ 2^{o}C.

Initial and Continuing Calibrations

The percent relative standard deviations (%RSDs) of all target compounds were within the QC acceptance criteria for the initial calibrations associated with the sample analyses. The percent differences (%Ds) of all target compounds were within the QC acceptance criteria for the continuing calibrations associated with the sample analyses.

The laboratory used hexacosane instead of n-Octacosane for the surrogate. No validation action is required.

Method Blanks/Equipment Blank

No target compounds were detected in the method blank and field blank. There was no trip blank (TB) or equipment blank (EB) reported with the samples in this data package. The associated equipment blanks

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

EB-1 and EB-2 were with SDGs 06C096 and 06C127, respectively. No target analytes were detected with these equipment blanks.

Surrogate Spike Recoveries

Surrogate recoveries were within the QC acceptance criteria in all sample analyses.

LCS Results

The percent recoveries (%Rs) and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria for the LCS and LCSD.

MS/MSD Results

MS/MSD analyses were performed on sample M120-50. The %Rs and RPDs of all reported spiked compounds were within QC acceptance criteria.

Field Duplicate Results

Field duplicate samples were not submitted with this sample set. No validation action is required.

Compound Quantitation

The recommended compounds (C_{10} and C_{28}) were used to establish the lower and upper retention time range for DRO and the recommended compounds (C28 and C38) were used to establish lower and upper retention time range for ORO (oil range organics). All peaks contributing to the reported results were within the calculated range.

Quantitation Limits and Sample Results

Calculations were spot-checked. There were no discrepancies noted.

Samples FB-1 was analyzed at a minor dilution due to the sample preparation requirement. Sample results and sample quantitation limits were adjusted accordingly. No dilution was required for the remaining samples in this data set. The project-required reporting limits were not exceeded for any sample in this data set. Sample quantitation limits (SQLs) for all samples were within the target quantitation limits.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date: August 9, 2006 Revised October 5, 2006

To: Dave Gerry/Camarillo

From: Vinora Nicholls/Westford

Subject: Data Validation, Ethylene Glycol Analyses
Henderson Upgradient Investigation
Tronox LLC Henderson, Nevada
EMAX SDG 06C081

Distribution: Robert Kennedy/Westford

04020-023-152

TH019EG.rev

SUMMARY

Limited validation was performed on the data for six soil samples and one field blank analyzed for ethylene glycol by SW-846 method 8015B. The samples were collected at the Tronox facility in Henderson Nevada on March 8, 2006 and submitted to EMAX Laboratories (EMAX), Inc. in Torrance, California for analysis. EMAX analyzed the samples and reported the results under sample delivery group (SDG) 06C081.

The analytical data were evaluated according to the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (10/99), the Region 9 Superfund Data Evaluation/Validation Guidance, NDEP Guidance on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodology.

In general, the data are valid as reported and may be used for decision making purposes. No data were rejected or qualified as a result of data validation.

SAMPLES

The samples included in this review are listed below:

Sample IDs	Sample IDs
M118-0.5	M118-50
M118-5	M118-80
M118-10	FB-1
M118-30	

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

Sample data were reviewed for the following parameters, where applicable to the method:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Initial and continuing calibrations
- Method blanks/equipment blanks
- Surrogate spike recoveries
- Laboratory control sample (LCS) results
- Matrix spike/matrix spike duplicate (MS/MSD) results
- Field duplicate results
- Compound quantitation
- Quantitation limits and sample results

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. No discrepancies were found

Holding Times and Sample Preservation

The samples were extracted and analyzed within the method specified holding times.

The cooler temperatures upon receipt at the laboratory were 2.8^{o}C and 2.5 ^{o}C, which were within the acceptable range of 4$\pm$ 2^{o}C.

Initial and Continuing Calibrations

The percent relative standard deviation (%RSD) of ethylene glycol fell outside (24.6%) QC acceptance criteria for the initial calibrations associated with the sample analyses. Quantitation was performed using a linear regression which met the QC acceptance criteria for correlation coefficient. The percent differences (%Ds) of all target compounds were within the QC acceptance criteria for the continuing calibrations associated with the sample analyses.

Method Blanks/Equipment Blank

No target compounds were detected in the method blank and field blank. There were no trip blanks (TB), or equipment blanks (EB) reported with the samples in this data package. The associated equipment blanks, EB-1 and EB-2, are reported under SDGs 06C096 and 06C127, respectively. No target compounds were detected in the associated equipment blanks.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Surrogate Spike Recoveries

Surrogate spikes were not performed because the EPA method and the laboratory SOP do not require surrogates for direct injection analysis. No validation action was taken on this basis.

LCS Results

The percent recoveries (%Rs) and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria for the LCS and LCSD.

MS/MSD Results

MS/MSD analyses were performed on sample M118-50. The %Rs and RPDs of all reported spiked compounds were within QC acceptance criteria.

Field Duplicate Results

Field duplicate samples were not submitted with this sample set. No validation action is required.

Compound Quantitation

Retention times were defined during calibration. Retention times fell within acceptance criteria for all samples.

Quantitation Limits and Sample Results

Calculations were spot-checked. There were no discrepancies noted.

No dilutions were required for the samples in this data set; therefore the sample quantitation limits (SQLs) were unaffected and met the target quantitation limits.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date:	August 25, 2006 Revised October 5, 2006
To:	Dave Gerry/Camarillo
From:	Vinora Nicholls/Westford
Subject:	Data Validation, Alcohols Analyses Henderson Upgradient Investigation Tronox LLC Henderson, Nevada EMAX SDG 06C081 and 06C081A
Distribution:	Robert Kennedy/Westford

04020-023-152

TH019FA.rev

SUMMARY

Limited validation was performed on the data for six soil samples, one groundwater sample, one trip blank, and one field blank analyzed for methanol and ethanol analyses by SW-846 method 8015B. The samples were collected at the Tronox facility in Henderson Nevada on March 8, 2006 and submitted to EMAX Laboratories (EMAX), Inc. in Torrance, California for analysis. EMAX analyzed the samples and reported the results under sample delivery groups (SDG) 06C081 and 06C081A. 06C081A was used for the analysis of the Trip Blank which was not included in the original SDG.

The analytical data were evaluated according to the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (10/99), the Region 9 Superfund Data Evaluation/Validation Guidance, NDEP Guidance on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodology.

In general, the data appear to be valid as reported and may be used for decision making purposes. Some methanol surface soil results were rejected because the detections appear to be false positives due to cross-contamination during shipping. Methanol was not detected in the resampled and reanalyzed surface soils in SDG 06C238. The subsurface soil methanol results were qualified as probable false positives (Z) due to the same cross-contamination during shipping (see discussion below).

SAMPLES

The samples included in this review are listed below:

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Sample IDs	Sample IDs
M118-0.5	M118-30
M118-5	M118-50
M118-10	M118-80
Trip Blank	FB-1

REVIEW ELEMENTS

Sample data were reviewed for the following parameters, where applicable to the method:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Initial and continuing calibrations
- Method blanks/equipment blanks
- Surrogate spike recoveries
- Laboratory control sample (LCS) results
- Matrix spike/matrix spike duplicate (MS/MSD) results
- Field duplicate results
- Compound quantitation
- Quantitation limits and sample results

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. No discrepancies were found.

Holding Times and Sample Preservation

All samples except the trip blank were extracted and analyzed within the method specified holding times.

The cooler temperatures upon receipt at the laboratory were 2.8^{o}C and 2.5 ^{o}C, which were within the acceptable range of 4$\pm$ 2^{o}C.

Initial and Continuing Calibrations

The percent relative standard deviations (%RSDs) of all target compounds were within the QC acceptance criteria for the initial calibrations associated with the sample analyses. The percent differences (%Ds) of all target compounds were within the QC acceptance criteria for the continuing calibrations associated with the sample analyses.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Method Blanks/Equipment Blank

No target compounds were detected in the method blank, field blank or trip blank. There was no equipment blank (EB) reported with the samples in this data package. The associated equipment blanks, EB-1 and EB-2, were reported under SDG 06C096 and 06C127, respectively. No target compounds were detected in the associated equipment blanks.

Surrogate Spike Recoveries

Surrogate spikes were not performed because the EPA method and the laboratory SOP do not require surrogates for direct injection analysis. No validation action was taken on this basis.

LCS Results

The percent recoveries (%R) and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria for the LCS and LCSD.

MS/MSD Results

MS/MSD analyses were performed on sample M118-50. The %Rs and RPDs of all reported spiked compounds were within QC acceptance criteria.

Field Duplicate Results

Field duplicate samples were not submitted with this sample set. No validation action is required.

Compound Quantitation

Retention times were defined during calibration. Target analyte retention times fell within acceptance criteria for all QC samples.

Quantitation Limits and Sample Results

Calculations were spot-checked. There were no discrepancies noted.

No dilutions were required for the samples in this data set; therefore the sample quantitation limits (SQLs) were unaffected and met the target quantitation limit.

All subsurface soil methanol results (samples M118-5, M118-30, M118-50, M118-10, and M118-80) were qualified as probable false positives (Z) due to suspected methanol cross contamination from methanol preserved VOC vials. Soil samples for methanol analysis were collected in capped sleeves and stored in the same ziplock bags as the methanol containing VOC vials during shipping.

The surface soil methanol result (sample M118-0.5) was rejected (R) as false positive due to methanol cross-contamination as described above. Resampling and reanalysis of this surface soil sample in SDG06C238 confirmed that methanol was not detectable when the sample was shipped without methanol containing vials in the same cooler.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date: August 25, 2006 Revised October 9, 2006

To: Dave Gerry/Camarillo

From: Vinora Nicholls/Westford

Subject: Data Validation, GRO Analyses
Henderson Upgradient Investigation
Tronox LLC Henderson, Nevada
EMAX SDG 06C081

Distribution: Robert Kennedy/Westford

04020-023-152

TH019gro.rev.doc

SUMMARY

Limited validation was performed on the data for six soil samples plus one field blank analyzed for gasoline range organics (GRO) by SW-846 methods 5030B/5035/8015B. The samples were collected at the Tronox LLC site in Henderson, Nevada on March 8, 2006 and submitted to EMAX Laboratories (EMAX), Inc in Torrance, California for analysis. EMAX processed the samples and reported the results under sample delivery group (SDG) 06C081.

The analytical data were evaluated according to the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (10/99), the Region 9 Superfund Data Evaluation/Validation Guidance, NDEP Guidance on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodology.

In general, the data are valid as reported and may be used for decision making purposes. No data were rejected or qualified based on data validation.

SAMPLES

The samples included in this review are listed below:

Sample IDs	Sample IDs
M118-0.5	M118-50
M118-5	M118-80
M118-10	FB-1
M118-30	

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

Sample data were reviewed for the following parameters, where applicable:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Initial and continuing calibrations
- Method blanks/equipment blanks
- Surrogate spike recoveries
- Laboratory control sample (LCS) results
- Matrix spike/matrix spike duplicate (MS/MSD) results
- Field duplicate results
- Compound quantitation
- Quantitation limits and sample results

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. No discrepancies were found.

Holding Times and Sample Preservation

The samples were analyzed within the method specified holding time.

The cooler temperatures upon receipt at the laboratory were 2.8^{o}C and 2.5 ^{o}C, which were within the acceptance criterion of 4$\pm$ 2^{o}C.

Initial and Continuing Calibrations

The percent relative standard deviations (%RSDs) of all target compounds were within the QC acceptance criteria for the initial calibrations associated with the sample analyses. The percent differences (%Ds) of all target compounds were within the QC acceptance criteria for the continuing calibrations associated with the sample analyses.

The laboratory used 1,1,1-trifluorotoluene(1,1,1-TFT) as a surrogate; however results for 1,1,1-TFT were not reported on the sample results data sheet. Data validation actions are not required for this surrogate nonconformance.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Method Blanks/Equipment Blank

GRO was not detected in the method blank and field blank. There were no trip blanks (TBs) or equipment blanks (EBs) reported with the samples in this data package. The associated equipment blanks, EB-1 and EB-2, were reported in SDGs 06C096 and 06C127, respectively. GRO was not detected in the associated equipment blanks.

Surrogate Spike Recoveries

Surrogate recoveries were within the QC acceptance criteria in all sample analyses.

LCS Results

The percent recoveries (%Rs) and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria for the LCS and LCSD.

MS/MSD Results

MS/MSD analyses were performed on sample M118-50. The %Rs and RPDs of all spiked compounds were within QC acceptance criteria.

Field Duplicate Results

Field duplicate samples were not submitted with this sample set. No validation action was taken on this basis.

Compound Quantitation

The recommended compounds n-hexane and n-decane were used to establish the GRO lower and upper retention time range, respectively. All peaks contributing to the reported results were within the calibrated range.

Quantitation Limits and Sample Results

Calculations were spot-checked. There were no discrepancies noted.

All samples except M118-50 and FB-1 were analyzed at minor dilutions due to the sample preparation requirement. Sample results and sample quantitation limits were adjusted accordingly. The project-required reporting limits were not exceeded for any sample in this data set.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date:	August 14, 2006 Revised October 10, 2006
To:	David Gerry/Camarillo
From:	Linda Sulkowski/Westford
Subject:	Data Validation, Metals Analysis Henderson Upgradient Investigation Tronox LLC Henderson, Nevada EMAX SDG 06C081
Distribution:	R. Kennedy/Westford

04020-023-152
TH019inolms.rev

SUMMARY

Limited validation was performed on the data for 10 soil samples analyzed for a project-specific list of metals by SW-846 methods 6020A and 7471A. The samples were collected at the Tronox LLC site in Henderson, Nevada on March 8, 2006 and were submitted to EMAX Laboratories (EMAX) in Torrance, CA for analysis. EMAX processed the samples and reported the results under sample delivery group (SDG) 06C081.

The analytical data were evaluated with reference 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 on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodologies.

In general, the data are valid as reported and may be used for decision making purposes. Non-detect results for antimony were rejected due to very low MS/MSD recoveries. Selected other results were qualified due to nonconformance with certain QC criteria (see discussion below).

SAMPLES

The samples included in this review are listed below.

Sample IDs	
M118-0.5	M118-5
M118-10	M118-20
M118-20D (field duplicate of M118-20)	M118-30
M118-40	M118-50
M118-60	M118-80

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

Sample data were reviewed for the following parameters, where applicable to the method:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Inductively coupled plasma/mass spectrometry (ICP/MS) tuning
- Initial and continuing calibrations
- Method blanks/equipment blanks
- Laboratory control sample (LCS)/laboratory control sample duplicate (LCSD) results
- Matrix spike/matrix spike duplicate (MS/MSD) results
- Internal standard performance
- Field duplicate results
- Quantitation limits and sample results

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. No discrepancies were found.

Holding Times and Sample Preservation

The samples were digested and analyzed within the method specified holding times.

The cooler temperatures upon receipt at EMAX were within the acceptance criteria of 4 ± 2°C.

ICP/MS Tuning

A tuning solution (daily performance check) containing elements representing all of the mass regions of interest was analyzed at the beginning of each analytical sequence. The percent relative standard deviations (%RSDs) for elements in the tuning solution met the QC acceptance criteria of <5%.

Initial and Continuing Calibrations

All criteria were met for the calibration curves, and the initial and continuing calibration verification (ICV/CCV) standards.

Method Blanks/Equipment Blanks

Molybdenum and vanadium were detected in the laboratory preparation blank at concentrations > the method detection limit (MDL), but < the sample quantitation limit (SQL). Aluminum, copper, iron, manganese, and/or zinc were detected in the equipment blank samples EB-1 and EB-2, which were reported in SDGs 16C096 and 06C127, respectively. Target analytes were not detected in the bracketing initial and continuing calibration blanks (ICB/CCBs) associated with the soil samples. The

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

presence of blank contamination indicated that false positive results might have existed for these analytes in the associated samples. The following tables summarize the highest level of blank contamination and the associated samples.

Type of Blank	Analyte	Maximum Blank Concentration* (mg/Kg)
Preparation Blank	Molybdenum	0.137 J
	Vanadium	0.132 J
Associated samples: All sediment samples in this data set. *Adjusted for sample preparation factors and moisture content.		

Type of Blank	Analyte	Maximum Blank Concentration* (µg/L)
Equipment Blank EB-1	Aluminum	41
	Copper	4.4
Equipment Blank EB-2	Iron	0.48 J
	Manganese	8.4
	Zinc	17
Associated samples: All sediment samples in this data set. *Adjusted for sample preparation factors and moisture content.		

Sample results were qualified as follows:

For blank results >the SQL:

- Positive sample results $\geq$ MDL, but $\leq$ SQL were qualified as nondetect (U) at the SQL.
- Positive sample results > SQL, but < 10x the blank result were qualified as estimated, biased high (J+).
- Positive sample results that were $\geq$ 10x the blank result were accepted unqualified.

For blank results $\geq$ MDL, but $\leq$ SQL:

- Nondetect results were accepted unqualified.
- Positive sample results $\geq$ MDL, but $\leq$ SQL were qualified as nondetect (U) at the SQL.
- Positive sample results > SQL and < the Action Level (AL) of 5x the blank contamination level were qualified as undetected (U) at the reported concentration.

LCS/LCSD Results

The %Rs and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria for the LCS and LCSD.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

MS/MSD Results

MS/MSD analyses were performed on sample M118-50 from this sample set. The following table summarizes the %Rs and RPDs of the spiked target analytes that fell outside the QC acceptance criteria.

Analyte	MS/MSD %Rs	RPD	QC Acceptance Range %R (RPD)	Actions (Detects/Nondetects)
Antimony	28/27	ok	75-125% (20)	J-/R
Barium	55/63	ok	75-125% (20)	J-/UJ
Tungsten	65/65	ok	75-125% (20)	J-/UJ
Samples Affected: All samples.				

Post digestion spike analysis was subsequently performed on sample M118-50. The %Rs met the QC acceptance criteria.

Internal Standard Performance

The internal standard performance was within the QC acceptance criteria in all sample analyses.

Field Duplicate Results

Samples M118-20 and M118-20D were submitted as the field duplicate pair with this sample set. The following table summarizes the RPDs of the detected analytes in field duplicate samples M118-20 and M118-20D. Precision was deemed acceptable for thallium since the detected results were both less than 10x the MDL, and the absolute difference between the sample and duplicate results was < 8x the MDL. The RPDs were not calculable (NC) for antimony and tungsten due to nondetect results in either the sample or field duplicate sample. Precision was deemed acceptable for antimony and tungsten since the detected results in either the sample or field duplicate sample were < 10x the MDL. The remaining RPDs were within the QC acceptance criteria.

Compound	M118-20 (mg/Kg)	M118-20D (mg/Kg)	RPD
Aluminum	9230	8330	10
Antimony	0.11 J	0.107 U	NC
Arsenic	3.72	3.38	10
Barium	0.189	0.181	4
Beryllium	0.604	0.514 J	16
Cadmium	0.429 J	0.426 J	1
Calcium	29600	26600	11
Chromium	11.8	9.58	21
Cobalt	7.21	6.78	6
Copper	21.2	17.1	21
Iron	12700	12600	1
Lead	8.81	14.4	48
Magnesium	9120	8720	4
Manganese	423	367	14
Molybdenum	0.796	0.698	13
Nickel	16.1	14.9	8

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Compound	M118-20 (mg/Kg)	M118-20D (mg/Kg)	RPD
Potassium	2410	1790	30
Selenium	0.182 J	0.194 J	6
Sodium	802	753	6
Strontium	215	231	7
Thallium	0.217 J	0.111 J	65
Titanium	659	588	11
Tungsten	0.528 U	0.553 J	NC
Uranium	1	0.993	1
Vanadium	29.6	27	9
Zinc	38.5	34.3	12

Quantitation Limits and Sample Results

Dilutions were not performed on samples in this data set; therefore, the SQLs were not affected.

It should be noted that the laboratory reported results between the MDL and the SQL as estimated (J).

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date: August 16, 2006 Revised October 9, 2006

To: Dave Gerry/Camarillo

From: Linda Sulkowski/Westford

Subject: Data Validation, VOC Analysis
Henderson Upgradient Investigation
Tronox LLC Henderson, Nevada
EMAX SDG 06C081

Distribution: R. Kennedy/Westford

04020-023-152 File

TH019voclms.rev.doc

SUMMARY

Limited validation was performed on the data for six soil samples, one field blank, and one trip blank analyzed for a project-specific list of volatile organic compounds (VOCs) by SW-846 methods 5030B/5035/8260B. The samples were collected at the Tronox LLC site in Henderson, Nevada on March 8, 2006 and were submitted to EMAX Laboratories (EMAX) in Torrance, CA for analysis. EMAX processed the samples and reported the results under sample delivery group (SDG) 06C081.

The analytical data were evaluated with reference to the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (10/99), the Region 9 Superfund Data Evaluation/Validation Guidance, NDEP Guidance on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodology.

In general, the data are valid as reported and may be used for decision making purposes. Results for tert-butyl alcohol were rejected in all samples since the minimum response factor (RF) criterion was not met. The nondetected result for hexachlorobutadiene was estimated (UJ) in soil sample M118-50 due to poor MS/MSD precision.

SAMPLES

The samples included in this review are listed below:

Sample IDs	Sample IDs
M118-0.5	M118-5
M118-10	M118-30
M118-50	M118-80
FB-1 (field blank)	Trip Blank

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

Sample data were reviewed for the following parameters, where applicable:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Gas chromatography/mass spectrometry (GC/MS) tuning
- Initial and continuing calibrations
- Method blanks/equipment blanks/trip blanks
- Surrogate spike recoveries
- Laboratory control sample (LCS)/laboratory control sample duplicate (LCSD) results
- Matrix spike/matrix spike duplicate (MS/MSD) results
- Internal standard performance
- Field duplicate results
- Quantitation limits and sample results

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. No discrepancies were found.

Holding Times and Sample Preservation

The samples were analyzed within the method specified holding time.

The cooler temperatures upon receipt at EMAX were within the acceptance criterion of 4±2°C.

GC/MS Tuning

The frequency and abundance of all bromofluorobenzene (BFB) tuning results were within the QC acceptance criteria. The samples were analyzed within the method specified tuning intervals.

Initial and Continuing Calibrations

The percent relative standard deviations (%RSDs), the correlation coefficients, and/or the RFs of all target compounds were within the QC acceptance criteria for the initial calibration associated with the sample analyses with the following exception. Actions were applied as indicated below.

Compound	RF	Action (Detects/Nondetects)
Tert-butyl alcohol	0.027	J/R
Associated Samples:	All samples	

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

The percent differences (%Ds) of all target compounds were within the QC acceptance criteria for the continuing calibrations associated with the sample analyses.

Method Blanks/Equipment Blanks/Trip Blanks

Target compounds were not detected in the laboratory method blanks or in the trip blank associated with the samples in this data set. Dibromochloromethane was detected in the field blank sample at a concentration of 3.2 J μg/L. No qualifications to data were made as this sample is for informational purposes only.

Equipment blank samples EB-1 (reported in SDG 06C096) and EB-2 (reported in SDG 06C127) were associated with selected soil samples in this data set. Acetone was detected in EB-1 and EB-2 at 6.3 and 9.9 μg/L, respectively. The presence of blank contamination indicates that false positives may exist for this compound in the associated samples. An Action Level (AL) was established for the highest reported concentration of acetone at 10x the concentration detected. The following table summarizes the AL and the associated samples.

Blank Type	Compound	Concentration (μg/L)	AL (μg/Kg)	Associated Samples
EB-2 (equipment blank)	Acetone	9.9 J	99	M118-0.5, M118-10, M118-30, M118-50, M118-80

Sample results were qualified as follows:

- If the sample result was ≤ AL and ≤ the sample quantitation limit (SQL), the result was qualified as nondetect (U) at the SQL.
- If the sample result was ≤ AL and > SQL, the result was qualified as nondetect (U) at the reported concentration.
- If the sample result was > AL, the result was not qualified.

Surrogate Spike Recoveries

Surrogate percent recoveries (%Rs) were within the QC acceptance criteria in all sample analyses.

LCS/LCSD Results

The %Rs and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria for the LCS and LCSD.

MS/MSD Results

MS/MSD analyses were performed on sample M118-50. The RPD of hexachlorobutadiene (60%) fell below the QC acceptance criteria in the MS/MSD analyses. The nondetect result for hexachlorobutadiene in the unspiked sample was qualified as estimated (UJ).

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Internal Standard Performance

The internal standard performance was within the QC acceptance criteria in all sample analyses.

Field Duplicate Results

Field duplicate samples were not submitted with this sample set. No validation action was taken on this basis.

Quantitation Limits and Sample Results

Dilutions were not performed on samples in this data set. Sample quantitation limits (SQLs) for these samples were therefore not affected.

It should be noted that the laboratory reported 2-butanone, 4-methyl-2-pentanone, and 2-hexanone with SQLs of 10 µg/kg each, instead of the QAPP stipulated SQLs of 5 µg/kg for all soil samples. No data validation action was taken other than this notation.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date:	August 11, 2006 Revised October 9, 2006	
To:	David Gerry/Camarillo	
From:	Sheena Blair/Westford	
Subject:	Data Validation, Inorganic Analysis Henderson Upgradient Investigation Tronox LLC Henderson, Nevada EMAX SDG 06C081	
Distribution:	R. Kennedy/Westford	04020-023-152 TH019wc.sb.rev

SUMMARY

Limited validation was performed on the data for 10 soil samples analyzed for all or a subset of the following parameters:

- Chloride by SW-846 method 9056
- Nitrate as nitrogen by SW-846 method 9056
- Nitrite as nitrogen by SW-846 method 9056
- Sulfate by SW-846 method 9056
- Total cyanide by SW-846 method 9014
- Hexavalent chromium by SW-846 method 7199
- Chlorate by EPA 300.0 modified
- Perchlorate by EPA 314.0
- Total alkalinity by EPA 310.1
- Bicarbonate alkalinity by EPA 310.1(calculated from total and carbonate alkalinity)
- Carbonate alkalinity by EPA 310.1
- Specific conductance by SM 2510B, and
- pH by SW-846 method 9045C

The samples were collected at the Henderson site in Henderson, NV on March 8, 2006 and submitted to EMAX Laboratories, Inc in Torrance, CA for analysis. EMAX processed the samples and reported the results under sample delivery group (SDG) 06C081.

The analytical data were evaluated with reference 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 on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodologies.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

In general, the data are valid as reported and may be used for decision making purposes (see discussion below). No data were rejected.

SAMPLES

The samples included in this review are listed below:

Sample IDs	
M118-0.5	M118-30*
M118-5	M118-40
M118-10	M118-50*
M118-20	M118-60
M118-20D (field duplicate of M118-20)	M118-80
*Analyzed for all listed parameters. All other samples were analyzed for perchlorate and hexavalent chromium only	

REVIEW ELEMENTS

Sample data were reviewed for the following elements, where applicable to the method:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Initial and continuing calibrations
- Laboratory blanks/equipment 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

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. The following discrepancy was found:

- Although the label on the container for sample M118-40 listed Wet-Chemistry parameters, the COC did not request these parameters. At ENSR's authorization, the sample was analyzed per the analytical tests listed on the COC. No validation action was required other than this notation.

Holding Times and Sample Preservation

All samples were analyzed within the method-specified holdings times for all parameters. The soil digestate holding time for hexavalent chromium was assumed to be 7 days. This holding time was

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

based on the stability of Cr(VI) in digestates as mentioned in EPA Method 3060A Sec.6.4. In addition, the holding time was also based on the discussion of extended digestate stability as documented in EPA's Sample Holding Time Reevaluation (EPA/600/R-05/124, October 2005).

The cooler temperature upon receipt at EMAX was within the acceptance criteria of 4 ± 2°C.

Initial and Continuing Calibrations

All criteria were met for the calibration curves, and the initial and continuing calibration verification (ICV/CCV) standards (where applicable to the methods).

Laboratory Blanks/Equipment Blanks

No equipment blanks were associated with the samples in this data set, except for perchlorate and hexavalent chromium in soils. No validation action was taken on this basis.

Equipment blank sample EB-1 was submitted for perchlorate and hexavalent chromium, and reported under MWH Data Report number 169405R. Perchlorate and hexavalent chromium were not detected in EB-1; therefore no validation action was taken.

Equipment blank sample EB-2 was submitted for perchlorate only and reported under MWH Data Report number 169653R. Perchlorate was not detected in EB-2; therefore no validation action was taken.

Target compounds were not detected in the laboratory blanks associated with the samples in this data set.

LCS/LCSD Results

The percent recoveries (%Rs) and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria for all LCSs and LCSDs.

MS/MSD Results

The laboratory performed MS or MS/MSD analyses on sample M118-50 of this data set. The following table lists the sample and the analytes spiked. The %Rs and RPDs (where applicable) met the QC acceptance criteria.

Sample IDs	Analyte Spiked
M118-50 MS/MSD	Cyanide
M118-50 MS only	Hexavalent Chromium, Chloride, Nitrate as N, Nitrite as N, Sulfate, Chlorate, Perchlorate

Batch MS or MS/MSD analyses were performed on samples from other clients for all parameters, except those in the above table. Although this practice is acceptable, the results could not be directly applied to the samples analyzed in this data package because of possible differences in the sample matrix and type. No validation action was taken on this basis.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Laboratory Duplicate Results

Laboratory duplicate analyses were only performed on the following samples and for the following analytes in this data set. The other parameters in this data set did not have associated laboratory duplicate analyses. Thus, for parameters without an associated laboratory duplicate, the LCS/LCSD and/or the MS/MSD demonstrated precision and accuracy in the laboratory (see discussions above).

The following table lists the samples and the analytes. All RPDs met the QC acceptance criteria.

Sample IDs	Analyte
All samples	Hexavalent Chromium
M118-50	Chloride, Nitrate as N, Nitrite as N, Sulfate, Chlorate, Perchlorate, Alkalinity, Specific Conductance, pH

Field Duplicate Results

Samples M118-20 and MW118-20D were submitted as the field duplicate pair for perchlorate and hexavalent chromium analyses. There was no field duplicate pair submitted or associated with the other parameters in this data set.

Hexavalent chromium was not detected in the field duplicate samples M118-20 and MW118-20D; therefore, precision was deemed to be acceptable. The following table summarizes the RPD for perchlorate in the field duplicate samples. The RPD for perchlorate was not calculable (NC) due to a nondetect result for field duplicate sample M118-20. However, precision was deemed acceptable since the detected sample result was <10x the sample quantitation limit (SQL).

Analyte	M118-20 (µg/Kg)	M118-20D (µg/Kg)	RPD
Perchlorate	42.2 U	131	NC

Quantitation Limits and Sample Results

No dilutions were required for the samples in this data set for all parameters analyzed; therefore, sample quantitation limits (SQLs) were not affected.

It should be noted that the laboratory reported results between the MDL and the SQL. These results were qualified as estimated (J) by the laboratory. No validation action was taken on this basis.

Selected EMAX reporting limits did not meet the limits stated in the QAPP. No validation action was taken other than this notation.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date: August 25, 2006 Revised October 5, 2006

To: Dave Gerry/Camarillo

From: Vinora Nicholls/Westford

Subject: Data Validation, DRO Analyses
Henderson Upgradient Investigation
Tronox LLC Henderson, Nevada
EMAX SDG 06C096

Distribution: Robert Kennedy/Westford

04020-023-152

TH020DRO.rev

SUMMARY

Limited validation was performed on the data for one equipment blank, analyzed for diesel range organics (DRO) and oil range organics (ORO) by SW-846 methods 3550/8015B. The sample was collected at the Tronox LLC facility, in Henderson Nevada on March 9, 2006 and submitted to EMAX Laboratories (EMAX), Inc. in Torrance, California for analysis. EMAX analyzed the sample and reported the results under sample delivery group (SDG) 06C096.

The analytical data were evaluated according to the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (10/99), the Region 9 Superfund Data Evaluation/Validation Guidance, NDEP Guidance on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodology.

In general, the data are valid as reported and may be used for decision making purposes. No data were rejected or qualified as a result of data validation.

SAMPLES

The sample included in this review is listed below:

Sample ID
EB-1

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

Sample data were reviewed for the following parameters, where applicable to the method:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Initial and continuing calibrations
- Method blanks/equipment blanks
- Surrogate spike recoveries
- Laboratory control sample (LCS) results
- Matrix spike/matrix spike duplicate (MS/MSD) results
- Field duplicate results
- Compound quantitation
- Quantitation limits and sample results

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample report was checked to verify that the results corresponded to analytical requests as designated on the COC. No discrepancies were found

Holding Times and Sample Preservation

The sample was extracted and analyzed within the method specified holding times.

The cooler temperature upon receipt at the laboratory was 3.5^{o}C, which was within the acceptable range of 4$\pm$ 2^{o}C.

Initial and Continuing Calibrations

The percent relative standard deviations (%RSDs) of all target compounds were within the QC acceptance criteria for the initial calibrations associated with the sample analyses. The percent differences (%Ds) of all target compounds were within the QC acceptance criteria for the continuing calibrations associated with the sample analyses.

The laboratory used hexacosane instead of n-octacosane for the surrogate. No validation action is required.

Method Blanks/Equipment Blank

No target compounds were detected in the method blank or equipment blank. There were no trip blanks or field blanks (FB) reported with the sample in this data package.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Surrogate Spike Recoveries

Surrogate recoveries were within the QC acceptance criteria in the sample analysis.

LCS Results

The percent recoveries (%Rs) and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria for the LCS and LCSD.

MS/MSD Results

MS/MSD analyses were not submitted with this sample set. No validation action is required.

Field Duplicate Results

Field duplicate samples were not submitted with this sample set. No validation action is required.

Compound Quantitation

The recommended compounds (C_{10} and C_{28}) were used to establish the lower and upper retention time range for DRO and the recommended compounds (C28 and C38) were used to establish lower and upper retention time range for ORO (oil range organics). All peaks contributing to the reported results were within the calculated range.

Quantitation Limits and Sample Results

Calculations were spot-checked. There were no discrepancies noted.

The sample was analyzed at a minor dilution due to the sample preparation requirement. Sample results and sample quantitation limits were adjusted accordingly. The project-required reporting limit was not exceeded. Sample quantitation limits (SQL) were within the target quantitation limits.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date:	August 25, 2006 Revised October 6, 2006	
To:	Dave Gerry/Camarillo	
From:	Vinora Nicholls/Westford	
Subject:	Data Validation, Ethylene Glycol Analyses Henderson Upgradient Investigation Tronox LLC Henderson, Nevada EMAX SDG 06C096	
Distribution:	Robert Kennedy/Westford	04020-023-152 TH020EG.rev

SUMMARY

Limited validation was performed on the data for one equipment blank, analyzed for ethylene glycol by SW-846 method 8015B. The sample was collected at theTronox facility in Henderson Nevada on March 9, 2006 and submitted to EMAX Laboratories (EMAX), Inc. in Torrance, California for analysis. EMAX analyzed the sample and reported the result under sample delivery group (SDG) 06C096.

The analytical data were evaluated according to the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (10/99), the Region 9 Superfund Data Evaluation/Validation Guidance, NDEP Guidance on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodology.

In general, the data are valid as reported and may be used for decision making purposes. No data were rejected or qualified as a result of data validation.

SAMPLES

The sample included in this review is listed below:

Sample ID
EB-1

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

Sample data were reviewed for the following parameters, where applicable to the method:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Initial and continuing calibrations
- Method blanks/equipment blanks
- Surrogate spike recoveries
- Laboratory control sample (LCS) results
- Matrix spike/matrix spike duplicate (MS/MSD) results
- Field duplicate results
- Compound quantitation
- Quantitation limits and sample results

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. No discrepancies were found

Holding Times and Sample Preservation

The sample was extracted and analyzed within the method specified holding times.

The cooler temperature upon receipt at the laboratory was 3.5^{o}C, which was within the acceptable range of 4$\pm$ 2^{o}C.

Initial and Continuing Calibrations

The percent relative standard deviation (%RSD) of ethylene glycol fell outside (24.6%) QC acceptance criteria for the initial calibrations associated with the sample analyses. Quantitation was performed using a linear regression which met the QC acceptance criteria for correlation coefficient. The percent differences (%Ds) of all target compounds were within the QC acceptance criteria for the continuing calibrations associated with the sample analyses.

Method Blanks/Equipment Blank

No target compounds were detected in the method blank or equipment blank. There were no trip blanks or field blanks (FB) reported with the sample in this data package.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Surrogate Spike Recoveries

Surrogate spikes were not performed because the EPA method and the laboratory SOP do not require surrogates for direct injection analysis. No validation action was taken on this basis.

LCS Results

The percent recoveries (%Rs) and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria for the LCS and LCSD.

MS/MSD Results

MS/MSD analyses were not submitted with this sample set. No validation action is required.

Field Duplicate Results

Field duplicate samples were not submitted with this sample set. No validation action is required.

Compound Quantitation

Retention times were defined during calibration. Retention times fell within acceptance criteria for all samples.

Quantitation Limits and Sample Results

Calculations were spot-checked. There were no discrepancies noted.

No dilution was required for the sample in this data set; therefore the sample quantitation limit (SQL) was unaffected and met the target quantitation limit.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date: August 25, 2006 Revised October 6, 2006

To: Dave Gerry/Camarillo

From: Vinora Nicholls/Westford

Subject: Data Validation, Alcohol Analyses
Henderson Upgradient Investigation
Tronox LLC Henderson, Nevada
EMAX SDG 06C096

Distribution: Robert Kennedy/Westford

04020-023-152

TH020FA.rev

SUMMARY

Limited validation was performed on the data for one equipment blank, analyzed for methanol and ethanol by SW-846 method 8015B. The sample was collected at the Tronox facility in Henderson Nevada on March 9, 2006 and submitted to EMAX Laboratories (EMAX), Inc. in Torrance, California for analysis. EMAX analyzed the sample and reported the result under sample delivery group (SDG) 06C096.

The analytical data were evaluated according to the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (10/99), the Region 9 Superfund Data Evaluation/Validation Guidance, NDEP Guidance on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodology.

In general, the data are valid as reported and may be used for decision making purposes. No data were rejected or qualified as a result of data validation.

SAMPLES

The sample included in this review is listed below:

Sample ID
EB-1

REVIEW ELEMENTS

Sample data were reviewed for the following parameters, where applicable to the method:

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Initial and continuing calibrations
- Method blanks/equipment blanks
- Surrogate spike recoveries
- Laboratory control sample (LCS) results
- Matrix spike/matrix spike duplicate (MS/MSD) results
- Field duplicate results
- Compound quantitation
- Quantitation limits and sample results

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. No discrepancies were found

Holding Times and Sample Preservation

The sample was extracted and analyzed within the method specified holding times.

The cooler temperature upon receipt at the laboratory was 3.5^{o}C, which was within the acceptable range of 4$\pm$ 2^{o}C.

Initial and Continuing Calibrations

The percent relative standard deviations (%RSDs) of all target compounds were within the QC acceptance criteria for the initial calibrations associated with the sample analysis. The percent differences (%Ds) of all target compounds were within the QC acceptance criteria for the continuing calibrations associated with the sample analysis.

Method Blanks/Equipment Blank

No target compounds were detected in the method blank or equipment blank. There were no trip blanks or field blanks (FB) reported with the samples in this data package.

Surrogate Spike Recoveries

Surrogate spikes were not performed because the EPA method and the laboratory SOP do not require surrogates for direct injection analysis. No validation action was taken on this basis.

LCS Results

The percent recoveries (%R) and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria for the LCS and LCSD.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

MS/MSD Results

MS/MSD analyses were not submitted with this sample set. No validation action is required.

Field Duplicate Results

Field duplicate samples were not submitted with this sample set. No validation action is required.

Compound Quantitation

Retention times were defined during calibration. Retention times fell within acceptance criteria for all samples.

Quantitation Limits and Sample Results

Calculations were spot-checked. There were no discrepancies noted.

No dilution was required for the sample in this data set; therefore the sample quantitation limit (SQL) was unaffected and met the target quantitation limit.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date: August 25, 2006 Revised October 9, 2006

To: Dave Gerry/Camarillo

From: Vinora Nicholls/Westford

Subject: Data Validation, GRO Analyses
Henderson Upgradient Investigation
Tronox LLC Henderson, Nevada
EMAX SDG 06C096

Distribution: Robert Kennedy/Westford

04020-023-152

TH020gro.rev.doc

SUMMARY

Limited validation was performed on the data for one equipment blank analyzed for gasoline range organics (GRO) by SW-846 methods 5030B/8015B. The sample was collected at the Tronox LLC site in Henderson, Nevada on March 9, 2006 and submitted to EMAX Laboratories, Inc. in Torrance, California for analysis. EMAX processed the sample and reported the result under sample delivery group (SDG) 06C096.

The analytical data were evaluated according to the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (10/99), the Region 9 Superfund Data Evaluation/Validation Guidance, NDEP Guidance on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodology.

In general, the data are valid as reported and may be used for decision making purposes. No data were rejected or qualified based on data validation.

SAMPLES

The sample included in this review is listed below:

Sample ID
EB-1

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

Sample data were reviewed for the following parameters, where applicable:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Initial and continuing calibrations
- Method blanks/equipment blanks
- Surrogate spike recoveries
- Laboratory control sample (LCS) results
- Matrix spike/matrix spike duplicate (MS/MSD) results
- Field duplicate results
- Compound quantitation
- Quantitation limits and sample results

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample report was checked to verify that the result corresponded to analytical request as designated on the COC. No discrepancies were found

Holding Times and Sample Preservation

The sample was analyzed within the method specified holding time.

The cooler temperature upon receipt at the laboratory was 3.5^{o}C, which was within the acceptance criterion of 4$\pm$ 2^{o}C.

Initial and Continuing Calibrations

The percent relative standard deviations (%RSDs) of all target compounds were within the QC acceptance criteria for the initial calibrations associated with the sample analyses. The percent differences (%Ds) of all target compounds were within the QC acceptance criteria for the continuing calibrations associated with the sample analyses.

The laboratory used 1,1,1-trifluorotoluene(1,1,1-TFT) as a surrogate; however results for 1,1,1-TFT were not reported on the sample results data sheet. Data validation actions are not required for this surrogate nonconformance.

Method Blanks/Equipment Blank

GRO was not detected in the method blank or equipment blank. There were no trip blanks or field blanks reported with the sample in this data package.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Surrogate Spike Recoveries

Surrogate recoveries were within the QC acceptance criteria in the sample analysis.

LCS Results

The percent recoveries (%Rs) and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria for the LCS and LCSD.

MS/MSD Results

MS/MSD analyses were not performed on the sample in this sample set. No validation action was taken on this basis.

Field Duplicate Results

Field duplicate samples were not submitted with this sample set. No validation action was taken on this basis.

Compound Quantitation

The recommended compounds n-hexane and n-decane were used to establish the GRO lower and upper retention time range, respectively. All peaks contributing to the reported result were within the calibrated range.

Quantitation Limits and Sample Results

Calculations were spot-checked. There were no discrepancies noted.

A dilution was not required for the sample in this data set; therefore the sample quantitation limit (SQL) was unaffected and met the target quantitation limit.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date: August 16, 2006 Revised October 9, 2006

To: Dave Gerry/Camarillo

From: Linda Sulkowski/Westford

Subject: Data Validation, VOC Analysis
Henderson Upgradient Investigation
Tronox LLC Henderson, Nevada
EMAX SDG 06C096

Distribution: R. Kennedy/Westford

04020-023-152 File

TH020voclms.rev.doc

SUMMARY

Limited validation was performed on the data for one equipment blank sample analyzed for a project-specific list of volatile organic compounds (VOCs) by SW-846 method 8260B. The sample was collected at the Tronox LLC site in Henderson, Nevada on March 9, 2006 and was submitted to EMAX Laboratories (EMAX) in Torrance, CA for analysis. EMAX processed the sample and reported the results under sample delivery group (SDG) 06C096.

The analytical data were evaluated with reference to the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (10/99), the Region 9 Superfund Data Evaluation/Validation Guidance, NDEP Guidance on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodology.

In general, the data are valid as reported and may be used for decision making purposes. The non-detect result for tert-butyl alcohol was rejected in the sample since the minimum response factor (RF) criterion was not met. No other qualification of the data was required.

SAMPLES

The sample included in this review is listed below:

Sample ID
EB-1 (equipment blank)

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

- Sample data were reviewed for the following parameters, where applicable:
- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Gas chromatography/mass spectrometry (GC/MS) tuning
- Initial and continuing calibrations
- Method blanks/equipment blanks/trip blanks
- Surrogate spike recoveries
- Laboratory control sample (LCS)/laboratory control sample duplicate (LCSD) results
- Matrix spike/matrix spike duplicate (MS/MSD) results
- Internal standard performance
- Field duplicate results
- Quantitation limits and sample results

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample report was checked to verify that the results corresponded to analytical request as designated on the COC. No discrepancies were found.

Holding Times and Sample Preservation

The sample was analyzed within the method specified holding time.

The cooler temperature upon receipt at EMAX was within the acceptance criterion of 4±2°C.

GC/MS Tuning

The frequency and abundance of all bromofluorobenzene (BFB) tuning results were within the QC acceptance criteria. The sample was analyzed within the method specified tuning intervals.

Initial and Continuing Calibrations

The percent relative standard deviations (%RSDs), the correlation coefficients, and/or the RFs of all target compounds were within the QC acceptance criteria for the initial calibration associated with the sample analysis with the following exception. Actions were applied as indicated below.

Compound	RF	Action (Detects/Nondetects)
Tert-butyl alcohol	0.027	J/R
Associated Sample:	EB-1	

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

The percent differences (%Ds) of all target compounds were within the QC acceptance criteria for the continuing calibration associated with the sample analysis.

Method Blanks/Equipment Blanks/Trip Blanks

Trip blanks were not submitted with this sample set. No validation action was taken on this basis.

Target compounds were not detected in the laboratory method blank associated with the sample in this data set. Acetone was detected (6.3 µg/L) in the equipment blank sample. No validation action was taken on this basis since field samples were not submitted with this sample set.

Surrogate Spike Recoveries

Surrogate percent recoveries (%Rs) were within the QC acceptance criteria in the sample analysis.

LCS/LCSD Results

The %Rs and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria for the LCS and LCSD.

MS/MSD Results

MS/MSD analyses were not performed on the sample in this sample set. No validation action was taken on this basis.

Internal Standard Performance

The internal standard performance was within the QC acceptance criteria in the sample analysis.

Field Duplicate Results

Field duplicate samples were not submitted with this sample set. No validation action was taken on this basis.

Quantitation Limits and Sample Results

Dilutions were not performed on the sample in this data set. Sample quantitation limits (SQLs) for this sample were therefore not affected.

It should be noted that the laboratory reported 2-butanone, 4-methyl-2-pentanone, and 2-hexanone with SQLs of 10 µg/L each, instead of the QAPP stipulated SQLs of 5 µg/L for aqueous samples. No data validation action was taken other than this notation.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date: August 25, 2006 Revised October 6, 2006

To: Dave Gerry/Camarillo

From: Vinora Nicholls/Westford

Subject: Data Validation, DRO Analyses
Henderson Upgradient Investigation
Tronox LLC Henderson, Nevada
EMAX SDG 06C106

Distribution: Robert Kennedy/Westford

04020-023-152

TH021DRO.rev

SUMMARY

Limited validation was performed on the data for nine soil samples, including one field duplicate, analyzed for diesel range organics (DRO) and oil range organics (ORO) by SW-846 methods 3550B/8015B. The samples were collected at the Tronox facility in Henderson Nevada on March 10, 2006 and submitted to EMAX Laboratories (EMAX), Inc. in Torrance, California for analysis. EMAX processed the samples and reported the results under sample delivery group (SDG) 06C106.

The analytical data were evaluated according to the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (10/99), the Region 9 Superfund Data Evaluation/Validation Guidance, NDEP Guidance on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodology.

In general, the data are valid as reported and may be used for decision making purposes. No data were rejected or qualified as a result of data validation.

SAMPLES

The samples included in this review are listed below:

Sample IDs	Sample IDs
M121-0.5	M121-50
M121-5	M121-60
M121-10	M121-80
M121-5D	M121-70
M121-30	

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

Sample data were reviewed for the following parameters, where applicable to the method:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Initial and continuing calibrations
- Method blanks/equipment blanks
- Surrogate spike recoveries
- Laboratory control sample (LCS) results
- Matrix spike/matrix spike duplicate (MS/MSD) results
- Field duplicate results
- Compound quantitation
- Quantitation limits and sample results

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. No discrepancies were found

Holding Times and Sample Preservation

The samples were extracted and analyzed within the method specified holding times.

The cooler temperature upon receipt at the laboratory was 3.8^{o}C, which was within the acceptable range of 4$\pm$ 2^{o}C.

Initial and Continuing Calibrations

The percent relative standard deviations (%RSDs) of all target compounds were within the QC acceptance criteria for the initial calibrations associated with the sample analyses. The percent differences (%Ds) of all target compounds were within the QC acceptance criteria for the continuing calibrations associated with the sample analyses.

The laboratory used hexacosane instead of n-octacosane for the surrogate. No validation action was required.

Method Blanks/Equipment Blank

No target compounds were detected in the method blank. There were no trip blanks (TB), equipment blanks (EB), or field blanks (FB) reported with the samples in this data package. The associated equipment blanks, EB-1 and EB-2, were reported under SDG 06C096 and 06C127, respectively. No target compounds were detected in the associated equipment blanks.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Surrogate Spike Recoveries

Surrogate recoveries were within the QC acceptance criteria in all sample analyses.

LCS Results

The percent recoveries (%Rs) and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria for the LCS and LCSD.

MS/MSD Results

MS/MSD analyses were not submitted with this sample set. No validation action was required.

Field Duplicate Results

Samples M121-5 and M121-5D were submitted the field duplicate pair. The results for detected compounds and their relative percent differences (RPDs) are tabulated below. The RPD was not calculable (NC) because both sample and duplicate results were nondetects. Precision was deemed acceptable.

Compound	M121-5 (mg/Kg)	M121-5D (mg/Kg)	RPD
DRO	11U	11U	NC

Compound Quantitation

The recommended compounds (C_{10} and C_{28}) were used to establish the lower and upper retention time range for DRO and the recommended compounds (C28 and C38) were used to establish lower and upper retention time range for ORO (oil range organics).

Quantitation Limits and Sample Results

Calculations were spot-checked. There were no discrepancies noted.

Sample M121-0.5 was analyzed at a 10x dilution factor due to the high concentration found. The sample result and sample quantitation limit were adjusted accordingly. No dilution was required for any other sample in the data set. The project-required reporting limits were not exceeded for any sample in this data set. Sample quantitation limits (SQLs) for all samples were within the target quantitation limits. It should be noted that the laboratory reported that the chromatograms of samples M121-0.5 and M121-30 displayed motor oil-like patterns.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date: August 26, 2006 Revised October 6, 2006

To: Dave Gerry/Camarillo

From: Vinora Nicholls/Westford

Subject: Data Validation, Ethylene Glycol Analyses
Henderson Upgradient Investigation
Tronox LLC Henderson, Nevada
EMAX SDG 06C106

Distribution: Robert Kennedy/Westford

04020-023-152

TH021EG.rev

SUMMARY

Limited validation was performed on the data for seven soil samples, including one field duplicate, analyzed for ethylene glycol by SW-846 method 8015B. The samples were collected at the Tronox facility in Henderson Nevada on March 10, 2006 and submitted to EMAX Laboratories (EMAX), Inc. in Torrance, California for analysis. EMAX analyzed the samples and reported the results under sample delivery group (SDG) 06C106.

The analytical data were evaluated according to the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (10/99), the Region 9 Superfund Data Evaluation/Validation Guidance, NDEP Guidance on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodology.

In general, the data appear to be valid as reported and may be used for decision making purposes. No data were rejected or qualified as a result of data validation.

SAMPLES

The samples included in this review are listed below:

Sample IDs	Sample IDs
M121-0.5	M121-30
M121-5	M121-50
M121-10	M121-80
M121-5D	

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

Sample data were reviewed for the following parameters, where applicable to the method:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Initial and continuing calibrations
- Method blanks/equipment blanks
- Surrogate spike recoveries
- Laboratory control sample (LCS) results
- Matrix spike/matrix spike duplicate (MS/MSD) results
- Field duplicate results
- Compound quantitation
- Quantitation limits and sample results

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. No discrepancies were found.

Holding Times and Sample Preservation

The samples were extracted and analyzed within the method specified holding times.

The cooler temperature upon receipt at the laboratory was 3.8^{o}C, which was within the acceptable range of 4$\pm$ 2^{o}C.

Initial and Continuing Calibrations

The percent relative standard deviations (%RSDs) of all target compounds were within the QC acceptance criteria for the initial calibrations associated with the sample analyses. The percent differences (%Ds) of all target compounds were within the QC acceptance criteria for the continuing calibrations associated with the sample analyses.

Method Blanks/Equipment Blank

No target compounds were detected in the method blank. There were no trip blanks (TB), or field blanks (FB) reported with the samples in this data package. The associated equipment blanks, EB-1 and EB-2, were reported under SDGs 06C096 and 06C127, respectively. No target compounds were detected in the associated equipment blanks.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Surrogate Spike Recoveries

Surrogate spikes were not performed because the EPA method and the laboratory SOP do not require surrogates for direct injection analysis. No validation action was taken on this basis.

LCS Results

The percent recoveries (%Rs) and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria for the LCS and LCSD.

MS/MSD Results

MS/MSD analyses were not submitted with this sample set. No validation action is required.

Field Duplicate Results

Samples M121-5 and M121-5D were submitted as a field duplicate pair. The results and their relative percent differences (RPDs) are tabulated below. Precision was deemed acceptable since RPD criteria were met.

Compound	M121-5 (mg/Kg)	M121-5D (mg/Kg)	RPD
Ethylene Glycol	22U	22U	NC

Compound Quantitation

Retention times were defined during calibration. Retention times fell within acceptance criteria for all samples.

Quantitation Limits and Sample Results

Calculations were spot-checked. There were no discrepancies noted.

No dilution was required for the samples in this data set; therefore the sample quantitation limits (SQLs) were unaffected and met the target quantitation limits.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date: August 25, 2006 Revised October 6, 2006

To: Dave Gerry/Camarillo

From: Vinora Nicholls/Westford

Subject: Data Validation, Alcohols Analyses
Henderson Upgradient Investigation
Tronox LLC Henderson, Nevada
EMAX SDG 06C106

Distribution: Robert Kennedy/Westford 04020-023-152

TH021FA.rev

SUMMARY

Limited validation was performed on the data for seven soil samples, including one field duplicate, analyzed for methanol and ethanol by SW-846 method 8015B. The samples were collected at the Tronox facility in Henderson Nevada on March 10, 2006 and submitted to EMAX Laboratories (EMAX), Inc in Torrance, California for analysis. EMAX analyzed the samples and reported the results under sample delivery group (SDG) 06C106.

The analytical data were evaluated according to the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (10/99), the Region 9 Superfund Data Evaluation/Validation Guidance, NDEP Guidance on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodology.

In general, the data appear to be valid as reported and may be used for decision making purposes. No data were rejected. The subsurface soil methanol results were qualified as probable false positives (Z) due to the same cross-contamination during shipping (see discussion below).

SAMPLES

The samples included in this review are listed below:

Sample IDs	Sample IDs
M121-0.5	M121-50
M121-5	M121-80
M121-10	M121-5D
M121-30	

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

Sample data were reviewed for the following parameters, where applicable to the method:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Initial and continuing calibrations
- Method blanks/equipment blanks
- Surrogate spike recoveries
- Laboratory control sample (LCS) results
- Matrix spike/matrix spike duplicate (MS/MSD) results
- Field duplicate results
- Compound quantitation
- Quantitation limits and sample results

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. No discrepancies were found

Holding Times and Sample Preservation

The samples were extracted and analyzed within the method specified holding times.

The cooler temperature upon receipt at the laboratory was 3.8^{o}C, which was within the acceptance criterion of 4$\pm$ 2^{o}C.

Initial and Continuing Calibrations

The percent relative standard deviations (%RSDs) of all target compounds were within the QC acceptance criteria for the initial calibrations associated with the sample analyses. The percent differences (%Ds) of all target compounds were within the QC acceptance criteria for the continuing calibrations associated with the sample analyses.

Method Blanks/Equipment Blank

No target compounds were detected in the method blank. There were no trip blanks (TB), or field blanks (FB) reported with the samples in this data package. The associated equipment blanks, EB-1 and EB-2, are reported under SDG 06C096 and 06C127, respectively. No target compounds were detected in the associated equipment blanks.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Surrogate Spike Recoveries

Surrogate spikes were not performed because the EPA method and the laboratory SOP do not require surrogates for direct injection analysis. No validation action was taken on this basis.

LCS Results

The percent recoveries (%Rs) and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria for the LCS and LCSD.

MS/MSD Results

MS/MSD analyses were not submitted with this sample set. No validation action was required.

Field Duplicate Results

Samples M121-5 and M121-5D were submitted a field duplicate pair. The results for detected compounds and their relative percent differences (RPDs) are tabulated below. The methanol results were qualified as probable false positives (Z) due to cross-contamination during shipping. Non-uniform cross-contamination in the sample and field duplicate resulted in the high RPD for methanol. The RPD of ethanol was not calculable (NC) due to nondetected results for one sample.

Compound	M121-5 (mg/Kg)	M121-5D (mg/Kg)	RPD
Methanol	0.72J Z	3.7 Z	135
Ethanol	1.1U	1.1	NC

Compound Quantitation

Retention times were defined during calibration. Retention times fell within acceptance criteria for all samples.

Quantitation Limits and Sample Results

Calculations were spot-checked. There were no discrepancies noted.

Sample M121-50 was analyzed at 2-fold dilution due to the concentration of methanol, which would have exceeded the calibration range if analyzed undiluted. The results were combined during validation to provide the lowest reporting limits and all results within the calibration range. The results for both sets of results were included in the data package. No dilution was required for the remaining samples in this data set; therefore the sample quantitation limits (SQLs) were unaffected and met the target quantitation limit.

All the positive subsurface soil methanol results (samples M121-5, M121-10, M121-50, M121-80, M121-5D, and M121-30) were qualified as probable false positives (Z) due to suspected methanol cross-contamination from methanol preserved VOC vials. Soil samples for methanol analysis were collected in capped sleeves and stored in the same ziplock bags as the methanol containing VOC vials during shipping.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date: August 25, 2006 Revised October 9, 2006

To: Dave Gerry/Camarillo

From: Vinora Nicholls/Westford

Subject: Data Validation, GRO Analyses
Henderson Upgradient Investigation
Tronox LLC Henderson, Nevada
EMAX SDG 06C106

Distribution: Robert Kennedy/Westford 04020-023-152

TH021gro.rev.doc

SUMMARY

Limited validation was performed on the data for nine soil samples analyzed for gasoline range organics (GRO) by SW-846 methods 5035/8015B. The samples were collected at the Tronox LLC site in Henderson, Nevada on March 10, 2006 and submitted to EMAX Laboratories (EMAX), Inc in Torrance, California for analysis. EMAX processed the samples and reported the results under sample delivery group (SDG) 06C106.

The analytical data were evaluated according to the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (10/99), the Region 9 Superfund Data Evaluation/Validation Guidance, NDEP Guidance on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodology.

In general, the data are valid as reported and may be used for decision making purposes. No data were rejected or qualified based on data validation.

SAMPLES

The samples included in this review are listed below:

Sample IDs	Sample IDs
M121-0.5	M121-50
M121-5	M121-60
M121-10	M121-80
M121-5D	M121-70
M121-30	

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

Sample data were reviewed for the following parameters, where applicable:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Initial and continuing calibrations
- Method blanks/equipment blanks
- Surrogate spike recoveries
- Laboratory control sample (LCS) results
- Matrix spike/matrix spike duplicate (MS/MSD) results
- Field duplicate results
- Compound quantitation
- Quantitation limits and sample results

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. No discrepancies were found.

Holding Times and Sample Preservation

The samples were analyzed within the method specified holding time.

The cooler temperature upon receipt at the laboratory was 3.8^{o}C, which was within the acceptance criterion of 4$\pm$ 2^{o}C.

Initial and Continuing Calibrations

The percent relative standard deviations (%RSDs) of all target compounds were within the QC acceptance criteria for the initial calibrations associated with the sample analyses. The percent differences (%Ds) of all target compounds were within the QC acceptance criteria for the continuing calibrations associated with the sample analyses.

The laboratory used 1,1,1-trifluorotoluene(1,1,1-TFT) as a surrogate; however results for 1,1,1-TFT were not reported on the sample results data sheet. Data validation actions are not required for this surrogate nonconformance.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Method Blanks/Equipment Blank

GRO was not detected in the method blank. There were no trip blanks (TBs) or field blanks (FBs) reported with the samples in this data package. The associated equipment blanks, EB-1 and EB-2, were reported in SDGs 06C096 and 06C127, respectively. GRO was not detected in the associated equipment blanks.

Surrogate Spike Recoveries

Surrogate recoveries were within the QC acceptance criteria in all sample analyses.

LCS Results

The percent recoveries (%Rs) and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria for the LCS and LCSD.

MS/MSD Results

MS/MSD analyses were not performed on a sample in this sample set. No validation action was taken on this basis

Field Duplicate Results

Samples M121-5 and M121-5D were submitted as the field duplicate pair. The RPD was not calculable (NC) because the sample and duplicate results were both nondetect. Precision was deemed acceptable.

Compound	M121-5 (mg/Kg)	M121-5D (mg/Kg)	RPD
GRO	1.2 U	1.1 U	NC

Compound Quantitation

The recommended compounds n-hexane and n-decane were used to establish the GRO lower and upper retention time range, respectively. All peaks contributing to the reported results were within the calibrated range.

Quantitation Limits and Sample Results

Calculations were spot-checked. There were no discrepancies noted.

All samples except M121-5D were analyzed at minor dilutions due to the sample preparation requirement. Sample results and sample quantitation limits were adjusted accordingly. The project-required reporting limits were not exceeded for any samples in this data set.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date:	August 14, 2006 Revised October 10, 2006
To:	David Gerry/Camarillo
From:	Linda Sulkowski/Westford
Subject:	Data Validation, Metals Analysis Henderson Upgradient Investigation Tronox LLC Henderson, Nevada EMAX SDG 06C106
Distribution:	R. Kennedy/Westford

04020-023-152
TH021inolms.rev

SUMMARY

Limited validation was performed on the data for 10 soil samples analyzed for a project-specific list of metals by SW-846 methods 6020A and 7471A. The samples were collected at the Tronox LLC site in Henderson, Nevada on March 10, 2006 and were submitted to EMAX Laboratories (EMAX) in Torrance, CA for analysis. EMAX processed the samples and reported the results under sample delivery group (SDG) 06C106.

The analytical data were evaluated with reference 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 on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodologies.

In general, the data are valid as reported and may be used for decision making purposes. No data were rejected. Selected results for molybdenum were qualified due to nonconformance with certain QC criteria (see discussion below).

SAMPLES

The samples included in this review are listed below.

Sample IDs	
M121-0.5	M121-5
M121-5D (field duplicate of M121-5)	M121-10
M121-20	M121-30
M121-40	M121-50
M121-60	M121-80

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

Sample data were reviewed for the following parameters, where applicable to the method:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Inductively coupled plasma/mass spectrometry (ICP/MS) tuning
- Initial and continuing calibrations
- Method blanks/equipment blanks
- Laboratory control sample (LCS)/laboratory control sample duplicate (LCSD) results
- Matrix spike/matrix spike duplicate (MS/MSD) results
- Internal standard performance
- Field duplicate results
- Quantitation limits and sample results

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. No discrepancies were found.

Holding Times and Sample Preservation

The samples were digested and analyzed within the method specified holding times.

The cooler temperature upon receipt at EMAX was within the acceptance criteria of 4 ± 2°C.

ICP/MS Tuning

A tuning solution (daily performance check) containing elements representing all of the mass regions of interest was analyzed at the beginning of each analytical sequence. The percent relative standard deviations (%RSDs) for elements in the tuning solution met the QC acceptance criteria of <5%.

Initial and Continuing Calibrations

All criteria were met for the calibration curves, and the initial and continuing calibration verification (ICV/CCV) standards.

Method Blanks/Equipment Blanks

Molybdenum and vanadium were detected in the laboratory preparation blank at concentrations > the method detection limit (MDL), but < the sample quantitation limit (SQL). Aluminum, copper, iron, manganese, and/or zinc were detected in the equipment blank samples EB-1 and EB-2, which were reported in SDGs 16C096 and 06C127, respectively. Target analytes were not detected in the bracketing continuing calibration blanks (CCBs) associated with the soil samples. The presence of

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

blank contamination indicated that false positive results might have existed for these analytes in the associated samples. The following tables summarize the highest level of blank contamination and the associated samples.

Type of Blank	Analyte	Maximum Blank Concentration* (mg/Kg)
Preparation Blank	Molybdenum	0.137 J
	Vanadium	0.132 J
Associated samples: All sediment samples in this data set. *Adjusted for sample preparation factors and moisture content.		

Type of Blank	Analyte	Maximum Blank Concentration* (µg/L)
Equipment Blank EB-1	Aluminum	41
	Copper	4.4
Equipment Blank EB-2	Iron	0.48 J
	Manganese	8.4
	Zinc	17
Associated samples: All sediment samples in this data set. *Adjusted for sample preparation factors and moisture content.		

Sample results were qualified as follows:

For blank results >the SQL:

- Positive sample results $\geq$ MDL, but $\leq$ SQL were qualified as nondetect (U) at the SQL.
- Positive sample results > SQL, but < 10x the blank result were qualified as estimated, biased high (J+).
- Positive sample results that were $\geq$ 10x the blank result were accepted unqualified.

For blank results $\geq$ MDL, but $\leq$ SQL:

- Nondetect results were accepted unqualified.
- Positive sample results $\geq$ MDL, but $\leq$ SQL were qualified as nondetect (U) at the SQL.
- Positive sample results > SQL and < the Action Level (AL) of 5x the blank contamination level were qualified as undetected (U) at the reported concentration.

LCS/LCSD Results

The %Rs and relative percent differences (RPDs) of all spiked analytes were within the QC acceptance criteria for the LCS and LCSD.

MS/MSD Results

MS/MSD analyses were not performed on a sample from this sample set. No validation action was taken on this basis.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Internal Standard Performance

The internal standard performance was within the QC acceptance criteria in all sample analyses.

Field Duplicate Results

Samples M121-5 and M121-5D were submitted as the field duplicate pair with this sample set. The following table summarizes the RPDs of the detected analytes in field duplicate samples M121-5 and M121-5D. The RPD was not calculable (NC) for antimony due to a nondetect result in sample M121-5. Precision was deemed acceptable for antimony since the detected result in field duplicate sample M121-5D was < 10x the MDL.

Compound	M121-5 (mg/Kg)	M121-5D (mg/Kg)	RPD
Aluminum	8000	8410	5
Antimony	0.111 U	0.328	NC
Arsenic	3.96	3.8	4
Barium	136	145	6
Beryllium	0.483	0.517	7
Cadmium	0.388	0.367	6
Calcium	64400	50300	25
Chromium	8.28	9.99	19
Cobalt	6	6.44	7
Copper	13.2	14.1	7
Iron	9410	10500	11
Lead	5.99	5.93	1
Magnesium	10800	12600	15
Manganese	253	260	3
Molybdenum	0.363	0.468	25
Nickel	13.4	14.8	10
Potassium	1770	1620	9
Selenium	0.205	0.201	2
Sodium	765	851	11

Compound	M121-5 (mg/Kg)	M121-5D (mg/Kg)	RPD
Strontium	256	260	2
Titanium	508	593	15
Uranium	1.01	1.04	3
Vanadium	23.6	28.1	17
Zinc	27	28.3	5

Quantitation Limits and Sample Results

Dilutions were not performed on samples in this data set; therefore, the SQLs were not affected.

It should be noted that the laboratory reported results between the MDL and the SQL as estimated (J).

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date: August 16, 2006 Revised October 9, 2006

To: Dave Gerry/Camarillo

From: Linda Sulkowski/Westford

Subject: Data Validation, VOC Analysis
Henderson Upgradient Investigation
Tronox LLC Henderson, Nevada
EMAX SDG 06C106

Distribution: R. Kennedy/Westford

04020-023-152 File

TH021voclms.rev.doc

SUMMARY

Limited validation was performed on the data for nine soil samples analyzed for a project-specific list of volatile organic compounds (VOCs) by SW-846 methods 5035/8260B. The samples were collected at the Tronox LLC site in Henderson, Nevada on March 10, 2006 and were submitted to EMAX Laboratories (EMAX) in Torrance, CA for analysis. EMAX processed the samples and reported the results under sample delivery group (SDG) 06C106.

The analytical data were evaluated with reference to the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (10/99), the Region 9 Superfund Data Evaluation/Validation Guidance, NDEP Guidance on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodology.

In general, the data are valid as reported and may be used for decision making purposes. Results for tert-butyl alcohol were rejected in all samples since the minimum response factor (RF) criterion was not met. No other qualification of the data was required.

SAMPLES

The samples included in this review are listed below:

Sample IDs	Sample IDs
M121-0.5	M121-5
M121-5D (field duplicate of M121-5)	M121-10
M121-30	M121-50
M121-60	M121-70
M121-80	

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

Sample data were reviewed for the following parameters, where applicable:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Gas chromatography/mass spectrometry (GC/MS) tuning
- Initial and continuing calibrations
- Method blanks/equipment blanks/trip blanks
- Surrogate spike recoveries
- Laboratory control sample (LCS)/laboratory control sample duplicate (LCSD) results
- Matrix spike/matrix spike duplicate (MS/MSD) results
- Internal standard performance
- Field duplicate results
- Quantitation limits and sample results

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. The following discrepancies were found.

Sample M121-0.5 was received with one broken vial. Sufficient sample was received to complete the analysis. No validation action was taken on this basis.

The collection time was not listed on the vial label for sample M121-60. No validation action was taken on this basis.

The collection date and time were not listed on the vial label for sample M121-70. No validation action was taken on this basis.

Holding Times and Sample Preservation

The samples were analyzed within the method specified holding time.

The cooler temperature upon receipt at EMAX was within the acceptance criterion of 4±2°C.

GC/MS Tunes

The frequency and abundance of all bromofluorobenzene (BFB) tuning results were within the QC acceptance criteria. The samples were analyzed within the method specified tuning intervals.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Initial and Continuing Calibrations

The percent relative standard deviations (%RSDs), the correlation coefficients, and/or the RFs of all target compounds were within the QC acceptance criteria for the initial calibration associated with the sample analyses with the following exception. Actions were applied as indicated below.

Compound	RF	Action (Detects/Nondetects)
Tert-butyl alcohol	0.027	J/R
Associated Samples:	All samples	

The percent differences (%Ds) of all target compounds were within the QC acceptance criteria for the continuing calibration associated with the sample analyses.

Method Blanks/Equipment Blanks/Trip Blanks

Trip blanks were not submitted with this sample set. No validation action was taken on this basis.

Target compounds were not detected in the laboratory method blank associated with the samples in this data set.

Equipment blank samples EB-1 (reported in SDG 06C096) and EB-2 (reported in SDG 06C127) were associated with selected soil samples in this data set. Acetone was detected in EB-1 and EB-2 at 6.3 and 9.9 μg/L, respectively. The presence of blank contamination indicates that false positives may exist for this compound in the associated samples. An Action Level (AL) was established for the highest reported concentration of acetone at 10x the concentration detected. The following table summarizes the AL and the associated samples.

Blank Type	Compound	Concentration (μg/L)	AL (μg/Kg)	Associated Samples
EB-2 (equipment blank)	Acetone	9.9 J	99	M121-0.5, M121-10, M121-30, M121-50, M121-60, M121-70, M121-80

Sample results were qualified as follows:

- If the sample result was ≤ AL and ≤ the sample quantitation limit (SQL), the result was qualified as nondetect (U) at the SQL.
- If the sample result was ≤ AL and > SQL, the result was qualified as nondetect (U) at the reported concentration.
- If the sample result was > AL, the result was not qualified.

Surrogate Spike Recoveries

Surrogate percent recoveries (%Rs) were within the QC acceptance criteria in all sample analyses.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

LCS/LCSD Results

The %Rs and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria for the LCS and LCSD.

MS/MSD Results

MS/MSD analyses were not performed on a sample from this sample set. No validation action was taken on this basis.

Internal Standard Performance

The internal standard performance was within the QC acceptance criteria in all sample analyses.

Field Duplicate Results

Samples M121-5 and M121-5D were submitted as the field duplicate pair with this sample set. The following table summarizes the RPD of the detected analyte. Precision was deemed acceptable.

Compound	M121-5 (µg/Kg)	M121-5D (µg/Kg)	RPD
Acetone	6.5 J	5.6 J	15

Quantitation Limits and Sample Results

Dilutions were not performed on samples in this data set. Sample quantitation limits (SQLs) for these samples were therefore not affected.

It should be noted that the laboratory reported 2-butanone, 4-methyl-2-pentanone, and 2-hexanone with SQLs of 10 µg/kg each, instead of the QAPP stipulated SQLs of 5 µg/kg for all soil samples. No data validation action was taken other than this notation.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date:	August 10, 2006 Revised October 9, 2006	
To:	David Gerry/Camarillo	
From:	Sheena Blair/Westford	
Subject:	Data Validation, Inorganic Analysis Henderson Upgradient Investigation Tronox LLC Henderson, Nevada EMAX SDG 06C106	
Distribution:	R. Kennedy/Westford	04020-023-152 TH021wc.sb.rev

SUMMARY

Limited validation was performed on the data for 10 soil samples analyzed for all or a subset of the following parameters:

- Chloride by SW-846 method 9056
- Nitrate as nitrogen by SW-846 method 9056
- Nitrite as nitrogen by SW-846 method 9056
- Sulfate by SW-846 method 9056
- Total cyanide by SW-846 method 9014
- Hexavalent chromium by SW-846 method 7199
- Chlorate by EPA 300.0 modified
- Perchlorate by EPA 314.0
- Total alkalinity by EPA 310.1
- Bicarbonate alkalinity by EPA 310.1(calculated from total and carbonate alkalinity)
- Carbonate alkalinity by EPA 310.1
- Specific conductance by SM 2510B, and
- pH by SW-846 method 9045C

The samples were collected at the Henderson site in Henderson, NV on March 10, 2006 and submitted to EMAX Laboratories, Inc in Torrance, CA for analysis. EMAX processed the samples and reported the results under sample delivery group (SDG) 06C106.

The analytical data were evaluated with reference 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 on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodologies.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

In general, the data are valid as reported and may be used for decision making purposes. No data were rejected.

SAMPLES

The samples included in this review are listed below:

Sample IDs	
M121-0.5	M121-30*
M121-5	M121-40
M121-10-	M121-50*
M121-20	M121-60
M121-5D (field duplicate of M121-5)	M121-80
*Analyzed for all listed parameters, all other samples were analyzed for perchlorate and hexavalent chromium only	

REVIEW ELEMENTS

Sample data were reviewed for the following elements, where applicable to the method:

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

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. The following discrepancies were found:

- The collection time was not recorded on the sample container label for sample M121-60. However, the collection time were listed on the COC. No validation action was taken other than this notation.

- The collection date and time were not recorded on the sample container label for sample M121-70. However, the collection date and time were listed on the COC. No validation action was taken other than this notation.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Holding Times and Sample Preservation

All samples were analyzed within the method-specified holdings times for all parameters analyzed.

The cooler temperature upon receipt at EMAX was within the acceptance criteria of 4 ± 2°C.

Initial and Continuing Calibrations

All criteria were met for the calibration curves, and the initial and continuing calibration verification (ICV/CCV) standards (where applicable to the methods).

Laboratory Blanks/Equipment Blanks

No equipment blanks were associated with the samples in this data set, except for perchlorate and hexavalent chromium in soils. No validation action was taken on this basis.

Equipment blank sample EB-1 was submitted for perchlorate and hexavalent chromium, and reported under MWH Data Report number 169405R. Perchlorate and hexavalent chromium were not detected in EB-1; therefore no validation action was taken.

Equipment blank sample EB-2 was submitted for perchlorate only and reported under MWH Data Report number 169653R. Perchlorate was not detected in EB-2; therefore no validation action was taken.

Target compounds were not detected in the laboratory blanks associated with the samples in this data set.

LCS/LCSD Results

The percent recoveries (%Rs) and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria for all LCSs and LCSDs.

MS/MSD Results

MS analysis was performed on sample M121-40 for hexavalent chromium. The %R met the laboratory QC acceptance criteria.

Batch MS or MS/MSD analyses were performed on samples from other clients for all parameters, except for hexavalent chromium. Although this practice is acceptable, the results could not be directly applied to the samples analyzed in this data package because of possible differences in the sample matrix and type. No validation action was taken on this basis.

Laboratory Duplicate Results

Laboratory duplicate analyses were only performed on all the samples for hexavalent chromium, and all RPDs met the laboratory QC acceptance criteria. The other parameters in this data set did not have associated laboratory duplicate analyses. Thus, for parameters without an associated laboratory duplicate, the LCS/LCSD and/or the MS/MSD demonstrated precision and accuracy in the laboratory (see discussions above).

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Field Duplicate Results

Samples M121-0.5 and MW121-0.5D were submitted as the field duplicate pair for perchlorate and hexavalent chromium analyses. There was no field duplicate pair submitted or associated with the other parameters in this data set.

Hexavalent chromium was not detected in the field duplicate samples M121-0.5 and MW121-0.5D; therefore, precision was deemed to be acceptable. The following table summarizes the RPD for perchlorate in the field duplicate samples.

Analyte	M121-0.5 (µg/Kg)	M121-0.5D (µg/Kg)	RPD	Action
Perchlorate	3610	3010	18	None

The RPD for perchlorate met the QC acceptance criteria of 50% for a soil matrix.

Quantitation Limits and Sample Results

Dilutions were performed for selected parameters due to elevated concentrations of these analytes present in the sample. The following table lists the samples, analytes, and the dilutions required.

Sample ID	Analyte	Dilution Factor
M121-5	Perchlorate	10x
M121-5D	Perchlorate	10x
M121-30	Chloride, Sulfate	5x

It should be noted that the laboratory reported results between the MDL and the SQL. These results were qualified as estimated (J) by the laboratory. No validation action was taken on this basis.

Selected EMAX reporting limits did not meet the limits stated in the QAPP. No validation action was taken other than this notation.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date: August 25, 2006 Revised October 6, 2006

To: Dave Gerry/Camarillo

From: Vinora Nicholls/Westford

Subject: Data Validation, DRO Analyses
Henderson Upgradient Investigation
Tronox LLC Henderson, Nevada
EMAX SDG 06C119

Distribution: Robert Kennedy/Westford 04020-023-152

TH022DRO.rev

SUMMARY

Limited validation was performed on the data for one pump blank, analyzed for diesel range organics (DRO) and oil range organics (ORO) by SW-846 method 3520C/8015B. The sample was collected at the Tronox facility in Henderson Nevada on March 13, 2006 and submitted to EMAX Laboratories, Inc. in Torrance, California for analysis. EMAX analyzed the sample and reported the result under sample delivery group (SDG) 06C119.

The analytical data were evaluated according to the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (10/99), the Region 9 Superfund Data Evaluation/Validation Guidance, NDEP Guidance on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodology.

In general, the data are valid as reported and may be used for decision making purposes. No data were rejected or qualified based on the results of data validation.

SAMPLES

The sample included in this review is listed below:

Sample ID
Pump Blank

REVIEW ELEMENTS

Sample data were reviewed for the following parameters, where applicable to the method:

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Initial and continuing calibrations
- Method blanks/equipment blanks
- Surrogate spike recoveries
- Laboratory control sample (LCS) results
- Matrix spike/matrix spike duplicate (MS/MSD) results
- Field duplicate results
- Compound quantitation
- Quantitation limits and sample results

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. Sample TR-10A listed on the corrected chain-of-custody was not reported.

Holding Times and Sample Preservation

The samples were extracted and analyzed within the method specified holding times.

The cooler temperature upon receipt at the laboratory was 4.3 ^{o}C, which was within the acceptance criterion of 4$\pm$ 2^{o}C.

Initial and Continuing Calibrations

The percent relative standard deviations (%RSDs) of all target compounds were within the QC acceptance criteria for the initial calibrations associated with the sample analyses. The percent differences (%Ds) of all target compounds were within the QC acceptance criteria for the continuing calibrations associated with the sample analyses.

The laboratory used hexacosane instead of n-octacosane for the surrogate. No validation action was required.

Method Blanks/Equipment Blank

No target compounds were detected in the method blank. There were no equipment blank (EB) or field blank (FB) reported with the samples in this data package.

Surrogate Spike Recoveries

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Surrogate recovery was slightly outside the QC acceptance criteria in the Pump Blank sample (62% compared to the lower QC limit of 63%). Positive results were qualified as estimated (J) based on this surrogate recovery.

LCS Results

The percent recoveries (%Rs) and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria for the LCS and LCSD.

MS/MSD Results

MS/MSD analyses were not submitted with this sample set. No validation action is required.

Field Duplicate Results

Field duplicate samples were not submitted with this sample set. No validation action is required.

Compound Quantitation

The recommended compounds (C_{10} and C_{28}) were used to establish the lower and upper retention time range for DRO and the recommended compounds (C28 and C38) were used to establish lower and upper retention time range for ORO (oil range organics).

Quantitation Limits and Sample Results

Calculations were spot-checked. There were no discrepancies noted.

The sample was analyzed at a minor dilution due to the sample preparation requirement. Sample result and sample quantitation limit were adjusted accordingly. The project required reporting limit was not exceeded. Sample quantitation limits (SQL) were within the target quantitation limits. A very large discrete peak found in the sample was quantified as DRO although the chromatographic pattern did not match the calibration standard for diesel fuel. No validation action was taken based on results for the Pump Blank because the actual pump involved was not used for sample collection.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date: August 26, 2006 Revised October 6, 2006

To: Dave Gerry/Camarillo

From: Vinora Nicholls/Westford

Subject: Data Validation, Ethylene Glycol Analyses
Henderson Upgradient Investigation
Tronox LLC Henderson, Nevada
EMAX SDG 06C119

Distribution: Robert Kennedy/Westford 04020-023-152

TH022EG.rev

SUMMARY

Limited validation was performed on the data for one groundwater sample analyzed for ethylene glycol by SW-846 method 8015B. The sample was collected at the Tronox facility in Henderson Nevada on March 13, 2006 and submitted to EMAX Laboratories (EMAX), Inc. in Torrance, California for analysis. EMAX analyzed the sample and reported the result under sample delivery group (SDG) 06C119.

The analytical data were evaluated according to the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (10/99), the Region 9 Superfund Data Evaluation/Validation Guidance, NDEP Guidance on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodology.

In general, the data are valid as reported and may be used for decision making purposes. No data were rejected or qualified based on the results of the data validation.

SAMPLES

The sample included in this review is listed below:

Sample ID
TR-10A

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

Sample data were reviewed for the following parameters, where applicable to the method:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Initial and continuing calibrations
- Method blanks/equipment blanks
- Surrogate spike recoveries
- Laboratory control sample (LCS) results
- Matrix spike/matrix spike duplicate (MS/MSD) results
- Field duplicate results
- Compound quantitation
- Quantitation limits and sample results

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample report was checked to verify that the results corresponded to analytical requests as designated on the COC. No discrepancies were found.

Holding Times and Sample Preservation

The sample was extracted and analyzed within the method specified holding times.

The cooler temperature upon receipt at the laboratory was 4.3 ^{o}C, which was within the acceptance criterion of 4$\pm$ 2^{o}C.

Initial and Continuing Calibrations

The percent relative standard deviations (%RSDs) of all target compounds were within the QC acceptance criteria for the initial calibrations associated with the sample analyses. The percent differences (%Ds) of all target compounds were within the QC acceptance criteria for the continuing calibrations associated with the sample analyses.

Method Blanks/Equipment Blank

No target compounds were detected in the method blank. There were no trip blanks (TB), equipment blanks (EB), or field blanks (FB) reported with the samples in this data package. The associated equipment blank EB-3 is reported under SDG 06C239. No target compounds were detected in the associated equipment blank.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Surrogate Spike Recoveries

Surrogate spikes were not performed because the EPA method and the laboratory SOP do not require surrogates for direct injection analysis. No validation action was taken on this basis.

LCS Results

The percent recoveries (%Rs) and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria for the LCS and LCSD.

MS/MSD Results

MS/MSD analyses were not submitted with this sample set. No validation action was required.

Field Duplicate Results

Field duplicate samples were not submitted with this sample set. No validation action was required.

Compound Quantitation

Retention times were defined during calibration. Retention times fell within acceptance criteria for the sample.

Quantitation Limits and Sample Results

Calculations were spot-checked. There were no discrepancies noted.

No dilution was required for the sample in this data set; therefore the sample quantitation limit (SQL) was unaffected and met the target quantitation limit.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date:	August 15, 2006 Revised October 6, 2006	
To:	Dave Gerry/Camarillo	
From:	Vinora Nicholls/Westford	
Subject:	Data Validation, Alcohols Analyses Henderson Upgradient Investigation Tronox LLC Henderson, Nevada EMAX SDG 06C119	
Distribution:	Robert Kennedy/Westford	04020-023-152 TH022FA.rev

SUMMARY

Limited validation was performed on the data for one groundwater sample analyzed for methanol and ethanol by SW-846 method 8015B. The sample was collected at the Tronox facility in Henderson Nevada on March 13, 2006 and submitted to EMAX Laboratories (EMAX), Inc in Torrance, California for analysis. EMAX analyzed the sample and reported the results under sample delivery group (SDG) 06C119.

The analytical data were evaluated according to the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (10/99), the Region 9 Superfund Data Evaluation/Validation Guidance, NDEP Guidance on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodology.

In general, the data are valid as reported and may be used for decision making purposes. No data were rejected or qualified based on the results of data validation.

SAMPLES

The sample included in this review is listed below:

Sample IDs
TR-10A

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

Sample data were reviewed for the following parameters, where applicable to the method:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Initial and continuing calibrations
- Method blanks/equipment blanks
- Surrogate spike recoveries
- Laboratory control sample (LCS) results
- Matrix spike/matrix spike duplicate (MS/MSD) results
- Field duplicate results
- Compound quantitation
- Quantitation limits and sample results

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. No discrepancies were found.

Holding Times and Sample Preservation

The samples were extracted and analyzed within the method specified holding times.

The cooler temperature upon receipt at the laboratory was 4.3 ^{o}C, which was within the acceptance criterion of 4$\pm$ 2^{o}C.

Initial and Continuing Calibrations

The percent relative standard deviations (%RSDs) of all target compounds were within the QC acceptance criteria for the initial calibrations associated with the sample analyses. The percent differences (%Ds) of all target compounds were within the QC acceptance criteria for the continuing calibrations associated with the sample analyses.

Method Blanks/Equipment Blank

No target compounds were detected in the method blank. There were no trip blanks (TB), equipment blanks (EB) or field blanks (FB) reported with the sample in this data package. The associated equipment blank EB-3 was reported under SDG 06C239. No target compounds were detected in the associated equipment blank.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Surrogate Spike Recoveries

Surrogate spikes were not performed because the EPA method and the laboratory SOP do not require surrogates for direct injection analysis. No validation action was taken on this basis.

LCS Results

The percent recoveries (%Rs) and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria for the LCS and LCSD.

MS/MSD Results

MS/MSD analyses were not submitted with this sample set. No validation action is required.

Field Duplicate Results

Field duplicate samples were not submitted with this sample set. No validation action is required.

Compound Quantitation

Retention times were defined during calibration. Retention times fell within acceptance criteria for all samples.

Quantitation Limits and Sample Results

Calculations were spot-checked. There were no discrepancies noted.

No dilution was required for the sample in this data set; therefore the sample quantitation limit (SQL) was unaffected and met the target quantitation limit.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date: August 26, 2006 Revised October 9, 2006

To: Dave Gerry/Camarillo

From: Vinora Nicholls/Westford

Subject: Data Validation, GRO Analyses
Henderson Upgradient Investigation
Tronox LLC Henderson, Nevada
EMAX SDG 06C119

Distribution: Robert Kennedy/Westford

04020-023-152

TH022gro.rev.doc

SUMMARY

Limited validation was performed on the data for one groundwater sample analyzed for gasoline range organics (GRO) by SW-846 methods 5030B/8015B. The sample was collected at the Tronox LLC site in Henderson, Nevada on March 13, 2006 and submitted to EMAX Laboratories (EMAX), Inc. in Torrance, California for analysis. EMAX processed the sample and reported the results under sample delivery group (SDG) 06C119.

The analytical data were evaluated according to the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (10/99), the Region 9 Superfund Data Evaluation/Validation Guidance, NDEP Guidance on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodology.

In general, the data are valid as reported and may be used for decision making purposes. No data were rejected or qualified based on data validation.

SAMPLES

The sample included in this review is listed below:

Sample ID
TR-10A

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

Sample data were reviewed for the following parameters, where applicable:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Initial and continuing calibrations
- Method blanks/equipment blanks
- Surrogate spike recoveries
- Laboratory control sample (LCS) results
- Matrix spike/matrix spike duplicate (MS/MSD) results
- Field duplicate results
- Compound quantitation
- Quantitation limits and sample results

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample report was checked to verify that the result corresponded to the analytical request as designated on the COC. No discrepancies were found.

Holding Times and Sample Preservation

The sample was analyzed within the method specified holding times.

The cooler temperature upon receipt at the laboratory was 4.3 ^{o}C, which was within the acceptance criterion of 4$\pm$ 2^{o}C.

Initial and Continuing Calibrations

The percent relative standard deviations (%RSDs) of all target compounds were within the QC acceptance criteria for the initial calibrations associated with the sample analyses. The percent differences (%Ds) of all target compounds were within the QC acceptance criteria for the continuing calibrations associated with the sample analyses.

The laboratory used 1,1,1-trifluorotoluene(1,1,1-TFT) as a surrogate; however results for 1,1,1-TFT were not reported on the sample results data sheet. Data validation actions are not required for this surrogate nonconformance.

Method Blanks/Equipment Blank

GRO was not detected in the method blank. There were no trip blanks (TBs), equipment blanks (EBs), or field blanks (FBs) reported with the sample in this data package. The associated equipment blank, EB-3, was reported in SDG 06C239. GRO was not detected in the associated equipment blank.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Surrogate Spike Recoveries

Surrogate recoveries were within the QC acceptance criteria in the sample analysis.

LCS Results

The percent recoveries (%Rs) and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria for the LCS and LCSD.

MS/MSD Results

MS/MSD analyses were not performed on the sample in this sample set. No validation action was taken on this basis.

Field Duplicate Results

Field duplicate samples were not submitted with this sample set. No validation action was taken on this basis.

Compound Quantitation

The recommended compounds n-hexane and n-decane were used to establish the GRO lower and upper retention time range, respectively. All peaks contributing to the reported results were within the calibrated range.

Quantitation Limits and Sample Results

Calculations were spot-checked. There were no discrepancies noted.

The sample was analyzed at a minor dilution due to the sample preparation requirement. The sample result and sample quantitation limit were adjusted accordingly. The project-required reporting limit was not exceeded. The laboratory reported that discrete peaks in sample TR-10A were not reported. Although the area of the peaks would have produced a GRO result over the method detection limit, they were excluded from the range and were considered a laboratory artifact and the result for TR-10A was reported as nondetect.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date: August 16, 2006 Revised October 9, 2006

To: Dave Gerry/Camarillo

From: Linda Sulkowski/Westford

Subject: Data Validation, VOC Analysis
Henderson Upgradient Investigation
Tronox LLC Henderson, Nevada
EMAX SDG 06C119

Distribution: R. Kennedy/Westford

04020-023-152 File

TH022voclms.rev.doc

SUMMARY

Limited validation was performed on the data for two aqueous samples analyzed for a project-specific list of volatile organic compounds (VOCs) by SW-846 methods 5030B/8260B. The samples were collected at the Tronox LLC site in Henderson, Nevada on March 13, 2006 and were submitted to EMAX Laboratories (EMAX) in Torrance, CA for analysis. EMAX processed the samples and reported the results under sample delivery group (SDG) 06C119.

The analytical data were evaluated with reference to the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (10/99), the Region 9 Superfund Data Evaluation/Validation Guidance, NDEP Guidance on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodology.

In general, the data are valid as reported and may be used for decision making purposes. Results for tert-butyl alcohol were rejected in all samples since the minimum response factor (RF) criterion was not met. No other qualification of the data was required.

SAMPLES

The samples included in this review are listed below:

Sample IDs	Sample IDs
TR-10A	Pump Blank

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

Sample data were reviewed for the following parameters, where applicable:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Gas chromatography/mass spectrometry (GC/MS) tuning
- Initial and continuing calibrations
- Method blanks/equipment blanks/trip blanks
- Surrogate spike recoveries
- Laboratory control sample (LCS)/laboratory control sample duplicate (LCSD) results
- Matrix spike/matrix spike duplicate (MS/MSD) results
- Internal standard performance
- Field duplicate results
- Quantitation limits and sample results

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. The following discrepancies were found.

The original COC did not contain sample Pump Blank. The laboratory received a corrected COC from ENSR via fax.

The collection times were not listed on the vial label for the samples. No validation action was taken on this basis.

Holding Times and Sample Preservation

The samples were analyzed within the method specified holding time.

The cooler temperature upon receipt at EMAX was within the acceptance criterion of 4±2°C.

GC/MS Tuning

The frequency and abundance of all bromofluorobenzene (BFB) tuning results were within the QC acceptance criteria. The samples were analyzed within the method specified tuning intervals.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Initial and Continuing Calibrations

The percent relative standard deviations (%RSDs), the correlation coefficients, and/or the RFs of all target compounds were within the QC acceptance criteria for the initial calibration associated with the sample analyses with the following exception. Actions were applied as indicated below.

Compound	RF	Action (Detects/Nondetects)
tert-butyl alcohol	0.027	J/R
Associated Samples:	All samples	

The percent differences (%Ds) of all target compounds were within the QC acceptance criteria for the continuing calibration associated with the sample analyses.

Method Blanks/Equipment Blanks/Trip Blanks

Trip blanks were not submitted with this sample set. No validation action was taken on this basis.

Equipment blank sample EB-3, reported in SDG 06C239, was associated with the samples in this data set. Target compounds were not detected in EB-3, therefore, no validation action was necessary.

Target compounds were not detected in the pump blank or in the laboratory method blank associated with the samples in this data set.

Surrogate Spike Recoveries

Surrogate percent recoveries (%Rs) were within the QC acceptance criteria in all sample analyses.

LCS/LCSD Results

The %Rs and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria for the LCS and LCSD.

MS/MSD Results

MS/MSD analyses were not performed on a sample from this sample set. No validation action was taken on this basis.

Internal Standard Performance

The internal standard performance was within the QC acceptance criteria in all sample analyses.

Field Duplicate Results

Field duplicate samples were not submitted with this sample set. No validation action was taken on this basis.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Quantitation Limits and Sample Results

Dilutions were not performed on samples in this data set. Sample quantitation limits (SQLs) for these samples were therefore not affected.

It should be noted that the laboratory reported 2-butanone, 4-methyl-2-pentanone, and 2-hexanone with SQLs of 10 µg/L each, instead of the QAPP stipulated SQLs of 5 µg/L for aqueous samples. No data validation action was taken other than this notation.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date: August 25, 2006 Revised October 6, 2006

To: Dave Gerry/Camarillo

From: Vinora Nicholls/Westford

Subject: Data Validation, DRO Analyses
Henderson Upgradient Investigation
Tronox LLC Henderson, Nevada
EMAX SDG 06C120

Distribution: Robert Kennedy/Westford 04020-023-152

TH023DRO.rev

SUMMARY

Limited validation was performed on the data for thirteen soil samples including two duplicate pairs, analyzed for diesel range organics (DRO) and oil range organics (ORO) by SW-846 methods 3550/8015B. The samples were collected at the Tronox facility in Henderson Nevada on March 11 and March 12, 2006 and submitted to EMAX Laboratories, Inc in Torrance, California for analysis. EMAX analyzed the samples and reported the results under sample delivery group (SDG) 06C120.

The analytical data were evaluated according to the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (10/99), the Region 9 Superfund Data Evaluation/Validation Guidance, NDEP Guidance on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodology.

In general, the data are valid as reported and may be used for decision making purposes. No data were rejected or qualified based on the results of data validation.

SAMPLES

The samples included in this review are listed below:

Sample IDs	Sample IDs
M116-0.5	M117-0.5
M116-0.5D	M117-5
M116-5	M117-10
M116-10	M117-30
M116-30	M117-50
M116-50	M117-80
	M11780-D

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

Sample data were reviewed for the following parameters, where applicable to the method:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Initial and continuing calibrations
- Method blanks/equipment blanks
- Surrogate spike recoveries
- Laboratory control sample (LCS) results
- Matrix spike/matrix spike duplicate (MS/MSD) results
- Field duplicate results
- Compound quantitation
- Quantitation limits and sample results

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. No discrepancies were found

Holding Times and Sample Preservation

The samples were extracted and analyzed within the method specified holding times.

The cooler temperatures upon receipt at the laboratory were 3.4 ^{o}C and 3.5 ^{o}C, which were within the acceptance criterion of 4$\pm$ 2^{o}C.

Initial and Continuing Calibrations

The percent relative standard deviations (%RSDs) of all target compounds were within the QC acceptance criteria for the initial calibrations associated with the sample analyses. The percent differences (%Ds) of all target compounds were within the QC acceptance criteria for the continuing calibrations associated with the sample analyses.

The laboratory used hexacosane instead of n-octacosane for the surrogate. No validation action was required.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Method Blanks/Equipment Blank

No target compounds were detected in the method blank. There were no trip blanks (TB), equipment blanks (EB) or field blanks (FB) reported with the samples in this data package.

Surrogate Spike Recoveries

Surrogate recoveries were within the QC acceptance criteria in all sample analyses.

LCS Results

The percent recoveries (%Rs) and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria for the LCS and LCSD.

MS/MSD Results

MS/MSD analyses were performed on sample M116-10. The %Rs and RPDs of all reported spiked compounds were within QC acceptance criteria.

Field Duplicate Results

Samples M116-0.5 and M116-0.5D, M117-80 and M117-80D were submitted as field duplicate pairs. The results for detected compounds and their relative percent differences (RPDs) are tabulated below. RPDs were not calculable (NC) because all samples/duplicate results were nondetects. Precision was deemed acceptable.

Compound	M116-0.5 (mg/Kg)	M116-0.5D (mg/Kg)	RPD
DRO	11U	11U	NC

Compound	M117-80 (mg/Kg)	M117-80D (mg/Kg)	RPD
DRO	12U	11U	NC

Compound Quantitation

The recommended compounds (C_{10} and C_{28}) were used to establish the lower and upper retention time range for DRO and the recommended compounds (C28 and C38) were used to establish lower and upper retention time range for ORO.

Quantitation Limits and Sample Results

Calculations were spot-checked. There were no discrepancies noted.

No dilution was required for the sample in this data set; therefore the sample quantitation limit (SQL) was unaffected and met the target quantitation limit.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date: August 26, 2006 Revised October 6, 2006

To: Dave Gerry/Camarillo

From: Vinora Nicholls/Westford

Subject: Data Validation, Ethylene Glycol Analyses
Henderson Upgradient Investigation
Tronox LLC Henderson, Nevada
EMAX SDG 06C120

Distribution: R.Kennedy/Westford

04020-023-152

TH023EG.rev

SUMMARY

Limited validation was performed on the data for thirteen soil samples including two duplicate pairs, plus one matrix spike and one matrix spike duplicate, analyzed for ethylene glycol by SW-846 method 8015B. The samples were collected at the Tronox facility in Henderson Nevada on March 11 and March 12, 2006 and submitted to EMAX Laboratories (EMAX), Inc. in Torrance, California for analysis. EMAX analyzed the samples and reported the results under sample delivery group (SDG) 06C120.

The analytical data were evaluated according to the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (10/99), the Region 9 Superfund Data Evaluation/Validation Guidance, NDEP Guidance on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodology.

In general, the data are valid as reported and may be used for decision making purposes. No data were rejected or qualified based on the results of data validation.

SAMPLES

The samples included in this review are listed below:

Sample IDs	Sample IDs
M116-0.5	M117-0.5
M116-0.5D	M117-5
M116-5	M117-10
M116-10	M117-30
M116-30	M117-50
M116-50	M117-80
	M11780-D

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

Sample data were reviewed for the following parameters, where applicable to the method:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Initial and continuing calibrations
- Method blanks/equipment blanks
- Surrogate spike recoveries
- Laboratory control sample (LCS) results
- Matrix spike/matrix spike duplicate (MS/MSD) results
- Field duplicate results
- Compound quantitation
- Quantitation limits and sample results

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. No discrepancies were found.

Holding Times and Sample Preservation

The samples were extracted and analyzed within the method specified holding times.

The cooler temperatures upon receipt at the laboratory were 3.4 ^{o}C and 3.5 ^{o}C, which were within the acceptance criterion of 4$\pm$ 2^{o}C.

Initial and Continuing Calibrations

The percent relative standard deviations (%RSDs) of all target compounds were within the QC acceptance criteria for the initial calibrations associated with the sample analyses. The percent differences (%Ds) of all target compounds were within the QC acceptance criteria for the continuing calibrations associated with the sample analyses.

Method Blanks/Equipment Blank

No target compounds were detected in the method blank. There were no trip blanks (TB), equipment blanks (EB) or field blanks (FB) reported with the samples in this data package. The associated equipment blanks, EB-1 and EB-2, are reported under SDGs 06C096 and 06C127, respectively. No target compounds were detected in the associated equipment blanks.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Surrogate Spike Recoveries

Surrogate spikes were not performed because the EPA method and the laboratory SOP do not require surrogates for direct injection analysis. No validation action was taken on this basis.

LCS Results

The percent recoveries (%Rs) and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria for the LCS and LCSD.

MS/MSD Results

MS/MSD analyses were performed on sample M116-10. The %Rs and RPDs of all reported spiked compounds were within QC acceptance criteria.

Field Duplicate Results

Samples M116-0.5/M116-0.5D and M117-80/M117-80D were submitted as field duplicate pairs. The results and their relative percent differences (RPDs) are tabulated below. Precision was deemed acceptable since RPD values were not calculable (NC). Ethylene glycol was not detected above the RL in either sample/duplicate pair.

Compound	M116-0.5 (mg/Kg)	M116-0.5D (mg/Kg)	RPD
Ethylene Glycol	42U	43U	NC

Compound	M117-80 (mg/Kg)	M117-80D (mg/Kg)	RPD
Ethylene Glycol	50U	46U	NC

Compound Quantitation

Retention times were defined during calibration. Retention times fell within acceptance criteria for all samples.

Quantitation Limits and Sample Results

Calculations were spot-checked. There were no discrepancies noted.

No dilutions were required for the samples in this data set; therefore the sample quantitation limits (SQLs) were unaffected and met the target quantitation limits.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date: August 25, 2006 Revised October 9, 2006

To: Dave Gerry/Camarillo

From: Vinora Nicholls/Westford

Subject: Data Validation, Alcohol Analyses
Henderson Upgradient Investigation
Tronox LLC Henderson, Nevada
EMAX SDG 06C120

Distribution: Robert Kennedy/Westford

04020-023-152

TH023FA.rev

SUMMARY

Limited validation was performed on the data for thirteen soil samples including two duplicate pairs, analyzed for methanol and ethanol by SW-846 method 8015B. The samples were collected at the Tronox facility in Henderson Nevada on March 11 and March 12, 2006 and submitted to EMAX Laboratories (EMAX), Inc. in Torrance, California for analysis. EMAX analyzed the samples and reported the results under sample delivery group (SDG) 06C120.

The analytical data were evaluated according to the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (10/99), the Region 9 Superfund Data Evaluation/Validation Guidance, NDEP Guidance on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodology.

In general, the data appear to be valid as reported and may be used for decision making purposes. Some methanol surface soil results were rejected because the detections appear to be false positives due to cross-contamination during shipping. Methanol was not detected in the resampled and reanalyzed surface soils in SDG06C238. The subsurface soil methanol results were qualified as probable false positives (Z) due to the same cross-contamination during shipping. Selected results have been qualified as estimated (J) due to minor QC nonconformances (see discussion below).

SAMPLES

The samples included in this review are listed below:

Sample IDs	Sample IDs
M116-0.5	M117-0.5
M116-0.5D	M117-5

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

M116-5	M117-10
M116-10	M117-30
M116-30	M117-50
M116-50	M117-80
	M11780-D

REVIEW ELEMENTS

Sample data were reviewed for the following parameters, where applicable to the method:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Initial and continuing calibrations
- Method blanks/equipment blanks
- Surrogate spike recoveries
- Laboratory control sample (LCS) results
- Matrix spike/matrix spike duplicate (MS/MSD) results
- Field duplicate results
- Compound quantitation
- Quantitation limits and sample results

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. No discrepancies were found

Holding Times and Sample Preservation

The samples were extracted and analyzed within the method specified holding times.

The cooler temperatures upon receipt at the laboratory were 3.4 ^{o}C and 3.5 ^{o}C, which were within the acceptance criterion of 4$\pm$ 2^{o}C.

Initial and Continuing Calibrations

The percent relative standard deviations (%RSDs) of all target compounds were within the QC acceptance criteria for the initial calibrations associated with the sample analyses. The percent differences (%Ds) of all target compounds were within the QC acceptance criteria for the continuing calibrations associated with the sample analyses.

Method Blanks/Equipment Blank

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

No target compounds were detected in the method blank. There were no trip blanks (TB), equipment blanks (EB) or field blanks (FB) reported with the samples in this data package. The associated equipment blanks, EB-1 and EB-2, were reported under SDGs 06C096 and 06C127, respectively. No target compounds were detected in the associated equipment blanks.

Surrogate Spike Recoveries

Surrogate spikes were not performed because the EPA method and the laboratory SOP do not require surrogates for direct injection analysis. No validation action was taken on this basis.

LCS Results

The percent recoveries (%Rs) and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria for the LCS and LCSD.

MS/MSD Results

MS/MSD analyses were performed on sample M117-80. The %Rs and RPDs of all reported spiked compounds were within QC acceptance criteria.

Field Duplicate Results

Samples M116-0.5/M116-0.5D and M117-80/M117-80D were submitted as field duplicate pairs. The results for detected compounds and their relative percent differences (RPDs) are tabulated below.

The positive results for methanol in samples M116-0.5 and M116-0.5D were rejected (R) as due to cross contamination from methanol preserved VOC vials during shipping. Non uniform cross-contamination of the sleeve containers explains the high RPD for the soil duplicate results. The RPD for ethanol was not calculable (NC) since both the sample and the sample duplicate were non-detects.

The positive results for methanol in samples M117-80 and M117-80D were qualified as estimated (J) since the detected result in the sample was greater than 5x the sample quantitation limit (SQL) and the RPD exceeded 50%. Non uniform cross-contamination of the sleeve containers explains the high RPD for the soil duplicate results. The RPD for ethanol was not calculable (NC) since both the sample and the sample duplicate were non-detects.

Compound	M116-0.5 (mg/Kg)	M116-0.5D (mg/Kg)	RPD
Methanol	1.1 R	19 R	178
Ethanol	1.1U	1.1U	NC

Compound	M117-80 (mg/Kg)	M117-80D (mg/Kg)	RPD
Methanol	12 J	5 J	82.4
Ethanol	1.2U	1.1U	NC

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Compound Quantitation

Retention times were defined during calibration. Analyte retention times fell within acceptance criteria for all samples.

Quantitation Limits and Sample Results

Calculations were spot-checked. There were no discrepancies noted.

Sample M117-5 was analyzed at 5-fold dilution due to the concentration of methanol, which would have exceeded the calibration range if analyzed undiluted. The results were combined during validation to provide the lowest reporting limits and all results within the calibration range. The results for both sets of results were included in the data package. No dilution was required for the remaining samples in this data set; therefore the sample quantitation limits (SQLs) were unaffected and met the target quantitation limit.

All subsurface soil methanol results (samples M116-5, M117-5, M117-10, M116-30, M116-50, M117-30, M117-50, M117-80, and M117-80D) were qualified as probable false positives (Z) due to suspected methanol cross contamination from methanol preserved VOC vials. Soil samples for methanol analysis were collected in capped sleeves and stored in the same ziplock bags as the methanol containing VOC vials during shipping.

All surface soil methanol results (samples M116-0.5, M116-0.5D, and M117-0.5) were rejected (R) as false positives due to methanol cross-contamination as described above. Resampling and reanalysis of these surface soil samples in SDG06C238 confirmed that methanol was not detectable when the samples were shipped without methanol containing vials in the same cooler.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date: August 25, 2006 Revised October 9, 2006

To: Dave Gerry/Camarillo

From: Vinora Nicholls/Westford

Subject: Data Validation, GRO Analyses
Henderson Upgradient Investigation
Tronox LLC Henderson, Nevada
EMAX SDG 06C120

Distribution: Robert Kennedy/Westford

04020-023-152

TH023gro.rev.doc

SUMMARY

Limited validation was performed on the data for thirteen soil samples analyzed for gasoline range organics (GRO) by SW-846 methods 5035/8015B. The samples were collected at the Tronox LLC site in Henderson, Nevada on March 11 and March 12, 2006 and submitted to EMAX Laboratories (EMAX), Inc. in Torrance, California for analysis. EMAX processed the samples and reported the results under sample delivery group (SDG) 06C120.

The analytical data were evaluated according to the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (10/99), the Region 9 Superfund Data Evaluation/Validation Guidance, NDEP Guidance on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodology.

In general, the data are valid as reported and may be used for decision making purposes. No data were rejected or qualified based on data validation.

SAMPLES

The samples included in this review are listed below:

Sample IDs	Sample IDs
M116-0.5	M117-0.5
M116-0.5D	M117-5
M116-5	M117-10
M116-10	M117-30
M116-30	M117-50
M116-50	M117-80
	M11780-D

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

Sample data were reviewed for the following parameters, where applicable:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Initial and continuing calibrations
- Method blanks/equipment blanks
- Surrogate spike recoveries
- Laboratory control sample (LCS) results
- Matrix spike/matrix spike duplicate (MS/MSD) results
- Field duplicate results
- Compound quantitation
- Quantitation limits and sample results

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. No discrepancies were found.

Holding Times and Sample Preservation

The samples were analyzed within the method specified holding time.

The cooler temperatures upon receipt at the laboratory were 3.4 ^{o}C and 3.5 ^{o}C, which were within the acceptance criterion of 4$\pm$ 2^{o}C.

Initial and Continuing Calibrations

The percent relative standard deviations (%RSDs) of all target compounds were within the QC acceptance criteria for the initial calibrations associated with the sample analyses. The percent differences (%Ds) of all target compounds were within the QC acceptance criteria for the continuing calibrations associated with the sample analyses.

The laboratory used 1,1,1-trifluorotoluene(1,1,1-TFT) as a surrogate; however results for 1,1,1-TFT were not reported on the sample results data sheet. Data validation actions are not required for this surrogate nonconformance.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Method Blanks/Equipment Blank

GRO was not detected in the method blank. There were no trip blanks (TBs), equipment blanks (EBs), or field blanks (FBs) reported with the samples in this data package. The associated equipment blanks, EB-1 and EB-2, were reported in SDGs 06C096 and 06C127, respectively. GRO was not detected in the associated equipment blanks.

Surrogate Spike Recoveries

Surrogate recoveries were within the QC acceptance criteria in all sample analyses.

LCS Results

The percent recoveries (%Rs) and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria for the LCS and LCSD.

MS/MSD Results

MS/MSD analyses were performed on sample M116-10. The %Rs and RPDs of all spiked compounds were within QC acceptance criteria.

Field Duplicate Results

Samples M116-0.5/M116-0.5D and M117-80/M117-80D were submitted as field duplicate pairs. RPDs were not calculable (NC) due to nondetect results reported in the samples. Precision was deemed acceptable.

Compound	M116-0.5 (mg/Kg)	M116-0.5D (mg/Kg)	RPD
GRO	1.1 U	1.1 U	NC

Compound	M117-80 (mg/Kg)	M117-80D (mg/Kg)	RPD
GRO	1.2 U	0.93 U	NC

Compound Quantitation

The recommended compounds n-hexane and n-decane were used to establish the GRO lower and upper retention time range, respectively. All peaks contributing to the reported results were within the calibrated range.

Quantitation Limits and Sample Results

Calculations were spot-checked. There were no discrepancies noted.

All samples except M116-0.5, M116-0.5D, M116-5, M116-30, M117-10 and M117-50 were analyzed at minor dilutions due to the sample preparation requirement. Sample results and sample quantitation limits were adjusted accordingly. The project-required reporting limits were not exceeded for any sample in this data set.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date: September 1, 2006
Revised October 10, 2006

To: David Gerry/Camarillo

From: Linda Sulkowski/Westford

Subject: Data Validation, Metals Analysis
Henderson Upgradient Investigation
Tronox LLC Henderson, Nevada
EMAX SDG 06C120

Distribution: R. Kennedy/Westford

04020-023-152
TH023inolms.rev

SUMMARY

Limited validation was performed on the data for 19 soil samples analyzed for a project-specific list of metals by SW-846 methods 6020A and 7471A. The samples were collected at the Tronox LLC site in Henderson, Nevada on March 11 and 12, 2006 and were submitted to EMAX Laboratories (EMAX) in Torrance, CA for analysis. EMAX processed the samples and reported the results under sample delivery group (SDG) 06C120.

The analytical data were evaluated with reference 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 on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodologies.

In general, the data are valid as reported and may be used for decision making purposes. Selected results were estimated due to nonconformances of certain QC criteria data (see discussion below).

SAMPLES

The samples included in this review are listed below.

Sample IDs	
M116-0.5	M116-0.5D (field duplicate of M116-0.5)
M116-5	M116-10
M116-20	M116-30
M116-40	M116-50
M117-0.5	M117-5
M117-10	M117-20

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Sample IDs	
M117-20D (field duplicate of M117-20)	M117-30
M117-40	M117-50
M117-60	M117-80
M117-80D (field duplicate of M117-80)	

REVIEW ELEMENTS

Sample data were reviewed for the following parameters, where applicable to the method:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Inductively coupled plasma/mass spectrometry (ICP/MS) tuning
- Initial and continuing calibrations
- Method blanks/equipment blanks
- Laboratory control sample (LCS)/laboratory control sample duplicate (LCSD) results
- Matrix spike/matrix spike duplicate (MS/MSD) results
- Internal standard performance
- Field duplicate results
- Quantitation limits and sample results

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. No discrepancies were found.

Holding Times and Sample Preservation

The samples were digested and analyzed within the method specified holding times.

The cooler temperatures upon receipt at EMAX were within the acceptance criteria of 4 ± 2°C.

ICP/MS Tuning

A tuning solution (daily performance check) containing elements representing all of the mass regions of interest was analyzed at the beginning of each analytical sequence. The percent relative standard deviations (%RSDs) for elements in the tuning solution met the QC acceptance criteria of <5%.

Initial and Continuing Calibrations

All criteria were met for the calibration curves, and the initial and continuing calibration verification (ICV/CCV) standards.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Method Blanks/Equipment Blanks

Copper and vanadium were detected in the laboratory preparation blank at concentrations > the method detection limit (MDL), but < the sample quantitation limit (SQL). Aluminum, copper, iron, manganese, and/or zinc were detected in the equipment blank samples EB-1 and EB-2, which were reported in SDGs 16C096 and 06C127, respectively. Target analytes were not detected in the bracketing continuing calibration blanks (CCBs) associated with the soil samples. The presence of blank contamination indicated that false positive results might have existed for these analytes in the associated samples. The following tables summarize the highest level of blank contamination and the associated samples.

Type of Blank	Analyte	Maximum Blank Concentration* (mg/Kg)
Preparation Blank	Copper	0.29 J
	Vanadium	0.119 J
Associated samples: All sediment samples in this data set. *Adjusted for sample preparation factors and moisture content.		

Type of Blank	Analyte	Maximum Blank Concentration* (µg/L)
Equipment Blank EB-1	Aluminum	41
	Copper	4.4
Equipment Blank EB-2	Iron	0.48 J
	Manganese	8.4
	Zinc	17
Associated samples: All sediment samples in this data set. *Adjusted for sample preparation factors and moisture content.		

Sample results were qualified as follows:

For blank results >the SQL:

- Positive sample results $\geq$ MDL, but $\leq$ SQL were qualified as nondetect (U) at the SQL.
- Positive sample results > SQL, but < 10x the blank result were qualified as estimated, biased high (J+).
- Positive sample results that were $\geq$ 10x the blank result were accepted unqualified.

For blank results $\geq$ MDL, but $\leq$ SQL:

- Nondetect results were accepted unqualified.
- Positive sample results $\geq$ MDL, but $\leq$ SQL were qualified as nondetect (U) at the SQL.
- Positive sample results > SQL and < the Action Level (AL) of 5x the blank contamination level were qualified as undetected (U) at the reported concentration.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

LCS/LCSD Results

The %Rs and relative percent differences (RPDs) of all spiked analytes were within the QC acceptance criteria for the LCS and LCSD.

MS/MSD Results

MS/MSD analyses were performed on sample M116-10 from this sample set. The following table summarizes the %Rs and RPDs of the spiked target analytes that fell outside the QC acceptance criteria.

Analyte	MS/MSD %Rs	RPD	QC Acceptance Range %R (RPD)	Actions (Detects/Nondetects)
Antimony	31/32	ok	75-125% (20)	J-/UJ
Aluminum	ok/126	ok	75-125% (20)	J+/A
Barium	50/164	27	75-125% (20)	J/UJ
Iron	ok/128	ok	75-125% (20)	J+/A
Tungsten	62/67	ok	75-125% (20)	J-/UJ
Samples Affected: All samples				

A post digestion spike analysis was subsequently performed on sample M116-10. The %Rs met the QC acceptance criteria.

Internal Standard Performance

The internal standard performance was within the QC acceptance criteria in all sample analyses.

Field Duplicate Results

Samples M116-0.5/M116-0.5D, M117-20/M117-20D, and M117-80/M117-80D were submitted as the field duplicate pairs associated with this sample set.

The following table summarizes the RPDs of the detected analytes in field duplicate samples M116-0.5 and M116-0.5D. Precision was deemed acceptable for platinum since the detected results were both less than 10x the MDL and the absolute difference between the sample and duplicate results was < 8x the MDL. The RPDs were not calculable (NC) for antimony and silver due to nondetected results in field duplicate sample M116-0.5D. Precision was deemed acceptable for antimony and silver since the detected results in sample M116-0.5 were < 10x the MDL.

Compound	M116-0.5 (mg/Kg)	M116-0.5D (mg/Kg)	RPD
Aluminum	9020	10800	18
Antimony	0.157	0.54 U	NC
Arsenic	2.77	3.06	10
Barium	178	201	12
Beryllium	0.567	0.623	9
Boron	7.46	10.9	37
Cadmium	0.628	0.688	9

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Compound	M116-0.5 (mg/Kg)	M116-0.5D (mg/Kg)	RPD
Calcium	20100	23700	16
Chromium	7.3	10.6	37
Cobalt	7.12	9.87	32
Copper	21.5	22.4	4
Iron	9120	12600	32
Lead	9.55	11.5	19
Magnesium	8900	10500	16
Manganese	644	777	19
Molybdenum	0.716	0.845	17
Nickel	13.8	18.5	29
Platinum	0.0391	0.0129	101
Potassium	2190	2440	11
Selenium	0.212	0.170	22
Silver	0.118	0.54 U	NC
Sodium	725	1010	33
Strontium	180	200	11
Thallium	0.373	0.238	44
Titanium	572	808	34
Tungsten	0.708	0.582	20
Uranium	0.835	1.00	18
Vanadium	21.9	29.6	30
Zinc	40.5	49.6	20

The following table summarizes the RPDs of the detected analytes in field duplicate samples M117-20 and M117-20D. The RPDs were NC for antimony and boron due to nondetect results in sample M117-20. Precision was deemed acceptable for antimony and silver since the detected results in sample M117-20D were <10x the MDL. The RPDs for copper and lead exceeded the QC acceptance criteria. Positive and nondetect results for copper and lead were qualified as estimated (J and UJ, respectively) in all samples, except samples M116-0.5 and M116-0.5D. The remaining RPDs were within the QC acceptance criteria.

Compound	M117-20 (mg/Kg)	M117-20D (mg/Kg)	RPD
Aluminum	10400	12900	21
Antimony	0.108 U	0.217	NC
Arsenic	3.61	4.63	25
Barium	156	211	30
Beryllium	0.505	0.662	27
Boron	5.41 U	7.5	NC
Cadmium	0.515	0.582	12
Calcium	40800	55400	30
Chromium	7.66	11.1	37
Cobalt	6.27	9.36	40
Copper	48.4	21.9	75
Iron	9640	12900	29
Lead	5.69	9.71	52
Magnesium	10800	15200	34

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Compound	M117-20 (mg/Kg)	M117-20D (mg/Kg)	RPD
Manganese	294	435	39
Molybdenum	0.316	0.385	20
Nickel	12.8	19.6	42
Potassium	1550	2120	31
Selenium	0.110	0.164	39
Sodium	841	895	6
Strontium	345	339	2
Titanium	563	769	31
Uranium	1.10	1.56	35
Vanadium	23.6	33.2	34
Zinc	42.1	41.1	2

The following table summarizes the RPDs of the detected analytes in field duplicate samples M117-80 and M117-80D. The RPD was NC for selenium due to a nondetect result in sample M117-80. Precision was deemed acceptable for selenium since the detected result in sample M117-80D was <10x the MDL. The RPDs for copper and zinc exceeded the QC acceptance criteria. Positive and nondetect results for copper and zinc were qualified as estimated (J and UJ, respectively) in all samples, except samples M116-0.5, M116-0.5D, M117-20, and M117-20D. The remaining RPDs were within the QC acceptance criteria.

Compound	M117-80 (mg/Kg)	M117-80D (mg/Kg)	RPD
Aluminum	12300	11500	7
Arsenic	10.2	9.23	10
Barium	116	90	25
Beryllium	0.743	0.714	4
Boron	11 J	10.1 J	9
Cadmium	0.566 J	0.565 J	0
Calcium	9650	10900	12
Chromium	18.8	19.2	2
Cobalt	6.08	6.59	8
Copper	228	30.5	153
Iron	12000	12400	3
Lead	7.35	8.1	10
Magnesium	14600	12400	1610
Manganese	211	190	10
Molybdenum	0.79	1.02	25
Nickel	14.9	14.7	1
Potassium	3290	3140	5
Selenium	0.621 U	0.14 J	NC
Sodium	931	990	6
Strontium	259	248	4
Titanium	715	763	6
Uranium	1.7	1.82	7
Vanadium	34.9	38.9	11
Zinc	227	132	132

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Quantitation Limits and Sample Results

Dilutions were not performed on samples in this data set; therefore, the SQLs were not affected.

It should be noted that the laboratory reported results between the MDL and the SQL as estimated (J).

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date: August 16, 2006 Revised October 9, 2006

To: Dave Gerry/Camarillo

From: Linda Sulkowski/Westford

Subject: Data Validation, VOC Analysis
Henderson Upgradient Investigation
Tronox LLC Henderson, Nevada
EMAX SDG 06C120

Distribution: R. Kennedy/Westford

04020-023-152 File

TH023voclms.rev.doc

SUMMARY

Limited validation was performed on the data for 13 soil samples analyzed for a project-specific list of volatile organic compounds (VOCs) by SW-846 methods 5035/8260B. The samples were collected at the Tronox LLC site in Henderson, Nevada on March 11 and 12, 2006 and were submitted to EMAX Laboratories (EMAX) in Torrance, CA for analysis. EMAX processed the samples and reported the results under sample delivery group (SDG) 06C120.

The analytical data were evaluated with reference to the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (10/99), the Region 9 Superfund Data Evaluation/Validation Guidance, NDEP Guidance on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodology.

In general, the data are valid as reported and may be used for decision making purposes. Results for tert-butyl alcohol were rejected in all samples since the minimum response factor (RF) criterion was not met. Nondetect results for 2,2-dichloropropane were estimated (UJ) in all soil samples since the percent difference (%D) criterion was not met in the continuing calibration.

SAMPLES

The samples included in this review are listed below:

Sample IDs	Sample IDs
M116-0.5	M116-0.5D (field duplicate of M116-0.5)
M116-5	M116-10
M116-30	M116-50
M117-0.5	M117-5
M117-10	M117-30
M117-50	M117-80

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

M117-80D (field duplicate of M117-80)	

REVIEW ELEMENTS

Sample data were reviewed for the following parameters, where applicable:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Gas chromatography/mass spectrometry (GC/MS) tuning
- Initial and continuing calibrations
- Method blanks/equipment blanks/trip blanks
- Surrogate spike recoveries
- Laboratory control sample (LCS)/laboratory control sample duplicate (LCSD) results
- Matrix spike/matrix spike duplicate (MS/MSD) results
- Internal standard performance
- Field duplicate results
- Quantitation limits and sample results

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. The following discrepancy was found. Samples M117-20 and M117-20D were listed on the COC for VOC analysis. The VOC analyses for these samples were cancelled by the laboratory since the VOC analyses were not requested in the sampling plan. No validation action was taken on this basis other than this notation.

Holding Times and Sample Preservation

The samples were analyzed within the method specified holding time.

The cooler temperature upon receipt at EMAX was within the acceptance criterion of 4±2°C.

GC/MS Tuning

The frequency and abundance of all bromofluorobenzene (BFB) tuning results were within the QC acceptance criteria. The samples were analyzed within the method specified tuning intervals.

Initial and Continuing Calibrations

The percent relative standard deviations (%RSDs), the correlation coefficients, and/or the RFs of all target compounds were within the QC acceptance criteria for the initial calibration associated with the sample analyses with the following exception. Actions were applied as indicated below.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Compound	RF	Action (Detects/Nondetects)
Tert-butyl alcohol	0.027	J/R
Associated Samples:	All samples	

The percent differences (%Ds) of all target compounds were within the QC acceptance criteria for the continuing calibrations associated with the sample analyses with the following exceptions. Actions were applied as indicated below.

Compound	%D	Action (Detects/Nondetects)
2,2-Dichloropropane	35.7	J/UJ
Associated Samples:	M116-0.5, M116-5, M116-10, M116-30, M116-50, M117-0.5 and M117-5.	
2,2-Dichloropropane	41.2	J/UJ
Associated Samples:	M117-10, M117-30, M117-50, M117-80, and M117-80D	

Method Blanks/Equipment Blanks/Trip Blanks

Trip blanks were not submitted with this sample set. No validation action was taken on this basis.

Target compounds were not detected in the laboratory method blanks associated with the samples in this data set.

Equipment blank samples EB-1 (reported in SDG 06C096) and EB-2 (reported in SDG 06C127) were associated with selected soil samples in this data set. Acetone was detected in EB-1 and EB-2 at 6.3 and 9.9 μg/,L respectively. The presence of blank contamination indicates that false positives may exist for this compound in the associated samples. An Action Level (AL) was established for the highest reported concentration of acetone at 10x the concentration detected. The following table summarizes the AL and the associated samples.

Blank Type	Compound	Concentration (μg/L)	AL (μg/Kg)	Associated Samples
EB-2 (equipment blank)	Acetone	9.9 J	99	M116-0.5, M116-0.5D, M116-10, M116-30, M116-50, M117-0.5, M117-10, M117-30, M117-50, M117-80, M117-80D

Sample results were qualified as follows:

- If the sample result was ≤ AL and ≤ the sample quantitation limit (SQL), the result was qualified as nondetect (U) at the SQL.
- If the sample result was ≤ AL and > SQL, the result was qualified as nondetect (U) at the reported concentration.
- If the sample result was > AL, the result was not qualified.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Surrogate Spike Recoveries

Surrogate percent recoveries (%Rs) were within the QC acceptance criteria in all sample analyses.

LCS/LCSD Results

The %Rs and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria for the LCS and LCSD.

MS/MSD Results

MS/MSD analyses were performed on sample M116-10. The %Rs and RPDs of the spiked target analytes were all within the QC acceptance criteria.

Internal Standard Performance

The internal standard performance was within the QC acceptance criteria in all sample analyses.

Field Duplicate Results

Samples M116-0.5/M116-0.5D and M117-80/M117-80D were submitted as the field duplicate pairs with this sample set. The following table summarizes the RPD of the detected analyte in field duplicate samples M116-0.5 and M116-0.5D. Precision was deemed acceptable since the detected results were both less than 5x the sample quantitation limit (SQL).

Compound	M116-0.5 (µg/Kg)	M116-0.5D (µg/Kg)	RPD
Acetone	12	22	59

The following table summarizes the RPD of the detected analyte in field duplicate samples M117-80 and M117-80D. The RPD was not calculable (NC) due to a nondetect result in sample M117-80. Precision was deemed acceptable since the detected result in field duplicate sample M117-80D was less than 5x the SQL.

Compound	M117-80 (µg/Kg)	M117-80D (µg/Kg)	RPD
Trichlorofluoromethane	5 U	2.4 J	NC

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Quantitation Limits and Sample Results

Dilutions were not performed on samples in this data set. Sample quantitation limits (SQLs) for these samples were therefore not affected.

It should be noted that the laboratory reported 2-butanone, 4-methyl-2-pentanone, and 2-hexanone with SQLs of 10 µg/kg each, instead of the QAPP stipulated SQLs of 5 µg/kg for all soil samples. No data validation action was taken other than this notation.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date:	August 10, 2006 Revised October 9, 2006	
To:	David Gerry/Camarillo	
From:	Sheena Blair/Westford	
Subject:	Data Validation, Inorganic Analysis Henderson Upgradient Investigation Tronox LLC Henderson, Nevada EMAX SDG 06C120	
Distribution:	R. Kennedy/Westford	04020-023-152 TH023wc.sb.rev

SUMMARY

Limited validation was performed on the data for 19 soil samples analyzed for all or a subset of the following parameters:

- Chloride by SW-846 method 9056
- Nitrate as nitrogen by SW-846 method 9056
- Nitrite as nitrogen by SW-846 method 9056
- Sulfate by SW-846 method 9056
- Total cyanide by SW-846 method 9014
- Hexavalent chromium by SW-846 method 7199
- Chlorate by EPA 300.0 modified
- Perchlorate by EPA 314.0
- Total alkalinity by EPA 310.1
- Bicarbonate alkalinity by EPA 310.1(calculated from total and carbonate alkalinity)
- Carbonate alkalinity by EPA 310.1
- Specific conductance by SM 2510B, and
- pH by SW-846 method 9045C

The samples were collected at the Henderson site in Henderson, NV on March 11 and 12, 2006 and submitted to EMAX Laboratories, Inc in Torrance, CA for analysis. EMAX processed the samples and reported the results under sample delivery group (SDG) 06C120.

The analytical data were evaluated with reference 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 on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodologies.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

In general, the data are valid as reported and may be used for decision making purposes. No data were rejected. All perchlorate results were qualified as estimated due to laboratory duplicate imprecision (see discussion below).

SAMPLES

The samples included in this review are listed below:

Sample IDs	
M116-0.5	M116-0.5D (field duplicate of M116-0.5)
M116-5	M116-10
M116-20	M116-30
M116-40	M116-50
M117-0.5	M117-5
M117-10	M117-20
M117-20D (field duplicate of M117-20)	M117-30*
M117-40	M117-50*
M117-60	M117-80
M117-80D (field duplicate of M117-80)	
*Analyzed for all parameters listed above. All other samples analyzed for perchlorate and hexavalent chromium, except samples M117-20 and M117-20D were analyzed for hexavalent chromium only.	

REVIEW ELEMENTS

Sample data were reviewed for the following elements, where applicable to the method:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Initial and continuing calibrations
- Laboratory blanks/equipment 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

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. The following discrepancy was found:

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

- EMAX only received eight sample containers each for samples M116-0.5 and M116-0.5D, although the COC listed nine containers. EMAX notified ENSR about the discrepancy. No validation action was required.

Holding Times and Sample Preservation

All samples were analyzed within the method-specified holdings times for all parameters analyzed.

The cooler temperature upon receipt at EMAX was within the acceptance criteria of 4 ± 2°C.

Initial and Continuing Calibrations

All criteria were met for the calibration curves, and the initial and continuing calibration verification (ICV/CCV) standards (where applicable to the methods).

Laboratory Blanks/Equipment Blanks

No equipment blanks were associated with the samples in this data set, except for perchlorate and hexavalent chromium in soils. No validation action was taken on this basis.

Equipment blank sample EB-1 was submitted for perchlorate and hexavalent chromium, and reported under MWH Data Report number 169405R. Perchlorate and hexavalent chromium were not detected in EB-1; therefore no validation action was taken.

Equipment blank sample EB-2 was submitted for perchlorate only and reported under MWH Data Report number 169653R. Perchlorate was not detected in EB-2; therefore no validation action was taken.

Target compounds were not detected in the laboratory blanks associated with the samples in this data set.

LCS/LCSD Results

The percent recoveries (%Rs) and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria for all LCSs and LCSDs.

MS/MSD Results

MS analyses were performed on sample M116-10 for hexavalent chromium and perchlorate. The %R met the laboratory QC acceptance criteria.

Batch MS or MS/MSD analyses were performed on samples from other clients for all parameters, except for hexavalent chromium and perchlorate. Although this practice is acceptable, the results could not be directly applied to the samples analyzed in this data package because of possible differences in the sample matrix and type. No validation action was taken on this basis.

Laboratory Duplicates

Laboratory duplicate analyses were only performed on all the samples for hexavalent chromium and on sample M116-10 for perchlorate. All hexavalent chromium sample results were nondetect and

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

precision was deemed to be acceptable. The RPD for perchlorate was 32%, which exceeded the laboratory QC limit of 15%. Thus, all detected and nondetected perchlorate results for the samples in this data set were qualified as (J and UJ, respectively).

The other parameters in this data set did not have associated laboratory duplicate analyses. Thus, for parameters without an associated laboratory duplicate, the LCS/LCSD and/or the MS/MSD demonstrated precision and accuracy in the laboratory (see discussions above).

Field Duplicate Results

Samples M116-0.5/M116-0.5D and MW117-80/MW117-80D were submitted as field duplicate pairs for perchlorate and hexavalent chromium. In addition, samples MW117-20/MW117-20D were submitted as the field duplicate pair for hexavalent chromium. There was no field duplicate pair submitted or associated with the other parameters in this data set.

The hexavalent chromium results for all the field duplicate pairs were nondetect; therefore, precision was deemed to be acceptable. The following table summarizes the detected results and the RPDs for perchlorate in the field duplicate pairs.

Field Duplicate Pair	Analyte	Sample Result (µg/Kg)	Duplicate (µg/Kg)	RPD	Action
M116-0.5/M116-0.5D	Perchlorate	600	803	29	None
MW117-80/MW117-80D	Perchlorate	94.7	83.1	13	None

The RPDs for perchlorate met the QC acceptance criteria of 50% for a soil matrix.

Quantitation Limits and Sample Results

Samples M116-0.5D and M116-5 were analyzed for perchlorate at 2 and 5-fold dilutions, respectively, due to elevated concentrations of perchlorate present in the samples.

It should be noted that the laboratory reported results between the MDL and the SQL. These results were qualified as estimated (J) by the laboratory. No validation action was taken on this basis.

Selected EMAX reporting limits did not meet the limits stated in the QAPP. No validation action was taken other than this notation.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date: August 24, 2006 Revised October 9, 2006

To: Dave Gerry/Camarillo

From: Vinora Nicholls/Westford

Subject: Data Validation, DRO Analyses
Henderson Upgradient Investigation
Tronox LLC Henderson, Nevada
EMAX SDG 06C127

Distribution: Robert Kennedy/Westford

04020-023-152

TH024DRO.rev

SUMMARY

Limited validation was performed on the data for six soil samples, including one field duplicate, one equipment blank, and one groundwater sample analyzed for diesel range organics (DRO) and oil range organics (ORO) by SW-846 methods 3520C/3550B/8015B. The samples were collected at the Tronox facility in Henderson Nevada on March 14, 2006 and submitted to EMAX Laboratories (EMAX), Inc in Torrance, California for analysis. EMAX analyzed the samples and reported the results under sample delivery group (SDG) 06C127.

The analytical data were evaluated according to the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (10/99), the Region 9 Superfund Data Evaluation/Validation Guidance, NDEP Guidance on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodology.

In general, the data are valid as reported and may be used for decision making purposes. Selected results have been qualified as estimated (J/UJ) due to minor QC nonconformances (see discussion below).

SAMPLES

The samples included in this review are listed below:

Sample IDs	Sample IDs
M119-0.5	M119-50
M119-0.5D	EB-2
M119-5	TR-9A
M119-10	M119-32

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

Sample data were reviewed for the following parameters, where applicable to the method:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Initial and continuing calibrations
- Method blanks/equipment blanks
- Surrogate spike recoveries
- Laboratory control sample (LCS) results
- Matrix spike/matrix spike duplicate (MS/MSD) results
- Field duplicate results
- Compound quantitation
- Quantitation limits and sample results

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. No discrepancies were found

Holding Times and Sample Preservation

The samples were extracted and analyzed within the method specified holding times.

The cooler temperature upon receipt at the laboratory was 3.8 ^{o}C, which was within the acceptance criterion of 4$\pm$ 2^{o}C.

Initial and Continuing Calibrations

The percent relative standard deviations (%RSDs) of all target compounds were within the QC acceptance criteria for the initial calibrations associated with the sample analyses. The percent differences (%Ds) of all target compounds were within the QC acceptance criteria for the continuing calibrations associated with the sample analyses.

The laboratory used hexacosane instead of n-octacosane for the surrogate. No validation action is required.

Method Blanks/Equipment Blank

No target compounds were detected in the method blank and equipment blank. There were no trip blanks (TB), or field blanks (FB) reported with the samples in this data package. An additional equipment blank, EB-1, reported under SDG 06C096, is associated with the soil samples and EB-3 in SDG 06C239 is

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

associated with the water sample TR-9A. No target analytes were detected in these equipment blanks.

Surrogate Spike Recoveries

Surrogate recoveries were within the QC acceptance criteria in all sample analyses.

LCS Results

The percent recoveries (%Rs) and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria for the LCS and LCSD.

MS/MSD Results

MS/MSD analyses were not submitted with this sample set. No validation action is required.

Field Duplicate Results

Samples M119-0.5 and M119-0.5D were submitted as the field duplicate pair. The results for detected compounds and their relative percent differences (RPDs) are tabulated below. The RPD was not calculable (NC) because one sample result was a nondetect. Precision was deemed acceptable.

Compound	M119-0.5 (mg/Kg)	M119-0.5D (mg/Kg)	RPD
DRO	11U	6.2J	NC

Compound Quantitation

The recommended compounds (C_{10} and C_{28}) were used to establish the lower and upper retention time range for DRO and the recommended compounds (C28 and C38) were used to establish lower and upper retention time range for ORO.

Quantitation Limits and Sample Results

Calculations were spot-checked. No discrepancies were noted but some data qualifications were provided by the laboratory and are explained below.

Samples EB-2 and TR-9A were analyzed at minor dilutions due to the sample preparation requirement. Sample results and sample quantitation limits were adjusted accordingly. No dilutions were required for the remaining samples. The project-required reporting limits were not exceeded for any sample in this data set. Sample quantitation limits (SQLs) for all samples were within the target quantitation limits. The laboratory reported that sample M119-0.5D displayed motor oil-like fuel pattern. Discrete peaks found in sample TR-9A were included in the DRO range quantified but did not match fuel standard chromatographic patterns. The result for M119-0.5D was qualified as estimated (J) since the result fell between the method detection limit and the reporting limit.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date: August 25, 2006 Revised September 9, 2006

To: Dave Gerry/Camarillo

From: Vinora Nicholls/Westford

Subject: Data Validation, Ethylene Glycol Analyses
Henderson Upgradient Investigation
Tronox LLC Henderson, Nevada
EMAX SDG 06C127

Distribution: Robert Kennedy/Westford

04020-023-152

TH024EG.rev

SUMMARY

Limited validation was performed on the data for six soil samples, including one field duplicate, one equipment blank and one groundwater sample analyzed for ethylene glycol by SW-846 method 8015B. The samples were collected at the Tronox facility in Henderson Nevada on March 14, 2006 and submitted to EMAX Laboratories (EMAX), Inc. in Torrance, California for analysis. EMAX analyzed the samples and reported the results under sample delivery group (SDG) 06C127.

The analytical data were evaluated according to the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (10/99), the Region 9 Superfund Data Evaluation/Validation Guidance, NDEP Guidance on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodology.

In general, the data are valid as reported and may be used for decision making purposes. No data were rejected or qualified based on the results of data validation.

SAMPLES

The samples included in this review are listed below:

Sample IDs	Sample IDs
M119-0.5	M119-50
M119-0.5D	EB-2
M119-5	TR-9A
M119-10	M119-32

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

Sample data were reviewed for the following parameters, where applicable to the method:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Initial and continuing calibrations
- Method blanks/equipment blanks
- Surrogate spike recoveries
- Laboratory control sample (LCS) results
- Matrix spike/matrix spike duplicate (MS/MSD) results
- Field duplicate results
- Compound quantitation
- Quantitation limits and sample results

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. No discrepancies were found.

Holding Times and Sample Preservation

The samples were extracted and analyzed within the method specified holding times.

The cooler temperature upon receipt at the laboratory was 3.8 ^{o}C, which was within the acceptable range of 4$\pm$ 2^{o}C.

Initial and Continuing Calibrations

The percent relative standard deviations (%RSDs) of all target compounds were within the QC acceptance criteria for the initial calibrations associated with the sample analyses. The percent differences (%Ds) of all target compounds were within the QC acceptance criteria for the continuing calibrations associated with the sample analyses.

Method Blanks/Equipment Blank

No target compounds were detected in the method blank and equipment blank. There were no trip blanks (TB), or field blanks (FB) reported with the samples in this data package. Equipment blank EB-3 is associated with the water sample TR-9A. The equipment blanks associated with the soils are EB-1 and EB-2 which are reported under SDGs 06C096 and 06C127, respectively. No target compounds were detected in these associated equipment blanks.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Surrogate Spike Recoveries

Surrogate spikes were not performed because the EPA method and the laboratory SOP do not require surrogates for direct injection analysis. No validation action was taken on this basis.

LCS Results

The percent recoveries (%Rs) and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria for the LCS and LCSD.

MS/MSD Results

MS/MSD analyses were not submitted with this sample set. No validation action is required.

Field Duplicate Results

Samples M119-0.5 and M119-0.5D were submitted as a field duplicate pair. The results and their relative percent differences (RPDs) are tabulated below. The RPD is not calculable (NC) because both sample and duplicate were nondetects. Precision was deemed acceptable.

Compound	M119-0.5 (mg/Kg)	M119-0.5D (mg/Kg)	RPD
Ethylene Glycol	44U	44U	NC

Compound Quantitation

Retention times were defined during calibration. Retention times fell within acceptance criteria for all samples.

Quantitation Limits and Sample Results

Calculations were spot-checked. There were no discrepancies noted.

No dilutions were required for the samples in this data set; therefore the sample quantitation limits (SQLs) were unaffected and met the target quantitation limits.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date: August 9, 2006 Revised October 9, 2006

To: Dave Gerry/Camarillo

From: Vinora Nicholls/Westford

Subject: Data Validation, Alcohol Analyses
Henderson Upgradient Investigation
Tronox LLC Henderson, Nevada
Emax SDG 06C127

Distribution: Robert Kennedy/Westford 04020-023-152

TH024FA.rev

SUMMARY

Limited validation was performed on the data for six soil samples, including one field duplicate, one equipment blank and one water sample analyzed for methanol and ethanol by SW-846 method 8015B. The samples were collected at the Tronox facility in Henderson Nevada on March 14, 2006 and submitted to EMAX Laboratories, Inc in Torrance, California for analysis. EMAX processed the samples and reported the results under sample delivery group (SDG) 06C127.

The analytical data were evaluated according to the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (10/99), the Region 9 Superfund Data Evaluation/Validation Guidance, NDEP Guidance on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodology.

In general, the data are valid as reported and may be used for decision making purposes. No data were rejected or qualified based on the results of data validation.

SAMPLES

The samples included in this review are listed below:

Sample IDs	Sample IDs
M119-0.5	M119-32
M119-0.5D	M119-50
M119-5	EB-2
M119-10	TR-9A

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

- Sample data were reviewed for the following parameters, where applicable to the method:
- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Initial and continuing calibrations
- Method blanks/equipment blanks
- Surrogate spike recoveries
- Laboratory control sample (LCS) results
- Matrix spike/matrix spike duplicate (MS/MSD) results
- Field duplicate results
- Compound quantitation
- Quantitation limits and sample results

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. No discrepancies were found.

Holding Times and Sample Preservation

The samples were extracted and analyzed within the method specified holding times.

The cooler temperature upon receipt at the laboratory was 3.8 ^{o}C, which was within the acceptable range of 4$\pm$ 2^{o}C.

Initial and Continuing Calibrations

The percent relative standard deviations (%RSDs) of all target compounds were within the QC acceptance criteria for the initial calibrations associated with the sample analyses. The percent differences (%Ds) of all target compounds were within the QC acceptance criteria for the continuing calibrations associated with the sample analyses.

Method Blanks/Equipment Blank

No target compounds were detected in the method blank and equipment blank. There were no trip blanks (TB), or field blanks (FB) reported with the samples in this data package. Equipment blank EB-3 is associated with the water sample TR-9A. The equipment blanks associated with the soils are EB-1 and EB-2 in SDG 06C096 and 06C127, respectively. No target compounds were detected in these associated equipment blanks.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Surrogate Spike Recoveries

Surrogate spikes were not performed because the EPA method and the laboratory SOP do not require surrogates for direct injection analysis. No validation action was taken on this basis.

LCS Results

The percent recoveries (%R) and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria for the LCS and LCSD.

MS/MSD Results

MS/MSD analyses were not submitted with this sample set. No validation action is required.

Field Duplicate Results

Samples M119-0.5 and M119-0.5D were submitted as field duplicate pairs. The results for detected compounds and their relative percent differences (RPDs) are tabulated below. The RPD is not calculable (NC) because both sample and duplicate were non-detects. Precision was deemed acceptable.

Compound	M119-0.5 (mg/Kg)	M119-0.5D (mg/Kg)	RPD
Methanol	1.1U	1.1U	NC
Ethanol	1.1U	1.1U	NC

Compound Quantitation

Retention times were defined during calibration. Analyte retention times fell within acceptance criteria for all samples.

Quantitation Limits and Sample Results

Calculations were spot-checked. There were no discrepancies noted.

No dilution was required for the sample in this data set; therefore the sample quantitation limit (SQL) was unaffected and met the target quantitation limit.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date: August 25, 2006 Revised October 9, 2006

To: Dave Gerry/Camarillo

From: Vinora Nicholls/Westford

Subject: Data Validation, GRO Analyses
Henderson Upgradient Investigation
Tronox LLC Henderson, Nevada
EMAX SDG 06C127

Distribution: Robert Kennedy/Westford

04020-023-152

TH024gro.rev.doc

SUMMARY

Limited validation was performed on the data for six soil samples, one equipment blank, and one groundwater sample analyzed for gasoline range organics (GRO) by SW-846 method 5030B/5035/8015B. The samples were collected at the Tronox LLC site in Henderson, Nevada on March 14, 2006 and submitted to EMAX Laboratories (EMAX), Inc. in Torrance, California for analysis. EMAX processed the samples and reported the results under sample delivery group (SDG) 06C127.

The analytical data were evaluated according to the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (10/99), the Region 9 Superfund Data Evaluation/Validation Guidance, NDEP Guidance on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodology.

In general, the data are valid as reported and may be used for decision making purposes. No data were rejected or qualified based on data validation.

SAMPLES

The samples included in this review are listed below:

Sample IDs	Sample IDs
M119-0.5	M119-50
M119-0.5D	EB-2
M119-5	TR-9A
M119-10	
M119-32	

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

Sample data were reviewed for the following parameters, where applicable:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Initial and continuing calibrations
- Method blanks/equipment blanks
- Surrogate spike recoveries
- Laboratory control sample (LCS) results
- Matrix spike/matrix spike duplicate (MS/MSD) results
- Field duplicate results
- Compound quantitation
- Quantitation limits and sample results

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. No discrepancies were found.

Holding Times and Sample Preservation

The samples were analyzed within the method specified holding time.

The cooler temperature upon receipt at the laboratory was 3.8 ^{o}C, which was within the acceptance criterion of 4$\pm$ 2^{o}C.

Initial and Continuing Calibrations

The percent relative standard deviations (%RSDs) of all target compounds were within the QC acceptance criteria for the initial calibrations associated with the sample analyses. The percent differences (%Ds) of all target compounds were within the QC acceptance criteria for the continuing calibrations associated with the sample analyses.

The laboratory used 1,1,1-trifluorotoluene(1,1,1-TFT) as a surrogate; however results for 1,1,1-TFT were not reported on the sample results data sheet. Data validation actions are not required for this surrogate nonconformance.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Method Blanks/Equipment Blank

GRO was not detected in the method blank and equipment blank. There were no trip blanks (TBs) or field blanks (FBs) reported with the samples in this data package. Equipment blank EB-3 is associated with the water sample TR-9A. The equipment blanks associated with the soils are EB-1 and EB-2 and were reported in SDGs 06C096 and 06C127, respectively. GRO was not detected in these associated equipment blanks.

Surrogate Spike Recoveries

Surrogate recoveries were within the QC acceptance criteria in all sample analyses.

LCS Results

The percent recoveries (%Rs) and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria for the LCS and LCSD.

MS/MSD Results

MS/MSD analyses were not performed on a sample in this sample set. No validation action was taken on this basis.

Field Duplicate Results

Samples M119-0.5 and M119-0.5D were submitted as the field duplicate pair. The RPD is not calculable (NC) because both sample and duplicate results were nondetect. Precision was deemed acceptable.

Compound	M119-0.5 (mg/Kg)	M119-0.5D (mg/Kg)	RPD
GRO	1.4 U	1.1 U	NC

Compound Quantitation

The recommended compounds n-hexane and n-decane were used to establish the GRO lower and upper retention time range, respectively. All peaks contributing to the reported results were within the calibrated range.

Quantitation Limits and Sample Results

Calculations were spot-checked. There were no discrepancies noted.

All samples except M119-50, EB-2, and TR-9A were analyzed at minor dilutions due to the sample preparation requirement. Sample results and sample quantitation limits were adjusted accordingly. The project-required reporting limits were not exceeded for any sample in this data set.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date:	August 14, 2006 Revised October 10, 2006
To:	David Gerry/Camarillo
From:	Linda Sulkowski/Westford
Subject:	Data Validation, Metals Analysis Henderson Upgradient Investigation Tronox LLC Henderson, Nevada EMAX SDG 06C0127
Distribution:	R. Kennedy/Westford

04020-023-152
TH024inolms.rev

SUMMARY

Limited validation was performed on the data for eight soil samples analyzed for a project-specific list of metals by SW-846 methods 6020A and 7471A. The samples were collected at the Tronox LLC site in Henderson, Nevada on March 14, 2006 and were submitted to EMAX Laboratories (EMAX) in Torrance, CA for analysis. EMAX processed the samples and reported the results under sample delivery group (SDG) 06C127.

The analytical data were evaluated with reference 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 on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodologies.

In general, the data are valid as reported and may be used for decision making purposes. Selected results were qualified as estimated due to nonconformances of certain QC criteria (see discussion below).

SAMPLES

The samples included in this review are listed below:

Sample IDs	
M119-0.5	M119-0.5D (field duplicate of M119-0.5)
M119-5	M119-10
M119-20	M119-32
M119-40	M119-50

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

Sample data were reviewed for the following parameters, where applicable to the method:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Inductively coupled plasma/mass spectrometry (ICP/MS) tuning
- Initial and continuing calibrations
- Method blanks/equipment blanks
- Laboratory control sample (LCS)/laboratory control sample duplicate (LCSD) results
- Matrix spike/matrix spike duplicate (MS/MSD) results
- Internal standard performance
- Field duplicate results
- Quantitation limits and sample results

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. The following discrepancy was found.

- The collection date and time were not listed on the container labels for sample M119-40. The laboratory obtained the information from the COC. No validation action was taken on this basis.

Holding Times and Sample Preservation

The samples were digested and analyzed within the method specified holding time.

The cooler temperature upon receipt at EMAX was within the acceptance criteria of 4 ± 2°C.

ICP/MS Tuning

A tuning solution (daily performance check) containing elements representing all of the mass regions of interest was analyzed at the beginning of each analytical sequence. The percent relative standard deviations (%RSDs) for elements in the tuning solution met the QC acceptance criteria of <5%.

Initial and Continuing Calibrations

All criteria were met for the calibration curves, and the initial and continuing calibration verification (ICV/CCV) standards.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Method Blanks/Equipment Blanks

Calcium, chromium, iron, and strontium were detected in the laboratory preparation blank at concentrations > the method detection limit (MDL), but < the sample quantitation limit (SQL). Aluminum, copper, iron, manganese, and/or zinc were detected in the equipment blank samples EB-1 and EB-2, which were reported in SDGs 16C096 and 06C127, respectively. Target analytes were not detected in the bracketing continuing calibration blanks (CCBs) associated with the soil samples. The presence of blank contamination indicated that false positive results might have existed for these analytes in the associated samples. The following tables summarize the highest level of blank contamination and the associated samples.

Type of Blank	Analyte	Maximum Blank Concentration* (mg/Kg)
Preparation Blank	Calcium	38.4 J
	Chromium	0.165 J
	Iron	9.23 J
	Strontium	0.25 J
Associated samples: All sediment samples in this data set. *Adjusted for sample preparation factors and moisture content.		

Type of Blank	Analyte	Maximum Blank Concentration* (µg/L)
Equipment Blank EB-1	Aluminum	41
	Copper	4.4
Equipment Blank EB-2	Iron	0.48 J
	Manganese	8.4
	Zinc	17
Associated samples: All sediment samples in this data set. *Adjusted for sample preparation factors and moisture content.		

Sample results were qualified as follows:

For blank results >the SQL:

- Positive sample results ≥ MDL, but ≤ SQL were qualified as nondetect (U) at the SQL.
- Positive sample results > SQL, but < 10x the blank result were qualified as estimated, biased high (J+).
- Positive sample results that were ≥ 10x the blank result were accepted unqualified.

For blank results ≥ MDL, but ≤ SQL:

- Nondetect results were accepted unqualified.
- Positive sample results ≥ MDL, but ≤ SQL were qualified as nondetect (U) at the SQL.
- Positive sample results > SQL and < the Action Level (AL) of 5x the blank contamination level were qualified as undetected (U) at the reported concentration.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

LCS/LCSD Results

The %Rs and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria for the LCS and LCSD.

MS/MSD Results

Pre-digestion MS/MSD analyses were not performed on a sample from this sample set.

Post digestion spike analyses were performed on sample M120-50. The %Rs met the QC acceptance criteria with the following exception. The %R of titanium (128%) exceeded the QC acceptance criteria. Positive results for titanium were qualified as estimated biased high (J+) in all soil samples.

Internal Standard Performance

The internal standard performance was within the QC acceptance criteria in all sample analyses.

Field Duplicate Results

Samples M119-0.5 and M119-0.5D were submitted as the field duplicate pair with this sample set. The following table summarizes the RPDs of the detected analytes in field duplicate samples M119-0.5 and M119-0.5D. The RPDs were not calculable (NC) for selenium and silver due to nondetect results in sample M119-0.5. Precision was deemed acceptable for selenium and silver since the detected results in sample M119-0.5D were < 10x the MDL. The RPDs for arsenic, calcium, and copper exceeded the QC acceptance criteria. Positive and nondetect results for arsenic, calcium, and copper were qualified as estimated (J, UJ). The remaining RPDs were within the QC acceptance criteria.

Compound	M119-0.5 (mg/Kg)	M119-0.5D (mg/Kg)	RPD
Aluminum	8100	9500	16
Arsenic	2.54	4.70	60
Barium	150	216	36
Beryllium	0.502 J	0. 543 J	8
Boron	6.14 J	8.17 J	28
Cadmium	0.394 J	0.421 J	7
Calcium	21500	36700	52
Chromium	8.76	10.4	17
Cobalt	5.79	5.97	3
Copper	30.8	17.4	56
Iron	9700	10100	4
Lead	6.80	8.14	18
Magnesium	8170	9490	15
Manganese	272	358	27
Molybdenum	0.136 J	0.175 J	25
Nickel	13.3	12.9	3
Potassium	2030	2790	32
Selenium	0.109 U	0.117 J	NC
Silver	0.109 U	0.113 J	NC

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Compound	M119-0.5 (mg/Kg)	M119-0.5D (mg/Kg)	RPD
Sodium	478	468	2
Strontium	165	215	26
Titanium	536	622	15
Uranium	0.827	0.971	16
Vanadium	24.0	26.1	8
Zinc	44.2	35.3	22

Quantitation Limits and Sample Results

Dilutions were not performed on samples in this data set; therefore, the SQLs were not affected.

It should be noted that the laboratory reported results between the MDL and the SQL as estimated (J).

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date: August 16, 2006 Revised October 9, 2006

To: Dave Gerry/Camarillo

From: Linda Sulkowski/Westford

Subject: Data Validation, VOC Analysis
Henderson Upgradient Investigation
Tronox LLC Henderson, Nevada
EMAX SDG 06C127

Distribution: R. Kennedy/Westford

04020-023-152 File

TH024voclms.rev.doc

SUMMARY

Limited validation was performed on the data for six soil samples, one aqueous sample, and one equipment blank analyzed for a project-specific list of volatile organic compounds (VOCs) by SW-846 methods 5030B/5035/8260B. The samples were collected at the Tronox LLC site in Henderson, Nevada on March 14, 2006 and were submitted to EMAX Laboratories (EMAX) in Torrance, CA for analysis. EMAX processed the samples and reported the results under sample delivery group (SDG) 06C127.

The analytical data were evaluated with reference to the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (10/99), the Region 9 Superfund Data Evaluation/Validation Guidance, NDEP Guidance on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodology.

In general, the data are valid as reported and may be used for decision making purposes. Results for tert-butyl alcohol were rejected in all samples since the minimum response factor (RF) criterion was not met. Selected results for 2,2-dichloropropane were estimated (UJ) in some soil samples since the percent difference (%D) criterion was not met in the continuing calibration.

SAMPLES

The samples included in this review are listed below:

Sample IDs	Sample IDs
M119-0.5	M119-0.5D (field duplicate of M119-0.5)
M119-5	M119-10
M119-32	M119-50
EB-2 (equipment blank)	TR-9A

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

Sample data were reviewed for the following parameters, where applicable:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Gas chromatography/mass spectrometry (GC/MS) tuning
- Initial and continuing calibrations
- Method blanks/equipment blanks/trip blanks
- Surrogate spike recoveries
- Laboratory control sample (LCS)/laboratory control sample duplicate (LCSD) results
- Matrix spike/matrix spike duplicate (MS/MSD) results
- Internal standard performance
- Field duplicate results
- Quantitation limits and sample results

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. The following discrepancies were found.

The collection date was not listed on the vial label for sample M119-0.5. No validation action was taken on this basis.

The collection times were not listed on the vial labels for samples EB-2 and TR-9A. No validation action was taken on this basis.

Holding Times and Sample Preservation

The samples were analyzed within the method specified holding time.

The cooler temperature upon receipt at EMAX was within the acceptance criterion of 4±2°C.

GC/MS Tuning

The frequency and abundance of all bromofluorobenzene (BFB) tuning results were within the QC acceptance criteria. The samples were analyzed within the method specified tuning intervals.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Initial and Continuing Calibrations

The percent relative standard deviations (%RSDs), the correlation coefficients, and/or the RFs of all target compounds were within the QC acceptance criteria for the initial calibration associated with the sample analyses with the following exception. Actions were applied as indicated below.

Compound	RF	Action (Detects/Nondetects)
Tert-butyl alcohol	0.027	J/R
Associated Samples:	All samples	

The percent differences (%Ds) of all target compounds were within the QC acceptance criteria for the continuing calibrations associated with the sample analyses with the following exception. Actions were applied as indicated below.

Compound	%D	Action (Detects/Nondetects)
2,2-Dichloropropane	41.2	J/UJ
Associated Samples:	M119-0.5, M119-0.5D, M119-5, and M119-10.	

Method Blanks/Equipment Blanks/Trip Blanks

Trip blanks were not submitted with this sample set. No validation action was taken on this basis.

Target compounds were not detected in the laboratory method blanks associated with the samples in this data set.

Equipment blank sample EB-3, reported in SDG 06C239, was associated with the aqueous sample in this data set. Target compounds were not detected in EB-3 therefore, no validation action was necessary. Equipment blank samples EB-1 (reported in SDG 06C096) and EB-2 were associated with selected soil samples in this data set. Acetone was detected in EB-1 and EB-2 at 6.3 and 9.9 μg/L, respectively. The presence of blank contamination indicates that false positives may exist for this compound in the associated samples. An Action Level (AL) was established for the highest reported concentration of acetone at 10x the concentration detected. The following table summarizes the AL and the associated samples.

Blank Type	Compound	Concentration (μg/L)	AL (μg/Kg)	Associated Samples
EB-2 (equipment blank)	Acetone	9.9 J	99	M119-0.5, M119-0.5D, M119-10, M119-32, M119-50

Sample results were qualified as follows:

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

- If the sample result was ≤ AL and ≤ the sample quantitation limit (SQL), the result was qualified as nondetect (U) at the SQL.
- If the sample result was ≤ AL and > SQL, the result was qualified as nondetect (U) at the reported concentration.
- If the sample result was > AL, the result was not qualified.

Surrogate Spike Recoveries

Surrogate percent recoveries (%Rs) were within the QC acceptance criteria in all sample analyses.

LCS/LCSD Results

The %Rs and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria for the LCS and LCSD.

MS/MSD Results

MS/MSD analyses were not performed on a sample from this sample set. No validation action was taken on this basis.

Internal Standard Performance

The internal standard performance was within the QC acceptance criteria in all sample analyses.

Field Duplicate Results

Samples M119-0.5 and M119-0.5D were submitted as the field duplicate pair with this sample set. The following table summarizes the RPD of the detected analyte. The RPD was not calculable (NC) due to a nondetect result in sample M119-0.5D. Precision was deemed acceptable since the detected result in sample M119-0.5 was less than 5x the SQL.

Compound	M119-0.5 (µg/Kg)	M119-0.5D (µg/Kg)	RPD
Acetone	6.2 J	11 U	NC

Quantitation Limits and Sample Results

Dilutions were not performed on samples in this data set. Sample quantitation limits (SQLs) for these samples were therefore not affected.

It should be noted that the laboratory reported 2-butanone, 4-methyl-2-pentanone, and 2-hexanone with SQLs of 10 µg/kg each, instead of the QAPP stipulated SQLs of 5 µg/kg for all soil samples. No data validation action was taken other than this notation.

It should also be noted that the laboratory reported 2-butanone, 4-methyl-2-pentanone, and 2-hexanone with SQLs of 10 µg/L each, instead of the QAPP stipulated SQLs of 5 µg/L for the aqueous samples. No data validation action was taken other than this notation.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date:	August 10, 2006 Revised October 9, 2006	
To:	David Gerry/Camarillo	
From:	Sheena Blair/Westford	
Subject:	Data Validation, Inorganic Analysis Henderson Upgradient Investigation Tronox LLC Henderson, Nevada EMAX SDG 06C127	
Distribution:	R. Kennedy/Westford	04020-023-152 TH024wc.sb.rev

SUMMARY

Limited validation was performed on the data for eight soil samples analyzed for all or a subset of the following parameters:

- Chloride by SW-846 method 9056
- Nitrate as nitrogen by SW-846 method 9056
- Nitrite as nitrogen by SW-846 method 9056
- Sulfate by SW-846 method 9056
- Total cyanide by SW-846 method 9014
- Hexavalent chromium by SW-846 method 7199
- Chlorate by EPA 300.0 modified
- Perchlorate by EPA 314.0
- Total alkalinity by EPA 310.1
- Bicarbonate alkalinity by EPA 310.1(calculated from total and carbonate alkalinity)
- Carbonate alkalinity by EPA 310.1
- Specific conductance by SM 2510B, and
- pH by SW-846 method 9045C

The samples were collected at the Henderson site in Henderson, NV on March 14, 2006 and submitted to EMAX Laboratories, Inc in Torrance, CA for analysis. EMAX processed the samples and reported the results under sample delivery group (SDG) 06C127.

The analytical data were evaluated with reference 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 on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodologies.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

In general, the data are valid as reported and may be used for decision making purposes. No data were rejected.

SAMPLES

The samples included in this review are listed below:

Sample IDs	
M119-0.5	M119-0.5D (field duplicate of M119-0.5)
M119-5	M119-10
M119-20	M119-32*
M119-40	M119-50
* Sample analyzed for all parameters. All other samples analyzed for perchlorate and hexavalent chromium only.	

REVIEW ELEMENTS

Sample data were reviewed for the following elements, where applicable to the method:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Initial and continuing calibrations
- Laboratory blanks/equipment 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

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. The following discrepancies were found:

- The sample label for sample M119-32 was missing the collection date and analyses requested.

- The sample label for sample M119-40 was missing the collection date and time.

EMAX processed the samples using the information recorded on the COC. No validation action was required other than this notation.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Holding Times and Sample Preservation

All samples were analyzed within the method-specified holdings times for all parameters analyzed.

The cooler temperature upon receipt at EMAX was within the acceptance criteria of 4 ± 2°C.

Initial and Continuing Calibrations

All criteria were met for the calibration curves, and the initial and continuing calibration verification (ICV/CCV) standards (where applicable to the methods).

Laboratory Blanks/Equipment Blanks

No equipment blanks were associated with the samples in this data set, except for perchlorate and hexavalent chromium in soils. No validation action was taken on this basis.

Equipment blank sample EB-1 was submitted for perchlorate and hexavalent chromium, and reported under MWH Data Report number 169405R. Perchlorate and hexavalent chromium were not detected in EB-1; therefore no validation action was taken.

Equipment blank sample EB-2 was submitted for perchlorate only and reported under MWH Data Report number 169653R. Perchlorate was not detected in EB-2; therefore no validation action was taken.

Target compounds were not detected in the laboratory blanks associated with the samples in this data set.

LCS/LCSD Results

The percent recoveries (%Rs) and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria for all LCSs and LCSDs.

MS/MSD Results

MS analyses were performed on sample M119-5 for hexavalent chromium and perchlorate. MS/MSD analyses were performed on sample M119-32 for cyanide. The %Rs and RPDs met the laboratory QC acceptance criteria for all three parameters.

Batch MS or MS/MSD analyses were performed on samples from other clients for all parameters, except for hexavalent chromium, perchlorate, and cyanide. Although this practice is acceptable, the results could not be directly applied to the samples analyzed in this data package because of possible differences in the sample matrix and type. No validation action was taken on this basis.

Laboratory Duplicate Results

Laboratory duplicate analyses were performed on all the samples for hexavalent chromium and on sample M119-5 for perchlorate. All hexavalent chromium sample results were nondetect and precision was deemed to be acceptable. The RPD for perchlorate met the QC acceptance criteria.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

The other parameters in this data set did not have associated laboratory duplicate analyses. Thus, for parameters without an associated laboratory duplicate, the LCS/LCSD and/or the MS/MSD demonstrated precision and accuracy in the laboratory (see discussions above).

Field Duplicate Results

Samples M119-0.5 and M119-0.5D were submitted as the field duplicate pair for perchlorate and hexavalent chromium. There was no field duplicate pair submitted or associated with the other parameters in this data set.

The hexavalent chromium results for field duplicates M119-0.5 and M119-0.5D were nondetect; therefore, precision was deemed to be acceptable. The following table summarizes the detected results and the RPDs for perchlorate in the field duplicate pair. The RPD for perchlorate was not calculable (NC) due to a nondetect sample result. Precision was deemed acceptable since the detected field duplicate result was <10x the sample quantitation limit (SQL).

Analyte	M119-0.5 (µg/Kg)	M119-05D (µg/Kg)	RPD	Action
Perchlorate	40 U	22.1 J	NC	None

Quantitation Limits and Sample Results

Dilutions were performed for selected parameters due to elevated concentrations of these analytes present in the sample. The following table lists the samples, analytes, and the dilutions required.

Sample ID	Analyte	Dilution Factor
M119-32	Sulfate	250x
M119-10	Perchlorate	5x
M119-20	Perchlorate	5x

It should be noted that the laboratory reported results between the MDL and the SQL. These results were qualified as estimated (J) by the laboratory. No validation action was taken on this basis.

Selected EMAX reporting limits did not meet the limits stated in the QAPP. No validation action was taken other than this notation.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date: August 25, 2006 Revised October 9, 2006

To: Dave Gerry/Camarillo

From: Vinora Nicholls/Westford

Subject: Data Validation, DRO Analyses
Henderson Upgradient Investigation
Tronox LLC Henderson, Nevada
EMAX SDG 06C199

Distribution: Robert Kennedy/Westford 04020-023-152

TH025DRO.rev

SUMMARY

Limited validation was performed on the data for one groundwater sample was analyzed for diesel range organics (DRO) and oil range organics (ORO) by SW-846 method 3520C/8015B. The sample was collected at the Tronox facility in Henderson Nevada on March 20, 2006 and submitted to EMAX Laboratories (EMAX), Inc in Torrance, California for analysis. EMAX processed the sample and reported the result under sample delivery group (SDG) 06C199.

The analytical data were evaluated according to the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (10/99), the Region 9 Superfund Data Evaluation/Validation Guidance, NDEP Guidance on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodology.

In general, the data are valid as reported and may be used for decision making purposes. No data were rejected or qualified based on the results of data validation.

SAMPLES

The sample included in this review is listed below:

Sample ID
M103A

REVIEW ELEMENTS

Sample data were reviewed for the following parameters, where applicable to the method:

- Agreement of analyses conducted with chain-of-custody (COC) requests

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

- Holding times and sample preservation
- Initial and continuing calibrations
- Method blanks/equipment blanks
- Surrogate spike recoveries
- Laboratory control sample (LCS) results
- Matrix spike/matrix spike duplicate (MS/MSD) results
- Field duplicate results
- Compound quantitation
- Quantitation limits and sample results

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. No discrepancies were found

Holding Times and Sample Preservation

The samples were extracted and analyzed within the method specified holding times.

The cooler temperature upon receipt at the laboratory was 4.2^{o}C, which was within the acceptable range of 4$\pm$ 2^{o}C.

Initial and Continuing Calibrations

The percent relative standard deviations (%RSDs) of all target compounds were within the QC acceptance criteria for the initial calibrations associated with the sample analyses. The percent differences (%Ds) of all target compounds were within the QC acceptance criteria for the continuing calibrations associated with the sample analyses.

The laboratory used hexacosane instead of n-octacosane for the surrogate. No validation action is required.

Method Blanks/Equipment Blank

No target compounds were detected in the method blank. There were no trip blanks (TB), equipment blanks (EB) or field blanks (FB) reported with the samples in this data package. The associated equipment blank, EB-3, was in SDG 06C239. No target analytes were detected in the equipment blank.

Surrogate Spike Recoveries

Surrogate recoveries were within the QC acceptance criteria in all sample analyses.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

LCS Results

The percent recoveries (%Rs) and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria for the LCS and LCSD.

MS/MSD Results

MS/MSD analyses were not submitted with this sample set. No validation action is required.

Field Duplicate Results

Field duplicate samples were not submitted with this sample set. No validation action is required.

Compound Quantitation

The recommended compounds (C_{10} and C_{28}) were used to establish the lower and upper retention time range for DRO and the recommended compounds (C28 and C38) were used to establish lower and upper retention time range for ORO.

Quantitation Limits and Sample Results

Calculations were spot-checked. There were no discrepancies noted.

The sample was analyzed at a minor dilution due to the sample preparation requirement. Sample result and sample quantitation limit was adjusted accordingly. The project-required reporting limit was not exceeded for any sample in this data set. Sample quantitation limit (SQL) for the sample was within the target quantitation limit.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date: August 25, 2006 Revised October 10, 2006

To: Dave Gerry/Camarillo

From: Vinora Nicholls/Westford

Subject: Data Validation, Ethylene Glycol Analyses
Henderson Upgradient Investigation
Tronox LLC Henderson, Nevada
EMAX SDG 06C199

Distribution: Robert Kennedy/Westford

04020-023-152

TH025EG.rev

SUMMARY

Limited validation was performed on the data for one water sample analyzed for ethylene glycol by SW-846 method 8015B. The sample was collected at the Tronox facility in Henderson, Nevada on March 20, 2006 and submitted to EMAX Laboratories (EMAX), Inc. in Torrance, California for analysis. EMAX analyzed the sample and reported the result under sample delivery group (SDG) 06C199.

The analytical data were evaluated according to the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (10/99), the Region 9 Superfund Data Evaluation/Validation Guidance, NDEP Guidance on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodology.

In general, the data are valid as reported and may be used for decision making purposes. . No data were rejected or qualified based on the results of data validation.

SAMPLES

The sample included in this review is listed below:

Sample ID
M103A

REVIEW ELEMENTS

Sample data were reviewed for the following parameters, where applicable to the method:

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Initial and continuing calibrations
- Method blanks/equipment blanks
- Surrogate spike recoveries
- Laboratory control sample (LCS) results
- Matrix spike/matrix spike duplicate (MS/MSD) results
- Field duplicate results
- Compound quantitation
- Quantitation limits and sample results

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. No discrepancies were found.

Holding Times and Sample Preservation

The sample was analyzed within the method specified holding time.

The cooler temperature upon receipt at the laboratory was 2^{o}C, which was within the acceptable range of 4$\pm$ 2^{o}C.

Initial and Continuing Calibrations

The percent relative standard deviations (%RSDs) of all target compounds were within the QC acceptance criteria for the initial calibrations associated with the sample analyses. The percent differences (%Ds) of all target compounds were within the QC acceptance criteria for the continuing calibrations associated with the sample analyses.

Method Blanks/Equipment Blank

No target compounds were detected in the method blank. There were no trip blanks (TB), equipment blanks (EB) or field blanks (FB) reported with the samples in this data package. The equipment blank associated with this water sample was EB-3 and reported under SDG 06C239. No target compounds were detected in the associated equipment blank.

Surrogate Spike Recoveries

Surrogate spikes were not performed because the EPA method and the laboratory SOP do not require surrogates for direct injection analysis. No validation action was taken on this basis.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

LCS Results

The percent recoveries (%Rs) and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria for the LCS and LCSD.

MS/MSD Results

MS/MSD analyses were not submitted with this sample set. No validation action is required.

Field Duplicate Results

Field duplicate samples were not submitted with this sample set. No validation action is required.

Compound Quantitation

Retention times were defined during calibration. Analyte retention times fell within acceptance criteria for all samples.

Quantitation Limits and Sample Results

Calculations were spot-checked. There were no discrepancies noted.

No dilution was required for the sample in this data set; therefore the sample quantitation limit (SQL) was unaffected and met the target quantitation limit.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date:	August 9, 2006 Revised October 9, 2006	
To:	Dave Gerry/Camarillo	
From:	Vinora Nicholls/Westford	
Subject:	Data Validation, Alcohol Analyses Henderson Upgradient Investigation Tronox LLC Henderson, Nevada Emax SDG 06C199	
Distribution:	R.Kennedy/Westford	04020-023-152 TH025FA.rev

SUMMARY

Limited validation was performed on the data for one water sample analyzed for methanol and ethanol by SW-846 method 8015B. The sample was collected at the Tronox facility in Henderson Nevada on March 20, 2006 and submitted to EMAX Laboratories, Inc in Torrance, California for analysis. EMAX processed the sample and reported the result under sample delivery group (SDG) 06C199.

The analytical data were evaluated according to the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (10/99), the Region 9 Superfund Data Evaluation/Validation Guidance, NDEP Guidance on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodology.

In general, the data are valid as reported and may be used for decision making purposes. No data were rejected or qualified based on the results of data validation.

SAMPLES

The samples included in this review are listed below:

Sample ID
M103A

REVIEW ELEMENTS

- Sample data were reviewed for the following parameters, where applicable to the method:
- Agreement of analyses conducted with chain-of-custody (COC) requests

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

- Holding times and sample preservation
- Initial and continuing calibrations
- Method blanks/equipment blanks
- Surrogate spike recoveries
- Laboratory control sample (LCS) results
- Matrix spike/matrix spike duplicate (MS/MSD) results
- Field duplicate results
- Compound quantitation
- Quantitation limits and sample results

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. No discrepancies were found.

Holding Times and Sample Preservation

The sample was analyzed within the method specified holding times.

The cooler temperature upon receipt at the laboratory was 2.0^{o}C, which was within the acceptable range of 4$\pm$ 2^{o}C.

Initial and Continuing Calibrations

The percent relative standard deviations (%RSDs) of all target compounds were within the QC acceptance criteria for the initial calibrations associated with the sample analyses. The percent differences (%Ds) of all target compounds were within the QC acceptance criteria for the continuing calibrations associated with the sample analyses.

Method Blanks/Equipment Blank

No target compounds were detected in the method blank. There were no trip blanks (TB), equipment blanks (EB) or field blanks (FB) reported with the sample in this data package. The equipment blank associated with this water sample is EB-3 in SDG 06C239. No target compounds were detected in the associated equipment blank.

Surrogate Spike Recoveries

Surrogate spikes were not performed because the EPA method and the laboratory SOP do not require surrogates for direct injection analysis. No validation action was taken on this basis.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

LCS Results

The percent recoveries (%R) and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria for the LCS and LCSD.

MS/MSD Results

MS/MSD analyses were not submitted with this sample set. No validation action is required.

Field Duplicate Results

Field duplicate samples were not submitted with this sample set. No validation action is required.

Compound Quantitation

Retention times were defined during calibration. Retention times fell within acceptance criteria for all samples.

Quantitation Limits and Sample Results

Calculations were spot-checked. There were no discrepancies noted.

No dilution was required for the sample in this data set; therefore the sample quantitation limit (SQL) was unaffected and met the target quantitation limit.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date: August 25, 2006 Revised October 9, 2006

To: Dave Gerry/Camarillo

From: Vinora Nicholls/Westford

Subject: Data Validation, GRO Analyses
Henderson Upgradient Investigation
Tronox LLC Henderson, Nevada
EMAX SDG 06C199

Distribution: Robert Kennedy/Westford

04020-023-152

TH025gro.rev.doc

SUMMARY

Limited validation was performed on the data for one groundwater sample analyzed for gasoline range organics (GRO) by SW-846 methods 5030B/8015B. The sample was collected at the Tronox LLC site in Henderson, Nevada on March 20, 2006 and submitted to EMAX Laboratories (EMAX), Inc. in Torrance, California for analysis. EMAX analyzed the sample and reported the result under sample delivery group (SDG) 06C199.

The analytical data were evaluated according to the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (10/99), the Region 9 Superfund Data Evaluation/Validation Guidance, NDEP Guidance on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodology.

In general, the data are valid as reported and may be used for decision making purposes. No data were rejected or qualified based on data validation.

SAMPLES

The sample included in this review is listed below:

Sample ID
M103A

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

Sample data were reviewed for the following parameters, where applicable:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Initial and continuing calibrations
- Method blanks/equipment blanks
- Surrogate spike recoveries
- Laboratory control sample (LCS) results
- Matrix spike/matrix spike duplicate (MS/MSD) results
- Field duplicate results
- Compound quantitation
- Quantitation limits and sample results

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample report was checked to verify that the result corresponded to analytical request as designated on the COC. No discrepancies were found.

Holding Times and Sample Preservation

The sample was analyzed within the method specified holding time.

The cooler temperature upon receipt at the laboratory was 2.0^{o}C, which was within the acceptance criterion of 4$\pm$ 2^{o}C.

Initial and Continuing Calibrations

The percent relative standard deviations (%RSDs) of all target compounds were within the QC acceptance criteria for the initial calibrations associated with the sample analysis. The percent differences (%Ds) of all target compounds were within the QC acceptance criteria for the continuing calibrations associated with the sample analysis.

The laboratory used 1,1,1-trifluorotoluene(1,1,1-TFT) as a surrogate; however results for 1,1,1-TFT were not reported on the sample results data sheet. Data validation actions are not required for this surrogate nonconformance.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Method Blanks/Equipment Blank

GRO was not detected in the method blank. There were no trip blanks (TBs), equipment blanks (EBs), or field blanks (FBs) reported with the sample in this data package. The equipment blank associated with this water sample was EB-3, reported in SDG 06C239. GRO was not detected in the associated equipment blank.

Surrogate Spike Recoveries

Surrogate recoveries were within the QC acceptance criteria for the sample analysis.

LCS Results

The percent recoveries (%Rs) and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria for the LCS and LCSD.

MS/MSD Results

MS/MSD analyses were not performed on the sample in this sample set. No validation action was taken on this basis.

Field Duplicate Results

Field duplicate samples were not submitted with this sample set. No validation action was taken on this basis.

Compound Quantitation

The recommended compounds n-hexane and n-decane were used to establish the GRO lower and upper retention time range, respectively. All peaks contributing to the reported results were within the calibrated range.

Quantitation Limits and Sample Results

Calculations were spot-checked. There were no discrepancies noted.

No dilution was required for the sample in this data set; therefore the sample quantitation limit (SQL) was unaffected and met the target quantitation limit.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date: August 16, 2006 Revised October 9, 2006

To: Dave Gerry/Camarillo

From: Linda Sulkowski/Westford

Subject: Data Validation, VOC Analysis
Henderson Upgradient Investigation
Tronox LLC Henderson, Nevada
EMAX SDG 06C199

Distribution: R. Kennedy/Westford

04020-023-152 File

TH025voclms.rev.doc

SUMMARY

Limited validation was performed on the data for one aqueous sample analyzed for a project-specific list of volatile organic compounds (VOCs) by SW-846 methods 5030B/8260B. The sample was collected at the Tronox LLC site in Henderson, Nevada on March 20, 2006 and was submitted to EMAX Laboratories (EMAX) in Torrance, CA for analysis. EMAX processed the sample and reported the results under sample delivery group (SDG) 06C199.

The analytical data were evaluated with reference to the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (10/99), the Region 9 Superfund Data Evaluation/Validation Guidance, NDEP Guidance on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodology.

In general, the data are valid as reported and may be used for decision making purposes. The result for tert-butyl alcohol was rejected in the sample since the minimum response factor (RF) criterion was not met. The nondetect result for naphthalene was estimated (UJ) in the sample since the percent difference (%D) criterion was not met in the continuing calibration.

SAMPLES

The sample included in this review is listed below:

Sample ID
M103A

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

Sample data were reviewed for the following parameters, where applicable:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Gas chromatography/mass spectrometry (GC/MS) tuning
- Initial and continuing calibrations
- Method blanks/equipment blanks/trip blanks
- Surrogate spike recoveries
- Laboratory control sample (LCS)/laboratory control sample duplicate (LCSD) results
- Matrix spike/matrix spike duplicate (MS/MSD) results
- Internal standard performance
- Field duplicate results
- Quantitation limits and sample results

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample report was checked to verify that the results corresponded to analytical request as designated on the COC. No discrepancies were found.

Holding Times and Sample Preservation

The sample was analyzed within the method specified holding time.

The cooler temperature upon receipt at EMAX was within the acceptance criterion of 4±2°C.

GC/MS Tuning

The frequency and abundance of all bromofluorobenzene (BFB) tuning results were within the QC acceptance criteria. The sample was analyzed within the method specified tuning intervals.

Initial and Continuing Calibrations

The percent relative standard deviations (%RSDs), the correlation coefficients, and/or the RFs of all target compounds were within the QC acceptance criteria for the initial calibration associated with the sample analysis with the following exception. Actions were applied as indicated below.

Compound	RF	Action (Detects/Nondetects)
Tert-butyl alcohol	0.019	J/R
Associated Sample:	Sample M103A	

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

The percent differences (%Ds) of all target compounds were within the QC acceptance criteria for the continuing calibration associated with the sample analysis with the following exception. Actions were applied as indicated below.

Compound	%D	Action (Detects/Nondetects)
Naphthalene	26.9	J/UJ
Associated Sample:	Sample M103A	

Method Blanks/Equipment Blanks/Trip Blanks

Equipment blank sample EB-3, reported in SDG 06C239, was associated with the sample in this data set. Target compounds were not detected in EB-3 therefore, no validation action was necessary.

Target compounds were not detected in the laboratory method blank or the trip blank associated with the sample in this data set.

Surrogate Spike Recoveries

Surrogate percent recoveries (%Rs) were within the QC acceptance criteria in the sample analysis.

LCS/LCSD Results

The %Rs and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria for the LCS and LCSD.

MS/MSD Results

MS/MSD analyses were not performed on the sample in this sample set. No validation action was taken on this basis.

Internal Standard Performance

The internal standard performance was within the QC acceptance criteria in the sample analysis.

Field Duplicate Results

Field duplicate samples were not submitted with this sample set. No validation action was taken on this basis.

Quantitation Limits and Sample Results

Dilutions were not performed on the sample in this data set. Sample quantitation limits (SQLs) for this sample were therefore not affected.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

It should be noted that the laboratory reported 2-butanone, 4-methyl-2-pentanone, and 2-hexanone with SQLs of 10 µg/L each, instead of the QAPP stipulated SQLs of 5 µg/L for the aqueous samples. No data validation action was taken other than this notation.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date: August 25, 2006 Revised October 9, 2006

To: Dave Gerry/Camarillo

From: Vinora Nicholls/Westford

Subject: Data Validation, DRO Analyses
Henderson Upgradient Investigation
Tronox LLC Henderson, Nevada
EMAX SDG 06C187

Distribution: Robert Kennedy/Westford 04020-023-152

TH026DRO.rev

SUMMARY

Limited validation was performed on the data for four groundwater samples including one field duplicate analyzed for analyzed for diesel range organics (DRO) and oil range organics (ORO) by SW-846 methods 3520C/8015B. The samples were collected at the Tronox facility in Henderson Nevada on March 20, 2006 and submitted to EMAX Laboratories, Inc in Torrance, California for analysis. EMAX processed the sample and reported the result under sample delivery group (SDG) 06C187.

The analytical data were evaluated according to the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (10/99), the Region 9 Superfund Data Evaluation/Validation Guidance, NDEP Guidance on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodology.

In general, the data are valid as reported and may be used for decision making purposes. No data were rejected or qualified based on the results of data validation. .

SAMPLES

The samples included in this review are listed below:

Sample IDs	Sample IDs
TR-8A	TR-7A
TR-8D	TR-8

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

Sample data were reviewed for the following parameters, where applicable to the method:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Initial and continuing calibrations
- Method blanks/equipment blanks
- Surrogate spike recoveries
- Laboratory control sample (LCS) results
- Matrix spike/matrix spike duplicate (MS/MSD) results
- Field duplicate results
- Compound quantitation
- Quantitation limits and sample results

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. The sample result page for TR-8D was missing.

Holding Times and Sample Preservation

The samples were extracted and analyzed within the method specified holding times.

The cooler temperature upon receipt at the laboratory was 2.2^{o}C, which was within the acceptable range of 4$\pm$ 2^{o}C.

Initial and Continuing Calibrations

The percent relative standard deviations (%RSDs) of all target compounds were within the QC acceptance criteria for the initial calibrations associated with the sample analyses. The percent differences (%Ds) of all target compounds were within the QC acceptance criteria for the continuing calibrations associated with the sample analyses.

The laboratory used hexacosane instead of n-octacosane for the surrogate. No validation action is required.

Method Blanks/Equipment Blank

No target analytes were detected in the method blank. There were no trip blanks (TB), equipment blanks (EB) or field blanks (FB) reported with the samples in this data package. The associated equipment blank, EB-3 is reported under SDG 06C239. No target analytes were detected in this equipment blank.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Surrogate Spike Recoveries

Surrogate recoveries were within the QC acceptance criteria in all sample analyses.

LCS Results

The percent recoveries (%Rs) and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria for the LCS and LCSD.

MS/MSD Results

MS/MSD analyses were not submitted with this sample set. No validation action is required.

Field Duplicate Results

Samples TR-8 and TR-8D were submitted as a field duplicate pair. The results for detected compounds and their relative percent differences (RPDs) are tabulated below. The RPD was not calculable (NC) because the sample and duplicate results were non-detects. Precision was deemed acceptable.

Compound	TR-8 (mg/Kg)	TR-8D (mg/Kg)	RPD
DRO	0.47U	0.47U	NC

Compound Quantitation

The recommended compounds (C_{10} and C_{28}) were used to establish the lower and upper retention time range for DRO and the recommended compounds (C28 and C38) were used to establish lower and upper retention time range for ORO.

Quantitation Limits and Sample Results

Calculations were spot-checked. There were no discrepancies noted.

The samples were analyzed at minor dilutions due to the sample preparation requirement. Sample results and sample quantitation limits were adjusted accordingly. The project-required reporting limits were not exceeded for any sample in this data set. Sample quantitation limits (SQsL) were within the target quantitation limit. It is worth mentioning that the laboratory reported that the chromatogram for sample TR-8A displayed a possible heavier fuel pattern. Some discrete peaks found in samples TR-8A and TR-7A were included in the reported DRO range but did not match fuel standard patterns.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date: August 25, 2006 Revised October 10, 2006

To: Dave Gerry/Camarillo

From: Vinora Nicholls/Westford

Subject: Data Validation, Ethylene Glycol Analyses
Henderson Upgradient Investigation
Tronox LLC Henderson, Nevada
EMAX SDG 06C187

Distribution: Robert Kennedy/Westford

04020-023-152

TH026EG.rev

SUMMARY

Limited validation was performed on the data for four groundwater samples including one field duplicate analyzed for gasoline range organics (GRO) by SW-846 method 5030B/8015B. The samples were collected at the Tronox facility in Henderson Nevada on March 20, 2006 and submitted to EMAX Laboratories (EMAX), Inc. in Torrance, California for analysis. EMAX analyzed the samples and reported the results under sample delivery group (SDG) 06C187.

The analytical data were evaluated according to the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (10/99), the Region 9 Superfund Data Evaluation/Validation Guidance, NDEP Guidance on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodology.

In general, the data are valid as reported and may be used for decision making purposes. No data were rejected or qualified based on the results of data validation.

SAMPLES

The samples included in this review are listed below:

Sample IDs	Sample IDs
TR-8A	TR-7A
TR-8D	TR-8A

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

Sample data were reviewed for the following parameters, where applicable to the method:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Initial and continuing calibrations
- Method blanks/equipment blanks
- Surrogate spike recoveries
- Laboratory control sample (LCS) results
- Matrix spike/matrix spike duplicate (MS/MSD) results
- Field duplicate results
- Compound quantitation
- Quantitation limits and sample results

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. No discrepancies were found.

Holding Times and Sample Preservation

The samples were analyzed within the method specified holding times.

The cooler temperature upon receipt at the laboratory was 2.2^{o}C, which was within the acceptable range of 4$\pm$ 2^{o}C.

Initial and Continuing Calibrations

The percent relative standard deviations (%RSDs) of all target compounds were within the QC acceptance criteria for the initial calibrations associated with the sample analyses. The percent differences (%Ds) of all target compounds were within the QC acceptance criteria for the continuing calibrations associated with the sample analyses.

Method Blanks/Equipment Blank

No target compounds were detected in the method blank. There were no trip blanks (TB), equipment blanks (EB) or field blanks (FB) reported with the samples in this data package. The associated equipment blank EB-3 was reported under SDG 06C239. No target compounds were detected in the associated equipment blank.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Surrogate Spike Recoveries

Surrogate spikes were not performed because the EPA method and the laboratory SOP do not require surrogates for direct injection analysis. No validation action was taken on this basis.

LCS Results

The percent recoveries (%Rs) and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria for the LCS and LCSD.

MS/MSD Results

MS/MSD analyses were not submitted with this sample set. No validation action is required.

Field Duplicate Results

Samples TR-8 and TR-8D were submitted as a field duplicate pair. The results for detected compounds and their relative percent differences (RPDs) are tabulated below. Precision was deemed acceptable since the RPD was not calculable (NC). Both sample and duplicate results were non-detects.

Compound	TR-8 (mg/Kg)	TR-8D (mg/Kg)	RPD
Ethylene Glycol	10U	10U	NC

Compound Quantitation

Retention times were defined during calibration. Analyte retention times fell within acceptance criteria for all samples.

Quantitation Limits and Sample Results

Calculations were spot-checked. There were no discrepancies noted.

No dilutions were required for the samples in this data set; therefore the sample quantitation limits (SQLs) were unaffected and met the target quantitation limit.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date: August 9, 2006 Revised October 10, 2006

To: Dave Gerry/Camarillo

From: Vinora Nicholls/Westford

Subject: Data Validation, Alcohol Analyses
Henderson Upgradient Investigation
Tronox LLC Henderson, Nevada
Emax SDG 06C187

Distribution: R.Kennedy/Westford

04020-023-152

TH026FA.rev

SUMMARY

Limited validation was performed on the data for four water samples including one field duplicate analyzed for methanol and ethanol by SW-846 method 8015B. The samples were collected at the Tronox facility in Henderson Nevada on March 20, 2006 and submitted to EMAX Laboratories, Inc in Torrance, California for analysis. EMAX processed the sample and reported the result under sample delivery group (SDG) 06C187.

The analytical data were evaluated according to the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (10/99), the Region 9 Superfund Data Evaluation/Validation Guidance, NDEP Guidance on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodology.

In general, the data are valid as reported and may be used for decision making purposes. No data were rejected or qualified based on the results of data validation.

SAMPLES

The samples included in this review are listed below:

Sample IDs	Sample IDs
TR-8	TR-7A
TR-8D	TR-8A

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

- Sample data were reviewed for the following parameters, where applicable to the method:
- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Initial and continuing calibrations
- Method blanks/equipment blanks
- Surrogate spike recoveries
- Laboratory control sample (LCS) results
- Matrix spike/matrix spike duplicate (MS/MSD) results
- Field duplicate results
- Compound quantitation
- Quantitation limits and sample results

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. No discrepancies were found.

Holding Times and Sample Preservation

The samples analyzed within the method specified holding times.

The cooler temperature upon receipt at the laboratory was 2.2^{o}C, which was within the acceptable range of 4$\pm$ 2^{o}C.

Initial and Continuing Calibrations

The percent relative standard deviations (%RSDs) of all target compounds were within the QC acceptance criteria for the initial calibrations associated with the sample analyses. The percent differences (%Ds) of all target compounds were within the QC acceptance criteria for the continuing calibrations associated with the sample analyses.

Method Blanks/Equipment Blank

No target compounds were detected in the method blank. There were no trip blanks (TB), equipment blanks (EB) or field blanks (FB) reported with the samples in this data package. The associated equipment blank EB-3 was with SDG 06C239. No target compounds were detected in the associated equipment blank

Surrogate Spike Recoveries

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Surrogate spikes were not performed because the EPA method and the laboratory SOP do not require surrogates for direct injection analysis. No validation action was taken on this basis.

LCS Results

The percent recoveries (%R) and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria for the LCS and LCSD.

MS/MSD Results

MS/MSD analyses were not submitted with this sample set. No validation action is required.

Field Duplicate Results

Samples TR-8 and TR-8D were submitted as field duplicates. The results for detected compounds and their relative percent differences (RPDs) are tabulated below. Precision was deemed acceptable since the RPD was not calculable (NC). Both sample and duplicate results were non-detects.

Compound	TR-8 (mg/Kg)	TR-8D (mg/Kg)	RPD
Methanol	1.0U	1.0U	NC
Ethanol	1.0U	1.0U	NC

Compound Quantitation

Retention times were defined during calibration. Retention times fell within acceptance criteria for all samples.

Quantitation Limits and Sample Results

Calculations were spot-checked. There were no discrepancies noted.

No dilution was required for the sample in this data set; therefore the sample quantitation limit (SQL) was unaffected and met the target quantitation limit.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date: August 25, 2006 Revised October 9, 2006

To: Dave Gerry/Camarillo

From: Vinora Nicholls/Westford

Subject: Data Validation, GRO Analyses
Henderson Upgradient Investigation
Tronox LLC Henderson, Nevada
EMAX SDG 06C187

Distribution: Robert Kennedy/Westford

04020-023-152

TH026gro.rev.doc

SUMMARY

Limited validation was performed on the data for four groundwater samples analyzed for gasoline range organics (GRO) by SW-846 methods 5030B/8015B. The samples were collected at the Tronox LLC site in Henderson, Nevada on March 20, 2006 and submitted to EMAX Laboratories (EMAX), Inc. in Torrance, California for analysis. EMAX processed the samples and reported the results under sample delivery group (SDG) 06C187.

The analytical data were evaluated according to the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (10/99), the Region 9 Superfund Data Evaluation/Validation Guidance, NDEP Guidance on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodology.

In general, the data are valid as reported and may be used for decision making purposes. No data were rejected or qualified based on data validation.

SAMPLES

The samples included in this review are listed below:

Sample IDs	Sample IDs
TR-8A	TR-7A
TR-8D	TR-8A

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

Sample data were reviewed for the following parameters, where applicable:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Initial and continuing calibrations
- Method blanks/equipment blanks
- Surrogate spike recoveries
- Laboratory control sample (LCS) results
- Matrix spike/matrix spike duplicate (MS/MSD) results
- Field duplicate results
- Compound quantitation
- Quantitation limits and sample results

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. No discrepancies were found.

Holding Times and Sample Preservation

The samples were analyzed within the method specified holding time.

The cooler temperature upon receipt at the laboratory was 2.2^{o}C, which was within the acceptance criterion of 4$\pm$ 2^{o}C.

Initial and Continuing Calibrations

The percent relative standard deviations (%RSDs) of all target compounds were within the QC acceptance criteria for the initial calibrations associated with the sample analyses. The percent differences (%Ds) of all target compounds were within the QC acceptance criteria for the continuing calibrations associated with the sample analyses.

The laboratory used 1,1,1-trifluorotoluene(1,1,1-TFT) as a surrogate; however results for 1,1,1-TFT were not reported on the sample results data sheet. Data validation actions are not required for this surrogate nonconformance.

Method Blanks/Equipment Blank

GRO was not detected in the method blank. There were no trip blanks (TBs), equipment blanks (EBs), or field blanks (FBs) reported with the samples in this data package. The associated equipment blank, EB-3, was reported in SDG 06C239. GRO was not detected in this associated equipment blank.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Surrogate Spike Recoveries

Surrogate recoveries were within the QC acceptance criteria in all sample analyses.

LCS Results

The percent recoveries (%Rs) and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria for the LCS and LCSD.

MS/MSD Results

MS/MSD analyses were not performed on a sample in this sample set. No validation action was taken on this basis.

Field Duplicate Results

Samples TR-8 and TR-8D were submitted as a field duplicate pair. The RPD was not calculable (NC) since both sample and duplicate results were nondetect. Precision was deemed acceptable.

Compound	TR-8 (mg/Kg)	TR-8D (mg/Kg)	RPD
GRO	0.1 U	0.1 U	NC

Compound Quantitation

The recommended compounds n-hexane and n-decane were used to establish the GRO lower and upper retention time range, respectively. All peaks contributing to the reported results were within the calibrated range.

Quantitation Limits and Sample Results

Calculations were spot-checked. There were no discrepancies noted.

No dilutions were required for the samples in this data set; therefore the sample quantitation limits (SQLs) were unaffected and met the target quantitation limit.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date: August 16, 2006 Revised October 9, 2006

To: Dave Gerry/Camarillo

From: Linda Sulkowski/Westford

Subject: Data Validation, VOC Analysis
Henderson Upgradient Investigation
Tronox LLC Henderson, Nevada
EMAX SDG 06C187

Distribution: R. Kennedy/Westford

04020-023-152 File

TH026voclms.rev.doc

SUMMARY

Limited validation was performed on the data for four aqueous samples and one trip blank analyzed for a project-specific list of volatile organic compounds (VOCs) by SW-846 methods 5030B/8260B. The samples were collected at the Tronox LLC site in Henderson, Nevada on March 20, 2006 and were submitted to EMAX Laboratories (EMAX) in Torrance, CA for analysis. EMAX processed the samples and reported the results under sample delivery group (SDG) 06C187.

The analytical data were evaluated with reference to the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (10/99), the Region 9 Superfund Data Evaluation/Validation Guidance, NDEP Guidance on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodology.

In general, the data are valid as reported and may be used for decision making purposes. Results for tert-butyl alcohol were rejected in all samples since the minimum response factor (RF) criterion was not met. No other qualification of the data was required.

SAMPLES

The samples included in this review are listed below:

Sample IDs	Sample IDs
TR-8A	TR-7A
TR-8	TR-8D (field duplicate of TR-8)
Trip Blank	

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

Sample data were reviewed for the following parameters, where applicable:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Gas chromatography/mass spectrometry (GC/MS) tuning
- Initial and continuing calibrations
- Method blanks/equipment blanks/trip blanks
- Surrogate spike recoveries
- Laboratory control sample (LCS)/laboratory control sample duplicate (LCSD) results
- Matrix spike/matrix spike duplicate (MS/MSD) results
- Internal standard performance
- Field duplicate results
- Quantitation limits and sample results

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. The following discrepancies were found.

The collection time was not listed on the COC for sample TR-8D. No validation action was taken on this basis.

The collection date and time were not listed on the vial label for sample TR-7A. No validation action was taken on this basis.

The collection times were not listed on the vial labels for samples TR-8, TR-8D, and Trip Blank. No validation action was taken on this basis.

Holding Times and Sample Preservation

The samples were analyzed within the method specified holding time.

The cooler temperature upon receipt at EMAX was within the acceptance criterion of 4±2°C.

GC/MS Tuning

The frequency and abundance of all bromofluorobenzene (BFB) tuning results were within the QC acceptance criteria. The samples were analyzed within the method specified tuning intervals.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Initial and Continuing Calibrations

The percent relative standard deviations (%RSDs), the correlation coefficients, and/or the response factors (RFs) of all target compounds were within the QC acceptance criteria for the initial calibration associated with the sample analyses with the following exception. Actions were applied as indicated below.

Compound	RF	Action (Detects/Nondetects)
Tert-butyl alcohol	0.019	J/R
Associated Samples:	All samples	

The percent differences (%Ds) of all target compounds were within the QC acceptance criteria for the continuing calibration associated with the sample analyses.

Method Blanks/Equipment Blanks/Trip Blanks

Equipment blank sample EB-3, reported in SDG 06C239, was associated with the samples in this data set. Target compounds were not detected in EB-3 therefore, no validation action was necessary.

Target compounds were not detected in the laboratory method blank or in the trip blank associated with the samples in this data set.

Surrogate Spike Recoveries

Surrogate percent recoveries (%Rs) were within the QC acceptance criteria in all sample analyses.

LCS/LCSD Results

The %Rs and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria for the LCS and LCSD.

MS/MSD Results

MS/MSD analyses were not performed on a sample from this sample set. No validation action was taken on this basis.

Internal Standard Performance

The internal standard performance was within the QC acceptance criteria in all sample analyses.

Field Duplicate Results

Samples TR-8 and TR-8D were submitted as the field duplicate pair with this sample set. The following table summarizes the RPD of the detected analyte, which was within the QC acceptance criteria.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Compound	TR-8 (µg/Kg)	TR-8D (µg/Kg)	RPD
Trichloroethene	1.3 J	1.1 J	17

Quantitation Limits and Sample Results

Dilutions were not performed on samples in this data set. Sample quantitation limits (SQLs) for these samples were therefore not affected.

It should be noted that the laboratory reported 2-butanone, 4-methyl-2-pentanone, and 2-hexanone with SQLs of 10 µg/L each, instead of the QAPP stipulated SQLs of 5 µg/L for the aqueous samples. No data validation action was taken other than this notation.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date: August 25, 2006 Revised October 10, 2006

To: Dave Gerry/Camarillo

From: Vinora Nicholls/Westford

Subject: Data Validation, DRO Analyses
Henderson Upgradient Investigation
Tronox LLC Henderson, Nevada
EMAX SDG 06C193

Distribution: Robert Kennedy/Westford 04020-023-152

TH027DRO.rev

SUMMARY

Limited validation was performed on the data for four groundwater samples analyzed for diesel range organics (DRO) and oil range organics (ORO) by SW-846 methods 5030B/8015B. The samples were collected at the Tronox facility in Henderson Nevada on March 21, 2006 and submitted to EMAX Laboratories (EMAX), Inc. in Torrance, California for analysis. EMAX analyzed the samples and reported the results under sample delivery group (SDG) 06C193.

The analytical data were evaluated according to the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (10/99), the Region 9 Superfund Data Evaluation/Validation Guidance, NDEP Guidance on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodology.

In general, the data are valid as reported and may be used for decision making purposes. No data were rejected or qualified based on the results of data validation.

SAMPLES

The samples included in this review are listed below:

Sample IDs	Sample IDs
TR-9	TR-10
TR-7	M103

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

Sample data were reviewed for the following parameters, where applicable to the method:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Initial and continuing calibrations
- Method blanks/equipment blanks
- Surrogate spike recoveries
- Laboratory control sample (LCS) results
- Matrix spike/matrix spike duplicate (MS/MSD) results
- Field duplicate results
- Compound quantitation
- Quantitation limits and sample results

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. No discrepancies were found

Holding Times and Sample Preservation

The samples were extracted and analyzed within the method specified holding times.

The cooler temperature upon receipt at the laboratory was 3.4^{o}C, which was within the acceptable range of 4$\pm$ 2^{o}C.

Initial and Continuing Calibrations

The percent relative standard deviations (%RSDs) of all target compounds were within the QC acceptance criteria for the initial calibrations associated with the sample analyses. The percent differences (%Ds) of all target compounds were within the QC acceptance criteria for the continuing calibrations associated with the sample analyses.

The laboratory used hexacosane instead of n-octacosane for the surrogate. No validation action is required.

Method Blanks/Equipment Blank

No target compounds were detected in the method. There were no equipment blanks (EB), or field blanks (FB) reported with the samples in this data package.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Surrogate Spike Recoveries

Surrogate recoveries were within the QC acceptance criteria in all sample analyses.

LCS Results

The percent recoveries (%Rs) and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria for the LCS and LCSD.

MS/MSD Results

MS/MSD analyses were not submitted with this sample set. No validation action is required.

Field Duplicate Results

Field duplicate samples were not submitted with this sample set. No validation action is required.

Compound Quantitation

The recommended compounds (C_{10} and C_{28}) were used to establish the lower and upper retention time range for DRO and the recommended compounds (C28 and C38) were used to establish lower and upper retention time range for ORO.

Quantitation Limits and Sample Results

Calculations were spot-checked. There were no discrepancies noted.

The samples were analyzed at minor dilutions due to the sample preparation requirement. Sample results and sample quantitation limits were adjusted accordingly. The project-required reporting limits were not exceeded for any sample in this data set. Sample quantitation limits (SQsL) were within the target quantitation limit.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date: August 25, 2006 Revised October 10, 2006

To: Dave Gerry/Camarillo

From: Vinora Nicholls/Westford

Subject: Data Validation, Ethylene Glycol Analyses
Henderson Upgradient Investigation
Tronox LLC Henderson, Nevada
EMAX SDG 06C193

Distribution: Robert Kennedy/Westford

04020-023-152

TH027EG.rev

SUMMARY

Limited validation was performed on the data for four groundwater samples and one trip blank analyzed for ethylene glycol by SW-846 method 8015B. The samples were collected at the Tronox facility in Henderson Nevada on March 21, 2006 and submitted to EMAX Laboratories (EMAX), Inc in Torrance, California for analysis. EMAX processed the sample and reported the result under sample delivery group (SDG) 06C193.

The analytical data were evaluated according to the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (10/99), the Region 9 Superfund Data Evaluation/Validation Guidance, NDEP Guidance on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodology.

In general, the data are valid as reported and may be used for decision making purposes. No data were rejected or qualified based on the results of data validation.

SAMPLES

The samples included in this review are listed below:

Sample IDs	Sample IDs
TR-9	TR-10
TR-7	Trip Blank
M103	

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

Sample data were reviewed for the following parameters, where applicable to the method:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Initial and continuing calibrations
- Method blanks/equipment blanks
- Surrogate spike recoveries
- Laboratory control sample (LCS) results
- Matrix spike/matrix spike duplicate (MS/MSD) results
- Field duplicate results
- Compound quantitation
- Quantitation limits and sample results

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. No discrepancies were found.

Holding Times and Sample Preservation

The samples were analyzed within the method specified holding times.

The cooler temperature upon receipt at the laboratory was 3.4^{o}C, which was within the acceptable range of 4$\pm$ 2^{o}C.

Initial and Continuing Calibrations

The percent relative standard deviations (%RSDs) of all target compounds were within the QC acceptance criteria for the initial calibrations associated with the sample analyses. The percent differences (%Ds) of all target compounds were within the QC acceptance criteria for the continuing calibrations associated with the sample analyses.

Method Blanks/Equipment Blank

No target compounds were detected in the method blank and trip blank. There were no equipment blanks (EB), or field blanks (FB) reported with the samples in this data package.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Surrogate Spike Recoveries

Surrogate spikes were not performed because the EPA method and the laboratory SOP do not require surrogates for direct injection analysis. No validation action was taken on this basis.

LCS Results

The percent recoveries (%Rs) and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria for the LCS and LCSD.

MS/MSD Results

MS/MSD analyses were not submitted with this sample set. No validation action is required.

Field Duplicate Results

Field duplicate samples were not submitted with this sample set. No validation action is required.

Compound Quantitation

Retention times were defined during calibration. Analyte retention times fell within acceptance criteria for all samples.

Quantitation Limits and Sample Results

Calculations were spot-checked. There were no discrepancies noted.

No dilutions were required for the samples in this data set; therefore the sample quantitation limits (SQLs) were unaffected and met the target quantitation limit.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date: August 9, 2006 Revised October 10, 2006

To: Dave Gerry/Camarillo

From: Vinora Nicholls/Westford

Subject: Data Validation, Alcohol Analyses
Henderson Upgradient Investigation
Tronox LLC Henderson, Nevada
Emax SDG 06C193

Distribution: R.Kennedy/Westford

04020-023-152

TH027FA.rev

SUMMARY

Limited validation was performed on the data for four water samples and one trip blank analyzed for methanol and ethanol by SW-846 method 8015B. The samples were collected at the Tronox facility in Henderson Nevada on March 21, 2006 and submitted to EMAX Laboratories, Inc in Torrance, California for analysis. EMAX processed the sample and reported the result under sample delivery group (SDG) 06C193.

The analytical data were evaluated according to the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (10/99), the Region 9 Superfund Data Evaluation/Validation Guidance, NDEP Guidance on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodology.

In general, the data are valid as reported and may be used for decision making purposes. No data were rejected or qualified based on the results of data validation.

SAMPLES

The samples included in this review are listed below:

Sample IDs	Sample IDs
TR-9	TR-10
TR-7	Trip Blank
M103	

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

- Sample data were reviewed for the following parameters, where applicable to the method:
- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Initial and continuing calibrations
- Method blanks/equipment blanks
- Surrogate spike recoveries
- Laboratory control sample (LCS) results
- Matrix spike/matrix spike duplicate (MS/MSD) results
- Field duplicate results
- Compound quantitation
- Quantitation limits and sample results

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. No discrepancies were found

Holding Times and Sample Preservation

The samples were analyzed within the method specified holding times.

The cooler temperature upon receipt at the laboratory was 3.4^{o}C, which was within the acceptable range of 4$\pm$ 2^{o}C.

Initial and Continuing Calibrations

The percent relative standard deviations (%RSDs) of all target compounds were within the QC acceptance criteria for the initial calibrations associated with the sample analyses. The percent differences (%Ds) of all target compounds were within the QC acceptance criteria for the continuing calibrations associated with the sample analyses.

Method Blanks/Equipment Blank

No target compounds were detected in the method blank and trip blank. There were no equipment blanks (EB), or field blanks (FB) reported with the samples in this data package.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Surrogate Spike Recoveries

Surrogate spikes were not performed because the EPA method and the laboratory SOP do not require surrogates for direct injection analysis. No validation action was taken on this basis.

LCS Results

The percent recoveries (%R) and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria for the LCS and LCSD.

MS/MSD Results

MS/MSD analyses were not submitted with this sample set. No validation action is required.

Field Duplicate Results

Field duplicate samples were not submitted with this sample set. No validation action is required.

Compound Quantitation

Retention times were defined during calibration. Analyte retention times fell within acceptance criteria for all samples.

Quantitation Limits and Sample Results

Calculations were spot-checked. There were no discrepancies noted.

No dilution was required for the sample in this data set; therefore the sample quantitation limit (SQL) was unaffected and met the target quantitation limit.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date: August 25, 2006 Revised October 9, 2006

To: Dave Gerry/Camarillo

From: Vinora Nicholls/Westford

Subject: Data Validation, GRO Analyses
Henderson Upgradient Investigation
Tronox LLC Henderson, Nevada
EMAX SDG 06C193

Distribution: Robert Kennedy/Westford 04020-023-152

TH027gro.rev.doc

SUMMARY

Limited validation was performed on the data for four groundwater samples and one trip blank analyzed for gasoline range organics (GRO) by SW-846 methods 5030B/8015B. The samples were collected at the Tronox LLC site in Henderson, Nevada on March 21, 2006 and submitted to EMAX Laboratories (EMAX), Inc. in Torrance, California for analysis. EMAX processed the samples and reported the results under sample delivery group (SDG) 06C193.

The analytical data were evaluated according to the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (10/99), the Region 9 Superfund Data Evaluation/Validation Guidance, NDEP Guidance on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodology.

In general, the data are valid as reported and may be used for decision making purposes. No data were rejected or qualified based on data validation.

SAMPLES

The samples included in this review are listed below:

Sample IDs	Sample IDs
TR-9	TR-10
TR-7	Trip Blank
M103	

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

Sample data were reviewed for the following parameters, where applicable:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Initial and continuing calibrations
- Method blanks/equipment blanks
- Surrogate spike recoveries
- Laboratory control sample (LCS) results
- Matrix spike/matrix spike duplicate (MS/MSD) results
- Field duplicate results
- Compound quantitation
- Quantitation limits and sample results

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. No discrepancies were found.

Holding Times and Sample Preservation

The samples were analyzed within the method specified holding time.

The cooler temperature upon receipt at the laboratory was 3.4^{o}C, which was within the acceptance criterion of 4$\pm$ 2^{o}C.

Initial and Continuing Calibrations

The percent relative standard deviations (%RSDs) of all target compounds were within the QC acceptance criteria for the initial calibrations associated with the sample analyses. The percent differences (%Ds) of all target compounds were within the QC acceptance criteria for the continuing calibrations associated with the sample analyses.

The laboratory used 1,1,1-trifluorotoluene(1,1,1-TFT) as a surrogate; however results for 1,1,1-TFT were not reported on the sample results data sheet. Data validation actions are not required for this surrogate nonconformance.

Method Blanks/Equipment Blank

GRO was not detected in the method blank and trip blank. There were no equipment blanks (EBs) or field blanks (FBs) required for the samples in this data package since dedicated pumps were used.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Surrogate Spike Recoveries

Surrogate recoveries were within the QC acceptance criteria in all sample analyses.

LCS Results

The percent recoveries (%Rs) and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria for the LCS and LCSD.

MS/MSD Results

MS/MSD analyses were not performed on a sample in this sample set. No validation action was taken on this basis.

Field Duplicate Results

Field duplicate samples were not submitted with this sample set. No validation action was taken on this basis.

Compound Quantitation

The recommended compounds n-hexane and n-decane were used to establish the GRO lower and upper retention time range, respectively. All peaks contributing to the reported results were within the calibrated range.

Quantitation Limits and Sample Results

Calculations were spot-checked. There were no discrepancies noted.

No dilution was required for the samples in this data set; therefore the sample quantitation limits (SQs) were unaffected and met the target quantitation limit. Discrete peaks were reported for all samples. The peaks were also apparent in the laboratory's method blank; however, the concentrations of these artifact peaks did not exceed the method detection limit in any samples.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date: August 16, 2006 Revised October 9, 2006

To: Dave Gerry/Camarillo

From: Linda Sulkowski/Westford

Subject: Data Validation, VOC Analysis
Henderson Upgradient Investigation
Tronox LLC Henderson, Nevada
EMAX SDG 06C193

Distribution: R. Kennedy/Westford 04020-023-152 File

TH027voclms.rev.doc

SUMMARY

Full validation was performed on the data for four aqueous samples and one trip blank analyzed for a project-specific list of volatile organic compounds (VOCs) by SW-846 methods 5030B/8260B. The samples were collected at the Tronox LLC site in Henderson, Nevada on March 21, 2006 and were submitted to EMAX Laboratories (EMAX) in Torrance, CA for analysis. EMAX processed the samples and reported the results under sample delivery group (SDG) 06C193.

The analytical data were evaluated with reference to the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (10/99), the Region 9 Superfund Data Evaluation/Validation Guidance, NDEP Guidance on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodology.

In general, the data are valid as reported and may be used for decision making purposes. Results for tert-butyl alcohol were rejected in all samples since the minimum response factor (RF) criterion was not met. No other qualification of the data was required.

SAMPLES

The samples included in this review are listed below:

Sample IDs	Sample IDs
TR-9	TR-10
TR-7	M-103
Trip Blank	

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

Sample data were reviewed for the following parameters, where applicable:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Gas chromatography/mass spectrometry (GC/MS) tuning
- Initial and continuing calibrations
- Method blanks/equipment blanks/trip blanks
- Surrogate spike recoveries
- Laboratory control sample (LCS)/laboratory control sample duplicate (LCSD) results
- Matrix spike/matrix spike duplicate (MS/MSD) results
- Internal standard performance
- Field duplicate results
- Quantitation limits and sample results

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. The following discrepancies were found.

The collection time listed on the COC for sample TR-7 was 1140. The sample time listed on the vial label for sample TR-7 was 1200. No validation action was taken on this basis.

The collection time listed on the COC for sample M-103 was 1400. The sample time listed on the vial label for sample M-103 was 1430. No validation action was taken on this basis.

Holding Times and Sample Preservation

The samples were analyzed within the method specified holding time.

The cooler temperature upon receipt at EMAX was within the acceptance criterion of 4±2°C.

GC/MS Tuning

The frequency and abundance of all bromofluorobenzene (BFB) tuning results were within the QC acceptance criteria. The samples were analyzed within the method specified tuning intervals.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Initial and Continuing Calibrations

The percent relative standard deviations (%RSDs), the correlation coefficients, and/or the RFs of all target compounds were within the QC acceptance criteria for the initial calibration associated with the sample analyses with the following exception. Actions were applied as indicated below.

Compound	RF	Action (Detects/Nondetects)
Tert-butyl alcohol	0.019	J/R
Associated Samples:	All samples	

The percent differences (%Ds) of all target compounds were within the QC acceptance criteria for the continuing calibration associated with the sample analyses.

Method Blanks/Equipment Blanks/Trip Blanks

Equipment blank sample EB-3, reported in SDG 06C239, was associated with the samples in this data set. Target compounds were not detected in EB-3, therefore, no validation action was necessary.

Target compounds were not detected in the laboratory method blank or in the trip blank associated with the samples in this data set.

Surrogate Spike Recoveries

Surrogate percent recoveries (%Rs) were within the QC acceptance criteria in all sample analyses.

LCS/LCSD Results

The %Rs and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria for the LCS and LCSD.

MS/MSD Results

MS/MSD analyses were not performed on a sample from this sample set. No validation action was taken on this basis.

Internal Standard Performance

The internal standard performance was within the QC acceptance criteria in all sample analyses.

Field Duplicate Results

Field duplicate samples were not submitted with this sample set. No validation action was taken on this basis.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Quantitation Limits and Sample Results

Calculations were spot-checked. There were no discrepancies noted.

Dilutions were not performed on samples in this data set. Sample quantitation limits (SQLs) for these samples were therefore not affected.

It should be noted that the laboratory reported 2-butanone, 4-methyl-2-pentanone, and 2-hexanone with SQLs of 10 µg/L each, instead of the QAPP stipulated SQLs of 5 µg/L for the aqueous samples. No data validation action was taken other than this notation.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date: August 25, 2006 Revised October 10, 2006

To: Dave Gerry/Camarillo

From: Vinora Nicholls/Westford

Subject: Data Validation, DRO Analyses
Henderson Upgradient Investigation
Tronox LLC Henderson, Nevada
EMAX SDG 06C204

Distribution: Robert Kennedy/Westford

04020-023-152

TH028DRO.rev

SUMMARY

Full validation was performed on the data for two groundwater samples analyzed for diesel range organics (DRO) and oil range organics (ORO) by SW-846 method 3520C/8015B. The samples were collected at theTronox facility in Henderson Nevada on March 22, 2006 and submitted to EMAX Laboratories (EMAX), Inc. in Torrance, California for analysis. EMAX analyzed the samples and reported the results under sample delivery group (SDG) 06C204.

The analytical data were evaluated according to the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (10/99), the Region 9 Superfund Data Evaluation/Validation Guidance, NDEP Guidance on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodology.

In general, the data are valid as reported and may be used for decision making purposes. No data were rejected or qualified based on the results of data validation.

SAMPLES

The samples included in this review are listed below:

Sample IDs	Sample IDs
M-120	M-118

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

Sample data were reviewed for the following parameters, where applicable to the method:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Initial and continuing calibrations
- Method blanks/equipment blanks
- Surrogate spike recoveries
- Laboratory control sample (LCS) results
- Matrix spike/matrix spike duplicate (MS/MSD) results
- Field duplicate results
- Compound quantitation
- Quantitation limits and sample results

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. No discrepancies were found

Holding Times and Sample Preservation

The samples were extracted and analyzed within the method specified holding times.

The cooler temperature upon receipt at the laboratory was 3.5^{o}C, which was within the acceptable range of 4$\pm$ 2^{o}C.

Initial and Continuing Calibrations

The percent relative standard deviations (%RSDs) of all target compounds were within the QC acceptance criteria for the initial calibrations associated with the sample analyses. The percent differences (%Ds) of all target compounds were within the QC acceptance criteria for the continuing calibrations associated with the sample analyses.

The laboratory used hexacosane instead of n-octacosane for the surrogate. No validation action is required.

Method Blanks/Equipment Blank

No target compounds were detected in the method blank. There were no equipment blanks (EB), or field blanks (FB) reported with the samples in this data package.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Surrogate Spike Recoveries

Surrogate recoveries were within the QC acceptance criteria in all sample analyses.

LCS Results

The percent recoveries (%Rs) and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria for the LCS and LCSD.

MS/MSD Results

MS/MSD analyses were not submitted with this sample set. No validation action is required.

Field Duplicate Results

Field duplicate samples were not submitted with this sample set. No validation action is required.

Compound Quantitation

The recommended compounds (C_{10} and C_{28}) were used to establish the lower and upper retention time range for DRO and the recommended compounds (C28 and C38) were used to establish lower and upper retention time range for ORO.

Quantitation Limits and Sample Results

Calculations were checked. There were no discrepancies noted.

The samples were analyzed at minor dilutions due to the sample preparation requirement. Sample results and sample quantitation limits were adjusted accordingly. The project-required reporting limits were not exceeded for any sample in this data set. Sample quantitation limits (SQsL) were within the target quantitation limit.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date: August 25, 2006 Revised October 10, 2006

To: Dave Gerry/Camarillo

From: Vinora Nicholls/Westford

Subject: Data Validation, Ethylene Glycol Analyses
Henderson Upgradient Investigation
Tronox LLC Henderson, Nevada
EMAX SDG 06C204

Distribution: Robert Kennedy/Westford

04020-023-152

TH028EG.rev

SUMMARY

Full validation was performed on the data for two groundwater samples and one trip blank analyzed for ethylene glycol by SW-846 method 8015B. The samples were collected at the Tronox facility in Henderson Nevada on March 22, 2006 and submitted to EMAX Laboratories (EMAX), Inc. in Torrance, California for analysis. EMAX processed the sample and reported the result under sample delivery group (SDG) 06C204.

The analytical data were evaluated according to the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (10/99), the Region 9 Superfund Data Evaluation/Validation Guidance, NDEP Guidance on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodology.

In general, the data are valid as reported and may be used for decision making purposes. No data were rejected or qualified based on the results of data validation.

SAMPLES

The samples included in this review are listed below:

Sample IDs	Sample IDs
M-120	M-118
Trip Blank	

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

Sample data were reviewed for the following parameters, where applicable to the method:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Initial and continuing calibrations
- Method blanks/equipment blanks
- Surrogate spike recoveries
- Laboratory control sample (LCS) results
- Matrix spike/matrix spike duplicate (MS/MSD) results
- Field duplicate results
- Compound quantitation
- Quantitation limits and sample results

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. No discrepancies were found

Holding Times and Sample Preservation

The samples were analyzed within the method specified holding times.

The cooler temperature upon receipt at the laboratory was 3.5^{o}C, which was within the acceptable range of 4$\pm$ 2^{o}C.

Initial and Continuing Calibrations

The percent relative standard deviations (%RSDs) of all target compounds were within the QC acceptance criteria for the initial calibrations associated with the sample analyses. The percent differences (%Ds) of all target compounds were within the QC acceptance criteria for the continuing calibrations associated with the sample analyses.

Method Blanks/Equipment Blank

No target compounds were detected in the method blank and trip blank. There were no equipment blanks (EB), or field blanks (FB) reported with the samples in this data package.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Surrogate Spike Recoveries

Surrogate spikes were not performed because the EPA method and the laboratory SOP do not require surrogates for direct injection analysis. No validation action was taken on this basis.

LCS Results

The percent recoveries (%Rs) and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria for the LCS and LCSD.

MS/MSD Results

MS/MSD analyses were not submitted with this sample set. No validation action is required.

Field Duplicate Results

Field duplicate samples were not submitted with this sample set. No validation action is required.

Compound Quantitation

Retention times were defined during calibration. Ananlyte retention times fell within acceptance criteria for all samples.

Quantitation Limits and Sample Results

Calculations were checked. There were no discrepancies noted.

No dilutions were required for the samples in this data set; therefore the sample quantitation limits (SQLs) were unaffected and met the target quantitation limit.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date: August 9, 2006 Revised October 10, 2006

To: Dave Gerry/Camarillo

From: Vinora Nicholls/Westford

Subject: Data Validation, Alcohol Analyses
Henderson Upgradient Investigation
Tronox LLC Henderson, Nevada
Emax SDG 06C204

Distribution: R.Kennedy/Westford

04020-023-152

TH028FA.rev

SUMMARY

Full validation was performed on the data for two water samples and one trip blank analyzed for methanol and ethanol by SW-846 method 8015B. The samples were collected at the Tronox facility in Henderson Nevada on March 22, 2006 and submitted to EMAX Laboratories, Inc in Torrance, California for analysis. EMAX analyzed the sample and reported the result under sample delivery group (SDG) 06C204.

The analytical data were evaluated according to the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (10/99), the Region 9 Superfund Data Evaluation/Validation Guidance, NDEP Guidance on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodology.

In general, the data are valid as reported and may be used for decision making purposes. No data were rejected or qualified based on the results of data validation.

SAMPLES

The samples included in this review are listed below:

Sample IDs	Sample IDs
M-120	M-118
Trip Blank	

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

- Sample data were reviewed for the following parameters, where applicable to the method:
- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Initial and continuing calibrations
- Method blanks/equipment blanks
- Surrogate spike recoveries
- Laboratory control sample (LCS) results
- Matrix spike/matrix spike duplicate (MS/MSD) results
- Field duplicate results
- Compound quantitation
- Quantitation limits and sample results

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. No discrepancies were found

Holding Times and Sample Preservation

The samples were analyzed within the method specified holding times.

The cooler temperature upon receipt at the laboratory was 3.5^{o}C, which was within the acceptable range of 4$\pm$ 2^{o}C.

Initial and Continuing Calibrations

The percent relative standard deviations (%RSDs) of all target compounds were within the QC acceptance criteria for the initial calibrations associated with the sample analyses. The percent differences (%Ds) of all target compounds were within the QC acceptance criteria for the continuing calibrations associated with the sample analyses.

Method Blanks/Equipment Blank

No target compounds were detected in the method blank and trip blank. There were no equipment blanks (EB), or field blanks (FB) reported with the samples in this data package.

Surrogate Spike Recoveries

Surrogate spikes were not performed because the EPA method and the laboratory SOP do not require surrogates for direct injection analysis. No validation action was taken on this basis.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

LCS Results

The percent recoveries (%R) and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria for the LCS and LCSD.

MS/MSD Results

MS/MSD analyses were not submitted with this sample set. No validation action is required.

Field Duplicate Results

Field duplicate samples were not submitted with this sample set. No validation action is required.

Compound Quantitation

Retention times were defined during calibration. Analyte retention times fell within acceptance criteria for all samples.

Quantitation Limits and Sample Results

Calculations were checked. There were no discrepancies noted.

No dilution was required for the sample in this data set; therefore the sample quantitation limit (SQL) was unaffected and met the target quantitation limit.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date: August 25, 2006 Revised October 9, 2006

To: Dave Gerry/Camarillo

From: Vinora Nicholls/Westford

Subject: Data Validation, GRO Analyses
Henderson Upgradient Investigation
Tronox LLC Henderson, Nevada
EMAX SDG 06C204

Distribution: Robert Kennedy/Westford

04020-023-152

TH028gro.rev.doc

SUMMARY

Full validation was performed on the data for two groundwater samples and one trip blank analyzed for gasoline range organics (GRO) by SW-846 methods 5030B/8015B. The samples were collected at the Tronox LLC site in Henderson, Nevada on March 22, 2006 and submitted to EMAX Laboratories (EMAX), Inc. in Torrance, California for analysis. EMAX processed the samples and reported the results under sample delivery group (SDG) 06C204.

The analytical data were evaluated according to the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (10/99), the Region 9 Superfund Data Evaluation/Validation Guidance, NDEP Guidance on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodology.

In general, the data are valid as reported and may be used for decision making purposes. No data were rejected or qualified based on data validation.

SAMPLES

The samples included in this review are listed below:

Sample IDs	Sample IDs
M-120	M-118
Trip Blank	

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

- Sample data were reviewed for the following parameters, where applicable:
- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Initial and continuing calibrations
- Method blanks/equipment blanks
- Surrogate spike recoveries
- Laboratory control sample (LCS) results
- Matrix spike/matrix spike duplicate (MS/MSD) results
- Field duplicate results
- Compound quantitation
- Quantitation limits and sample results

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. No discrepancies were found.

Holding Times and Sample Preservation

The samples were analyzed within the method specified holding time.

The cooler temperature upon receipt at the laboratory was 3.5^{o}C, which was within the acceptance criterion of 4$\pm$ 2^{o}C.

Initial and Continuing Calibrations

The percent relative standard deviations (%RSDs) of all target compounds were within the QC acceptance criteria for the initial calibrations associated with the sample analyses. The percent differences (%Ds) of all target compounds were within the QC acceptance criteria for the continuing calibrations associated with the sample analyses.

The laboratory used 1,1,1-trifluorotoluene(1,1,1-TFT) as a surrogate; however results for 1,1,1-TFT were not reported on the sample results data sheet. Data validation actions are not required for this surrogate nonconformance.

Method Blanks/Equipment Blank

GRO was not detected in the method blank and trip blank. There were no equipment blanks (EBs) or field blanks (FBs) reported with the samples in this data package.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Surrogate Spike Recoveries

Surrogate recoveries were within the QC acceptance criteria in all sample analyses.

LCS Results

The percent recoveries (%Rs) and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria for the LCS and LCSD.

MS/MSD Results

MS/MSD analyses were not performed on a sample in this sample set. No validation action was taken on this basis.

Field Duplicate Results

Field duplicate samples were not submitted with this sample set. No validation action was taken on this basis.

Compound Quantitation

The recommended compounds n-hexane and n-decane were used to establish the GRO lower and upper retention time range, respectively. All peaks contributing to the reported results were within the calibrated range.

Quantitation Limits and Sample Results

Calculations were checked. There were no discrepancies noted.

No dilutions were required for the samples in this data set; therefore the sample quantitation limits (SQLs) were unaffected and met the target quantitation limit. Discrete peaks were reported for the samples; however, the peaks were also observed in the laboratory's quality control samples. The concentrations of these artifact peaks did not exceed the method detection limit in any samples.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date: August 3, 2006 Revised October 10, 2006

To: Dave Gerry/Camarillo

From: Paula DiMattei/Westford

Subject: Data Validation, OC Pesticide, OP Pesticide, and PCB Analyses
Tronox Henderson Upgradient
Henderson, NV
EMAX SDG 06C204

Distribution: R. Kennedy/Westford 04020-023-152 File

TH028.ocp.opp.pcbpld.rev

SUMMARY

Full validation was performed on the data for one aqueous sample for organochlorine (OC) pesticides by SW-846 method 8081A, for organophosphorus (OP) pesticides by SW-846 method 8141A, and for polychlorinated biphenyls (PCBs) by SW-846 method 8082. The sample was collected at the Tronox LLC (Tronox) facility, formerly Kerr-McGee Chemical LLC site in Henderson, NV on March 22, 2006 and was submitted to EMAX Laboratories, Inc. (EMAX) in Torrance, CA for analysis. EMAX processed the sample and reported the results under sample delivery group (SDG) 06C204.

The analytical data were evaluated with reference to the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (10/99), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The National Functional Guidelines were modified to accommodate the non-CLP methodologies.

In general, the data are valid as reported and may be used for decision making purposes. No data were rejected. Selected data points were qualified due to nonconformances of certain QC criteria (see discussion below).

SAMPLES

The sample included in this review is listed below:

Sample ID
M-120

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

Sample data were reviewed for the following parameters, where applicable to the method:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Initial and continuing calibrations
- Pesticide instrument performance (OC Pesticides only)
- Method blanks/equipment blanks
- Surrogate spike recoveries
- Laboratory control sample (LCS) results
- Matrix spike/matrix spike duplicate (MS/MSD) results
- Field duplicate results
- Quantitation limits and sample results

DISCUSSION

Agreement of Analyses Conducted with COC Requests

OC Pesticides/OP Pesticides/PCBs

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. No discrepancies were found.

Holding Times and Sample Preservation

OC Pesticides/OP Pesticides/PCBs

The cooler temperatures upon sample receipt were within the acceptance criterion of 4± 2°C.

The sample was extracted and analyzed within the method specified holding times.

Initial and Continuing Calibrations

OC Pesticides

The percent relative standard deviations (%RSDs) of all target compounds were within the QC acceptance criteria for the initial calibrations associated with the sample analyses. The percent differences (%Ds) of all target compounds were within the QC acceptance criteria for the continuing calibrations associated with the sample analyses with the following exceptions.

Calibration (column)	Compound	%D
CC 4/10/06 11:09 (RTX-CLPEST)	Endrin	17
Associated sample: M-120		

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Calibration (column)	Compound	%D
CC 4/10/06 11:09 (RTX-CLPESTII)	Endrin	28
Associated sample: M-120		
CC 4/10/06 18:39 (RTX-CLPEST)	Endrin	19
Associated sample: M-120		
CC 4/10/06 18:39 (RTX-CLPESTII)	Endrin	31
Associated sample: M-120		

Endrin was not detected in the associated sample M-120 and all %D criteria exceeded QC criteria as a result of high recoveries in the continuing calibrations. Therefore, no data validation actions were required on this basis.

OP Pesticides

The percent relative standard deviations (%RSDs) of all target compounds were within the QC acceptance criteria for the initial calibrations associated with the sample analyses. The %Ds of all target compounds were within the QC acceptance criteria for the continuing calibrations associated with the sample analyses with the following exceptions.

Calibration (column)	Compound	%D
CC 3/31/06 (RTX-OPPESTICIDES)	Naled	21
Associated sample: M-120		
CC 4/1/06 2:14 (RTX-OPPESTICIDES)	Ethoprop	16
	Naled	27
Associated samples: M-120		

Ethoprop and naled were not detected in the associated sample M-120 and all %D criteria exceeded QC criteria as a result of high recoveries in the continuing calibrations. Therefore, no data validation actions were required on this basis.

PCBs

The percent relative standard deviations (%RSDs) of all target compounds were within the QC acceptance criteria for the initial calibrations associated with the sample analyses. The %Ds of all target compounds were within the QC acceptance criteria for the continuing calibrations associated with the sample analyses.

Pesticide Instrument Performance (OC Pesticides only)

All instrument performance standards were analyzed at the proper frequency and the percent (%) breakdown of 4,4'-DDT and endrin met the QC acceptance limits.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Method Blanks/Equipment Blank

OC Pesticides/OP Pesticides/PCBs

Target compounds were not detected in the laboratory method blanks associated with the sample in this data set.

Surrogate Spike Recoveries

OC Pesticides/OP Pesticides/PCBs

Surrogate recoveries (%Rs) were within the QC acceptance criteria in all sample analyses.

LCS Results

OC Pesticides/PCBs

The %Rs and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria for the LCS and LCSD analyses.

OP Pesticides

More than half of all of the target compounds in the LCS and LCSD analyses exceeded the RPD QC acceptance criteria. Consequently, professional judgment was used to qualify all of the nondetected OP pesticide compound results in the associated sample M-120 as estimated (UJ).

MS/MSD Results

OC Pesticides/OP Pesticides/PCBs

MS/MSD analyses were not performed on the sample in this data set. No data validation actions were taken on this basis.

Field Duplicate Results

OC Pesticides/OP Pesticides/PCBs

A field duplicate pair was not submitted for this data set. No data validation actions were taken on this basis.

Quantitation Limits and Sample Results

OC Pesticides/OP Pesticides/PCBs

Calculations were spot-checked. There were no discrepancies noted.

Dilutions were not performed on sample in this data set. Sample quantitation limits (SQLs) for this sample were therefore not affected.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date: August 10, 2006 Revised October 10, 2006

To: Dave Gerry/Camarillo

From: Robert Kennedy/Westford

Subject: Data Validation, SVOC Analysis
Henderson Upgradient Investigation
Tronox LLC Henderson, NV
Emax SDG 06C204

Distribution: D. Simmons/Westford 04020-023-152

TH028svocrkk.rev

SUMMARY

Full validation was performed on the data for one groundwater sample analyzed for modified Target Compound List (TCL) semivolatile organic compounds (SVOCs) by SW-846 method 8270C. Selected ion monitoring (SIM) analysis was performed on a selected target compound set as specified in the Work Plan Addendum. The sample was collected at the Tronox facility in Henderson, NV on March 22, 2006 and was submitted to EMAX Laboratories in Torrance, CA for analysis. EMAX processed the sample and reported the results under sample delivery group (SDG) 06C204.

The analytical data were evaluated according to the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (10/99), the Region 9 Superfund Data Evaluation/Validation Guidance, NDEP Guidance on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodology

In general, the data are valid as reported and may be used for decision making purposes. Nondetect results for one analyte were rejected based on recovery and precision problems in the laboratory control samples. No other data were rejected or qualified as estimated due to nonconformances of QC criteria (see discussion below).

SAMPLES

The samples included in this review are listed below.

Sample IDs
M120

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

Sample data were reviewed for the following parameters:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times/sample preservation
- Gas chromatography/mass spectrometry (GC/MS) tuning
- Initial calibrations and continuing calibration verifications
- Laboratory blanks/equipment blanks/field blanks
- Surrogate spike recoveries
- Matrix spike (MS)/matrix spike duplicate (MSD) results
- Laboratory control sample (LCS)/laboratory control sample duplicate (LCSD) results
- Field duplicate results
- Internal standard performance
- Sample quantitation/detection limit results

DISCUSSION

Agreement of Analyses Conducted With COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. No discrepancies were found.

Holding Times/Sample Preservation

The cooler temperatures of all coolers upon receipt at EMAX were within the acceptance criterion of 4±2°C.

All samples were extracted and analyzed within the method specified holding times.

GC/MS Tuning

The frequency and abundance of the decafluorotriphenylphosphine (DFTPP) tuning results were within the QC acceptance criteria. All samples were analyzed within 12 hours from the DFTPP tuning.

Initial Calibrations and Continuing Calibration Verifications

The percent relative standard deviations (%RSDs), the percent differences (%Ds), and the relative response factors (RRFs) were all within the QC acceptance criteria in the initial and continuing calibrations.

Laboratory Blanks/Equipment Blanks/Field Blanks

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Target compounds were not detected in the laboratory method blanks. The equipment blank associated with this water sample, EB-3, was reported under SDG 06C239. Two compounds (naphthalene and acenaphthene) were detected in the SIM analysis of the equipment blank but not detected in the associated sample. No validation action was taken on this basis.

Surrogate Spike Recoveries

The surrogate percent recoveries (%Rs) were within the QC acceptance criteria in all sample analyses.

MS/MSD Results

MS/MSD analyses were not performed on sample M120 due to limited sample volume. No data validation actions were taken on this basis.

LCS/LCSD Results

The %R and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria with the following exception. The LCS %R (9%) for 3,3'-dichlorobenzidine recovered below the QC acceptance limits (20-140%). The nondetect 3,3'-dichlorobenzidine result in the associated sample M120 was qualified as rejected (R) due to the very low (<10%) LCS recovery. The LCS/LCSD RPD (79%) for 3,3'-dichlorobenzidine also exceeded the QC acceptance criterion (30%); however, no further data validation actions were required.

Field Duplicate Results

No field duplicate samples were provided with this data set. No data validation actions were taken on this basis.

Internal Standard Performance

Internal standard performance met the QC acceptance criteria in all sample analyses.

Sample Quantitation/Detection Limit Results

Dilutions were not performed on samples in this data set. Sample quantitation limits (SQLs) for these samples were therefore not affected.

Calculations were spot-checked. There were no discrepancies noted.

It was noted that the SVOC analyte reporting limits (RL) are not based on the low point of calibration but rather the *second* lowest calibration point and the MDLs reported are not statistically determined but appear to be consistently ½ of the RL. No validation action was taken on this basis.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date: August 16, 2006 Revised October 9, 2006

To: Dave Gerry/Camarillo

From: Linda Sulkowski/Westford

Subject: Data Validation, VOC Analysis
Henderson Upgradient Investigation
Tronox LLC Henderson, Nevada
EMAX SDG 06C204

Distribution: R. Kennedy/Westford

04020-023-152 File

TH028voclms.rev.doc

SUMMARY

Full validation was performed on the data for two aqueous samples and one trip blank analyzed for a project-specific list of volatile organic compounds (VOCs) by SW-846 methods 5030B/8260B. The samples were collected at the Tronox LLC site in Henderson, Nevada on March 22, 2006 and were submitted to EMAX Laboratories (EMAX) in Torrance, CA for analysis. EMAX processed the samples and reported the results under sample delivery group (SDG) 06C204.

The analytical data were evaluated with reference to the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (10/99), the Region 9 Superfund Data Evaluation/Validation Guidance, NDEP Guidance on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodology.

In general, the data are valid as reported and may be used for decision making purposes. Results for tert-butyl alcohol were rejected in all samples since the minimum response factor (RF) criterion were not met. Results for naphthalene were estimated (UJ) in all samples since the percent difference (%D) criterion was not met in the continuing calibration.

SAMPLES

The samples included in this review are listed below:

Sample IDs	Sample IDs
M-120	M-118
Trip Blank	

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

Sample data were reviewed for the following parameters, where applicable:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Gas chromatography/mass spectrometry (GC/MS) tuning
- Initial and continuing calibrations
- Method blanks/equipment blanks/trip blanks
- Surrogate spike recoveries
- Laboratory control sample (LCS)/laboratory control sample duplicate (LCSD) results
- Matrix spike/matrix spike duplicate (MS/MSD) results
- Internal standard performance
- Field duplicate results
- Quantitation limits and sample results

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. The following discrepancy was found.

The collection times were not listed on the vial labels for sample M-120. No validation action was taken on this basis.

The VOC vials containing sample Trip Blank were not labeled with ENSR labels. The vials were labeled with EMAX labels. No validation action was taken on this basis.

The COC lists the collection time for sample M-118 as 1430. The VOC vial label lists the collection time as 1130. No validation action was taken on this basis.

Holding Times and Sample Preservation

The samples were analyzed within the method specified holding time.

The cooler temperature upon receipt at EMAX was within the acceptance criterion of 4±2°C.

GC/MS Tuning

The frequency and abundance of all bromofluorobenzene (BFB) tuning results were within the QC acceptance criteria. The samples were analyzed within the method specified tuning intervals.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Initial and Continuing Calibrations

The percent relative standard deviations (%RSDs), the correlation coefficients, and/or the RFs of all target compounds were within the QC acceptance criteria for the initial calibration associated with the sample analyses with the following exception. Actions were applied as indicated below.

Compound	RF	Action (Detects/Nondetects)
tert-butyl alcohol	0.019	J/R
Associated Samples:	All samples	

The percent differences (%Ds) of all target compounds were within the QC acceptance criteria for the continuing calibration associated with the sample analyses with the following exception. Actions were applied as indicated below.

Compound	%D	Action (Detects/Nondetects)
Naphthalene	27.8	J/UJ
Associated Samples:	All samples	

Method Blanks/Equipment Blanks/Trip Blanks

Equipment blank sample EB-3, reported in SDG 06C239, was associated with the samples in this data set. Target compounds were not detected in EB-3 therefore, no validation action was necessary.

Target compounds were not detected in the laboratory method blank or in the trip blank associated with the samples in this data set.

Surrogate Spike Recoveries

Surrogate percent recoveries (%Rs) were within the QC acceptance criteria in all sample analyses.

LCS/LCSD Results

The %Rs and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria for the LCS and LCSD.

MS/MSD Results

MS/MSD analyses were not performed on a sample from this sample set. No validation action was taken on this basis.

Internal Standard Performance

The internal standard performance was within the QC acceptance criteria in all sample analyses.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Field Duplicate Results

Field duplicate samples were not submitted with this sample set. No validation action was taken on this basis.

Quantitation Limits and Sample Results

Calculations were spot-checked. There were no discrepancies noted.

Dilutions were not performed on samples in this data set. Sample quantitation limits (SQLs) for these samples were therefore not affected.

It should be noted that the laboratory reported 2-butanone, 4-methyl-2-pentanone, and 2-hexanone with SQLs of 10 µg/L each, instead of the QAPP stipulated SQLs of 5 µg/L for the aqueous samples. No data validation action was taken other than this notation.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date:	August 10, 2006 Revised October 9, 2006	
To:	David Gerry/Camarillo	
From:	Sheena Blair/Westford	
Subject:	Data Validation, Inorganic Analysis Henderson Upgradient Investigation Tronox LLC Henderson, Nevada EMAX SDG 06C204	
Distribution:	R. Kennedy/Westford	04020-023-152 TH028wc.sb.rev

SUMMARY

Limited validation was performed on the data for one groundwater sample analyzed for the following parameters:

- Orthophosphate by SW-846 method 9056
- Sulfite by EPA 377.1, and
- Ignitability by SW-846 method 1010

The sample was collected at the Henderson site in Henderson, NV on March 22, 2006 and submitted to EMAX Laboratories, Inc in Torrance, CA for analysis. EMAX processed the sample and reported the results under sample delivery group (SDG) 06C204.

The analytical data were evaluated with reference 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 on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodologies.

In general, the data are valid as reported and may be used for decision making purposes. No data were rejected.

SAMPLES

The sample included in this review is listed below:

Sample ID
M-120

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

Sample data were reviewed for the following elements, where applicable to the method:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Calibrations
- Laboratory blanks/equipment 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

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. The following discrepancy was found:

- Although, the sample collection date was noted on the sample labels the collection time was missing. Holding times were calculated using the time recorded on the COC. No validation action was required other than this notation.

Holding Times and Sample Preservation

Sample M-120 was analyzed within the method-specified holdings times for all parameters analyzed.

The cooler temperature upon receipt at EMAX was within the acceptance criteria of 4 ± 2°C.

Calibrations

All criteria were met for the calibration curves, and the initial and continuing calibration verification (ICV/CCV) standards (where applicable to the methods).

Laboratory Blanks/Equipment Blanks

No equipment blanks were associated with the samples in this data set. No validation action was taken on this basis.

Target compounds were not detected in the laboratory blanks associated with sample M-120.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

LCS/LCSD Results

The percent recoveries (%Rs) and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria for all LCSs and LCSDs.

MS/MSD Results

Batch MS or MS/MSD analyses were performed on samples from other clients for all parameters. Although this practice is acceptable, the results could not be directly applied to the samples analyzed in this data package because of possible differences in the sample matrix and type. No validation action was taken on this basis.

Laboratory Duplicate Results

Laboratory duplicate analysis was performed on sample M-120 for sulfite. The RPD met the laboratory QC acceptance criteria.

The other parameters in this data set did not have associated laboratory duplicate analyses. Thus, for parameters without an associated laboratory duplicate, the LCS/LCSD and/or the MS/MSD demonstrated precision and accuracy in the laboratory (see discussions above).

Field Duplicate Results

Field duplicate samples were not submitted with this sample set. No validation action was taken on this basis.

Quantitation Limits and Sample Results

No dilutions were required for the samples in this data set for all parameters; therefore, sample quantitation limits (SQLs) were not affected.

Selected EMAX reporting limits did not meet the limits stated in the QAPP. No validation action was taken other than this notation.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date: August 24, 2006 Revised October 10, 2006

To: Dave Gerry/Camarillo

From: Vinora Nicholls/Westford

Subject: Data Validation, DRO Analyses
Henderson Upgradient Investigation
Tronox LLC Henderson, Nevada
EMAX SDG 06C222

Distribution: Robert Kennedy/Westford 04020-023-152

TH029DRO.rev

SUMMARY

Limited validation was performed on the data for three groundwater samples analyzed for diesel range organics (DRO) and oil range organics (ORO) by SW-846 method 3520CB/8015B. The samples were collected at the Tronox facility in Henderson Nevada on March 23, 2006 and submitted to EMAX Laboratories (EMAX), Inc in Torrance, California for analysis. EMAX processed the sample and reported the result under sample delivery group (SDG) 06C222.

The analytical data were evaluated according to the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (10/99), the Region 9 Superfund Data Evaluation/Validation Guidance, NDEP Guidance on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodology.

In general, the data are valid as reported and may be used for decision making purposes. No data were rejected. Selected results have been qualified as estimated (J/UJ) due to minor QC nonconformances (see discussion below).

SAMPLES

The samples included in this review are listed below:

Sample IDs	Sample IDs
M-121	H-11
M-117	

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

Sample data were reviewed for the following parameters, where applicable to the method:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Initial and continuing calibrations
- Method blanks/equipment blanks
- Surrogate spike recoveries
- Laboratory control sample (LCS) results
- Matrix spike/matrix spike duplicate (MS/MSD) results
- Field duplicate results
- Compound quantitation
- Quantitation limits and sample results

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. No discrepancies were found

Holding Times and Sample Preservation

The samples were extracted and analyzed within the method specified holding times.

The cooler temperature upon receipt at the laboratory was 4.2^{o}C, which was within the acceptable range of 4$\pm$ 2^{o}C.

Initial and Continuing Calibrations

The percent relative standard deviations (%RSDs) of all target compounds were within the QC acceptance criteria for the initial calibrations associated with the sample analyses. The percent differences (%Ds) of all target compounds were within the QC acceptance criteria for the continuing calibrations associated with the sample analyses.

The laboratory used hexacosane instead of n-octacosane for the surrogate. No validation action is required.

Method Blanks/Equipment Blank

No target compounds were detected in the method blank and trip blank. There were no equipment blanks (EB), or field blanks (FB) reported with the samples in this data package.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Surrogate Spike Recoveries

Surrogate recoveries were within the QC acceptance criteria in all sample analyses.

LCS Results

The percent recoveries (%Rs) and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria for the LCS and LCSD.

MS/MSD Results

MS/MSD analyses were performed on sample M121. The %Rs and RPDs of all reported spiked compounds were within QC acceptance criteria.

Field Duplicate Results

Field duplicate samples were not submitted with this sample set. No validation action is required.

Compound Quantitation

The recommended compounds (C_{10} and C_{28}) were used to establish the lower and upper retention time range for DRO and the recommended compounds (C28 and C38) were used to establish lower and upper retention time range for ORO (oil range organics).

Quantitation Limits and Sample Results

Calculations were spot-checked. There were no discrepancies noted.

The samples were analyzed at minor dilutions due to the sample preparation requirement. Sample results and sample quantitation limits were adjusted accordingly. The project-required reporting limits were not exceeded for any sample in this data set. Sample quantitation limits (SQsL) were within the target quantitation limit. The laboratory reported that H-11 chromatogram displayed a lighter fuel pattern than typical diesel fuel. A discrete peak not matching the fuel standard chromatographic pattern was included in the DRO range. The result for H-11 was reported as estimated (J) since the result fell between the method detection limit and the reporting limit.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date: August 25, 2006 Revised October 10, 2006

To: Dave Gerry/Camarillo

From: Vinora Nicholls/Westford

Subject: Data Validation, Ethylene Glycol Analyses
Henderson Upgradient Investigation
Tronox LLC Henderson, Nevada
EMAX SDG 06C222

Distribution: Robert Kennedy/Westford

04020-023-152

TH029EG.rev

SUMMARY

Limited validation was performed on the data for three groundwater samples and one trip blank analyzed for ethylene glycol by SW-846 method 8015B. The samples were collected at the Tronox facility in Henderson Nevada on March 23, 2006 and submitted to EMAX Laboratories (EMAX), Inc. in Torrance, California for analysis. EMAX analyzed the sample and reported the result under sample delivery group (SDG) 06C222.

The analytical data were evaluated according to the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (10/99), the Region 9 Superfund Data Evaluation/Validation Guidance, NDEP Guidance on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodology.

In general, the data are valid as reported and may be used for decision making purposes. No data were rejected or qualified based on the results of data validation.

SAMPLES

The samples included in this review are listed below:

Sample IDs	Sample IDs
M-121	H-11
M-117	Trip Blank

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

Sample data were reviewed for the following parameters, where applicable to the method:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Initial and continuing calibrations
- Method blanks/equipment blanks
- Surrogate spike recoveries
- Laboratory control sample (LCS) results
- Matrix spike/matrix spike duplicate (MS/MSD) results
- Field duplicate results
- Compound quantitation
- Quantitation limits and sample results

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. No discrepancies were found.

Holding Times and Sample Preservation

The samples were analyzed within the method specified holding times.

The cooler temperature upon receipt at the laboratory was 2.5^{o}C, which was within the acceptable range of 4$\pm$ 2^{o}C.

Initial and Continuing Calibrations

The percent relative standard deviations (%RSDs) of all target compounds were within the QC acceptance criteria for the initial calibrations associated with the sample analyses. The percent differences (%Ds) of all target compounds were within the QC acceptance criteria for the continuing calibrations associated with the sample analyses.

Method Blanks/Equipment Blank

No target compound was detected in the method blank. There were no equipment blanks (EB), or field blanks (FB) reported with the samples in this data package. The associated equipment blank for sample H-11 is EB3 which was reported under SDG 06C239. The target compound was not detected in EB-3.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Surrogate Spike Recoveries

Surrogate spikes were not performed because the EPA method and the laboratory SOP do not require surrogates for direct injection analysis. No validation action was taken on this basis.

LCS Results

The percent recoveries (%Rs) and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria for the LCS and LCSD.

MS/MSD Results

MS/MSD analyses were performed on sample M-121. The %Rs and RPDs of all reported spiked compounds were within QC acceptance criteria.

Field Duplicate Results

Field duplicate samples were not submitted with this sample set. No validation action is required.

Compound Quantitation

Retention times were defined during calibration. Analyte retention times fell within acceptance criteria for all samples.

Quantitation Limits and Sample Results

Calculations were spot-checked. There were no discrepancies noted.

No dilutions were required for the samples in this data set; therefore the sample quantitation limits (SQLs) were unaffected and met the target quantitation limit.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date: August 9, 2006 Revised October 10, 2006

To: Dave Gerry/Camarillo

From: Vinora Nicholls/Westford

Subject: Data Validation, Alcohol Analyses
Henderson Upgradient Investigation
Tronox LLC Henderson, Nevada
Emax SDG 06C222

Distribution: R.Kennedy/Westford

04020-023-152

TH029FA.rev

SUMMARY

Limited validation was performed on the data for three water samples, one trip blank, plus one matrix spike and one matrix spike duplicate were analyzed for methanol and ethanol by SW-846 method 8015B. The samples were collected at the Tronox facility in Henderson Nevada on March 27, 2006 and submitted to EMAX Laboratories, Inc in Torrance, California for analysis. EMAX analyzed the sample and reported the result under sample delivery group (SDG) 06C222.

The analytical data were evaluated according to the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (10/99), the Region 9 Superfund Data Evaluation/Validation Guidance, NDEP Guidance on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodology.

In general, the data are valid as reported and may be used for decision making purposes. No data were rejected or qualified based on the results of data validation.

SAMPLES

The samples included in this review are listed below:

Sample IDs	Sample IDs
M-121	H-11
M-117	Trip Blank

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

- Sample data were reviewed for the following parameters, where applicable to the method:
- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Initial and continuing calibrations
- Method blanks/equipment blanks
- Surrogate spike recoveries
- Laboratory control sample (LCS) results
- Matrix spike/matrix spike duplicate (MS/MSD) results
- Field duplicate results
- Compound quantitation
- Quantitation limits and sample results

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. No discrepancies were found.

Holding Times and Sample Preservation

The samples were analyzed within the method specified holding times.

The cooler temperature upon receipt at the laboratory was 2.5^{o}C, which was within the acceptable range of 4$\pm$ 2^{o}C.

Initial and Continuing Calibrations

The percent relative standard deviations (%RSDs) of all target compounds were within the QC acceptance criteria for the initial calibrations associated with the sample analyses. The percent differences (%Ds) of all target compounds were within the QC acceptance criteria for the continuing calibrations associated with the sample analyses.

Method Blanks/Equipment Blank

No target compounds were detected in the method blank and trip blank. There were no equipment blanks (EB), or field blanks (FB) reported with the samples in this data package.

Surrogate Spike Recoveries

Surrogate spikes were not performed because the EPA method and the laboratory SOP do not require surrogates for direct injection analysis. No validation action was taken on this basis.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

LCS Results

The percent recoveries (%R) and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria for the LCS and LCSD.

MS/MSD Results

MS/MSD analyses were performed on sample M121. The %Rs and RPD of all reported spiked compounds were within QC acceptance criteria.

Field Duplicate Results

Field duplicate samples were not submitted with this sample set. No validation action is required.

Compound Quantitation

Retention times were defined during calibration. Retention times fell within acceptance criteria for all samples.

Quantitation Limits and Sample Results

Calculations were spot-checked. There were no discrepancies noted.

No dilution was required for the sample in this data set; therefore the sample quantitation limit (SQL) was unaffected and met the target quantitation limit.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date: August 25, 2006 Revised October 9, 2006

To: Dave Gerry/Camarillo

From: Vinora Nicholls/Westford

Subject: Data Validation, GRO Analyses
Henderson Upgradient Investigation
Tronox LLC Henderson, Nevada
EMAX SDG 06C222

Distribution: Robert Kennedy/Westford 04020-023-152

TH029gro.rev.doc

SUMMARY

Limited validation was performed on the data for three groundwater samples and one trip blank analyzed for gasoline range organics (GRO) by SW-846 methods 5030B/8015B. The samples were collected at the Tronox LLC site in Henderson, Nevada on March 23, 2006 and submitted to EMAX Laboratories (EMAX), Inc. in Torrance, California for analysis. EMAX processed the samples and reported the results under sample delivery group (SDG) 06C222.

The analytical data were evaluated according to the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (10/99), the Region 9 Superfund Data Evaluation/Validation Guidance, NDEP Guidance on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodology.

In general, the data are valid as reported and may be used for decision making purposes. No data were rejected or qualified based on data validation.

SAMPLES

The samples included in this review are listed below:

Sample IDs	Sample IDs
M-121	H-11
M-117	Trip Blank

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

Sample data were reviewed for the following parameters, where applicable:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Initial and continuing calibrations
- Method blanks/equipment blanks
- Surrogate spike recoveries
- Laboratory control sample (LCS) results
- Matrix spike/matrix spike duplicate (MS/MSD) results
- Field duplicate results
- Compound quantitation
- Quantitation limits and sample results

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. No discrepancies were found.

Holding Times and Sample Preservation

The samples were analyzed within the method specified holding time.

The cooler temperature upon receipt at the laboratory was 2.5^{o}C, which was within the acceptance criterion of 4$\pm$ 2^{o}C.

Initial and Continuing Calibrations

The percent relative standard deviations (%RSDs) of all target compounds were within the QC acceptance criteria for the initial calibrations associated with the sample analyses. The percent differences (%Ds) of all target compounds were within the QC acceptance criteria for the continuing calibrations associated with the sample analyses.

The laboratory used 1,1,1-trifluorotoluene(1,1,1-TFT) as a surrogate; however results for 1,1,1-TFT were not reported on the sample results data sheet. Data validation actions are not required for this surrogate nonconformance.

Method Blanks/Equipment Blank

GRO was not detected in the method blank and trip blank. There were no equipment blanks (EBs) or field blanks (FBs) reported with the samples in this data package.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Surrogate Spike Recoveries

Surrogate recoveries were within the QC acceptance criteria in all sample analyses.

LCS Results

The percent recoveries (%Rs) and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria for the LCS and LCSD.

MS/MSD Results

MS/MSD analyses were performed on sample M-121. The %Rs and RPD of all spiked compounds were within QC acceptance criteria.

Field Duplicate Results

Field duplicate samples were not submitted with this sample set. No validation action was taken on this basis.

Compound Quantitation

The recommended compounds n-hexane and n-decane were used to establish the GRO lower and upper retention time range, respectively. All peaks contributing to the reported results were within the calibrated range.

Quantitation Limits and Sample Results

Calculations were spot-checked. There were no discrepancies noted.

No dilutions were required for the samples in this data set; therefore the sample quantitation limits (SQLs) were unaffected and met the target quantitation limit. Discrete peaks were reported in the GRO range for sample H-11 which did not match the gasoline standard. The result was reported as estimated (J) since the result fell between the method detection limit and the reporting limit.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date: August 16, 2006 Revised October 9, 2006

To: Dave Gerry/Camarillo

From: Linda Sulkowski/Westford

Subject: Data Validation, VOC Analysis
Henderson Upgradient Investigation
Tronox LLC Henderson, Nevada
EMAX SDG 06C222

Distribution: R. Kennedy/Westford

04020-023-152 File

TH029voclms.rev.doc

SUMMARY

Limited validation was performed on the data for three aqueous samples and one trip blank analyzed for a project-specific list of volatile organic compounds (VOCs) by SW-846 methods 5030B/8260B. The samples were collected at the Tronox LLC site in Henderson, Nevada on March 23, 2006 and were submitted to EMAX Laboratories (EMAX) in Torrance, CA for analysis. EMAX processed the samples and reported the results under sample delivery group (SDG) 06C222.

The analytical data were evaluated with reference to the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (10/99), the Region 9 Superfund Data Evaluation/Validation Guidance, NDEP Guidance on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodology.

In general, the data are valid as reported and may be used for decision making purposes. Results for tert-butyl alcohol were rejected in all samples since the minimum response factor (RF) criterion was not met. Naphthalene results were estimated in all samples due to percent difference (%D) exceedances with the continuing calibration associated with the samples. No other qualification of the data was required.

SAMPLES

The samples included in this review are listed below:

Sample IDs	Sample IDs
M-121	M-117
H-11	Trip Blank

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

Sample data were reviewed for the following parameters, where applicable:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Gas chromatography/mass spectrometry (GC/MS) tuning
- Initial and continuing calibrations
- Method blanks/equipment blanks/trip blanks
- Surrogate spike recoveries
- Laboratory control sample (LCS)/laboratory control sample duplicate (LCSD) results
- Matrix spike/matrix spike duplicate (MS/MSD) results
- Internal standard performance
- Field duplicate results
- Quantitation limits and sample results

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. The following discrepancy was found.

The collection times were not listed on the vial labels for all samples. No validation action was taken on this basis.

Holding Times and Sample Preservation

The samples were analyzed within the method specified holding time.

The cooler temperature upon receipt at EMAX was within the acceptance criterion of 4±2°C.

GC/MS Tuning

The frequency and abundance of all bromofluorobenzene (BFB) tuning results were within the QC acceptance criteria. The samples were analyzed within the method specified tuning intervals.

Initial and Continuing Calibrations

The percent relative standard deviations (%RSDs), the correlation coefficients, and/or the RFs of all target compounds were within the QC acceptance criteria for the initial calibration associated with the sample analyses with the following exception. Actions were applied as indicated below.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Compound	RF	Action (Detects/Nondetects)
Tert-butyl alcohol	0.019	J/R
Associated Samples:	All samples	

The percent differences (%Ds) of all target compounds were within the QC acceptance criteria for the continuing calibration associated with the sample analyses with the following exceptions. Actions were applied as indicated below.

Compound	%D	Action (Detects/Nondetects)
Naphthalene	26.9	J/UJ
Associated Samples:	All samples	

Method Blanks/Equipment Blanks/Trip Blanks

Equipment blank sample EB-3, reported in SDG 06C239, was associated with the samples in this data set. Target compounds were not detected in EB-3, therefore, no validation action was necessary.

Target compounds were not detected in the laboratory method blank or in the trip blank associated with the samples in this data set.

Surrogate Spike Recoveries

Surrogate percent recoveries (%Rs) were within the QC acceptance criteria in all sample analyses.

LCS/LCSD Results

The %Rs and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria for the LCS and LCSD.

MS/MSD Results

MS/MSD analyses were performed on sample M-121 from this sample set. The %Rs and RPDs of the spiked target analytes were all within the QC acceptance criteria.

Internal Standard Performance

The internal standard performance was within the QC acceptance criteria in all sample analyses.

Field Duplicate Results

Field duplicate samples were not submitted with this sample set. No validation action was taken on this basis.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Quantitation Limits and Sample Results

Dilutions were not performed on samples in this data set. Sample quantitation limits (SQLs) for these samples were therefore not affected.

It should be noted that the laboratory reported 2-butanone, 4-methyl-2-pentanone, and 2-hexanone with SQLs of 10 µg/L each, instead of the QAPP stipulated SQLs of 5 µg/L for the aqueous samples. No data validation action was taken other than this notation.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date: August 25, 2006 Revised October 10, 2006

To: Dave Gerry/Camarillo

From: Vinora Nicholls/Westford

Subject: Data Validation, DRO Analyses
Henderson Upgradient Investigation
Tronox LLC Henderson, Nevada
EMAX SDG 06C239

Distribution: Robert Kennedy/Westford

04020-023-152

TH030DRO.rev

SUMMARY

Full validation was performed on the data for one equipment blank analyzed for diesel range organics (DRO) and oil range organics (ORO) by SW-846 methods 5030B/8015B. The sample was collected at the Tronox facility in Henderson Nevada on March 24, 2006 and submitted to EMAX Laboratories (EMAX), Inc in Torrance, California for analysis. EMAX analyzed the sample and reported the result under sample delivery group (SDG) 06C239.

The analytical data were evaluated according to the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (10/99), the Region 9 Superfund Data Evaluation/Validation Guidance, NDEP Guidance on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodology.

In general, the data are valid as reported and may be used for decision making purposes. No data were rejected or qualified based on the results of data validation.

SAMPLES

The samples included in this review are listed below:

Sample ID
EB-3

REVIEW ELEMENTS

Sample data were reviewed for the following parameters, where applicable to the method:

- Agreement of analyses conducted with chain-of-custody (COC) requests

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

- Holding times and sample preservation
- Initial and continuing calibrations
- Method blanks/equipment blanks
- Surrogate spike recoveries
- Laboratory control sample (LCS) results
- Matrix spike/matrix spike duplicate (MS/MSD) results
- Field duplicate results
- Compound quantitation
- Quantitation limits and sample results

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. No discrepancies were found

Holding Times and Sample Preservation

The samples were extracted and analyzed within the method specified holding times.

The cooler temperature upon receipt at the laboratory was 3.4^{o}C, which was within the acceptable range of 4$\pm$ 2^{o}C.

Initial and Continuing Calibrations

The percent relative standard deviations (%RSDs) of all target compounds were within the QC acceptance criteria for the initial calibrations associated with the sample analyses. The percent differences (%Ds) of all target compounds were within the QC acceptance criteria for the continuing calibrations associated with the sample analyses.

The laboratory used hexacosane instead of n-octacosane for the surrogate. No validation action is required.

Method Blanks/Equipment Blank

No target compounds were detected in the method blank.

Surrogate Spike Recoveries

Surrogate recoveries were within the QC acceptance criteria in all sample analyses.

LCS Results

The percent recoveries (%R) and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria for the LCS and LCSD.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

MS/MSD Results

MS/MSD analyses were not submitted with this sample set. No validation action is required.

Field Duplicate Results

Field duplicate samples were not submitted with this sample set. No validation action is required.

Compound Quantitation

The recommended compounds (C_{10} and C_{28}) were used to establish the lower and upper retention time range for DRO and the recommended compounds (C28 and C38) were used to establish lower and upper retention time range for ORO (oil range organics).

Quantitation Limits and Sample Results

Calculations were spot-checked. There were no discrepancies noted.

The samples were analyzed at minor dilutions due to the sample preparation requirement. Sample results and sample quantitation limits were adjusted accordingly. The project-required reporting limits were not exceeded for any sample in this data set. Sample quantitation limits (SQsL) were within the target quantitation limit.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date: August 9, 2006 Revised October 10, 2006

To: Dave Gerry/Camarillo

From: Vinora Nicholls/Westford

Subject: Data Validation, Ethylene Glycol Analyses
Henderson Upgradient Investigation
Tronox LLC Henderson, Nevada
EMAX SDG 06C239

Distribution: Robert Kennedy/Westford

04020-023-152

TH030EG.rev

SUMMARY

Limited validation was performed on the data for one equipment blank and one trip blank analyzed for ethylene glycol by SW-846 method 8015B. The samples were collected at theTronox facility in Henderson Nevada on March 24, 2006 and submitted to EMAX Laboratories (EMAX), Inc. in Torrance, California for analysis. EMAX analyzed the samples and reported the results under sample delivery group (SDG) 06C239.

The analytical data were evaluated according to the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (10/99), the Region 9 Superfund Data Evaluation/Validation Guidance, NDEP Guidance on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodology.

In general, the data are valid as reported and may be used for decision making purposes. No data were rejected or qualified based on the results of data validation.

SAMPLES

The samples included in this review are listed below:

Sample ID
EB-3
Trip Blank

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

Sample data were reviewed for the following parameters, where applicable to the method:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Initial and continuing calibrations
- Method blanks/equipment blanks
- Surrogate spike recoveries
- Laboratory control sample (LCS) results
- Matrix spike/matrix spike duplicate (MS/MSD) results
- Field duplicate results
- Compound quantitation
- Quantitation limits and sample results

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. No discrepancies were found

Holding Times and Sample Preservation

The samples were analyzed within the method specified holding times.

The cooler temperature upon receipt at the laboratory was 3.4^{o}C, which was within the acceptable range of 4$\pm$ 2^{o}C.

Initial and Continuing Calibrations

The percent relative standard deviations (%RSDs) of all target compounds were within the QC acceptance criteria for the initial calibrations associated with the sample analyses. The percent differences (%Ds) of all target compounds were within the QC acceptance criteria for the continuing calibrations associated with the sample analyses.

Method Blanks/Equipment Blank

No target compounds were detected in the method, trip blank or equipment blank EB-3.

Surrogate Spike Recoveries

Surrogate spikes were not performed because the EPA method and the laboratory SOP do not require surrogates for direct injection analysis. No validation action was taken on this basis.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

LCS Results

The percent recoveries (%Rs) and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria for the LCS and LCSD.

MS/MSD Results

MS/MSD analyses were not submitted with this sample set. No validation action is required.

Field Duplicate Results

Field duplicate samples were not submitted with this sample set. No validation action is required.

Compound Quantitation

Retention times were defined during calibration. Analyte retention times fell within acceptance criteria for all samples.

Quantitation Limits and Sample Results

Calculations were spot-checked. There were no discrepancies noted.

No dilutions were required for the samples in this data set; therefore the sample quantitation limits (SQLs) were unaffected and met the target quantitation limit.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date: August 9, 2006 Revised October 10, 2006

To: Dave Gerry/Camarillo

From: Vinora Nicholls/Westford

Subject: Data Validation, Alcohol Analyses
Henderson Upgradient Investigation
Tronox LLC Henderson, Nevada
Emax SDG 06C239

Distribution: R.Kennedy/Westford

04020-023-152

TH030FA.rev

SUMMARY

Limited validation was performed on the data for one equipment blank and one trip blank analyzed for methanol and ethanol by SW-846 method 8015B. The samples were collected at the Tronox facility in Henderson, Nevada on March 24, 2006 and submitted to EMAX Laboratories, Inc in Torrance, California for analysis. EMAX analyzed the samples and reported the results under sample delivery group (SDG) 06C239.

The analytical data were evaluated according to the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (10/99), the Region 9 Superfund Data Evaluation/Validation Guidance, NDEP Guidance on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodology.

In general, the data are valid as reported and may be used for decision making purposes. No data were rejected or qualified based on the results of data validation.

SAMPLES

The samples included in this review are listed below:

Sample ID
EB-3
Trip Blank

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

- Sample data were reviewed for the following parameters, where applicable to the method:
- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Initial and continuing calibrations
- Method blanks/equipment blanks
- Surrogate spike recoveries
- Laboratory control sample (LCS) results
- Matrix spike/matrix spike duplicate (MS/MSD) results
- Field duplicate results
- Compound quantitation
- Quantitation limits and sample results

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. No discrepancies were found

Holding Times and Sample Preservation

The samples were analyzed within the method specified holding times.

The cooler temperature upon receipt at the laboratory was 3.4^{o}C, which was within the acceptable range of 4$\pm$ 2^{o}C.

Initial and Continuing Calibrations

The percent relative standard deviations (%RSDs) of all target compounds were within the QC acceptance criteria for the initial calibrations associated with the sample analyses. The percent differences (%Ds) of all target compounds were within the QC acceptance criteria for the continuing calibrations associated with the sample analyses.

Method Blanks/Equipment Blank

No target compounds were detected in the method blank, trip blank or equipment blank EB-3.

Surrogate Spike Recoveries

Surrogate spikes were not performed because the EPA method and the laboratory SOP do not require surrogates for direct injection analysis. No validation action was taken on this basis.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

LCS Results

The percent recoveries (%R) and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria for the LCS and LCSD.

MS/MSD Results

MS/MSD analyses were not submitted with this sample set. No validation action is required.

Field Duplicate Results

Field duplicate samples were not submitted with this sample set. No validation action is required.

Compound Quantitation

Retention times were defined during calibration. Analyte retention times fell within acceptance criteria for all samples.

Quantitation Limits and Sample Results

Calculations were spot-checked. There were no discrepancies noted.

No dilution was required for the sample in this data set; therefore the sample quantitation limit (SQL) was unaffected and met the target quantitation limit.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date: August 25, 2006 Revised October 9, 2006

To: Dave Gerry/Camarillo

From: Vinora Nicholls/Westford

Subject: Data Validation, GRO Analyses
Henderson Upgradient Investigation
Tronox LLC Henderson, Nevada
EMAX SDG 06C239

Distribution: Robert Kennedy/Westford 04020-023-152

TH030gro.rev.doc

SUMMARY

Limited validation was performed on the data for one equipment blank and one trip blank analyzed for gasoline range organics (GRO) by SW-846 methods 5030B/8015B. The samples were collected at the Tronox LLC site in Henderson, Nevada on March 24, 2006 and submitted to EMAX Laboratories (EMAX), Inc. in Torrance, California for analysis. EMAX processed the samples and reported the results under sample delivery group (SDG) 06C239.

The analytical data were evaluated according to the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (10/99), the Region 9 Superfund Data Evaluation/Validation Guidance, NDEP Guidance on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodology.

In general, the data are valid as reported and may be used for decision making purposes. No data were rejected or qualified based on data validation.

SAMPLES

The samples included in this review are listed below:

Sample ID
EB-3
Trip Blank

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

Sample data were reviewed for the following parameters, where applicable:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Initial and continuing calibrations
- Method blanks/equipment blanks
- Surrogate spike recoveries
- Laboratory control sample (LCS) results
- Matrix spike/matrix spike duplicate (MS/MSD) results
- Field duplicate results
- Compound quantitation
- Quantitation limits and sample results

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. No discrepancies were found.

Holding Times and Sample Preservation

The samples were analyzed within the method specified holding time.

The cooler temperature upon receipt at the laboratory was 3.4^{o}C, which was within the acceptance criterion of 4$\pm$ 2^{o}C.

Initial and Continuing Calibrations

The percent relative standard deviations (%RSDs) of all target compounds were within the QC acceptance criteria for the initial calibrations associated with the sample analyses. The percent differences (%Ds) of all target compounds were within the QC acceptance criteria for the continuing calibrations associated with the sample analyses.

The laboratory used 1,1,1-trifluorotoluene(1,1,1-TFT) as a surrogate; however results for 1,1,1-TFT were not reported on the sample results data sheet. Data validation actions were not required for this surrogate nonconformance.

Method Blanks/Equipment Blank

GRO was not detected in the method blank, trip blank, or equipment blank EB-3.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Surrogate Spike Recoveries

Surrogate recoveries were within the QC acceptance criteria in all sample analyses.

LCS Results

The percent recoveries (%Rs) and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria for the LCS and LCSD.

MS/MSD Results

MS/MSD analyses were not performed on a sample in this sample set. No validation action was taken on this basis.

Field Duplicate Results

Field duplicate samples were not submitted with this sample set. No validation action was taken on this basis.

Compound Quantitation

The recommended compounds n-hexane and n-decane were used to establish the GRO lower and upper retention time range, respectively. All peaks contributing to the reported results were within the calibrated range.

Quantitation Limits and Sample Results

Calculations were spot-checked. There were no discrepancies noted.

No dilutions were required for the samples in this data set; therefore the sample quantitation limit (SQL) was unaffected and met the target quantitation limit. Discrete peaks were reported for both samples; however, the peaks were also observed in the laboratory's quality control samples and the concentration of these discrete peaks as GRO (C_6 –C_{10}) was less than the adjusted method detection limit.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date: August 2, 2006 Revised October 10, 2006

To: Dave Gerry/Camarillo

From: Paula DiMattei/Westford

Subject: Data Validation, OC Pesticide, OP Pesticide, and PCB Analyses
Tronox Henderson Upgradient
Henderson, NV
EMAX SDG 06C239

Distribution: R. Kennedy/Westford 04020-023-152 File

TH030.ocp.opp.pcbpld.rev

SUMMARY

Limited validation was performed on the data for one aqueous equipment blank sample for organochlorine (OC) pesticides by SW-846 method 8081A, for organophosphorus (OP) pesticides by SW-846 method 8141A, and for polychlorinated biphenyls (PCBs) by SW-846 method 8082. The sample was collected at the Tronox LLC (Tronox) facility, formerly Kerr-McGee Chemical LLC site in Henderson, NV on March 24, 2006 and was submitted to EMAX Laboratories, Inc. (EMAX) in Torrance, CA for analysis. EMAX processed the sample and reported the results under sample delivery group (SDG) 06C239.

The analytical data were evaluated with reference to the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (10/99), the Region 9 Superfund Data Evaluation/Validation Guidance, NDEP Guidance on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The National Functional Guidelines were modified to accommodate the non-CLP methodologies.

In general, the data are valid as reported and may be used for decision making purposes. No data were rejected. Selected data points were qualified due to nonconformances of certain QC criteria (see discussion below).

SAMPLES

The sample included in this review is listed below:

Sample ID
EB-3 (Equipment Blank)

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

Sample data were reviewed for the following parameters, where applicable to the method:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Initial and continuing calibrations
- Pesticide instrument performance (OC Pesticides only)
- Method blanks/equipment blanks
- Surrogate spike recoveries
- Laboratory control sample (LCS) results
- Matrix spike/matrix spike duplicate (MS/MSD) results
- Field duplicate results
- Quantitation limits and sample results

DISCUSSION

Agreement of Analyses Conducted with COC Requests

OC Pesticides/OP Pesticides/PCBs

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. No discrepancies were found.

Holding Times and Sample Preservation

OC Pesticides/OP Pesticides/PCBs

The cooler temperatures upon sample receipt were within the acceptance criteria of 4± 2°C.

The sample was extracted and analyzed within the method specified holding times.

Initial and Continuing Calibrations

OC Pesticides

The percent relative standard deviations (%RSDs) of all target compounds were within the QC acceptance criteria for the initial calibrations associated with the sample analyses. The percent differences (%Ds) of all target compounds were within the QC acceptance criteria for the continuing calibrations associated with the sample analyses with the following exceptions.

Calibration (column)	Compound	%D
CC 4/10/06 11:09	Endrin	17

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Calibration (column)	Compound	%D
(RTX-CLPEST)		
Associated sample: EB-3		
CC 4/10/06 11:09 (RTX-CLPESTII)	Endrin	28
Associated sample: EB-3		
CC 4/10/06 18:39 (RTX-CLPEST)	Endrin	19
Associated sample: EB-3		
CC 4/10/06 18:39 (RTX-CLPESTII)	Endrin	31
Associated sample: EB-3		

Endrin was not detected in the associated sample EB-3 and all %D criteria exceeded QC criteria as a result of high recoveries in the continuing calibrations. Therefore, no data validation actions were required on this basis.

OP Pesticides

The percent relative standard deviations (%RSDs) of all target compounds were within the QC acceptance criteria for the initial calibrations (IC) associated with the sample analyses, and the %Ds of all target compounds were within the QC acceptance criteria for the continuing calibrations (CC) associated with the sample analyses with the following exceptions.

Calibration (column)	Compound	%RSD/%D
IC 2/1/06 (RTX-OPPESTICIDES)	Naled	24
Associated sample: EB-3		
CC 3/31/06 (RTX-OPPESTICIDES)	Naled	21
Associated sample: EB-3		
CC 4/1/06 2:14 (RTX-OPPESTICIDES)	Ethoprop	16
	Naled	27
Associated samples: EB-3		

The nondetect naled result in sample EB-3 was qualified as estimated (UJ) due to the initial calibration nonconformance. Ethoprop and naled were not detected in the associated sample EB-3 and all %D criteria exceeded QC criteria as a result of high recoveries in the continuing calibrations. Therefore, no data validation actions were required on this basis.

PCBs

The percent relative standard deviations (%RSDs) of all target compounds were within the QC acceptance criteria for the initial calibrations associated with the sample analyses. The %Ds of all target compounds were within the QC acceptance criteria for the continuing calibrations associated with the sample analyses.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Pesticide Instrument Performance (OC Pesticides only)

All instrument performance standards were analyzed at the proper frequency and the percent (%) breakdown of 4,4'-DDT and endrin met the QC acceptance limits.

Method Blanks/Equipment Blank

OC Pesticides/OP Pesticides/PCBs

Target compounds were not detected in the laboratory method blanks associated with the sample in this data set.

Surrogate Spike Recoveries

OC Pesticides/OP Pesticides/PCBs

Surrogate recoveries (%Rs) were within the QC acceptance criteria in all sample analyses.

LCS Results

OC Pesticides/PCBs

The %Rs and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria for the LCS and LCSD analyses.

OP Pesticides

The LCS %Rs were within the QC acceptance criteria for the LCS analyses with the following exceptions.

Compound	LCS /LCSD %R	RPD	QC limits		Action (Detects/Nondetects)
			%R	RPD	
Dementon-O	ok/ok	50	10-130	30	J/UJ
Dementon-S	ok/ok	51	10-130	30	J/UJ
Ethoprop	137/ok	ok	40-130	30	J/Accept result
Diazinon	135/ok	ok	40-130	30	J/Accept result
Disulfoton	ok/ok	65	10-130	30	J/UJ
Tokuthion	139/ok	ok	40-130	30	J/Accept result
Stirophos	177/ok	ok	20-160	30	J/Accept result
Bolstar	144/ok	ok	20-130	30	J/Accept result
Fensulfothion	152/ok	41	10-140	30	J/UJ
Azinphos-methyl	186/ok	ok	20-160	30	J/Accept result
Coumaphos	184/146	ok	30-160	30	J/Accept result
Dimethoate	ok/ok	33	10-140	30	J/UJ

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

MS/MSD Results

OC Pesticides/OP Pesticides/PCBs

MS/MSD analyses were not performed on the sample in this data set. No data validation actions were taken on this basis.

Field Duplicate Results

OC Pesticides/OP Pesticides/PCBs

A field duplicate pair was not submitted for this data set. No data validation actions were taken on this basis.

Quantitation Limits and Sample Results

OC Pesticides/OP Pesticides/PCBs

Dilutions were not performed on sample in this data set. Sample quantitation limits (SQLs) for this sample were therefore not affected.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date: August 10, 2006 Revised October 10, 2006

To: Dave Gerry/Camarillo

From: Robert Kennedy/Westford

Subject: Data Validation, SVOC Analysis
Henderson Upgradient Investigation
Tronox LLC Henderson, NV
Emax SDG 06C239

Distribution: D. Simmons/Westford 04020-023-152

TH030svocrkk.rev

SUMMARY

Limited validation was performed on the data for one equipment blank analyzed for modified Target Compound List (TCL) semivolatile organic compounds (SVOCs) by SW-846 method 8270C. Selected ion monitoring (SIM) analysis was performed on a selected target compound set as specified in the Work Plan Addendum. The sample was collected at the Tronox facility in Henderson, NV on March 24, 2006 and was submitted to EMAX Laboratories in Torrance, CA for analysis. EMAX processed the sample and reported the results under sample delivery group (SDG) 06C239.

The analytical data were evaluated according to the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (10/99), the Region 9 Superfund Data Evaluation/Validation Guidance, NDEP Guidance on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodology

In general, the data are valid as reported and may be used for decision making purposes. Nondetect results for one analyte were rejected based on recovery and precision problems in the laboratory control samples. No other data were rejected or qualified as estimated due to nonconformances of QC criteria (see discussion below).

SAMPLES

The samples included in this review are listed below.

Sample IDs
EB-3 (equipment blank)

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

Sample data were reviewed for the following parameters:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times/sample preservation
- Gas chromatography/mass spectrometry (GC/MS) tuning
- Initial calibrations and continuing calibration verifications
- Laboratory blanks/equipment blanks/field blanks
- Surrogate spike recoveries
- Matrix spike (MS)/matrix spike duplicate (MSD) results
- Laboratory control sample (LCS)/laboratory control sample duplicate (LCSD) results
- Field duplicate results
- Internal standard performance
- Sample quantitation/detection limit results

DISCUSSION

Agreement of Analyses Conducted With COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. No discrepancies were found.

Holding Times/Sample Preservation

The cooler temperatures of all coolers upon receipt at EMAX were within the acceptance criteria of 4±2°C.

All samples were extracted and analyzed within the method specified holding times.

GC/MS Tuning

The frequency and abundance of the decafluorotriphenylphosphine (DFTPP) tuning results were within the QC acceptance criteria. All samples were analyzed within 12 hours from the DFTPP tuning.

Initial Calibrations and Continuing Calibration Verifications

The percent relative standard deviations (%RSDs), the percent differences (%Ds), and the relative response factors (RRFs) were all within the QC acceptance criteria in the initial and continuing calibrations.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Laboratory Blanks/Equipment Blanks/Field Blanks

Target compounds were not detected in the laboratory method blanks.

Surrogate Spike Recoveries

The surrogate percent recoveries (%Rs) were within the QC acceptance criteria in all sample analyses.

MS/MSD Results

MS/MSD analyses were not performed on the equipment blank. No data validation actions were taken on this basis.

LCS/LCSD Results

The %R and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria with the following exception. The LCS %R (9%) for 3,3'-dichlorobenzidine recovered below the QC acceptance limits (20-140%). The nondetect 3,3'-dichlorobenzidine result in the associated equipment blank (EB-3) was qualified as rejected (R) due to the very low (<10%) LCS recovery. The LCS/LCSD RPD (79%) for 3,3'-dichlorobenzidine also exceeded the QC acceptance criterion (30%); however, no further data validation actions were required.

Field Duplicate Results

No field duplicate samples were provided with this data set. No data validation actions were taken on this basis.

Internal Standard Performance

Internal standard performance met the QC acceptance criteria in all sample analyses.

Sample Quantitation/Detection Limit Results

Dilutions were not performed on samples in this data set. Sample quantitation limits (SQLs) for these samples were therefore not affected.

Calculations were spot-checked. There were no discrepancies noted.

It was noted that the SVOC analyte reporting limits (RL) are not based on the low point of calibration but rather the *second* lowest calibration point and the MDLs reported are not statistically determined but appear to be consistently ½ of the RL. No validation action was taken on this basis.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date: August 16, 2006 Revised October 9, 2006

To: Dave Gerry/Camarillo

From: Linda Sulkowski/Westford

Subject: Data Validation, VOC Analysis
Henderson Upgradient Investigation
Tronox LLC Henderson, Nevada
EMAX SDG 06C239

Distribution: R. Kennedy/Westford

04020-023-152 File

TH030voclms.rev.doc

SUMMARY

Limited validation was performed on the data for one aqueous equipment blank and one trip blank analyzed for a project-specific list of volatile organic compounds (VOCs) by SW-846 methods 5030B/8260B. The samples were collected at the Tronox LLC site in Henderson, Nevada on March 24, 2006 and were submitted to EMAX Laboratories (EMAX) in Torrance, CA for analysis. EMAX processed the samples and reported the results under sample delivery group (SDG) 06C239.

The analytical data were evaluated with reference to the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (10/99), the Region 9 Superfund Data Evaluation/Validation Guidance, NDEP Guidance on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodology.

In general, the data are valid as reported and may be used for decision making purposes. Results for tert-butyl alcohol were rejected in all samples since the minimum response factor (RF) criterion was not met. Results for naphthalene were estimated (UJ) in all samples since the percent difference (%D) criterion was not met in the continuing calibration.

SAMPLES

The samples included in this review are listed below:

Sample IDs	Sample IDs
EB-3 (equipment blank)	Trip Blank

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

Sample data were reviewed for the following parameters, where applicable:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Gas chromatography/mass spectrometry (GC/MS) tuning
- Initial and continuing calibrations
- Method blanks/equipment blanks/trip blanks
- Surrogate spike recoveries
- Laboratory control sample (LCS)/laboratory control sample duplicate (LCSD) results
- Matrix spike/matrix spike duplicate (MS/MSD) results
- Internal standard performance
- Field duplicate results
- Quantitation limits and sample results

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. The following discrepancy was found.

The collection times were not listed on the VOC vial labels for all samples. No validation action was taken on this basis.

Holding Times and Sample Preservation

The samples were analyzed within the method specified holding time.

The cooler temperature upon receipt at EMAX was within the acceptance criterion of 4±2°C.

GC/MS Tuning

The frequency and abundance of all bromofluorobenzene (BFB) tuning results were within the QC acceptance criteria. The samples were analyzed within the method specified tuning intervals.

Initial and Continuing Calibrations

The percent relative standard deviations (%RSDs), the correlation coefficients, and/or the RFs of all target compounds were within the QC acceptance criteria for the initial calibration associated with the sample analyses with the following exception. Actions were applied as indicated below.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Compound	RF	Action (Detects/Nondetects)
Tert-butyl alcohol	0.019	J/R
Associated Samples:	All samples	

The percent differences (%Ds) of all target compounds were within the QC acceptance criteria for the continuing calibration associated with the sample analyses with the following exceptions. Actions were applied as indicated below.

Compound	%D	Action (Detects/Nondetects)
Naphthalene	26.9	J/UJ
Associated Samples:	All samples	

Method Blanks/Equipment Blanks/Trip Blanks

Target compounds were not detected in the equipment blank, the trip blank, or in the laboratory method blank associated with the samples in this data set.

Surrogate Spike Recoveries

Surrogate percent recoveries (%Rs) were within the QC acceptance criteria in all sample analyses.

LCS/LCSD Results

The %Rs and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria for the LCS and LCSD.

MS/MSD Results

MS/MSD analyses were not performed on a sample from this sample set. No validation action was taken on this basis.

Internal Standard Performance

The internal standard performance was within the QC acceptance criteria in all sample analyses.

Field Duplicate Results

Field duplicate samples were not submitted with this sample set. No validation action was taken on this basis.

Quantitation Limits and Sample Results

Dilutions were not performed on samples in this data set. Sample quantitation limits (SQLs) for these samples were therefore not affected.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

It should be noted that the laboratory reported 2-butanone, 4-methyl-2-pentanone, and 2-hexanone with SQLs of 10 µg/L each, instead of the QAPP stipulated SQLs of 5 µg/L for the aqueous samples. No data validation action was taken other than this notation.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date: August 25, 2006 Revised October 10, 2006

To: Dave Gerry/Camarillo

From: Vinora Nicholls/Westford

Subject: Data Validation, Alcohol Analyses
Henderson Upgradient Investigation
Tronox LLC Henderson, Nevada
EMAX SDG 06C238

Distribution: Robert Kennedy/Westford

04020-023-152

TH031FA.rev

SUMMARY

Limited validation was performed on the data for five soil samples, and one trip blank analyzed for methanol and ethanol by SW-846 method 8015B. The samples were collected at the Tronox facility in Henderson, Nevada on March 24, 2006 and submitted to EMAX Laboratories (EMAX), Inc in Torrance, California for analysis. EMAX analyzed the samples and reported the results under sample delivery group (SDG) 06C238.

The analytical data were evaluated according to the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (10/99), the Region 9 Superfund Data Evaluation/Validation Guidance, NDEP Guidance on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodology.

In general, the data are valid as reported and may be used for decision making purposes. No data were rejected or qualified based on the results of data validation.

SAMPLES

The samples included in this review are listed below:

Sample IDs	Sample IDs
M-120-0.5R	M-117-0.5R
M-121-0.5R	Trip Blank
M-118-0.5R	M-116-0.5R

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

Sample data were reviewed for the following parameters, where applicable to the method:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Initial and continuing calibrations
- Method blanks/equipment blanks
- Surrogate spike recoveries
- Laboratory control sample (LCS) results
- Matrix spike/matrix spike duplicate (MS/MSD) results
- Field duplicate results
- Compound quantitation
- Quantitation limits and sample results

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. No discrepancies were found

Holding Times and Sample Preservation

The samples were extracted and analyzed within the method specified holding times.

The cooler temperature upon receipt at the laboratory was 3.6^{o}C, which was within the acceptable range of 4$\pm$ 2^{o}C.

Initial and Continuing Calibrations

The percent relative standard deviations (%RSDs) of all target compounds were within the QC acceptance criteria for the initial calibrations associated with the sample analyses. The percent differences (%Ds) of all target compounds were within the QC acceptance criteria for the continuing calibrations associated with the sample analyses.

Method Blanks/Equipment Blank

No target compounds were detected in the method, trip blank or equipment blank EB-3. The equipment blanks associated with the soil samples (EB-1 and EB-2) were reported under SDGs 06C096 and 06C127, respectively. No target compounds were detected in these equipment blanks.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Surrogate Spike Recoveries

Surrogate spikes were not performed because the EPA method and the laboratory SOP do not require surrogates for direct injection analysis. No validation action was taken on this basis.

LCS Results

The percent recoveries (%Rs) and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria for the LCS and LCSD.

MS/MSD Results

MS/MSD analyses were not submitted with this sample set. No validation action is required.

Field Duplicate Results

Field duplicate samples were not submitted with this sample set. No validation action is required.

Compound Quantitation

Retention times were defined during calibration. Retention times fell within acceptance criteria for all samples.

Quantitation Limits and Sample Results

Calculations were spot-checked. There were no discrepancies noted.

No dilutions were required for the samples in this data set; therefore the sample quantitation limits (SQLs) were unaffected and met the target quantitation limit. The sample IDs containing “R” were resampled soils. The original samples of these soils reported in SDG 06C120, 06C081, 06C106, and 06C071, were cross-contaminated by methanol during shipping and resampled/reanalyzed in SDG06C238 to confirm the initial soil methanol detections were false positives.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date:	August 15, 2006 Revised October 10, 2006
To:	David Gerry/Camarillo
From:	Deborah Truini Blair/Westford
Subject:	Data Validation, Methyl Mercury Analysis Henderson Upgradient Investigation Tronox LLC Henderson, Nevada Frontier Geosciences Inc. SDG 169215
Distribution:	R. Kennedy/Westford
	04020-023-152 TH033methylmercurydat.rev

SUMMARY

Full validation was performed on the data for three soil samples analyzed for methyl mercury by modified EPA method 1630 (Frontier Geosciences Inc. SOP FGS-070). The samples were collected at the Henderson site in Henderson, NV on March 7, 2006 and were submitted to EMAX Laboratories, Inc. (EMAX) in Torrance, CA. EMAX then sent the samples to MWH Laboratories in Monrovia, CA where the samples were subsequently subcontracted to Frontier Geosciences Inc. in Seattle, WA for analysis. Frontier Geosciences Inc. processed the samples and reported the results under sample delivery group (SDG) 169215.

The analytical data were evaluated with reference 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 on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodologies.

In general, the data are valid as reported and may be used for decision making purposes. No data were rejected or qualified (see discussion below).

SAMPLES

The samples included in this review are listed below.

Sample IDs
M120-0.5
M120-10
M120-30

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

Sample data were reviewed for the following parameters:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times/sample preservation
- Initial and continuing calibrations
- Laboratory blanks/equipment blanks/field blanks
- Matrix spike/matrix spike duplicate (MS/MSD) results
- Laboratory duplicate results
- Field duplicate results
- Laboratory control sample (LCS) results
- Sample quantitation/detection limit results

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. No discrepancies were found.

Holding Times and Sample Preservation

The cooler temperatures upon sample receipt at EMAX, MWH Laboratories, and Frontier Geosciences Inc. were within the acceptance criteria of 4 ± 2°C.

The samples were analyzed within the method specified holding time.

Initial and Continuing Calibrations

All criteria were met for the calibration curves, and the initial calibration verification (ICV) and continuing calibration verification (CCV) standards.

Laboratory Blanks/Equipment Blanks/Field Blanks

Equipment blanks and field blanks were not collected in association with this data set; no validation action was required on this basis.

Methyl mercury was not detected in the laboratory instrument or method blanks at levels greater than the method required criterion.

MS/MSD Results

MS/MSD analyses were performed on sample M120-10. The percent recoveries (%Rs) and relative percent difference (RPD) for methyl mercury were within QC acceptance criteria.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Laboratory Duplicate Results

Laboratory duplicate analyses were performed on sample M120-10. The RPD for methyl mercury was within QC acceptance criteria.

Field Duplicate Results

A field duplicate pair was not submitted for this data set. No data validation actions were taken on this basis.

LCS Results

The %R of methyl mercury was within the QC acceptance criteria for the LCS analysis.

Quantitation Limits and Sample Results

Calculations were spot-checked. No discrepancies were noted.

All soil methyl methyl mercury results were reported on a wet weight basis.

Dilutions were not performed on samples in this data set; therefore, sample quantitation limits (SQLs) were not affected.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date:	August 15, 2006 Revised October 10, 2006	
To:	David Gerry/Camarillo	
From:	Deborah Truini Blair/Westford	
Subject:	Data Validation, Methyl Mercury Analysis Henderson Upgradient Investigation Tronox LLC Henderson, Nevada Frontier Geosciences Inc. SDG 170226	
Distribution:	R. Kennedy/Westford	04020-023-152 TH034methylmercurydat.rev

SUMMARY

Full validation was performed on the data for one groundwater sample analyzed for methyl mercury by modified EPA method 1630 (Frontier Geosciences Inc. SOP FGS-070). The sample was collected at the Henderson site in Henderson, NV on March 22, 2006 and was submitted to EMAX Laboratories, Inc. (EMAX) in Torrance, CA. EMAX then sent the sample to MWH Laboratories in Monrovia, CA where the sample was subsequently subcontracted to Frontier Geosciences Inc. in Seattle, WA for analysis. Frontier Geosciences Inc. processed the sample and reported the results under sample delivery group (SDG) 170226.

The analytical data were evaluated with reference 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 on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodologies.

In general, the data are valid as reported and may be used for decision making purposes. No data were rejected or qualified (see discussion below).

SAMPLES

The sample included in this review is listed below:

Sample IDs
M-120

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

Sample data were reviewed for the following parameters:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times/sample preservation
- Initial and continuing calibrations
- Laboratory blanks/equipment blanks/field blanks
- Matrix spike/matrix spike duplicate (MS/MSD) results
- Laboratory duplicate results
- Field duplicate results
- Laboratory control sample (LCS) results
- Sample quantitation/detection limit results

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. The following discrepancy was found.

- Two containers labeled M-120 were submitted for analysis. Frontier Geosciences analyzed both samples and reported the sample results with unique IDs: M-120 (FGS-C-515) and M-120 (FGS-C-783)

Holding Times and Sample Preservation

The cooler temperatures upon sample receipt at EMAX, MWH Laboratories, and Frontier Geosciences Inc. were within the acceptance criteria of 4 ± 2°C.

The samples were analyzed within the method specified holding time.

Initial and Continuing Calibrations

All criteria were met for the calibration curves, and the initial calibration verification (ICV) and continuing calibration verification (CCV) standards.

Laboratory Blanks/Equipment Blanks/Field Blanks

Equipment blanks and field blanks were not collected in association with this data set; no validation action was required on this basis.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Methyl mercury was not detected in the laboratory instrument or method blanks associated with the samples in this data set at levels greater than the method criterion.

MS/MSD Results

MS/MSD analyses were performed on sample M-120 (FGS-C-515). The percent recoveries (%Rs) and relative percent difference (RPD) for methyl mercury were within QC acceptance criteria.

Laboratory Duplicate Results

Laboratory duplicate analyses were performed on sample M-120 (FGS-C-515). The RPD for methyl mercury was within QC acceptance criteria.

Field Duplicate Results

A field duplicate pair was not submitted for this data set. No data validation actions were taken on this basis.

LCS Results

The %R of methyl mercury was within the QC acceptance criteria for the LCS analyses.

Quantitation Limits and Sample Results

Calculations were spot-checked. No discrepancies were noted.

Dilutions were not performed on samples in this data set; therefore, sample quantitation limits (SQLs) were not affected.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date:	August 11, 2006 Revised October 10, 2006
To:	David Gerry/Camarillo
From:	Linda Sulkowski/Westford
Subject:	Data Validation, Metals Analysis Henderson Upgradient Investigation Tronox LLC Henderson, Nevada MWH Data Report Number 169286R
Distribution:	R. Kennedy/Westford

04020-023-152
TH035inolms.rev

SUMMARY

Limited validation was performed on the data for one field blank analyzed for a project-specific list of total metals by SW-846 methods 6010B, 6020, and 7470, perchlorate by EPA 314, chlorate by EPA 300.1, and hexavalent chromium by SW-846 method 7199. The sample was collected at the Henderson site in Henderson, NV on March 8, 2006 and submitted to MWH Laboratories (MWH) in Monrovia, CA for analysis. MWH processed the sample and reported the results under Data Report Number 169286R.

The analytical data were evaluated with reference 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 on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodologies.

In general, the data are valid as reported and may be used for decision making purposes. No data were rejected. Selected data was qualified as estimated for certain QC nonconformances (see discussion below).

SAMPLES

The sample included in this review is listed below.

Sample ID
FB-1(field blank)

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

Sample data were reviewed for the following elements, where applicable to the method:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Inductively coupled plasma mass spectrometry (ICP/MS) tunes (6020 only)
- Calibrations
- Laboratory blanks/equipment 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
- Internal standard performance (6020 only)
- Quantitation limits and sample results

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. No discrepancies were found.

Holding Times and Sample Preservation

FB-1 was analyzed within the method-specified holding times for all parameters.

The cooler temperature upon receipt at MWH was within the acceptance criteria of 4 ± 2°C.

Documentation regarding sample pH verification upon receipt at the laboratory was not included in the data package. The only documentation that confirmed the pH of the sample was the mercury raw data analysis log. No action was taken except for this notation.

ICP/MS Tunes

A tuning solution (daily performance check) containing elements representing all of the mass regions of interest was analyzed at the beginning of each analytical sequence. The percent relative standard deviations (%RSDs) for elements in the tuning solution met the QC acceptance criteria of <5%.

Initial and Continuing Calibrations

All criteria were met for the calibration curves, and the initial and continuing calibration verification (ICV/CCV) standards.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Laboratory Blanks/Equipment Blanks

Target analytes were not detected in the laboratory blanks associated with the sample in this data set.

Target analytes were detected in equipment blank FB-1. The following table lists the analytes and the concentrations detected.

Blank/Collection Date	Analyte	Conc. Detected (µg/L)
FB-1 (field blank) 3/8/06	Arsenic	2.4
	Boron	0.15
	Barium	175
	Calcium	83
	Copper	2.0
	Iron	0.17
	Potassium	5.4
	Magnesium	31
	Manganese	3.7
	Molybdenum	6.1
	Sodium	100
	Uranium	5.0
	Zinc	5.1

The results for FB-1 are for informational purposes only; therefore, the FB-1 results were not used to qualify sample data reported in other MWH Data Report Numbers.

LCS/LCSD Results

The percent recoveries (%Rs) and relative percent differences (RPDs) of all spiked analytes were within the QC acceptance criteria for all LCSs and LCSDs.

MS/MSD Results

MS/MSD analyses for total metals, perchlorate, chlorate, and hexavalent chromium were not performed on sample FB-1. No validation action was taken on this basis.

Laboratory Duplicate Results

Laboratory duplicate analyses were not performed on sample FB-1. Precision and accuracy in the laboratory were demonstrated by the LCS/LCSD (see discussions above).

Field Duplicate Results

Field duplicate samples were not submitted with this sample set. No validation action was taken on this basis.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Internal Standard Performance

The internal standard performance was within the QC acceptance criteria for the sample. However, the %Rs of the internal standards exceeded the QC acceptance criteria in the analyses of the bracketing CCV standards and continuing calibration blanks (CCBs). The following table indicates the internal standards and %Rs that did not meet the 80-120% criteria.

QC ID	Date	Internal Standard	%R(s)	Action (Detects/Nondetects
CCV1	3/30/06	Li	79.3	J/UJ
		Ge	78.8	J/UJ
		In	78.8	J/UJ
CCV2	3/30/06	Li	66.5	J/UJ
		Ge	78.6	J/UJ
CCB2	3/30/06	Li	65.5	J/UJ
Associated Samples: FB-1				

Internal Standard Li – associated with Be, Al
Internal Standard Ge – associated with As, Co, Cr, Cu, Ni, Mn, Se, V, Zn
Internal Standard In – associated with Sb, Ba

Quantitation Limits and Sample Results

Dilutions were not performed on the sample in this data set; therefore, the sample quantitation limits (SQLs) were not affected.

Sample results were reported down to the SQL; nondetected results for these analytes were reported at the SQL and flagged with a “U”.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date:	August 11, 2006 Revised October 10, 2006	
To:	David Gerry/Camarillo	
From:	Sheena Blair/Westford	
Subject:	Data Validation, Metals Analysis Henderson Upgradient Investigation Tronox LLC Henderson, Nevada MWH Data Report Number 169405R	
Distribution:	R. Kennedy/Westford	04020-023-152 TH036inosb.rev

SUMMARY

Limited validation was performed on the data for one aqueous equipment blank analyzed for a project-specific list of total metals by SW-846 methods 6010B, 6020, and 7470, perchlorate by EPA 314, and hexavalent chromium by SW-846 method 7199. The sample was collected at the Henderson site in Henderson, NV on March 9, 2006 and submitted to MWH laboratories (MWH) in Monrovia, CA for analysis. MWH processed the sample and reported the results under Data Report Number 169405R.

The analytical data were evaluated with reference 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 on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodologies.

In general, the data are valid as reported and may be used for decision making purposes. No data were rejected. Selected data was qualified as estimated for certain QC nonconformances (see discussion below).

SAMPLES

The sample included in this review is listed below.

Sample ID
EB-1(equipment blank)

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

Sample data were reviewed for the following elements, where applicable to the method:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Inductively coupled plasma mass spectrometry (ICP/MS) tunes (6020 only)
- Calibrations
- Laboratory blanks/equipment 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
- Internal standard performance (6020 only)
- Quantitation limits and sample results

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. No discrepancies were found.

Holding Times and Sample Preservation

EB-1 was analyzed within the method-specified holding times for total metals, perchlorate, and hexavalent chromium.

The cooler temperature upon receipt at MWH was within the acceptance criteria of 4 ± 2°C.

Documentation regarding sample pH verification upon receipt at the laboratory was not included in the data package. The only documentation that confirmed the pH of the metals sample was the mercury raw data analysis log. No action was taken except for this notation.

ICP/MS Tunes

A tuning solution (daily performance check) containing elements representing all of the mass regions of interest was analyzed at the beginning of each analytical sequence. The percent relative standard deviations (%RSDs) met the QC acceptance criteria of <5% for elements in the tuning solution.

Calibrations

All criteria were met for the calibration curves, and the initial and continuing calibration verification (ICV/CCV) standards for all analyses.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Laboratory Blanks/Equipment Blanks

Target analytes were not detected in the laboratory blanks associated with the sample in this data set.

Target analytes were detected in equipment blank EB-1. The following table lists the analytes and the concentrations detected.

Blank/Collection Date	Analyte	Conc. Detected (µg/L)
EB-1 (equipment blank) 3/9/06	Aluminum	41
	Copper	4.4
	Iron	0.092
	Manganese	6.6
	Zinc	11
Associated samples:	All soils collected during the sampling event, except samples collected at 5' depth. The associated samples were reported in various SDG numbers. See individual validation reports for actions taken.	

LCS/LCSD Results

The percent recoveries (%Rs) and relative percent differences (RPDs) of all spiked analytes were within the QC acceptance criteria for all LCSs and LCSDs.

MS/MSD Results

MS/MSD analyses for total metals, perchlorate, and hexavalent chromium were not performed on sample EB-1. MS/MSDs were performed on samples from other clients, although this practice is acceptable, the results would not be directly applied to the equipment blank analyzed in this data package because of possible differences in the sample matrix and type. No validation action was taken on this basis.

Laboratory Duplicate Results

Laboratory duplicate analyses were not performed on sample EB-1. Precision and accuracy in the laboratory were demonstrated by the LCS/LCSD and/or the MS/MSD (see discussions above).

Field Duplicate Results

Field duplicate samples were not submitted with this sample set. No validation action was taken on this basis.

Internal Standard Performance

The internal standard performance was within the QC acceptance criteria in all sample analyses. However, the %Rs of the internal standards exceeded the QC acceptance criteria in the analyses of the bracketing CCV standards and continuing calibration blanks (CCBs). The following table indicates the internal standards and %Rs that did not meet the 80-120% criteria.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

QC ID	Date	Internal Standard	%R(s)	Action (Detects/Nondetects
CCV1	3/30/06	Li	79.3	J/UJ
		Ge	78.8	J/UJ
		In	78.8	J/UJ
CCV2	3/30/06	Li	66.5	J/UJ
		Ge	78.6	J/UJ
CCB2	3/30/06	Li	65.5	J/UJ
Associated Samples: EB-1				

Internal Standard Li – associated with Be, Al
Internal Standard Ge – associated with As, Co, Cr, Cu, Ni, Mn, Se, V, Zn
Internal Standard In – associated with Sb, Ba

Quantitation Limits and Sample Results

Dilutions were not performed on the sample EB-1; therefore, the sample quantitation limits (SQLs) were not affected.

Sample results were reported down to the SQL; nondetected results for these analytes were reported at the SQL and flagged with a “U”.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date:	August 11, 2006 Revised October 10, 2006
To:	David Gerry/Camarillo
From:	Lisa Krowitz/Westford
Subject:	Data Validation, Metals Analysis Henderson Upgradient Investigation Tronox LLC Henderson, Nevada MWH Data Report Number 169580
Distribution:	R. Kennedy/Westford

04020-023-152
TH037inolkk.rev

SUMMARY

Limited validation was performed on the data for one groundwater sample analyzed for a project-specific list of total metals by SW-846 methods 6010B, 6020, and 7470. The sample was collected at the Henderson site in Henderson, NV on March 13, 2006 and submitted to MWH laboratories (MWH) in Monrovia, CA for analysis. MWH processed the sample and reported the results under Data Report Number 169580.

The analytical data were evaluated with reference 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 on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodologies.

In general, the data are valid as reported and may be used for decision making purposes. No data were rejected. Selected results for were qualified as estimated due to nonconformance of certain QC criteria (see discussion below).

SAMPLES

The sample included in this review is listed below.

Sample ID
TR-10A

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

Sample data were reviewed for the following elements, where applicable to the method:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Inductively coupled plasma mass spectrometry (ICP/MS) tunes (6020 only)
- Calibrations
- Laboratory blanks/equipment 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
- Internal standard performance (6020 only)
- Quantitation limits and sample results

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. No discrepancies were found.

Holding Times and Sample Preservation

The sample was analyzed within the method-specified holding times for total metals.

The cooler temperature upon receipt at MWH was within the acceptance criteria of 4 ± 2°C.

Documentation regarding sample pH verification upon receipt at the laboratory was not included in the data package. The only documentation that confirmed the pH of the sample was the mercury raw data analysis log. No action was taken except for this notation.

ICP/MS Tunes

A tuning solution (daily performance check) containing elements representing all of the mass regions of interest was analyzed at the beginning of each analytical sequence. The percent relative standard deviations (%RSDs) met the QC acceptance criteria of <5% for elements in the tuning solution.

Calibrations

All criteria were met for the calibration curves, and the initial and continuing calibration verification (ICV/CCV) standards for all analyses.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Laboratory Blanks/Equipment Blanks

Target analytes were not detected in the laboratory blanks associated with the sample in this data set.

The equipment blank associated with the sample in this data set was EB-3, which was submitted with data report number 170393. Target analytes were detected in equipment blank EB-3. The presence of blank contamination indicated that false positive results or false negative results (for negative blanks) might have existed for these analytes in the associated samples. The table below lists the analytes and the concentrations detected in EB-3.

Blank/Collection Date	Analyte	Concentration Detected (µg/L)
EB-3 (equipment blank) 3/24/06	Barium	5.5
	Cobalt	3.5
	Iron	40
Associated sample: TR-10A		

The barium and iron results for sample TR-10A were significantly greater than the concentrations detected in equipment blank EB-3. It was considered that the low level of blank contamination present would have no impact on the barium and iron results; therefore no validation action was taken on this basis.

Cobalt was nondetect for sample TR-10A; therefore, this result was accepted unqualified.

LCS/LCSD Results

The percent recoveries (%Rs) and relative percent differences (RPDs) of all spiked analytes were within the QC acceptance criteria for all LCSs and LCSDs.

MS/MSD Results

MS/MSD analyses for total metals were performed on sample M-121, which was submitted in data report number 170342. The %Rs that did not meet the QC acceptance criteria of 75-125% for sample results that were <4x the spike concentration, and the RPDs that did not meet $\pm$ 20% are summarized in the table below. A post digestion spike was not analyzed.

Analyte	MS %R	MSD %R	RPD
Magnesium	ok	ok	23.7
Sodium	35.6	ok	31.7
Associated Samples: TR-10A			

Sample results were qualified as follows:

- If the %Rs were 30-74%, then positive sample results were qualified as estimated (J-) and nondetect results were estimated (UJ).
- If the %Rs were > 125%, then positive sample results were qualified as estimated (J+).

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

- If the RPD did not meet ± 20%, then positive and nondetect sample results were qualified as estimated (J/UJ).

Since the %Rs and RPD for sodium were both not acceptable, the positive sodium result in sample TR-10A was flagged with a "J" rather than with a "J-".

Laboratory Duplicate Results

Laboratory duplicates were not analyzed on the sample in this data set. Precision and accuracy in the laboratory were demonstrated by the LCS/LCSD and/or the MS/MSD (see discussions above).

Field Duplicate Results

Field duplicate samples were not submitted with this sample set. No validation action was taken on this basis.

Internal Standard Performance

The internal standard (IS) performance was within the QC acceptance criteria in all sample analyses. However, the %Rs of selected internal standards exceeded the QC acceptance criteria in the analyses of the bracketing CCV standards and continuing calibration blanks (CCBs). The following table indicates the ISs and %Rs that did not meet the 80-120% criteria.

QC ID	Date	Internal Standard	%R(s)	Action (Detects/Nondetects
CCV1	3/30/06	Li	78.3	J/UJ
		Ge	78.4	J/UJ
CCV2	3/30/06	Li	66.5	J/UJ
		Ge	78.6	J/UJ
CCB2	3/30/06	Li	65.5	J/UJ
Associated Samples: EB-1				

Internal Standard Li – associated with Be, Al
Internal Standard Ge – associated with As, Co, Cr, Cu, Ni, Mn, Se, V, Zn

Quantitation Limits and Sample Results

Dilutions were performed on the sample in this data set. The following table indicates the dilutions and the affected analytes.

Sample ID	Dilution	Analyte(s)
TR-10A	5	Al
	2	B, Ca, Fe, K, Mg, Na

Nondetected results were reported at the method reporting limit (MRL) established by the laboratory and flagged with a "U".

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date:	August 7, 2006 Revised October 9, 2006	
To:	David Gerry/Camarillo	
From:	Sheena Blair/Westford	
Subject:	Data Validation, Inorganic Analysis Henderson Upgradient Investigation Tronox LLC Henderson, Nevada MWH Data Report Number 169580R	
Distribution:	R. Kennedy/Westford	04020-023-152 TH037wc.sb.rev

SUMMARY

Limited validation was performed on the data for one groundwater sample analyzed for the following parameters:

- Perchlorate by EPA 314
- Chlorate by EPA 300.1
- Total alkalinity by EPA 310.1
- Chloride by SW-846 method 9056
- Sulfate by SW-846 method 9056
- Nitrite as nitrogen by SW-846 method 9056
- Nitrate as nitrogen by SW-846 method 9056
- Hexavalent chromium by SW-846 method 7199
- Total cyanide by SW-846 method 9012A
- Specific conductance by SW-846 method 9050A
- pH by SW-846 method 9040B, and
- Total dissolved solids by Standard Methods (SM) 2540C

The sample was collected at the Henderson site in Henderson, NV on March 13, 2006 and submitted to MWH in Monrovia, CA for analysis. MWH processed the sample and reported the results under Data Report Number 169580R.

The analytical data were evaluated with reference 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 on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodologies.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

In general, the data are valid as reported and may be used for decision making purposes. No data were rejected. The pH result for sample TR-10A was qualified as estimated (J) for holding time nonconformance (see discussion below).

SAMPLES

The sample included in this review is listed below:

Sample ID
TR-10A

REVIEW ELEMENTS

Sample data were reviewed for the following elements, where applicable to the method:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Calibrations
- Laboratory blanks/equipment 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

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. No discrepancies were found.

Holding Times and Sample Preservation

TR-10A was analyzed within the method specified holding times for all parameters, except pH. The holding time for pH was stated as "analyze immediately", which means the sample pH should have been determined at sample collection. Thus, the pH result in sample TR-10A was qualified as estimated (J).

The cooler temperature upon receipt at MWH was within the acceptance criteria of 4 ± 2°C.

The COC stated that the samples were preserved in the field according to the preservative listed on the bottle label. However, no documentation of pH confirmations were included in the data package. No action was taken except for this notation.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Calibrations

All criteria were met for the calibration curves, and the initial and continuing calibration verification (ICV/CCV) standards (where applicable to the methods).

Laboratory Blanks/Equipment Blanks

Equipment blank EB-3, which was reported under MWH Data Report 170393R, was associated with sample TR-10A.

Chloride, cyanide, and total dissolved solids were detected in equipment blank EB-3. The following table summarizes the analytes, the concentrations detected, and the associated sample.

Blank/Collection Date	Analyte	Conc. Detected (mg/L)
EB-3 (equipment blank) 3/24/06	Chloride	12
	Cyanide	0.013
	Total Dissolved Solids	12
Associated sample: TR-10A		

The chloride and total dissolved solids results for sample TR-10A were significantly greater than the concentrations detected in equipment blank EB-3. It was considered that the low level of blank contamination present would have no impact on the chloride and total dissolved results; therefore, no validation action was taken.

The cyanide result for sample TR-10A was nondetect; therefore, no validation action was taken.

Target compounds were not detected in the laboratory blanks associated with the sample in this data set.

LCS/LCSD Results

The percent recoveries (%Rs) and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria for all LCSs and LCSDs.

MS/MSD Results

Batch MS or MS/MSD analyses were performed on samples from other clients for all parameters. Although this practice is acceptable, the results could not be directly applied to the samples analyzed in this data package because of possible differences in the sample matrix and type. No validation action was taken on this basis.

Laboratory Duplicate Results

No laboratory duplicates were analyzed on the sample in this data set. The LCS/LCSD and/or the MS/MSD (see discussions above) demonstrated precision and accuracy in the laboratory.

Field Duplicate Results

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Field duplicate samples were not submitted with this sample set. No validation action was taken on this basis.

Quantitation Limits and Sample Results

Dilutions were performed on the sample in this data set for selected parameters due to elevated concentrations of these analytes present in the sample. The nondetect result for nitrite was reported at an elevated detection limit due to matrix interferences present in the sample. The sample quantitation limit (SQL) for nitrite was raised by a factor equivalent to the dilution factor. The following table lists the analytes and the dilutions required.

Sample ID	Analyte	Dilution Factor
TR-10A	Chloride	5x
	Chlorate	20x
	Perchlorate	50x
	Hexavalent Chromium	2x
	Nitrate	5x
	Sulfate	20x

Nondetect sample results were reported at the SQL and flagged with a “U”.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date:	August 11, 2006 Revised October 10, 2006
To:	David Gerry/Camarillo
From:	Lisa Krowitz/Westford
Subject:	Data Validation, Metals Analysis Henderson Upgradient Investigation Tronox LLC Henderson, Nevada MWH Data Report Number 169585
Distribution:	R. Kennedy/Westford

04020-023-152
TH038inolkk.rev

SUMMARY

Limited validation was performed on the data for one pump blank sample analyzed for a project-specific list of total metals by SW-846 methods 6010B, 6020, and 7470. The sample was collected at the Henderson site in Henderson, NV on March 13, 2006 and submitted to MWH laboratories (MWH) in Monrovia, CA for analysis. MWH processed the sample and reported the results under Data Report Number 169585.

The analytical data were evaluated with reference 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 on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodologies.

In general, the data are valid as reported and may be used for decision making purposes. No data were rejected. Selected results for were qualified as estimated due to nonconformance of certain QC criteria (see discussion below). It should be noted that no samples were collected using the pump during this sampling event and the data from the pump blank were not used to qualify sample data. The results for sample Pump Blank are for informational purposes only (see discussion below).

SAMPLES

The sample included in this review is listed below.

Sample ID
PUMP BLANK

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

Sample data were reviewed for the following elements, where applicable to the method:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Inductively coupled plasma mass spectrometry (ICP/MS) tunes (6020 only)
- Calibrations
- Laboratory blanks/equipment 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
- Internal standard performance (6020 only)
- Quantitation limits and sample results

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. No discrepancies were found.

Holding Times and Sample Preservation

The sample was analyzed within the method-specified holding times for total metals.

The cooler temperature upon receipt at MWH was within the acceptance criteria of 4 ± 2°C.

Documentation regarding sample pH verification upon receipt at the laboratory was not included in the data package. The only documentation that confirmed the pH of the sample was the mercury raw data analysis log. No action was taken except for this notation.

ICP/MS Tunes

A tuning solution (daily performance check) containing elements representing all of the mass regions of interest was analyzed at the beginning of each analytical sequence. The percent relative standard deviations (%RSDs) met the QC acceptance criteria of <5% for elements in the tuning solution.

Calibrations

All criteria were met for the calibration curves, and the initial and continuing calibration verification (ICV/CCV) standards for all analyses.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Laboratory Blanks/Equipment Blanks

Target analytes were not detected in the laboratory blanks associated with the sample in this data set.

Manganese was detected in the sample PUMP BLANK at 4.1 µg/L. The results for this blank are for informational purposes and no validation actions were required on this basis.

LCS/LCSD Results

The percent recoveries (%Rs) and relative percent differences (RPDs) of all spiked analytes were within the QC acceptance criteria for all LCSs and LCSDs.

MS/MSD Results

MS/MSD analyses were not performed on the pump blank. No validation action was taken on this basis.

Laboratory Duplicate Results

Laboratory duplicates were not analyzed on the sample in this data set. Precision and accuracy in the laboratory were demonstrated by the LCS/LCSD and/or the MS/MSD (see discussions above).

Field Duplicate Results

Field duplicate samples were not submitted with this sample set. No validation action was taken on this basis.

Internal Standard Performance

The internal standard (IS) performance was within the QC acceptance criteria in all sample analyses. However, the %Rs of selected internal standards exceeded the QC acceptance criteria in the analyses of the bracketing CCV standards and continuing calibration blanks (CCBs). The following table indicates the internal standards and %Rs that did not meet the 80-120% criteria.

QC ID	Date	Internal Standard	%R(s)	Action (Detects/Nondetects
CCV1	3/30/06	Li	78.3	J/UJ
		Ge	78.4	J/UJ
CCV2	3/30/06	Li	66.5	J/UJ
		Ge	78.6	J/UJ
Associated Samples: None				
CCB2	3/30/06	Li	65.5	J/UJ
CCV3	3/30/06	Li	75.0	J/UJ
		Ge	76.7	J/UJ
		In	77.3	J/UJ
CCB3	3/30/06	Li	72.9	J/UJ
		In	78.9	J/UJ
Associated Samples: PUMP BLANK				

Internal Standard Li – associated with Be, Al
Internal Standard Ge – associated with As, Co, Cr, Cu, Ni, Mn, Se, V, Zn
Internal Standard In – associated with Sb, Ba

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Quantitation Limits and Sample Results

There were no dilutions performed on the sample in this data set. Nondetected results were reported at the method reporting limit (MRL) established by the laboratory and flagged with a “U”.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date:	August 7, 2006 Revised October 9, 2006	
To:	David Gerry/Camarillo	
From:	Sheena Blair/Westford	
Subject:	Data Validation, Inorganic Analysis Henderson Upgradient Investigation Tronox LLC Henderson, Nevada MWH Data Report Number 169585R	
Distribution:	R. Kennedy/Westford	04020-023-152 TH038wc.sb.rev

SUMMARY

Limited validation was performed on the data for one pump blank sample analyzed for the following parameters:

- Perchlorate by EPA 314
- Chlorate by EPA 300.1
- Total alkalinity by EPA 310.1
- Chloride by SW-846 method 9056
- Sulfate by SW-846 method 9056
- Nitrite as nitrogen by SW-846 method 9056
- Nitrate as nitrogen by SW-846 method 9056
- Hexavalent chromium by SW-846 method 7199
- Total cyanide by SW-846 method 9012A
- Specific conductance by SW-846 method 9050A
- pH by SW-846 method 9040B, and
- Total dissolved solids by Standard Methods (SM) 2540C

The sample was collected at the Henderson site in Henderson, NV on March 13, 2006 and submitted to MWH in Monrovia, CA for analysis. MWH processed the sample and reported the results under Data Report Number 169585R.

The analytical data were evaluated with reference 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 on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodologies.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

In general, the data are valid as reported and may be used for decision making purposes. No data were rejected. The hexavalent chromium and pH results for sample Pump Blank were qualified as estimated due to holding time nonconformances. It should be noted that no samples were collected using the pump during this sampling event and the data from the pump blank were not used to qualify sample data. The results for sample Pump Blank are for informational purposes only (see discussion below).

SAMPLES

The sample included in this review is listed below:

Sample ID
Pump Blank

REVIEW ELEMENTS

Sample data were reviewed for the following elements, where applicable to the method:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Calibrations
- Laboratory blanks/equipment 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

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. No discrepancies were found.

Holding Times and Sample Preservation

The sample was analyzed within the method specified holding times for all parameters, except hexavalent chromium and pH.

The hexavalent chromium analysis for sample pump blank was performed a few minutes outside the method-specified holding time; therefore, the nondetect hexavalent result for this sample was qualified as estimated (UJ).

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

The holding time for pH was stated as "analyze immediately", which means the sample pH should have been determined at sample collection. Thus, the pH result in sample PUMP BLANK was qualified as estimated (J).

The cooler temperature upon receipt at MWH was within the acceptance criteria of 4 ± 2°C.

The COC stated that the samples were preserved in the field according to the preservative listed on the bottle label. However, no documentation of pH confirmations were included in the data package. No action was taken except for this notation.

Calibrations

All criteria were met for the calibration curves, and the initial and continuing calibration verification (ICV/CCV) standards (where applicable to the methods).

Laboratory Blanks/Equipment Blanks

Target compounds were not detected in the laboratory blanks associated with the sample in this data set.

Perchlorate was detected in sample Pump Blank at 94 µg/L. The results for this blank are for informational purposes and no validation actions were required on this basis.

LCS/LCSD Results

The percent recoveries (%Rs) and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria for all LCSs and LCSDs.

MS/MSD Results

Batch MS or MS/MSD analyses were performed on samples from other clients for all parameters. Although this practice is acceptable, the results could not be directly applied to the samples analyzed in this data package because of possible differences in the sample matrix and type. No validation action was taken on this basis.

Laboratory Duplicate Results

No laboratory duplicates were analyzed on the sample in this data set. Precision and accuracy in the laboratory were demonstrated by the LCS/LCSD and/or the MS/MSD (see discussions above).

Field Duplicate Results

Field duplicate samples were not submitted with this sample set. No validation action was taken on this basis.

Quantitation Limits and Sample Results

Dilutions were not performed on the sample in this data set; therefore, the sample quantitation limits (SQLs) were not affected.

Nondetect sample results were reported at the SQL and flagged with a “U”.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date:	August 11, 2006 Revised October 10, 2006
To:	David Gerry/Camarillo
From:	Lisa Krowitz/Westford
Subject:	Data Validation, Metals Analysis Henderson Upgradient Investigation Tronox LLC Henderson, Nevada MWH Data Report Number 169653
Distribution:	R. Kennedy/Westford

04020-023-152
TH039inolkk.rev

SUMMARY

Limited validation was performed on the data for one groundwater sample and one equipment blank analyzed for a project-specific list of total metals by SW-846 methods 6010B, 6020, and 7470. The samples were collected at the Henderson site in Henderson, NV on March 14, 2006 and submitted to MWH laboratories (MWH) in Monrovia, CA for analysis. MWH processed the samples and reported the results under Data Report Number 169653.

The analytical data were evaluated with reference 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 on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodologies.

In general, the data are valid as reported and may be used for decision making purposes. No data were rejected. Selected results for were qualified as estimated due to nonconformance of certain QC criteria (see discussion below).

SAMPLES

The samples included in this review are listed below.

Sample IDs
TR-9A
EB-2 (Equipment Blank)

REVIEW ELEMENTS

Sample data were reviewed for the following elements, where applicable to the method:

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Inductively coupled plasma mass spectrometry (ICP/MS) tunes (6020 only)
- Calibrations
- Laboratory blanks/equipment 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
- Internal standard performance (6020 only)
- Quantitation limits and sample results

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. No discrepancies were found.

Holding Times and Sample Preservation

The samples were analyzed within the method-specified holding times for total metals.

The cooler temperature upon receipt at MWH was within the acceptance criteria of 4 ± 2°C.

Documentation regarding sample pH verification upon receipt at the laboratory was not included in the data package. The only documentation that confirmed the pH of the samples was the mercury raw data analysis log. No action was taken except for this notation.

ICP/MS Tunes

A tuning solution (daily performance check) containing elements representing all of the mass regions of interest was analyzed at the beginning of each analytical sequence. The percent relative standard deviations (%RSDs) met the QC acceptance criteria of <5% for elements in the tuning solution.

Calibrations

All criteria were met for the calibration curves, and the initial and continuing calibration verification (ICV/CCV) standards for all analyses.

Laboratory Blanks/Equipment Blanks

Target analytes were not detected in the laboratory blanks associated with the samples in this data set.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

The equipment blank associated with sample TR-9A was EB-3, which was submitted in data report number 170393. Target analytes were detected in equipment blank EB-3. The presence of blank contamination indicated that false positive results or false negative results (for negative blanks) might have existed for these analytes in the associated samples. The table below lists the analytes and the concentrations detected in EB-3.

Blank/Collection Date	Analyte	Concentration Detected (µg/L)
EB-3 (equipment blank) 3/24/06	Barium	5.5
	Cobalt	3.5
	Iron	40
Associated sample: TR-9A		

The barium and iron results for sample TR-9A were significantly greater than the concentrations detected in equipment blank EB-3. It was considered that the low level of blank contamination present would have no impact on the barium and iron results; therefore, no validation action was taken on this basis.

The detected cobalt result for sample TR-9A was > the method reporting limit (MRL), but < 10x the concentration detected in the equipment blank; therefore, the result was qualified as estimated, biased high (J+).

LCS/LCSD Results

The percent recoveries (%Rs) and relative percent differences (RPDs) of all spiked analytes were within the QC acceptance criteria for all LCSs and LCSDs.

MS/MSD Results

For sample TR-9A, MS/MSD analyses for total metals were performed on sample M-121, which was submitted in Data Report Number 170342. The %Rs that did not meet the QC acceptance criteria of 75-125% for sample results that were <4x the spike concentration, and the RPDs that did not meet the ± 20% criteria are summarized in the table below. A post digestion spike was not analyzed.

Analyte	MS %R	MSD %R	RPD %R
Magnesium	ok	ok	23.7
Sodium	35.6	ok	31.7
Associated Samples: TR-9A			

Sample results were qualified as follows:

- If the %Rs were 30-74%, then positive sample results were qualified as estimated (J-) and nondetect results were estimated (UJ).
- If the %Rs were > 125%, then positive sample results were qualified as estimated (J+).
- If the RPD did not meet ± 20%, then positive and nondetect sample results were qualified as estimated (J/UJ).

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Since the %Rs and RPD for sodium were both not acceptable, the positive sodium result in sample TR-9A was flagged with a "J" rather than with a "J-".

Laboratory Duplicate Results

Laboratory duplicates were not analyzed on the samples in this data set. Precision and accuracy in the laboratory were demonstrated by the LCS/LCSD and/or the MS/MSD (see discussions above).

Field Duplicate Results

Field duplicate samples were not submitted with this sample set. No validation action was taken on this basis.

Internal Standard Performance

The internal standard (IS) performance was within the QC acceptance criteria in all sample analyses. However, the %Rs of selected internal standards exceeded the QC acceptance criteria in the analyses of the bracketing CCV standards and continuing calibration blanks (CCBs). The following table indicates the ISs and %Rs that did not meet the 80-120% criteria.

QC ID	Date	Internal Standard	%R(s)	Action (Detects/Nondetects
CCV1	3/30/06	Li	78.3	J/UJ
		Ge	78.4	J/UJ
CCV2	3/30/06	Li	66.5	J/UJ
		Ge	78.6	J/UJ
CCB2	3/30/06	Li	65.5	J/UJ
Associated Samples: TR-9A				

Internal Standard Li – associated with Be, Al
Internal Standard Ge – associated with As, Co, Cr, Cu, Ni, Mn, Se, V, Zn

Quantitation Limits and Sample Results

Dilutions were performed on the samples in this data set. The following table indicates the sample, dilutions, and the affected analytes.

Sample ID	Dilution	Analyte(s)
TR-9A	100	Al
	2	B, Ca, Fe, K, Mg, Na
	10	Mn

Nondetected results were reported at the MRL established by the laboratory and flagged with a "U".

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date:	August 7, 2006 Revised October 9, 2006
To:	David Gerry/Camarillo
From:	Sheena Blair/Westford
Subject:	Data Validation, Inorganic Analysis Henderson Upgradient Investigation Tronox LLC Henderson, Nevada MWH Data Report Number 169653R
Distribution:	R. Kennedy/Westford

04020-023-152
TH039wc.sb.rev

SUMMARY

Limited validation was performed on the data for one groundwater sample and one equipment blank analyzed for all or a subset of the following parameters:

- Perchlorate by EPA 314
- Chlorate by EPA 300.1
- Total alkalinity by EPA 310.1
- Chloride by SW-846 method 9056
- Sulfate by SW-846 method 9056
- Nitrite as nitrogen by SW-846 method 9056
- Nitrate as nitrogen by SW-846 method 9056
- Hexavalent chromium by SW-846 method 7199
- Total cyanide by SW-846 method 9012A
- Specific conductance by SW-846 method 9050A
- pH by SW-846 method 9040B, and
- Total dissolved solids by Standard Methods (SM) 2540C

The samples were collected at the Henderson site in Henderson, NV on March 14, 2006 and submitted to MWH in Monrovia, CA for analysis. MWH processed the samples and reported the results under Data Report Number 169653R.

The analytical data were evaluated with reference 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 on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodologies.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

In general, the data are valid as reported and may be used for decision making purposes. No data were rejected. The pH result for sample TR-9A was qualified as estimated (J) for holding time nonconformance (see discussion below).

SAMPLES

The samples included in this review are listed below:

Sample IDs
TR-9A
EB-2 (equipment blank for soil perchlorate only)

REVIEW ELEMENTS

Sample data were reviewed for the following elements, where applicable to the method:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Calibrations
- Laboratory blanks/equipment 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

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. No discrepancies were found.

Holding Times and Sample Preservation

TR-9A was analyzed within the method specified holding times for all parameters, except pH. The holding time for pH was stated as "analyze immediately", which means the sample pH should have been determined at sample collection. Thus, the pH result in sample TR-9A was qualified as estimated (J).

The cooler temperature upon receipt at MWH was within the acceptance criteria of 4 ± 2°C.

The COC stated that the samples were preserved in the field according to the preservative listed on the bottle label. However, no documentation of pH confirmations were included in the data package. No action was taken except for this notation.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Calibrations

All criteria were met for the calibration curves, and the initial and continuing calibration verification (ICV/CCV) standards (where applicable to the methods).

Laboratory Blanks/Equipment Blanks

Equipment blank EB-2, which was reported in this data report, was associated with various soil samples that were collected during this sampling event and were reported in various SDGs. Target compounds were not detected in equipment blank EB-2

Equipment blank EB-3, which was reported in MWH Data Report 170393R, was associated with sample TR-9A.

Chloride, cyanide, and total dissolved solids were detected in equipment blank EB-3. The following table summarizes the analytes, the concentrations detected, and the associated sample.

Blank/Collection Date	Analyte	Conc. Detected (mg/L)
EB-3 (equipment blank) 3/24/06	Chloride	12
	Cyanide	0.013
	Total Dissolved Solids	12
Associated sample: TR-10A		

The chloride and total dissolved solids results for sample TR-10A were significantly greater than the concentrations detected in equipment blank EB-3. It was considered that the low level of blank contamination present would have no impact on the chloride and total dissolved results; therefore, no validation action was taken.

The cyanide result for sample TR-10A was nondetect; therefore, no validation action was taken.

Target compounds were not detected in the laboratory blanks associated with the sample in this data set.

LCS/LCSD Results

The percent recoveries (%Rs) and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria for all LCSs and LCSDs.

MS/MSD Results

Batch MS or MS/MSD analyses were performed on samples from other clients for all parameters. Although this practice is acceptable, the results could not be directly applied to the samples analyzed in this data package because of possible differences in the sample matrix and type. No validation action was taken on this basis.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Laboratory Duplicate Results

No laboratory duplicates were analyzed on the sample in this data set. The LCS/LCSD and/or the MS/MSD (see discussions above) demonstrated precision and accuracy in the laboratory.

Field Duplicate Results

Field duplicate samples were not submitted with this sample set. No validation action was taken on this basis.

Quantitation Limits and Sample Results

Dilutions were performed on sample TR-9A for chloride, nitrate, and sulfate due to elevated concentrations of these analytes present in the sample. The nondetect result for nitrite was reported at an elevated detection limit due to matrix interferences present in the sample. The sample quantitation limit (SQL) for nitrite in sample TR-9A was raised by a factor equivalent to the dilution factor. The following table lists the analytes and the dilutions required.

Sample ID	Analyte	Dilution Factor
TR-9A	Chloride, Nitrate, Nitrite, Sulfate	5x

Nondetect sample results were reported at the SQL and flagged with a “U”.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date:	August 14, 2006 Revised October 10, 2006
To:	David Gerry/Camarillo
From:	Lisa Krowitz/Westford
Subject:	Data Validation, Metals Analysis Henderson Upgradient Investigation Tronox LLC Henderson, Nevada MWH Data Report Number 170033
Distribution:	R. Kennedy/Westford

04020-023-152
TH040inolkk.rev

SUMMARY

Limited validation was performed on the data for five groundwater samples analyzed for a project-specific list of total metals by SW-846 methods 6010B, 6020, and 7470. The samples were collected at the Henderson site in Henderson, NV on March 20, 2006 and submitted to MWH laboratories (MWH) in Monrovia, CA for analysis. MWH processed the samples and reported the results under Data Report Number 170033.

The analytical data were evaluated with reference 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 on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodologies.

In general, the data are valid as reported and may be used for decision making purposes. No data were rejected. Selected results for were qualified as estimated due to nonconformance of certain QC criteria (see discussion below).

SAMPLES

The samples included in this review are listed below.

Sample IDs
TR-8A
TR-7A
M-103A
TR-8
TR-8D (Field Duplicate of TR-8)

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

Sample data were reviewed for the following elements, where applicable to the method:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Inductively coupled plasma mass spectrometry (ICP/MS) tunes (6020 only)
- Calibrations
- Laboratory blanks/equipment 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
- Internal standard performance (6020 only)
- Quantitation limits and sample results

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. No discrepancies were found.

Holding Times and Sample Preservation

The samples were analyzed within the method-specified holding times for total metals.

The cooler temperature upon receipt at MWH was within the acceptance criteria of 4 ± 2°C.

Documentation regarding sample pH verification upon receipt at the laboratory was not included in the data package. The only documentation that confirmed the pH of the samples was the mercury raw data analysis log. No action was taken except for this notation.

ICP/MS Tunes

A tuning solution (daily performance check) containing elements representing all of the mass regions of interest was analyzed at the beginning of each analytical sequence. The percent relative standard deviations (%RSDs) met the QC acceptance criteria of <5% for elements in the tuning solution.

Calibrations

All criteria were met for the calibration curves, and the initial and continuing calibration verification (ICV/CCV) standards for all analyses.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Laboratory Blanks/Equipment Blanks

Target analytes were not detected in the laboratory blanks associated with the sample in this data set. There was no equipment blank associated with samples TR-8 and TR-8D. The equipment blank associated with samples TR-8A, TR-7A, and M-103A was EB-3, which was submitted with data report number 170393. Target analytes were detected in equipment blank EB-3. The presence of blank contamination indicated that false positive results or false negative results (for negative blanks) might have existed for these analytes in the associated samples. The table below lists the analytes and the concentrations detected in EB-3.

Blank/Collection Date	Analyte	Concentration Detected (µg/L)
EB-3 (equipment blank) 3/24/06	Barium	5.5
	Cobalt	3.5
	Iron	40
Associated samples: TR-8A, TR-7A, M-103A		

The barium and iron results for the associated samples were significantly greater than the concentrations detected in equipment blank EB-3. It was considered that the low level of blank contamination present would have no impact on the barium and iron results; therefore, no validation action was taken on this basis.

The detected cobalt result for sample M-103A was > the method reporting limit (MRL), but < 10x the concentration detected in the equipment blank; therefore, the cobalt result was qualified as estimated, biased high (J+).

The cobalt results were nondetect for samples TR-7A and TR-8A; therefore, these results were accepted unqualified.

LCS/LCSD Results

The percent recoveries (%Rs) and relative percent differences (RPDs) of all spiked analytes were within the QC acceptance criteria for all LCSs and LCSDs.

MS/MSD Results

MS/MSD analyses for total metals were performed on sample M-121, which were reported in Data Report Number 170342. The %Rs that did not meet the QC acceptance criteria of 75-125% for sample results that were <4x the spike concentration, and the RPDs that did not meet $\pm$ 20% are summarized in the table below. A post digestion spike was not analyzed.

Analyte	MS %R	MSD %R	RPD
Magnesium	ok	ok	23.7
Sodium	35.6	ok	31.7
Associated Samples: All samples in this data set			

Sample results were qualified as follows:

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

- If the %Rs were 30-74%, then positive sample results were qualified as estimated (J-) and nondetect results were estimated (UJ).
- If the %Rs were > 125%, then positive sample results were qualified as estimated (J+).
- If the RPD did not meet ± 20%, then positive and nondetect sample results were qualified as estimated (J/UJ).

Since the %Rs and RPD for sodium were both not acceptable, the positive sodium results in samples TR-8A, TR-7A, and M-103A were flagged "J" rather than with a "J-".

Laboratory Duplicate Results

Laboratory duplicates were not analyzed on the sample in this data set. Precision and accuracy in the laboratory were demonstrated by the LCS/LCSD and/or the MS/MSD (see discussions above).

Field Duplicate Results

Samples TR-8 and TR-8D were submitted as the field duplicate pair with this sample set. The following table summarizes the RPDs of the detected analytes in the field duplicate samples. Precision was deemed acceptable for copper and lead since the detected results were both less than 10x the MRL, and the absolute difference between the sample and duplicate results was < 4xMRL. The RPD was not calculable (NC) for nickel due to nondetect results in field duplicate sample TR-8D; therefore, precision was deemed acceptable.

Compound	TR-8 (µg/L)	TR-8D (µg/L)	RPD	Action
Aluminum	2800	1500	60	J/UJ
Arsenic	75	74	1	None
Barium	85	58	38	J/UJ
Boron	1200	1200	0	None
Calcium	99000	89000	11	None
Chromium	17	15	13	None
Copper	4.3	2.5	53	None
Iron	3000	1200	86	J/UJ
Lead	2.3	1.2	63	None
Magnesium	51000	46000	10	None
Manganese	53	26	68	J/UJ
Molybdenum	13	13	0	None
Nickel	5.1	5.0 U	NC	None
Potassium	11000	10000	9	None
Sodium	230000	220000	4	None
Titanium	160	64	86	J/UJ
Uranium	4.8	4.7	2	None
Vanadium	33	30	10	None
Zinc	75	41	59	J/UJ

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Internal Standard Performance

The internal standard (IS) performance was within the QC acceptance criteria in all sample analyses, except for the 10x dilution for Al in sample TR-8A. The IS Li had a %R of 121.1%; therefore, the positive Al result in sample TR-8A was qualified as estimated (J).

In addition, the %Rs of selected internal standards exceeded the QC acceptance criteria in the analyses of the bracketing CCV standards continuing calibration blanks (CCBs). The following table indicates the ISs and %Rs that did not meet the 80-120% criteria.

QC ID	Date	Internal Standard	%R(s)	Action (Detects/Nondetects
CCV1	3/30/06	Li	78.3	J/UJ
		Ge	78.4	J/UJ
CCV2	3/30/06	Li	66.5	J/UJ
		Ge	78.6	J/UJ
CCB2	3/30/06	Li	65.5	J/UJ
Associated Samples: TR-8A, TR-7A, M-103A, TR-8, TR-8D				
CCV3	3/30/06	Li	75.0	J/UJ
		Ge	76.7	J/UJ
		In	77.3	J/UJ
CCB3	3/30/06	Li	72.9	J/UJ
		In	78.9	J/UJ
Associated Samples: TR-7A, M-103A, TR-8, TR-8D				

Internal Standard Li – associated with Be, Al
Internal Standard Ge – associated with As, Co, Cr, Cu, Ni, Mn, Se, V, Zn
Internal Standard In – associated with Ag, Ba, Cd, Mo, Sb

Quantitation Limits and Sample Results

Dilutions were performed on the sample in this data set. The following table indicates the dilutions and the affected analytes.

Sample ID	Dilution	Analyte(s)
TR-8A	10	Al
	2	B, Ca, Fe, K, Mg, Na
TR-7A	10	Al
	2	B, Ca, Fe, K, Mg, Na
TR-8	10	Al
	2	B, Ca, Fe, K, Mg, Na
TR-8D	10	Al
	2	B, Ca, Fe, K, Mg, Na
M-103A	100	Al
	2	B, Ca, Fe, K, Mg, Na

Nondetected results were reported at the MRL established by the laboratory and flagged with a “U”.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date:	August 7, 2006 Revised October 9, 2006	
To:	David Gerry/Camarillo	
From:	Sheena Blair/Westford	
Subject:	Data Validation, Inorganic Analysis Henderson Upgradient Investigation Tronox LLC Henderson, Nevada MWH Data Report Number 170033R	
Distribution:	R. Kennedy/Westford	04020-023-152 TH040wc.sb.rev

SUMMARY

Limited validation was performed on the data for five groundwater samples analyzed for the following parameters:

- Perchlorate by EPA 314
- Chlorate by EPA 300.1
- Total alkalinity by EPA 310.1
- Chloride by SW-846 method 9056
- Sulfate by SW-846 method 9056
- Nitrite as nitrogen by SW-846 method 9056
- Nitrate as nitrogen by SW-846 method 9056
- Hexavalent chromium by SW-846 method 7199
- Total cyanide by SW-846 method 9012A
- Specific conductance by SW-846 method 9050A
- pH by SW-846 method 9040B, and
- Total dissolved solids by Standard Methods (SM) 2540C

The samples were collected at the Henderson site in Henderson, NV on March 20, 2006 and submitted to MWH in Monrovia, CA for analysis. MWH processed the samples and reported the results under Data Report Number 170033R.

The analytical data were evaluated with reference 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 on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodologies.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

In general, the data are valid as reported and may be used for decision making purposes. No data were rejected. The pH results for all samples were qualified as estimated (J) for holding time nonconformance (see discussion below).

SAMPLES

The samples included in this review are listed below:

Sample IDs
TR-8A
TR-7A
M-103A
TR-8
TR-8D (field duplicate of TR-8)

REVIEW ELEMENTS

Sample data were reviewed for the following elements, where applicable to the method:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Calibrations
- Laboratory blanks/equipment 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

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. No discrepancies were found.

Holding Times and Sample Preservation

All samples were analyzed within the method specified holding times for all parameters, except pH. The holding time for pH was stated as "analyze immediately", which means sample pH should have been determined at sample collection. Thus, the pH results for all samples were qualified as estimated (J).

The cooler temperature upon receipt at MWH was within the acceptance criteria of 4 ± 2°C.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

The COC stated that the samples were preserved in the field according to the preservative listed on the bottle label. However, no documentation of pH confirmations were included in the data package. No action was taken except for this notation.

Calibrations

All criteria were met for the calibration curves, and the initial and continuing calibration verification (ICV/CCV) standards (where applicable to the methods).

Laboratory Blanks/Equipment Blanks

No equipment blanks were associated with samples TR-8 and TR-8D. No validation action was taken on this basis.

Equipment blank EB-3, which was reported under MWH Data Report 170393R, was associated with samples TR-8A, TR-7A, and M-103A.

Chloride, cyanide, and total dissolved solids were detected in equipment blank EB-3. The following table summarizes the analytes, the concentrations detected, and the associated sample.

Blank/Collection Date	Analyte	Conc. Detected (mg/L)
EB-3 (equipment blank) 3/24/06	Chloride	12
	Cyanide	0.013
	Total Dissolved Solids	12
Associated sample: TR-10A		

The chloride and total dissolved solids results for samples TR-8A, TR-7A, and M-103A were significantly greater than the concentrations detected in equipment blank EB-3. It was considered that the low level of blank contamination present would have no impact on the chloride and total dissolved results; therefore, no validation action was taken.

The cyanide results for samples TR-8A, TR-7A, and M-103A were nondetect; therefore, no validation action was taken.

Target compounds were not detected in the laboratory blanks associated with the samples in this data set.

LCS/LCSD Results

The percent recoveries (%Rs) and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria for all LCSs and LCSDs.

MS/MSD Results

MS/MSD analysis was performed on sample TR-8 for nitrate. The %Rs and RPDs met the laboratory QC acceptance criteria.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Batch MS or MS/MSD analyses were performed on samples from other clients for all parameters, except for nitrate. Although this practice is acceptable, the results could not be directly applied to the samples analyzed in this data package because of possible differences in the sample matrix and type. No validation action was taken on this basis.

Laboratory Duplicate Results

Laboratory duplicate analysis was performed on sample TR-8 for nitrate. The RPD met the laboratory QC acceptance limits.

Laboratory duplicate analyses were not performed on the samples in this data set for all the other parameters analyzed. The LCS/LCSD and/or the MS/MSD (see discussions above) demonstrated precision and accuracy in the laboratory.

Field Duplicate Results

Samples TR-8 and TR-8D were submitted as the field duplicate pair with this sample set. The following table summarizes the RPDs of the detected analytes in field duplicate samples. The RPD for cyanide was not calculable (NC) due to a nondetect result in field duplicate sample TR-8D. However; precision was deemed acceptable since the detected cyanide result for sample TR-8 was <10x the sample quantitation limit (SQL). The RPDs for the remaining analytes met the QC acceptance criteria of 30% for an aqueous matrix.

Analyte	TR-8 (mg/L)	TR-8D (mg/L)	RPD
Cyanide	0.007	0.005 U	NC
Chloride	150	150	0
Sulfate	594	587	1
Nitrate	2.2	2.3	4
Alkalinity	78	83	6
Total Dissolved Solids	1210	1170	3
Hexavalent Chromium	14.8	14.9	1
Chlorate	2310 (µg/L)	2100 (µg/L)	10
Perchlorate	64 (µg/L)	65 (µg/L)	2
Specific Conductivity	1680 (µmho/cm)	1690 (µmho/cm)	1
pH	8.0 (pH units)	7.9 (pH units)	1

Quantitation Limits and Sample Results

Dilutions were performed on the samples in this data set for selected parameters due to elevated concentrations of these analytes present in the samples. The nondetect results for nitrite and cyanide were reported at an elevated detection limit due to matrix interferences present in the samples.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

The SQLs for nitrite and cyanide were raised by a factor equivalent to the dilution factor. The following table lists the analytes and the dilutions required.

Sample ID	Analyte	Dilution Factor
TR-8A	Chloride, Nitrate, Nitrite	5x
	Sulfate, Chlorate	20x
TR-7A	Chloride, Nitrate, Nitrite, Sulfate	5x
M-103A	Chloride, Nitrate, Nitrite,	5x
	Sulfate	20x
	Chlorate, Perchlorate	10x
TR-8	Chloride, Nitrate, Nitrite	5x
	Chlorate, Sulfate	20x
TR-8D	Chloride, Nitrate, Nitrite	5x
	Chlorate,	10X
	Sulfate	20x

Nondetect sample results were reported at the SQL and flagged with a “U”.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date:	August 7, 2006 Revised October 9, 2006	
To:	David Gerry/Camarillo	
From:	Sheena Blair/Westford	
Subject:	Data Validation, Inorganic Analysis Henderson Upgradient Investigation Tronox LLC Henderson, Nevada MWH Data Report Number 170190R	
Distribution:	R. Kennedy/Westford	04020-023-152 TH042wc.sb.rev

SUMMARY

Limited validation was performed on the data for four groundwater samples analyzed for the following parameters:

- Perchlorate by EPA 314
- Chlorate by EPA 300.1
- Total alkalinity by EPA 310.1
- Chloride by SW-846 method 9056
- Sulfate by SW-846 method 9056
- Nitrite as nitrogen by SW-846 method 9056
- Nitrate as nitrogen by SW-846 method 9056
- Hexavalent chromium by SW-846 method 7199
- Total cyanide by SW-846 method 9012A
- Specific conductance by SW-846 method 9050A
- pH by SW-846 method 9040B, and
- Total dissolved solids by Standard Methods (SM) 2540C

The samples were collected at the Henderson site in Henderson, NV on March 21, 2006 and submitted to MWH in Monrovia, CA for analysis. MWH processed the samples and reported the results under Data Report Number 170190R.

The analytical data were evaluated with reference 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 on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodologies.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

In general, the data are valid as reported and may be used for decision making purposes. No data were rejected. The pH results for samples M-103, TR-7, TR-9, and TR-10 were qualified as estimated (J) for holding time nonconformance (see discussion below).

SAMPLES

The samples included in this review are listed below:

Sample IDs
M-103
TR-7
TR-9
TR-10

REVIEW ELEMENTS

Sample data were reviewed for the following elements, where applicable to the method:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Calibrations
- Laboratory blanks/equipment 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

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. The following discrepancy was found:

- All samples in this data set were listed on the COC for hexavalent chromium analyses. The hexavalent analysis for all samples was subsequently cancelled due to a holding time issue within the laboratory. The samples were resubmitted for hexavalent chromium analysis and were reported under MWH Report number 170342.

Holding Times and Sample Preservation

All samples were analyzed within the method specified holding times for all parameters, except pH. The holding time for pH was stated as "analyze immediately", which means the sample pH should

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

have been determined at sample collection. Thus, the pH result in sample TR-9A was qualified as estimated (J).

The cooler temperature upon receipt at MWH was within the acceptance criteria of 4 ± 2°C.

The COC stated that the samples were preserved in the field according to the preservative listed on the bottle label. However, no documentation of pH confirmations was included in the data package. No action was taken except for this notation.

Calibrations

All criteria were met for the calibration curves, and the initial and continuing calibration verification (ICV/CCV) standards (where applicable to the methods).

Laboratory Blanks/Equipment Blanks

No equipment blanks were submitted with this data set. No validation action was taken on this basis.

Target compounds were not detected in the laboratory blanks associated with the samples in this data set.

LCS/LCSD Results

The percent recoveries (%Rs) and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria for all LCSs and LCSDs.

MS/MSD Results

MS/MSD analyses were performed on sample M-103 for chloride, nitrite, nitrate, and sulfate. The %Rs and RPDs met the laboratory QC acceptance criteria.

Batch MS or MS/MSD analyses were performed on samples from other clients for all parameters. Although this practice is acceptable, the results could not be directly applied to the samples analyzed in this data package because of possible differences in the sample matrix and type. No validation action was taken on this basis.

Laboratory Duplicate Results

Laboratory duplicate analysis was performed on sample TR-9 for total dissolved solids. The RPD met the laboratory QC acceptance criteria.

No laboratory duplicates were analyzed on samples in this data set for all the other parameters. The LCS/LCSD and/or the MS/MSD (see discussions above) demonstrated precision and accuracy in the laboratory.

Field Duplicate Results

Field duplicate samples were not submitted with this sample set. No validation action was taken on this basis.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Quantitation Limits and Sample Results

Dilutions were performed on the samples in this data set for selected parameters due to elevated concentrations of these analytes present in the samples. The nondetect results for nitrite and cyanide were reported at an elevated detection limit due to matrix interferences present in the samples. The sample quantitation limits (SQLs) for nitrite and cyanide were raised by a factor equivalent to the dilution factor. The following table lists the analytes and the dilutions required.

Sample IDs	Analyte	Dilution Factor
M-103	Chloride, Chlorate, Perchlorate, Nitrite, Nitrate	5x
	Cyanide	4x
	Sulfate	20x
TR-7	Chloride, Nitrate, Nitrite, Sulfate	5x
TR-9	Chloride, Nitrate, Nitrite, Sulfate	5x
TR-10	Chloride, Nitrate, Nitrite	5x
	Chlorate, Perchlorate	20x
	Sulfate	20x

Nondetect sample results were reported at the SQL and flagged with a “U”.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date:	August 8, 2006 Revised October 9, 2006
To:	David Gerry/Camarillo
From:	Sheena Blair/Westford
Subject:	Data Validation, Inorganic Analysis Henderson Upgradient Investigation Tronox LLC Henderson, Nevada MWH Data Report Number 170259R
Distribution:	R. Kennedy/Westford

04020-023-152
TH043wc.sb.rev

SUMMARY

Limited validation was performed on the data for one groundwater sample analyzed for the following parameters:

- Perchlorate by EPA 314
- Chlorate by EPA 300.1
- Total alkalinity by EPA 310.1
- Chloride by SW-846 method 9056
- Sulfate by SW-846 method 9056
- Nitrite as nitrogen by SW-846 method 9056
- Nitrate as nitrogen by SW-846 method 9056
- Hexavalent chromium by SW-846 method 7199
- Total cyanide by SW-846 method 9012A
- Specific conductance by SW-846 method 9050A
- pH by SW-846 method 9040B, and
- Total dissolved solids by Standard Methods (SM) 2540C

The sample was collected at the Henderson site in Henderson, NV on March 22, 2006 and submitted to MWH in Monrovia, CA for analysis. MWH processed the sample and reported the results under Data Report Number 170259R.

The analytical data were evaluated with reference 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 on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodologies.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

In general, the data are valid as reported and may be used for decision making purposes. No data were rejected. The pH result for sample M-118 was qualified as estimated (J) for holding time nonconformance (see discussion below).

SAMPLES

The sample included in this review is listed below:

Sample ID
M-118

REVIEW ELEMENTS

Sample data were reviewed for the following elements, where applicable to the method:

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

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. No discrepancies were found.

Holding Times and Sample Preservation

M-118 was analyzed within the method specified holding times for all parameters, except pH. The holding time for pH was stated as "analyze immediately", which means the sample pH should have been determined at sample collection. Thus, the pH result in sample M-118 was qualified as estimated (J).

The cooler temperature upon receipt at MWH was within the acceptance criteria of 4 ± 2°C.

The COC stated that the samples were preserved in the field according to the preservative listed on the bottle label. However, no documentation of pH confirmations was included in the data package. No action was taken except for this notation.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Calibrations

All criteria were met for the calibration curves, and the initial and continuing calibration verification (ICV/CCV) standards (where applicable to the methods).

Laboratory Blanks/Equipment Blanks

No equipment blanks were submitted with this data set. No validation action was taken on this basis.

Target compounds were not detected in the laboratory blanks associated with the sample in this data set.

LCS/LCSD Results

The percent recoveries (%Rs) and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria for all LCSs and LCSDs.

MS/MSD Results

Batch MS or MS/MSD analyses were performed on samples from other clients for all parameters. Although this practice is acceptable, the results could not be directly applied to the samples analyzed in this data package because of possible differences in the sample matrix and type. No validation action was taken on this basis.

Laboratory Duplicate Results

No laboratory duplicates were analyzed on the sample in this data set. The LCS/LCSD and/or the MS/MSD (see discussions above) demonstrated precision and accuracy in the laboratory.

Field Duplicate Results

Field duplicate samples were not submitted with this sample set. No validation action was taken on this basis.

Quantitation Limits and Sample Results

Dilutions were performed for chloride, nitrate, and sulfate on the sample in this data set due to elevated concentrations of these analytes present in the sample. The nondetect result for nitrite was reported at an elevated detection limit due to matrix interferences present in the sample. The sample quantitation limit (SQL) for nitrite was raised by a factor equivalent to the dilution factor. The following table lists the analytes and the dilutions required.

Sample ID	Analyte	Dilution Factor
M-118	Chloride, Nitrate, Nitrite, Sulfate	5x

Nondetect sample results were reported at the SQL and flagged with a “U”.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date:	August 7, 2006 Revised October 9, 2006
To:	David Gerry/Camarillo
From:	Sheena Blair/Westford
Subject:	Data Validation, Inorganic Analysis Henderson Upgradient Investigation Tronox LLC Henderson, Nevada MWH Data Report Number 170342R
Distribution:	R. Kennedy/Westford

04020-023-152
TH044wc.sb.rev

SUMMARY

Limited validation was performed on the data for seven groundwater samples analyzed for all or a subset of the following parameters:

- Perchlorate by EPA 314
- Chlorate by EPA 300.1
- Total alkalinity by EPA 310.1
- Chloride by SW-846 method 9056
- Sulfate by SW-846 method 9056
- Nitrite as nitrogen by SW-846 method 9056
- Nitrate as nitrogen by SW-846 method 9056
- Hexavalent chromium by SW-846 method 7199
- Total cyanide by SW-846 method 9012A
- Specific conductance by SW-846 method 9050A
- pH by SW-846 method 9040B, and
- Total dissolved solids by Standard Methods (SM) 2540C

The samples were collected at the Henderson site in Henderson, NV on March 23, 2006 and submitted to MWH in Monrovia, CA for analysis. MWH processed the samples and reported the results under Data Report Number 170342R.

The analytical data were evaluated with reference 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 on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodologies.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

In general, the data are valid as reported and may be used for decision making purposes. No data were rejected. Selected data points were qualified as estimated for either holding time or QC nonconformances (see discussion below).

SAMPLES

The samples included in this review are listed below:

Sample IDs
TR-9*
TR-10*
TR-7*
M-103*
H-11
M-117
M121
* Analyzed for Hexavalent Chromium only

REVIEW ELEMENTS

Sample data were reviewed for the following elements, where applicable to the method:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Calibrations
- Laboratory blanks/equipment 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

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. No discrepancies were found.

Holding Times and Sample Preservation

All samples were analyzed within the method specified holding times for all parameters, except pH for samples H-11, M-117 and M-121, and nitrate and nitrite for sample M-121.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Although, the initial undiluted analyses of sample M-121 for nitrate and nitrite were performed within the method-specified holding times, the re-analyses at 10x dilutions exceeded the holding times. Therefore, the positive and nondetect nitrite results for sample M-121 were qualified as estimated, biased low (J- and UJ, respectively).

The holding time for pH was stated as "analyze immediately", which means sample pH should have been determined at sample collection. Therefore, the pH results in samples H-11, M-117 and M-121 were qualified as estimated, biased low (J).

The cooler temperature upon receipt at MWH was within the acceptance criteria of 4 ± 2°C.

The COC stated that the samples were preserved in the field according to the preservative listed on the bottle label. However, no documentation of pH confirmations was included in the data package. No action was taken except for this notation.

Calibrations

All criteria were met for the calibration curves, and the initial and continuing calibration verification (ICV/CCV) standards (where applicable to the methods).

Laboratory Blanks/Equipment Blanks

No equipment blanks were associated with the samples submitted in this data set, except with sample H-11. No validation action was taken on this basis.

Equipment blank EB-3, which was reported under MWH Data Report 170393R, was associated with sample H-11.

Chloride, cyanide, and total dissolved solids were detected in equipment blank EB-3. The following table summarizes the analytes, the concentrations detected and the associated sample.

Blank/Collection Date	Analyte	Conc. Detected (mg/L)
EB-3 (equipment blank) 3/24/06	Chloride	12
	Cyanide	0.013
	Total Dissolved Solids	12
Associated sample: H-11		

The chloride and total dissolved solids result for sample H-11 were significantly greater than the concentrations detected in equipment blank EB-3. It was considered that the low level of blank contamination present would have no impact on the chloride and total dissolved results; therefore, no validation action was taken.

The cyanide result for sample H-11 was nondetect; therefore, no validation action was taken.

Target compounds were not detected in the laboratory blanks associated with the samples in this data set.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

LCS/LCSD Results

The percent recoveries (%Rs) and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria for all LCSs and LCSDs.

MS/MSD Results

MS/MSD analysis was performed on sample M-121, as designated on the COC. The %Rs and RPDs met the laboratory QC acceptance criteria, except for alkalinity. The alkalinity MS/MSD % Rs at 57% and 59%, respectively, fell below the laboratory QC acceptance limits of 80-120%. Therefore, positive and nondetect alkalinity results for samples H-11, M-117, and M-121 were qualified as estimated, biased low (J- and UJ, respectively).

Laboratory Duplicate Results

Laboratory duplicate analysis was performed on sample M-121 for total dissolved solids. The RPD met the laboratory QC acceptance limits.

Laboratory duplicate analyses were not performed on the samples in this data set for all the other parameters analyzed. The LCS/LCSD and/or the MS/MSD (see discussions above) demonstrated precision and accuracy in the laboratory.

Field Duplicate Results

Field duplicate samples were not submitted with this sample set. No validation action was taken on this basis.

Quantitation Limits and Sample Results

Dilutions were performed on the samples in this data set for selected parameters due to elevated concentrations of these analytes present in the samples. The nondetect results for nitrite in all samples and the nondetect nitrate result for sample H-11 were reported at elevated detection limits due to matrix interferences present in the samples. The sample quantitation limits (SQLs) for nitrite in all samples and nitrate in sample H-11 were raised by a factor equivalent to the dilution factor. The following table lists the analytes and the dilutions required.

Sample ID	Analyte	Dilution Factor
TR-10	Hexavalent Chromium	2x
H-11	Chloride, Nitrate, Nitrite	5x
	Perchlorate	4x
	Sulfate	20x
M-117	Chloride, Nitrate, Nitrite, Sulfate	5x
	Perchlorate	4x
M-121	Chloride, Nitrate, Nitrite	5x
	Chlorate	50x
	Perchlorate	100x
	Sulfate	20x

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Nondetect sample results were reported at the SQL and flagged with a “U”.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date:	August 8, 2006 Revised October 9, 2006	
To:	David Gerry/Camarillo	
From:	Sheena Blair/Westford	
Subject:	Data Validation, Inorganic Analysis Henderson Upgradient Investigation Tronox LLC Henderson, Nevada MWH Data Report Number 170393R	
Distribution:	R. Kennedy/Westford	04020-023-152 TH045wc.sb.rev

SUMMARY

Limited validation was performed on the data for one aqueous equipment blank sample analyzed for the following parameters:

- Perchlorate by EPA 314
- Chlorate by EPA 300.1
- Total alkalinity by EPA 310.1
- Chloride by SW-846 method 9056
- Sulfate by SW-846 method 9056
- Nitrite as nitrogen by SW-846 method 9056
- Nitrate as nitrogen by SW-846 method 9056
- Hexavalent chromium by SW-846 method 7199
- Total cyanide by SW-846 method 9012A
- Specific conductance by SW-846 method 9050A
- pH by SW-846 method 9040B, and
- Total dissolved solids by Standard Methods(SM) 2540C

The sample was collected at the Henderson site in Henderson, NV on March 24, 2006 and submitted to MWH in Monrovia, CA for analysis. MWH processed the sample and reported the results under Data Report Number 170393R.

The analytical data were evaluated with reference 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 on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodologies.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

In general, the data are valid as reported and may be used for decision making purposes. No data were rejected. The pH result for sample EB-3 was qualified as estimated, biased low (J) for holding time nonconformance (see discussion below).

SAMPLES

The sample included in this review is listed below:

Sample ID
EB-3 (equipment blank)

REVIEW ELEMENTS

Sample data were reviewed for the following elements, where applicable to the method:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times and sample preservation
- Calibrations
- Laboratory blanks/equipment 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

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. No discrepancies were found.

Holding Times and Sample Preservation

Equipment blank EB-3 was analyzed within the method specified holding times for all parameters, except pH. The holding time for pH was stated as "analyze immediately", which means sample pH should have been determined at sample collection. Thus, the pH results for sample EB-3 was qualified as estimated (J).

The cooler temperature upon receipt at MWH was within the acceptance criteria of 4 ± 2°C.

The COC stated that the samples were preserved in the field according to the preservative listed on the bottle label. However, no documentation of pH confirmations was included in the data package. No action was taken except for this notation.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Calibrations

All criteria were met for the calibration curves, and the initial and continuing calibration verification (ICV/CCV) standards (where applicable to the methods).

Laboratory Blanks/Equipment Blanks

Target compounds were not detected in the laboratory blanks associated with the sample in this data set.

Chloride, cyanide, and total dissolved solids were detected in equipment blank EB-3. The following table summarizes the analytes, the concentrations detected, and the associated sample.

Blank/Collection Date	Analyte	Conc. Detected (mg/L)
EB-3 (equipment blank) 3/24/06	Chloride	12
	Cyanide	0.013
	Total Dissolved Solids	12
Associated samples: TR-7A, TR-8A, TR-9A, TR-10A, M-103A, H-11		

The chloride and total dissolved solids results for samples TR-8A, TR-7A, and M-103A were significantly greater than the concentrations detected in equipment blank EB-3. It was considered that the low level of blank contamination present would have no impact on the chloride and total dissolved results; therefore, no validation action was taken.

The cyanide results for samples TR-8A, TR-7A, and M-103A were nondetect; therefore, no validation action was taken.

Target compounds were not detected in the laboratory blanks associated with the samples in this data set.

It should be noted that the associated samples were reported under various MWH data reports numbers. Any validation actions resulting from the equipment blank contamination (as noted above) were addressed in the respective validation memos.

LCS/LCSD Results

The percent recoveries (%Rs) and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria for all LCSs and LCSDs.

MS/MSD Results

MS/MSD analysis was performed on sample EB-3 for hexavalent chromium. The %Rs and RPD met the laboratory QC limits.

Batch MS or MS/MSD analyses were performed on samples from other clients for all parameters, except for hexavalent chromium. Although this practice is acceptable, the results could not be directly applied to the samples analyzed in this data package because of possible differences in the sample matrix and type. No validation action was taken on this basis.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Laboratory Duplicate Results

Laboratory duplicate analyses were not performed on the samples in this data set for all the other parameters analyzed. The LCS/LCSD and/or the MS/MSD (see discussions above) demonstrated precision and accuracy in the laboratory.

Field Duplicate Results

Field duplicate samples were not submitted with this sample set. No validation action was taken on this basis.

Quantitation Limits and Sample Results

Dilutions were not performed on the sample in this data set; therefore, the sample quantitation limits (SQLs) were not affected.

Nondetect sample results were reported at the SQL and flagged with a “U”.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date: August 8, 2006 Revised October 10, 2006

To: Dave Gerry/Camarillo

From: Deborah Truini/Westford

Subject: Data Validation, PCDD/PCDF Analyses
Tronox Henderson Upgradient
Henderson, NV
STL SDG G6C120362

Distribution: R. Kennedy/Westford 04020-023-152 File

TH052dioxindat.rev

SUMMARY

Full validation was performed on the data for one groundwater sample analyzed for polychlorinated dibenzodioxins (PCDD) and polychlorinated dibenzofurans (PCDF) by SW-846 method 8290. The samples were collected at the Tronox LLC (Tronox) facility, formerly Kerr-McGee Chemical LLC site in Henderson, NV on May 3, 2006 and were submitted to EMAX Laboratories, Inc. (EMAX) in Torrance, CA. EMAX then sent the samples to MWH Laboratories in Monrovia, CA where the samples were subsequently sent to Severn Trent Laboratories in Sacramento, CA (STL-Sacramento) for analysis. STL-Sacramento processed and reported these samples under sample delivery group (SDG) G6C120362.

The analytical data were evaluated with reference to the "USEPA Analytical Services Branch (ASB) National Functional Guidelines for Chlorinated Dibenzo-p-Dioxins (CDDs) and Chlorinated Dibenzofurans (CDFs) Data Review", EPA-540-R-05-001 (September 2005) and the quality control (QC) criteria specified in the analytical method and/or the site specific Quality Assurance Project Plan (QAPP). Modification of the Functional Guidelines was performed to accommodate the SW-846 methodologies.

In general, the data are valid as reported and may be used for decision making purposes. No data were rejected. Selected data points were qualified due to nonconformances of certain QC criteria (see discussion below).

SAMPLES

The sample included in this review is listed below.

Sample ID
M-120

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

Sample data were reviewed for the following parameters:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times/sample preservation
- Initial and continuing calibrations
- Laboratory blanks/equipment blanks/field blanks
- Matrix spike/matrix spike duplicate (MS/MSD) results
- Internal and clean-up standard recoveries
- Field duplicate results
- Laboratory control sample/laboratory control sample duplicate (LCS/LCSD) results
- Sample quantitation/detection limit results

DISCUSSION

Agreement of Analyses Conducted With COC Requests

The sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. No discrepancies were found.

Holding Times/Sample Preservation

The cooler temperatures upon sample receipt at EMAX and MWH Laboratories and subsequently at STL-Sacramento were within the acceptance criteria of 4± 2°C.

The samples were extracted and analyzed within the method specified holding times.

Initial and Continuing Calibrations

The percent relative standard deviations of all target compounds were within the QC acceptance criteria for the initial calibrations associated with the sample analyses. All target compounds met the retention time, ion abundance ratios, and signal-to-noise (S/N) acceptance criteria specified in the method.

The percent differences of all target compounds were within the QC acceptance criteria in the continuing calibrations associated with the sample analyses. All target compounds met the retention time, ion abundance ratios, and S/N acceptance criteria specified in the method.

Chromatographic resolution for the $^{13}C_{12}$-2,3,7,8-TCDD and the $^{13}C_{12}$-1,2,3,4-TCDD peaks met the QC acceptance criteria of 25 percent (%) resolution as specified in the method for the DB-5 column. Chromatographic resolution for the $^{13}C_{12}$-2,3,7,8-TCDF and the $^{13}C_{12}$-2,3,4,7-TCDF peaks met the QC acceptance criteria of 25 % resolution as specified in the method for the DB-225 column.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Laboratory Blanks/Equipment Blanks/Field Blanks

Field and equipment blank samples were not collected with this sample set.

There were no target compounds detected in the laboratory method blank associated with the samples in this data set.

MS/MSD Results

MS/MSD analyses were not performed on the sample in this data set. No data validation actions were taken on this basis.

Internal and Clean-up Standard Recoveries

Internal standard and clean-up standard %Rs were within QC acceptance criteria of 40-135% for all sample analyses.

Field Duplicate Results

A field duplicate pair was not submitted for this data set. No data validation actions were taken on this basis.

LCS/LCSD Results

The %Rs of all spiked compounds were within the QC acceptance criteria for the LCS.

Sample Quantitation/Detection Limit Results

Dilutions were not performed on the sample in this data set.

The following 2,3,7,8-substituted compound in the sample listed below was flagged as estimated (J) by the laboratory due to quantitation of the result at a concentration less than the lowest calibration standard but greater than the estimated detection limit; no further validation action was necessary:

M-120: 1,2,3,4,6,7,8-HpCDD

The positive total HpCDD result (total isomers within this level of chlorination) for sample M-120 was qualified as estimated (J) by the validator due to quantitation of the result at a concentration less than the lowest calibration standard but greater than the estimated detection limit.

The table below lists sample results which were considered to be non-detect by the laboratory but which did meet the compound identification criteria stipulated in the method. According to the laboratory's SOP, these results were not reported as positive results because the concentrations were less than ½ of the lowest calibration standard. However, the laboratory reported these results as nondetects at the actual sample results. Consequently, the detection limits for the sample results listed in the table below were raised to ½ of the lowest calibration standard since the laboratory considers these results to be nondetect at this level.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Sample ID	Compound	Raised Detection Limit (pg/L)
M-120	1,2,3,4,6,7,8-HpCDF	25
	1,2,3,4,7,8,9-HpCDF	25
	Total HpCDF	25
	OCDF	50

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date: August 15, 2006 Revised October 10, 2006

To: Dave Gerry/Camarillo

From: Sheena Blair/Westford

Subject: Data Validation, PLM Asbestos Analyses
Henderson Upgradient Investigation
Tronox LLC Henderson, Nevada
MWH Data Report Number 169215

Distribution: Robert Kennedy/Westford

04020-023-152 File

TH053asb.sb.rev

SUMMARY

Limited validation was performed on the data for three soil samples prepared and analyzed for asbestos in soil. The samples were prepared using the California Air Resources Board (CARB) method 435 and subsequently analyzed by polarized light microscopy (PLM) using EPA Method 600/R-93/116. The samples were collected at the Tronox facility in Henderson, NV on March 7, 2006 and submitted to MWH in Monrovia, CA for analysis. MWH subcontracted the samples to EMS Laboratories Inc. (EMS) in Pasadena, CA who processed the samples under Report Number 106002. The results were reported under MWH Data Report Number 169215.

The analytical data were evaluated with reference to the "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review" (1994 and October 2004), the Region 9 Superfund Data Evaluation/Validation Guidance, NDEP Guidance on Data Validation (5/06), and the quality control (QC) criteria specified in the Quality Assurance Project Plan (QAPP). The Regional and National Functional Guidelines were modified to accommodate the non-CLP methodologies.

In general, the data are valid as reported and may be used for decision making purposes. No data were rejected or qualified (see discussion below).

SAMPLES

The samples included in this review are listed below:

Sample ID
M120-0.5
M120-10
M120-30

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

REVIEW ELEMENTS

Sample data were reviewed for the following elements, where applicable to the method and on the information supplied by MWH and EMS:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Sample preservation
- Instrument Calibrations
- Blank Control/equipment blanks
- Quality control Sample
- Field duplicate results

DISCUSSION

Agreement of Analyses Conducted with COC Requests

The sample report was checked to verify that the results corresponded to analytical request as designated on the COC. No discrepancies were found.

Asbestos analysis was subcontracted from MWH to EMS. Sample custody documentation was present and complete for the transfer of samples from MWH to EMS.

Sample Preservation

The cooler temperatures upon receipt at MWH and EMS met the acceptance criteria of 4 ± 2°C.

Calibrations

The PLM daily calibration and instrument checks met the method specifications.

Blank Control/Equipment Blanks

No equipment blanks were submitted for asbestos with the samples in this data set. No validation actions were required on this basis.

Asbestos was not detected in the any of the laboratory blank contamination controls.

Quality Control Sample

The laboratory provided the results of a National Institute of Standards and Technology (NIST) National Voluntary Laboratory Accreditation Program (NVLAP) bulk proficiency test (PT) as the QC sample associated with the analysis of the samples in this data set. The PT sample for asbestos in soil by PLM using EPA Method 600/R-93/116 met the QC acceptance criteria.

ENSR
2 Technology Park Drive, Westford, Massachusetts, 01886-3140
T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Field Duplicate Results

Field duplicate samples were not submitted with this sample set. No validation action was taken on this basis.