TRILLIUM INC

Pine St. Canal
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462317

ADDENDUM TO THE DATA VALIDATION REPORT

FOR

PINE STREET SUPERFUND SITE
SOUTH BURLINGTON, VERMONT

INORGANIC ANALYSIS DATA
Metals and Cyanide in Soil

Laboratory Sample Delivery Group No. Z1535 (Addendum)

Chemical Analyses Performed

By:

IEA
Monroe, Connecticut

For:

The Johnson Company
Montpelier, Vermont

By:

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96454/KBW/CAE
ADZ1535I

TRILLIUM INC

EXECUTIVE SUMMARY

Validation of the inorganics analysis data prepared by IEA for four duplicate soil samples from the Pine Street Superfund Site in South Burlington, Vermont, has been completed by Trillium, Inc. The data were reported by the laboratory under Sample Delivery Group (SDG) No. Z1535 in a single data package which was received for review on May 17, 1996 (including a resubmission dated February 28, 1996) and which includes the following duplicate samples:

J_T2882.5D	J_T14-1D
J_T23-51D	J_T10-53D

This report is an addendum to the report previously submitted (6/23/96) for SDG No. Z1535, and is applicable only to the four samples listed above. The chain of custody record indicated that samples J_T2882.5, J_T14-1, J_T23-51, and J_T10-53 were to be analyzed in duplicate by the laboratory. Although laboratory quality control analyses are not generally reported as site samples and separate Form Is were not issued for the duplicates by the laboratory, at the request of USEPA, Region I and the client validation of the duplicates (suffix "D") has been performed. Results for the duplicates only are presented on the Data Summary Form in Attachment A. In lieu of Form Is for the duplicates, the Duplicate Summary Forms (Form VIs) were included in Attachment B. For validation purposes and for the purpose of this addendum, these samples were considered to be field duplicates.

Findings of the validation effort for the inorganics analysis data resulted in the following qualifications of sample results:

- Results for all target analytes in J_T2882.5D, J_T23-51D, and J_T10-53D were qualified as estimated (J, UJ).
- Results for antimony, arsenic, beryllium, cadmium, nickel, selenium, silver, thallium, and vanadium in J_T14-1D were qualified as estimated (J, UJ).
- Results for antimony, beryllium, and selenium in all four duplicate samples were qualified as less than the reported values (U).

All laboratory-applied "*," and "B" qualifiers were removed by the validator from the sample Form VIs.

Problems with the chain of custody records and data presentation in the data package for SDG No. Z1535 were previously discussed in the validation report submitted on 6/23/96, and are not repeated here.

Brief explanations of the reasons for application of the qualifiers listed above may be found in the Overall Assessment (Section XIII). Details of the validation findings and conclusions based on review of the results for each quality control requirement are provided in the remaining sections of this report.

This validation report addendum should be considered part of the data package for all future distributions of the inorganics data.

INTRODUCTION

Analyses for antimony, arsenic, beryllium, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, thallium, vanadium, zinc were performed according to SW-846 methods but included all of the U.S. EPA Contract Laboratory Program (CLP) protocols. Mercury analysis was performed according to CLP Statement of Work (SOW) ILM03.0. Total cyanide and amenable cyanide were analyzed according to Methods 335.3 and 335.1, respectively, from EPA 600/4-79/020, with CLP-like quality control and deliverables.

Trillium's validation was performed in conformance with the EPA Region I Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses (2/89 modification), as well as EPA's National Functional Guidelines for Inorganic Data Review, EPA 540/R-94/013 (2/94). Professional judgment was applied as necessary and appropriate.

The data validation process is intended to evaluate data on a technical basis rather than a contract compliance basis for chemical analyses conducted under the CLP. An initial assumption is that the data package is presented in accordance with the CLP requirements (or CLP-like, as in this case). It is also assumed that the data package represents the best efforts of the laboratory and has already been subjected to adequate and sufficient quality review prior to submission for validation.

During the validation process, laboratory data are verified against all available supporting documentation. Based on the findings of the evaluation, qualifier codes may be added, deleted, or modified by the data validator. Validated results are, therefore, either qualified or unqualified. Unqualified results mean that the reported values may be used without reservation. Final validated results are annotated with the following codes as defined by the Region I guidelines:

U - The analyte was analyzed for, but was not detected. The associated numerical value is the sample quantitation limit.

J - The associated numerical value is an estimated quantity.

R - The data are unusable (compound may or may not be present). Resampling and reanalysis is necessary for verification.

UJ - The material was analyzed for, but was not detected. The sample quantitation limit is an estimated quantity.

These codes are recorded on the Data Summary Forms contained in Attachment A, as well as on the Duplicate Summary Forms (Form VI) in Attachment B of this validation report to indicate qualifications placed on the data as a result of the validation effort.

Two facts should be noted by all data users. First, **the "R" qualifier means that the laboratory-reported value is unusable.** In other words, due to significant quality control problems, the analysis is invalid and provides no information as to whether the analyte is present or not. Rejected values should not appear on data tables because they cannot be relied upon, even as a last resort. Second, **no analyte concentration is guaranteed to be accurate even if all associated quality control is acceptable.** Strict quality control conformance serves only to increase confidence in reported results; any analytical result will always contain some error.

The user is also cautioned that the validation effort is based on the raw data printouts as provided by the laboratory. Software manipulation cannot be routinely detected during validation; unless otherwise stated in the report, these kinds of issues are outside the scope of this review.

I. Holding Times, Preservation and Sample Integrity

The soil samples were collected between October 11 and October 20, 1995. All metals and cyanide analyses were performed within the established holding times with the exception of total and amenable cyanide in J_T2882.5D, which was performed one day beyond the specified holding time. Results for total and amenable cyanide in J_T2882.5D were qualified as estimated (J, UJ) on this basis.

Documentation of percent solids measurements was included in the data package, and all percent solids values for the soil samples were correctly calculated and accurately reported. However, the solids contents of three of the samples were between 10 and 30 percent. Based on the high moisture content, results for all target analytes in J_T2882.5D, J_T23-51D, and J_T10-53D were qualified as estimated (J, UJ).

II. Calibration

Initial and continuing calibration verification (ICV/CCV) standards were run at the required frequencies. With some exceptions, results for all ICV/CCV standards were correctly reported on the summary forms, and recoveries of all target analytes were within the applicable acceptance limits. The concentration of thallium in CCV4 was incorrectly reported as 552.29 µg/L instead of the true value of 555.29 µg/L, and the concentration of silver in CCV7 of the second inductively coupled plasma (ICP) run was incorrectly reported as 0.37 µg/L instead of the true value of 50.9 µg/L. Percent recoveries for the affected analytes in the specified CCVs were therefore calculated and reported incorrectly. The percent recovery of thallium in CCV4 was 111.1% (not 110.4%), and the recovery of silver in CCV7 was 101.8% (not 0.7%). The recovery of thallium in CCV4 was above the maximum acceptance limit of 110 percent; however, since thallium was not detected in any of the associated samples, data qualification was not required on this basis.

ICV/CCV results for the 11/7/95 mercury analyses were not recorded on the initial and continuing calibration verification summary forms (Form II) included in the data package. Recoveries of mercury in all ICV/CCV standards were within acceptable limits for this run.

Correlation coefficients of the initial calibration for mercury and cyanide were greater than the minimum acceptance limit of 0.995.

Contract required detection limit (CRDL) standards were analyzed at the required frequencies and concentrations for all applicable analytes. Percent recoveries were correctly

calculated and accurately reported. Recoveries of most analytes in the CRDL standards were very poor; recoveries of the following analytes were outside the acceptance limits of 80 to 120 percent:

Analyte	Initial CRDL	Final CRDL
Antimony	19.6 %	13.9%
Arsenic	12.9%	4.5%
Beryllium	25.2%	21.7%
Cadmium	22.7%	15.1%
Chromium	22.3%	14.4%
Copper	18.7%	11.0%
Lead		65.4%
Nickel	22.2%	14.8%
Selenium		76.6%
Thallium	21.1%	16.3%
Vanadium	17.7%	11.7%
Zinc	22.1%	17.3%

Based on the low recoveries achieved in the CRDL standards, the following qualifiers were applied:

- Results for antimony, arsenic, beryllium, cadmium, nickel, thallium, and vanadium in all four duplicate samples were qualified as estimated (J, UJ).
- Results for selenium in J_T14-1D, J_T23-51D, and J_T10-53D were qualified as estimated (J).

III. Blanks

Initial and continuing calibration blanks were prepared and analyzed at the proper frequency for all target analytes. All laboratory blank results were accurately reported on the summary forms (Form III) included in the data package.

No target analytes were detected in the calibration blanks at concentrations above the applicable CRDLs or below the negative CRDLs. However, response at concentrations greater than the applicable instrument detection limits (IDL) were observed in associated calibration blanks for

antimony (3.0 µg/L), beryllium (1.3 to 1.6 µg/L), and selenium (2.4 and 3.2 µg/L), and arsenic (-4.2 and -4.7 µg/L) was detected in associated calibration blanks at values below its negative IDL.

Soil-matrix preparation blanks were digested and analyzed with the soil samples. Antimony (0.699 mg/Kg) and selenium (0.497 mg/Kg) were detected in the soil-matrix preparation blank.

Sample results less than five times the concentration of an analyte in associated laboratory blanks were qualified as follows:

- Results for antimony, beryllium, and selenium in all of the soil samples were qualified as less than the reported values (U).

The absolute value of arsenic in the calibration blank was less than two times the IDL. Therefore, data qualification was not required based on the negative values reported in the calibration blanks.

No field-generated blanks were submitted with this data set.

IV. ICP Interference Check Sample

Percent recoveries (%R) for the interference check samples were correctly calculated and accurately reported. All recoveries were within the acceptance limits of 80 to 120 percent.

V. Matrix Spike Sample Analysis

Sample J_T2882.5 was prepared as a matrix spike in association with the samples received by the laboratory on 10/14/95. Percent recoveries of all spiked analytes were correctly calculated, accurately reported, and with the exception of antimony (38.6%), mercury (49.0%), and silver (73.9%), within the acceptance limits of 75 to 125 percent. Results for antimony, mercury, and silver in J-T2882.5D were qualified as estimated (J, UJ) due to the low recoveries of these analytes in the matrix spike analysis.

Sample J_T14-1 was prepared as a matrix spike in association with the samples received by the laboratory on 10/18/95. Percent recoveries of all spiked analytes were correctly calculated, accurately reported, and with the exception of antimony (68.7%), within the acceptance limits. The result for antimony in J_T14-1D was qualified as estimated (UJ) on this basis.

Sample J_T23-51 was prepared as a matrix spike in association with the samples received by the laboratory on 10/20/95. Percent recoveries of all spiked analytes were correctly calculated, accurately reported, and with the exception of antimony (39.4%), within the acceptance limits. The result for antimony in J_T23-51D was qualified as estimated (UJ) on this basis.

Sample J_T10-53 was prepared as a matrix spike in association with the samples received by the laboratory on 10/24/95. Percent recoveries of all spiked analytes were correctly calculated, accurately reported, and with the exception of antimony (55.2%) and silver (45.2%), within the acceptance limits. Results for antimony and silver in J_T10-53D were qualified as estimated (J, UJ) on this basis.

VI. Duplicate Sample Analysis

A. Laboratory and Field Duplicates

Sample J_T2882.5 was prepared as a laboratory duplicate and is being considered as a field duplicate in association with the samples received by the laboratory on 10/14/95. With the exception of mercury, paired results for all target analytes were within the applicable acceptance criteria. The difference between paired duplicate results for mercury was greater than two times the CRDL; therefore, the result for mercury in J_T2882.5D was qualified as estimated (J, UJ).

Sample J_T14-1 was prepared as a laboratory/field duplicate in association with the samples received by the laboratory on 10/18/95. Paired results for all target analytes were within the applicable acceptance criteria.

Sample J_T23-51 was prepared as a laboratory/field duplicate in association with the samples received by the laboratory on 10/20/95. Paired results for all target analytes were within the applicable acceptance criteria.

Sample J_T10-53 was prepared as a laboratory/field duplicate in association with the samples received by the laboratory on 10/24/95. With the exception of total cyanide, paired results for all target analytes were within the applicable acceptance criteria. The difference between paired laboratory duplicate results for total cyanide was greater than two times the CRDL; therefore, the result for total cyanide in J_T10-53D was qualified as estimated (J).

Results for mercury were appropriately qualified with a "*" by the laboratory to indicate that the laboratory duplicate acceptance criterion was not met. All "*" qualifiers were removed by the validator.

VII. Laboratory Control Sample Analyses

Percent recoveries for the soil-matrix laboratory control samples were correctly calculated and accurately reported. Concentrations of all target analytes in the soil-matrix laboratory control samples were within the laboratory-established acceptance limits, as documented on Form VII.

VIII. Furnace Atomic Absorption QC

None of the samples in this data set was analyzed pursuant to furnace atomic absorption spectroscopy.

IX. ICP Serial Dilution Analysis

An ICP serial dilution analysis was performed on J_T14-1. Percent difference (%D) values were less than the maximum acceptance limit of 15 percent for all target analytes in which the original concentration (in the undiluted sample) was greater than 50 times the instrument detection limit (IDL).

X. Detection Limits

The IDLs reported on Form X in the data package were generated on July 15, 1995, this is more than three months prior to the sample analyses. CLP requires that IDLs be updated quarterly. The laboratory should be requested to explain or correct this discrepancy, as appropriate.

Sample-specific IDLs for all ICP analytes except thallium were correctly calculated and reported for the sediment sample analyses, including necessary adjustments for sample size and percent solids content.

In their 2/28/96 resubmission, the laboratory explained that the IDL reported for thallium in the original data package (4.0 µg/L) was incorrect due to a data system error. The corrected IDL (5.0 µg/L) was reported on revised summary forms provided in the resubmission. The corrected IDL for thallium was manually entered on the Form VI and is also reflected on the Data Summary Form in Attachment A.

XI. Sample Results Verification

All duplicate sample results were correctly calculated and reported, including any necessary adjustments for sample size and percent solids content.

Total cyanide results appear to have been calculated using a weight of 10 grams and a volume of 250 µL. Amenable cyanide results were not similarly calculated, and no information was provided in the data package to document how these calculations were performed. It was assumed for validation purposes that all sample results for amenable cyanide were correctly calculated and reported.

The validation guidelines specify that results for arsenic, thallium, selenium, and lead be qualified when these analytes are analyzed by ICP and the reported results are less than five times the IDL. Arsenic, thallium, selenium, and lead are typically analyzed by graphite furnace atomic absorption so that lower IDLs can be achieved. However, the soil samples were analyzed using trace ICP methodology, in which extremely low IDLs for all target analytes, including arsenic, thallium, selenium, and lead, can be achieved. Therefore, results for these four analytes were not qualified on this basis.

Target analyte results for each duplicate sample were reported to four decimal places on Form VIs; these values were rounded to reflect two decimal places, for the sake of consistency with the original sample analysis results and in accordance with the Statement of Work.

"B" qualifiers were appropriately applied by the laboratory to sample results when concentrations of target analytes were less than the CRDL. As concentrations approach the IDL, the accuracy of the measurement decreases; values closer to the CRDL, however, are probably quite accurate. Concentrations of all target analytes in the duplicate soil samples which were less than the CRDL and less than two times the IDL were qualified as follows:

- Results for cadmium and silver in J_T14-1D was qualified as estimated (J).

All laboratory-applied "B" qualifiers were removed by the validator.

XII. Documentation

The chain of custody (COC) records provided for review were accurately completed and included all of the samples reported in the data package. Problems observed with the COC records and with overall presentation are discussed in the previously submitted validation report for SDG No. Z1535.

XIII. Overall Assessment

Based on the validation effort, results for inorganic analytes in all samples were determined to be valid as reported with the following exceptions:

- Results for antimony, arsenic, beryllium, cadmium, nickel, selenium, thallium, and vanadium in J_T14-1D were qualified as estimated (J, UJ) due to low recoveries of these analytes in the associated CRDL standards. The result for antimony similarly also qualified due to a low matrix spike recovery. Results for cadmium and silver in J_T14-1D were also qualified as estimated (J) because concentrations of these analytes were less than two times the IDL.

- Results for antimony in all four duplicate soil samples were qualified as less than the reported values (U) due to preparation blank contamination.

- Results for beryllium and selenium in all four duplicate soil samples were qualified as less than the reported values (U) due to associated laboratory blank contamination.

- Results for all target analytes in J_T2882.5D, J_T23-51D, and J_T10-53D were qualified as estimated (J, UJ) because the solids contents of these samples were very low (between 10 and 30 percent). Results for antimony in all of these samples were similarly qualified due to low recoveries of this analyte in the associated CRDL standards and matrix spike analyses. Results for arsenic, beryllium, cadmium, nickel, thallium, and vanadium in all of the above-listed samples and for selenium in J_T23-51D were also qualified as estimated due to low recoveries of these analytes in the CRDL standards. Results for total and amenable cyanide in J_T2882.5 was also qualified as estimated due to analysis outside the specified holding times. Results for mercury and silver in J_T2882.5D were also qualified as estimated due to low recoveries of these analytes in the associated matrix spike analysis; the result for mercury in this sample was similarly qualified due to lack of agreement between laboratory/field duplicate results. The result for silver in J_T10-53D was also qualified as estimated due to a low recovery of this analyte in the

associated matrix spike analysis. The result for total cyanide in J_T10-53D was also qualified as estimated due to lack of agreement between laboratory/field duplicate results.

All laboratory-applied "*," and "B" qualifiers were removed by the validator from the sample Form VI.

Problems with the chain of custody records and data presentation were discussed in the previously submitted validation report (6/23/96) for SDG No. Z1535 and are not repeated here.

This validation report addendum should be considered part of the data package for all future distributions of the inorganics data.

TRILLIUM INC

ATTACHMENT A

DATA SUMMARY FORM
Laboratory Sample Delivery Group No. Z1535 (Addendum)
Metals and Cyanide in Soil

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DATA SUMMARY FORM: INORGANICS (ADDENDUM 8/7/96)
SOIL SAMPLES
(mg/Kg)

Site Name: Pine Street Superfund Site

Sampling Dates: October 11 - 20, 1995

Laboratory SDG No. Z 535 (Addendum)

Trillium Project No. 96454 (ADZ1535I)

Sample Identification		J-T288..5D		J-T14-1D		J-T23-51D		J-T10-53D											
Sample No.		15350 5D		1535012D		1535017D		1535020D											
% Solids		28 9		43.6		21.7		19.2											
CRDL																			
12	Antimony	2.9	UJ	1.4	UJ	4.9	UJ	4.8	UJ										
2	Arsenic	13 7	J	4.0	J	13.2	J	9.6	J										
1	Beryllium	0.7 5	UJ	0.50	UJ	1.2	UJ	1.3	UJ										
1	Cadmium	4 1	J	0.69	J	7.2	J	6.3	J										
2	Chromium	49 0	J	17.1		121	J	125	J										
5	Copper	1 0	J	43.4		294	J	235	J										
0.6	Lead	1 3	J	81.1		240	J	396	J										
0.2	Mercury	0.7 6	UJ	0.19	U	0.61	J	0.91	J										
8	Nickel	32 9	J	18.8	J	52.0	J	47.8	J										
1	Selenium	5 6	UJ	3.5	UJ	8.7	UJ	9.4	UJ										
2	Silver	2 0	J	0.51	J	23.0	J	53.3	J										
2	Thallium	3 5	UJ	2.2	UJ	4.6	UJ	5.2	UJ										
10	Vanadium	34 1	J	12.9	J	54.2	J	38.7	J										
4	Zinc	7 8	J	126		1168	J	717	J										
2	Total Cyanide	1 5	J	0.27	U	0.39	UJ	4.1	J										
2	Amenable Cyanide	0.- 0	UJ	0.27	U	0.39	UJ	0.57	UJ										

SW-846 Methods; ILM03.0; EPA 335.1 and EPA 335.3

TRILLIUM INC

ATTACHMENT B

DUPLICATE SUMMARY FORMS (Form V and VI)
Laboratory Sample Delivery Group No. Z1535 (Addendum)
Metals and Cyanide in Soil

U.S. EPA - CLP

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DUPLICATES

EPA SAMPLE NO.

J_T2882.5D

Lab Name: IEA Contract: _____

Lab Code: IEA Case No.: _____ SAS No.: _____ SDG No.: Z1535

Matrix: SOIL Level (low/med): LOW

% Solids for Sample: 28.94 % Solids for Duplicate: 28.94

0681

Concentration Units (ug/L or mg/kg dry weight): MG/KG

Analyte	Control Limit	Sample (S)	C	J_T2882.5D Duplicate (D)	C	RPD	Q	M
Aluminum								NR
Antimony		2.6450	B	2.9 ~~2.8750~~	~~B~~	JU 8.3		P
Arsenic	6.6	15.2468		13.7 ~~13.6773~~		J 10.8		P
Barium								NR
Beryllium		0.7207	B	0.75 ~~0.7476~~	~~B~~	UJ 3.7		P
Cadmium	3.3	4.3084		4.1 ~~4.0669~~	J	5.8		P
Calcium								NR
Chromium		47.8757		49.0 ~~48.9566~~	J	2.2		P
Cobalt								NR
Copper		131.8874		120.~~0552~~	J	9.4		P
Iron								NR
Lead		197.0890		183.~~0964~~	J	7.4		P
Magnesium								NR
Manganese				6				NR
Mercury	0.1	0.9027		0.25~~63~~	UJ	200.0	✓	CV
Nickel	26.5	32.6728		32.90~~69~~	J	0.7		P
Potassium				6				NR
Selenium	3.3	6.3139		5.~~5919~~	J	12.1		P
Silver		2.3224	B	2.0 ~~1.9617~~	~~B~~	J 16.8		P
Sodium								NR
Thallium		2.5130	U	3.5 2.6580	U	J		P
Vanadium	33.2	32.8791		34.1~~440~~	J	3.8		P
Zinc		773.8896		728 ~~727.5052~~	J	6.2		P
Cyanide								NR

8/7/96
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U.S. EPA - CLP

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DUPLICATES

EPA SAMPLE NO.
J-T2882.5-D

Lab Name: IEA-IL Contract: _____

Lab Code: _____ Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix (soil/water): Soil Level (low/med): _____

% Solids for Sample: 31 % Solids for Duplicate: 31

Concentration Units (ug/L or mg/kg dry weight): mg/kg

Analyte	Control Limit	Sample (S)	C	Duplicate (D)	C	RPD	Q	M
Aluminum								
Antimony								
Arsenic								
Barium								
Beryllium								
Cadmium								
Calcium								
Chromium								
Cobalt								
Copper								
Iron								
Lead								
Magnesium								
Manganese								
Mercury								
Nickel								
Potassium								
Selenium								
Silver								
Sodium								
Thallium								
Vanadium								
Zinc								
Cyanide		1.4		1.5 J		6.9		AS

K Watson
8/7/96

U.S. EPA - CLP

0995

6
DUPLICATES

EPA SAMPLE NO.
J-T2882.5-D

Lab Name: IEA-IL Contract: _____

Lab Code: _____ Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix (soil/water): _____ Level (low/med): _____

% Solids for Sample: _____ % Solids for Duplicate: _____

Concentration Units (ug/L or mg/kg dry weight): mg/kg

Analyte	Control Limit	Sample (S)	C	Duplicate (D)	C	RPD	Q	M
Aluminum								
Antimony								
Arsenic								
Barium								
Beryllium								
Cadmium								
Calcium								
Chromium								
Cobalt								
Copper								
Iron								
Lead								
Magnesium								
Manganese								
Mercury								
Nickel								
Potassium								
Selenium								
Silver								
Sodium								
Thallium								
Vanadium								
Zinc								
Cyanide		0.403	M	0.403	M	0		N

K. Watson
8/7/96

U.S. EPA - CLP

6
DUPLICATES

EPA SAMPLE NO.
0682

J_T14-1D

Lab Name: IEA Contract: _____

Lab Code: IEA Case No.: _____ SAS No.: _____ SDG No.: Z1535

Matrix: SOIL Level (low/med): LOW

% Solids for Sample: 43.59 % Solids for Duplicate: 43.59

Concentration Units (ug/L or mg/kg dry weight): MG/KG

Analyte	Control Limit	Sample (S)	C	J_T14-1D Duplicate (D)	C	RPD	Q	M
Aluminum								NR
Antimony		2.6241	B	1.4~~200~~	~~B~~	UJ 59.5		P
Arsenic		2.8735	B	4.0~~027~~	~~B~~	J 32.8		P
Barium								NR
Beryllium		0.4393	B	0.50 ~~0.4969~~	B	UJ 12.3		P
Cadmium		0.7261	B	0.69~~17~~	B	J 4.8		P
Calcium								NR
Chromium	4.1	16.8122		17.1 ~~17.0619~~		1.5		P
Cobalt								NR
Copper	10.4	42.9238		43.4~~510~~		1.2		P
Iron								NR
Lead		78.9132		81.1~~480~~		2.8		P
Magnesium								NR
Manganese								NR
Mercury	0.0	0.3096		0.19~~11~~	U	200.0	*	CV
Nickel	16.6	18.6149		18.8~~191~~		J 1.1		P
Potassium								NR
Selenium	2.0	3.1079		3.5 ~~3.4894~~		UJ 11.6		P
Silver		0.6278	B	0.51~~40~~	~~B~~	J 19.9		P
Sodium								NR
Thallium		1.7314	U	2.2 ~~1.6684~~	U	J		P
Vanadium		12.1691	B	12.9~~176~~	~~B~~	J 6.0		P
Zinc		128.0671		126 ~~125.8974~~		1.7		P
Cyanide								NR

K. Watson 8/7/96

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U.S. EPA - CLP

6
DUPLICATES

EPA SAMPLE NO.
J-T14-1-D

Lab Name: I EA-IC Contract: _____

Lab Code: _____ Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix (soil/water): Soil Level (low/med): _____

% Solids for Sample: 46 % Solids for Duplicate: 46

Concentration Units (ug/L or mg/kg dry weight): mg/kg

Analyte	Control Limit	Sample (S)	C	Duplicate (D)	C	RPD	Q	M
Aluminum								
Antimony								
Arsenic								
Barium								
Beryllium								
Cadmium								
Calcium								
Chromium								
Cobalt								
Copper								
Iron								
Lead								
Magnesium								
Manganese								
Mercury								
Nickel								
Potassium								
Selenium								
Silver								
Sodium								
Thallium								
Vanadium								
Zinc								
Cyanide		0.2717	W	0.2717	W	0		AS

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U.S. EPA - CLP

6
DUPLICATES

EPA SAMPLE NO.
J714-1-D

Lab Name: IEA-IL Contract: _____

Lab Code: _____ Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix (soil/water): Soil Level (low/med): _____

% Solids for Sample: 46 % Solids for Duplicate: 46

Concentration Units (ug/L or mg/kg dry weight): mg/kg

Analyte	Control Limit	Sample (S)	C	Duplicate (D)	C	RPD	Q	M
Aluminum								
Antimony								
Arsenic								
Barium								
Beryllium								
Cadmium								
Calcium								
Chromium								
Cobalt								
Copper								
Iron								
Lead								
Magnesium								
Manganese								
Mercury								
Nickel								
Potassium								
Selenium								
Silver								
Sodium								
Thallium								
Vanadium								
Zinc								
Cyanide		0.2717	W	0.2717	W	0		AS

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6
DUPLICATES

EPA SAMPLE NO. 0683

J_T23-51D

Lab Name: IEA Contract: _____

Lab Code: IEA Case No.: _____ SAS No.: _____ SDG No.: Z1535

Matrix: SOIL Level (low/med): LOW

% Solids for Sample: 21.69 % Solids for Duplicate: 21.69

Concentration Units (ug/L or mg/kg dry weight): MG/KG

Analyte	Control Limit	Sample (S)	C	J_T23-51D Duplicate (D)	C	RPD	Q	M
Aluminum								NR
Antimony		3.1297	B	4.9 ~~4.8894~~	~~B~~	UJ 43.9		P
Arsenic	8.3	11.7274		13.2 ~~13.1704~~	J	11.6		P
Barium								NR
Beryllium		0.8947	B	1.2 ~~1.1928~~	~~B~~	J 28.6		P
Cadmium	4.1	6.2903		7.2 ~~7.1544~~	J	12.8		P
Calcium								NR
Chromium		115.4774		121.~~2332~~	J	4.9		P
Cobalt								NR
Copper		281.4560		294.~~3668~~	J	4.5		P
Iron								NR
Lead		230.0964		240.~~3284~~	J	4.4		P
Magnesium								NR
Manganese								NR
Mercury	0.1	0.7814		0.61~~44~~	J	23.9	*	CV
Nickel	33.5	47.2714		52.~~0350~~	J	9.6		P
Potassium								NR
Selenium	4.1	5.9452		8.7 ~~8.6985~~	UJ	37.6		P
Silver	8.3	22.3335		23.0~~464~~	J	3.1		P
Sodium								NR
Thallium		3.4151	U	4.6 ~~3.3530~~	U	J		P
Vanadium	41.9	49.7767		54.2~~267~~	J	8.6		P
Zinc		1062.4174		1168 ~~1167.9391~~	J	9.5		P
Cyanide								NR

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6
DUPLICATES

EPA SAMPLE NO.
J-T27-51-D

Lab Name: IEA-IL Contract: _____

Lab Code: _____ Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix (soil/water): Soil Level (low/med): _____

% Solids for Sample: 72 % Solids for Duplicate: 72

Concentration Units (ug/L or mg/kg dry weight): mg/kg

Analyte	Control Limit	Sample (S)	C	Duplicate (D)	C	RPD	Q	M
Aluminum								
Antimony								
Arsenic								
Barium								
Beryllium								
Cadmium								
Calcium								
Chromium								
Cobalt								
Copper								
Iron								
Lead								
Magnesium								
Manganese								
Mercury								
Nickel								
Potassium								
Selenium								
Silver								
Sodium								
Thallium								
Vanadium								
Zinc								
Cyanide		0.4375		-0.3906		NC		AS

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6
DUPLICATES

EPA SAMPLE NO.
J-T23-51-D

Lab Name: IEA-IC Contract: _____

Lab Code: _____ Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix (soil/water): Soil Level (low/med): _____

% Solids for Sample: 32 % Solids for Duplicate: 32

Concentration Units (ug/L or mg/kg dry weight): mg/kg

Analyte	Control Limit	Sample (S)	C	Duplicate (D)	C	RPD	Q	M
Aluminum								
Antimony								
Arsenic								
Barium								
Beryllium								
Cadmium								
Calcium								
Chromium								
Cobalt								
Copper								
Iron								
Lead								
Magnesium								
Manganese								
Mercury								
Nickel								
Potassium								
Selenium								
Silver								
Sodium								
Thallium								
Vanadium								
Zinc								
Cyanide		0.3906	U	0.3906	U	0		N

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6
DUPLICATES

EPA SAMPLE NO. 26

J_T10-53D

Lab Name: IEA Contract: _____

Lab Code: IEA Case No.: _____ SAS No.: _____ SDG No.: Z1535

Matrix: SOIL Level (low/med): LOW

% Solids for Sample: 19.2 % Solids for Duplicate: 19.2

Concentration Units (ug/L or mg/kg dry weight): MG/KG

Analyte	Control Limit	Sample (S)	C	J_T10-53D Duplicate (D)	C	RPD	Q	M
Aluminum								NR
Antimony		6.0420	B	4.8 ~~4.7775~~	~~B~~	UJ 23.4		P
Arsenic	9.4	10.1674		9.6 ~~9.5552~~		J 6.2		P
Barium								NR
Beryllium		1.4092	B	1.3~~266~~	~~B~~	UJ 6.0		P
Cadmium	4.7	6.3286		6.3~~029~~	J	0.4		P
Calcium								NR
Chromium		125.3566		125.~~4461~~	J	0.1		P
Cobalt								NR
Copper		227.4534		235 ~~234.8902~~	J	3.2		P
Iron								NR
Lead		387.5620		396.~~0796~~	J	2.2		P
Magnesium								NR
Manganese								NR
Mercury	0.1	1.0208		0.91~~14~~	J	11.3	K	CV
Nickel	37.8	50.9011		47.8~~105~~	J	6.3		P
Potassium								NR
Selenium	4.7	9.4879		9.4 ~~9.3619~~	UJ	1.3		P
Silver		53.3165		53.3~~104~~	J			P
Sodium								NR
Thallium		3.9308	U	5.2 ~~3.7879~~	UJ			P
Vanadium		38.2421	B	38.7 ~~38.6770~~	~~B~~	J 1.1		P
Zinc		724.6822		717 ~~716.6346~~	J	1.1		P
Cyanide								NR

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6
DUPLICATES

EPA SAMPLE NO.
J-710-53-D

Lab Name: IEA-IL Contract: _____

Lab Code: _____ Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix (soil/water): Soil Level (low/med): _____

% Solids for Sample: 22 % Solids for Duplicate: 22

Concentration Units (ug/L or mg/kg dry weight): mg/kg

Analyte	Control Limit	Sample (S)	C	Duplicate (D)	C	RPD	Q	M
Aluminum								
Antimony								
Arsenic								
Barium								
Beryllium								
Cadmium								
Calcium								
Chromium								
Cobalt								
Copper								
Iron								
Lead								
Magnesium								
Manganese								
Mercury								
Nickel								
Potassium								
Selenium								
Silver								
Sodium								
Thallium								
Vanadium								
Zinc								
Cyanide		1.76		~~4.1~~ ~~4.057~~ J		78.9		RS

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6
DUPLICATES

EPA SAMPLE NO.
J-T10-57-D

Lab Name: IEA--IL Contract: _____

Lab Code: _____ Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix (soil/water): Soil Level (low/med): _____

% Solids for Sample: 22 % Solids for Duplicate: 22

Concentration Units (ug/L or mg/kg dry weight): mg/kg

Analyte	Control Limit	Sample (S)	C	Duplicate (D)	C	RPD	Q	M
Aluminum								
Antimony								
Arsenic								
Barium								
Beryllium								
Cadmium								
Calcium								
Chromium								
Cobalt								
Copper								
Iron								
Lead								
Magnesium								
Manganese								
Mercury								
Nickel								
Potassium								
Selenium								
Silver								
Sodium								
Thallium								
Vanadium								
Zinc								
Cyanide		0.5681	U	~~0.5681~~ 0.57 UJ	U	0		AS

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