Technical Memorandum

ecology and environment, inc.

Date: January 22, 2014

To: Mike McCrum, BLM Alaska State Office

From: Neil J. Brown, P.E., Project Engineer
Bill Richards, Project Manager

Subject: Results of the Solidification Treatability Study-Red Devil Mine Site, Red, Devil Alaska

INTRODUCTION

The Bureau of Land Management (BLM) is conducting a Remedial Investigation (RI) and Feasibility Study (FS) for the Red Devil Mine, an abandoned mercury mine on the Kuskokwim River located in southwest Alaska. Data collected as part of the RI indicate that some tailings at the RDM site fail the toxicity characteristic leaching procedure (TCLP) for arsenic. As part of assessing the technical feasibility of site-wide remediation, the BLM tasked Ecology and Environment, Inc. (E & E) with conducting a treatability study to assess the effectiveness of solidifying arsenic-contaminated mine tailings collected from the site. The results of treatability study are presented in this technical memorandum and will be used to develop the site-wide remediation alternatives in the Red Devil Mine Feasibility Study.

OBJECTIVES AND APPROACH

The primary objective of this treatability study is to establish whether solidification/stabilization will sufficiently treat tailings to concentrations less than the TCLP threshold. The TCLP methodology was applied to treated tailings, and the resulting leachate concentrations were compared to the following threshold concentrations:

- Arsenic: 5.0 milligrams per liter (mg/L)
- Mercury: 0.2 mg/L.

In addition to evaluating the treatment effectiveness in meeting TCLP standards, the solidified material were evaluated for engineering characteristics critical to critical to implementing full scale application of this treatment process at the RDM site.

The study approach is based on the September 23, 2013 Treatability Study Work Plan. The work plan was reviewed by EPA Region 10, Alaska Department of Environmental Conservation, Alaska Department of Natural Resources and Alaska Department of Health and Social Services. Due to schedule constraints, a revised version of the work plan was not created. The approach described in the draft work plan was followed with one modification. Based on agency comments, mercury was included as a study parameter to provide a more complete evaluation of the solidification process. It should be noted that no samples collected to date at RDM have failed TCLP for any parameter other than arsenic.

SAMPLE COLLECTION

The four representative soil samples were collected by BLM during a site visit conducted in September 2013. Figure 1 presents the approximate sample locations. A 5-gallon bucket was filled with tailings from each sample location. These four samples were subsequently shipped to E & E for processing and testing.

BASELINE DEVELOPMENT

Prior to the treatability testing, untreated tailings were submitted for total metal and TCLP analysis to establish a baseline to compare TCLP concentrations in solidified material to tailings that are currently present at the RDM site. A representative tailings aliquot was collected from each five-gallon bucket, placed in a laboratory-supplied container, and submitted for the following baseline laboratory analyses:

- Grain Size (ASTM D422-63[2007])
- Bulk Density (ASTM D5057-10)
- Total Arsenic (EPA 6010B)
- Total Mercury. (EPA 7471A)

Upon receipt of the analytical data, the two soil sample locations having the highest detected metals concentrations (13TS01 and 13TS03) were further analyzed for TCLP arsenic and mercury.

The grain size analysis was performed by TestAmerica's Burlington, Vermont laboratory, and the remaining analyses by TestAmerica's University Park, Illinois laboratory. A summary of the results for the baseline sampling are presented in Table 1. The complete laboratory data report is provided in Attachment A.

Table 1 Summary of Baseline Sampling Results
Red Devil Mine Site, Treatability Study
Red Devil, Alaska

Parameter (units)	13TS01	13TS02	13TS03	13TS04
Metals Analysis				
Total Arsenic (mg/kg)	9,400	7,700	6,700	4,800
Total Mercury (mg/kg)	1,100	890	2,000	560
TCLP Arsenic (mg/L)	11	NA	11	NA
TCLP Mercury (mg/L)	0.0071	NA	0.0025	NA
Grain Size Analysis				
Gravel (%)	50.3	47.3	48.0	45.7
Sand (%) – Total	35.1	35.1	33.4	32.1
Coarse (%)	11.1	13.2	12.0	9.4
Medium (%)	11.9	11.1	10.5	10.6
Fine (%)	12.1	10.8	10.9	12.1
Silt (%)	11.1	12.7	14.7	16.9
Clay (%)	3.5	4.9	3.9	5.3
Additional Parameters				
Percent Moisture	8.7	5.5	10.8	10.4
Bulk Density (g/cc)	2.1	2.3	2.2	2.2

Key:
g/cc = Grams per cubic centimeter.
mg/kg = Milligrams per kilogram.
mg/L = Milligrams per liter.
NA = Not analyzed.

Upon receipt of the soil samples in Chicago, the air space immediately above each bucket was screened using an Ohio Lumex (Model RA-915+) for mercury vapor.. For each sample container, the results were as follows:

- 13TS01: >37,000 nanograms per cubic meter (ng/m3)
- 13TS02: 70 ng/m3
- 13TS03: 112 ng/m3
- 13TS04: 56 ng/m3.

Based on the results of preliminary mercury vapor screening, ventilation measures and mercury vapor monitoring were implemented when soils were handled.

Pilot Test Sample Preparation

Based on the baseline sample results, tailings from samples 13TS01 and 13TS03 were selected because these samples had the highest detected total concentrations for arsenic (9,400 mg/kg and 6,700 mg/kg, respectively) and mercury (1,100 mg/kg and 2,000 mg/kg, respectively). For the treatability tests, two design mixes with varying amounts of the main binding agent were selected. The first mix used ordinary Portland cement (OPC), which was the primary binding agent, and the second mix used ferrous sulfate heptahydrate (ferrous sulfate) as a pre-treatment agent followed by the addition of OPC. Deionized water was subsequently added to hydrate the reagents and initiate the solidification reaction. A summary of the design mixes is presented in Table 2.

Table 2 Summary of Solidification Design Mixes
Red Devil Mine Site, Treatability Study
Red Devil, Alaska

Sample	Soil Location	Solidification Mix			
		Soil (grams)	Ordinary Portland Cement (grams)	Ferrous Sulfate (grams)	Water (milliliters)
RDM-CS01-1	13TS01	500	75	0	30
RDM-CS01-2		500	75	88	30
RDM-CS01-3		500	100	0	35
RDM-CS01-4		500	100	88	45
RDM-CS03-5	13TS03	500	75	0	30
RDM-CS03-6		500	75	88	25
RDM-CS03-7		500	100	0	35
RDM-CS03-8		500	100	88	45

Four soil samples from each sample location (for a total of eight samples) were tested. Sample preparation was as follows:

- An aliquot of 500 grams of soil was weighed and placed into a 2,000 milliliter (mL) high-density polyethylene jar. Tailings larger than 2 inches in size were omitted.

- Individual reagent additions were weighed out to the nearest gram according to the design mixes presented in Table 2.

- The 500 grams of soil were transferred to a clean stainless steel bowl, and the reagent(s) and water were added. It should be noted that if the design mix required ferrous sulfate, it was added first with a partial aliquot of water and mixed for a period of 5 minutes. Using a graduated cylinder,

water was added until the mixture was visibly wet while still maintaining stiffness. Both temperature and pH were measured as described below.

- As OPC was added, regardless of whether ferrous sulfate was used, the sample was mixed using a clean wide-blade, stiff spatula. Water was subsequently added as previously described, and the following measurements were recorded at three distinct times: the initiation of mixing, 2.5 minutes, and 5 minutes:
    - pH – using full-range pH strips (recorded to the nearest standard unit)
    - Temperature – Using a infrared thermometer
    - Mercury Vapor Concentrations –Approximately 2-inches above the bowl using a Lumex mercury vapor analyzer
    - The presence of excess fluid, odors, color, texture, and observable gas evolution.

After 5 minutes, the treated soil was placed back in its HDPE jar and lightly compacted to reduce void space.

Once the eight individual samples were prepared, they were stored under ambient conditions and evaluated for a period of seven days before being submitted to the laboratory for TCLP arsenic and mercury analysis. The samples were maintained at an approximate temperature of 50° F, which approximates the temperature at the RDM site during construction season. After approximately 24 hours, 72 hours, and seven days of curing, the following parameters were measured and recorded.

- Compaction strength in tons per square foot using a pocket penetrometer
- Elemental mercury vapor concentration in the jar head space using the Lumex
- General observations.

After recording Day 7 observations, portions of the solidified material were placed in laboratory-grade sample containers and delivered to an analytical laboratory for TCLP arsenic and mercury analysis.

RESULTS

All of the eight samples that were tested generated leachate that had detected concentrations of TCLP arsenic and mercury below the threshold for a characteristic hazardous waste. Table 3 provides a summary of the analytical results.

Table 3 Summary of TCLP Results for Solidified Samples
Red Devil Mine Site, Treatability Study
Red Devil, Alaska

Sample	Arsenic		Mercury	
	TCLP Criteria	Analytical Result	TCLP Criteria	Analytical Result
RDM-CS01-01	5.0	0.30	0.2	0.00086 B
RDM-CS01-02	5.0	1.7	0.2	0.2 B
RDM-CS01-03	5.0	0.23	0.2	0.0011 B
RDM-CS01-04	5.0	0.69	0.2	0.11 B
RDM-CS03-05	5.0	0.58	0.2	0.00013 JB
RDM-CS03-06	5.0	2.1	0.2	0.0032 B
RDM-CS03-07	5.0	0.37	0.2	0.030 B
RDM-CS03-08	5.0	0.52	0.2	0.0064 B

Key
B = Analyte detected in laboratory blank.
J = Estimate.

Arsenic

For untreated test samples RDM-CS01-01 through 04, which used tailings from sample location 13TS01, the total arsenic concentration was 9,400 mg/kg, and when untreated, generated a TCLP leachate concentration of 11 mg/L. After solidification, the maximum detected TCLP concentration was 1.7 mg/L (RDM-CS01-02).

For untreated test samples RDM-CS01-05 through 08, which used tailings collected from sample location 13TS03, the total arsenic concentration was 6,700 mg/kg, and generated a TCLP leachate concentration of 11 mg/L. After solidification, the maximum detected TCLP concentration was 2.1 mg/L (RDM-CS03-06).

It should be noted that the average TCLP arsenic concentration for those samples (both subsets) that were solidified using only OPC was 0.37 mg/L. The average TCLP leachate concentration for samples that were solidified using ferrous sulfate and OPC was 1.25 mg/L.

Mercury

For untreated test samples RDM-CS01-01 through 04, the total mercury concentration was 1,100 mg/kg, and generated a TCLP leachate concentration of 0.0071 mg/L. After solidification, the maximum detected TCLP concentration was 0.2 mg/L (RDM-CS01-02).

For untreated test samples RDM-CS01-05 through 08, the total mercury concentration was 2,000 mg/kg, and when untreated generated a TCLP leachate concentration of 0.0025 mg/L. After solidification, the maximum detected TCLP concentration was 0.03 mg/L (RDM-CS03-06), which is less than the TCLP requirement but higher than the baseline value.

As with arsenic, the addition of ferrous sulfate increased the leachability of mercury (in a solidified state) as compared with using only OPC. The average TCLP concentration for mercury in samples that were solidified using only OPC was 0.001 mg/L, whereas, in samples that were solidified using ferrous sulfate and OPC, the average TCLP leachate concentration was 0.08 mg/L. While still meeting the objective, leachate concentrations for samples treated with ferrous sulfate were a full order of magnitude greater than leachate concentrations for samples treated using OPC by itself.

Other Parameters

The pH did not vary when the tailings were mixed during preparation for solidification. When ferrous sulfate was added, the pH of the mix was maintained at four standard units. Tailing mixes that used only OPC maintained a pH of 11. Attachment B contains summary tables associated with other parameters.

No significant temperature increases were recorded for tailings that used only OPC. However, when OPC was added to the ferrous sulfate/soil mix, the temperature increased by approximately 10 ^{o}F.

Seven of the eight samples achieved a compression strength of more than 4.5 tons per square foot after seven days. For samples that used only OPC, the mixes exceeded the penetrometer's upper limit after a 24-hour period. 3 of the 4 samples that were treated with ferrous sulfate reached the penetrometers upper limit at the 7 day mark.

The final appearance of the 8 solidified tailings samples was granular and not a uniform solid mass, which would lend itself to allow for easier movement and placement upon completion of the solidification process.

Recommendations

The results of the solidification/stabilization treatability study indicates that RDM tailings can be sufficiently treated to pass TCLP threshold concentrations. Based on these results, solidification is a viable treatment option for the RDM site.

While the use of ferrous sulfate in the design mix yielded a granular mass that meets the objectives of generating a TCLP leachate that was less than the regulatory requirements, it did generate a leachate having a greater mercury concentration than the baseline value. The TCLP concentrations of both arsenic and mercury were higher than the design mixes that used only OPC.

Based on the literature reviewed when preparing the solidification work plan, ferrous sulfate was selected as an additive because of its ability to chemically fixate mercury, potentially reducing its leachability. The ferrous sulfate decreased the pH of the tailings mix, and therefore may have actually increased mercury leachability under the conditions of this study. While the treatability study was limited in determining whether there was an appropriate amount of ferrous sulfate added (i.e., too much or too little), the reduction in leaching associated with the ferrous sulfate/OPC mixes as compared to the baseline sample results can most likely be attributed to the use of OPC and not the ferrous sulfate..

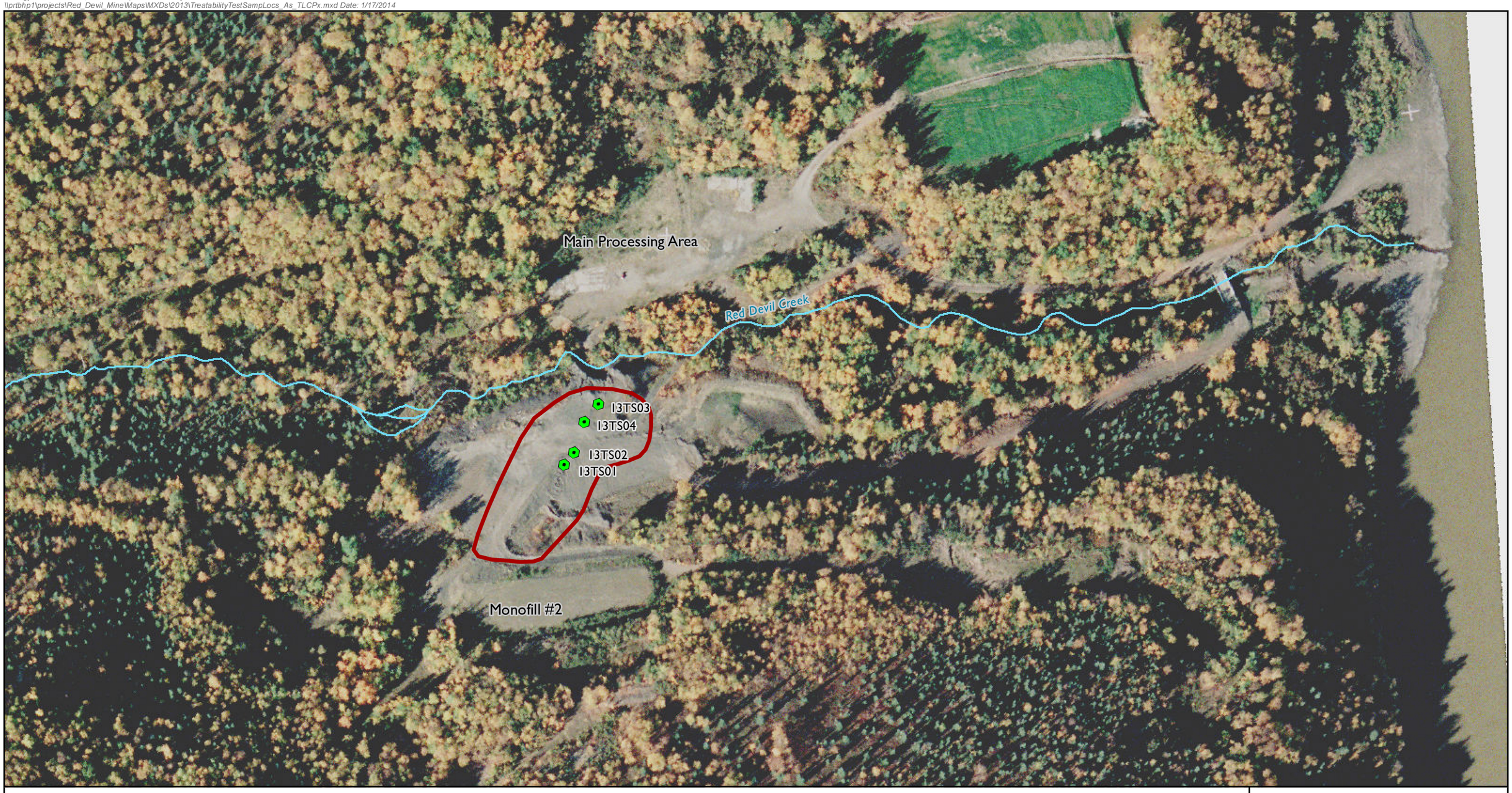
Given that the addition of OPC to RDM site tailings can generate a solidified mass that meets the TCLP leachate requirements, additional study associated with the use of ferrous sulfate is not warranted.

Additionally, the pH, temperature, and compressive strength achieved should not pose problems associated with implementing a full-scale solidification program. Both the pH and temperature increases associated with the solidified tailings should not pose operational problems associated with equipment or handling procedures. The temperature increase is minor, and the initial increased temperature of treated tailings will revert to ambient conditions over time. Elevated pH will only help reduce the potential for metals leaching. A compressive strength of greater than 4.5 tons/ft^2 equates to greater than 62 pounds per square inch (psi), which exceeds the EPA guidance recommendation of 50 psi (OSWER directive #9437.00-2A).

While this treatability study has demonstrated that RDM site soils can be solidified to meet the regulatory requirements associated with TCLP, additional study is recommended before implementing a full-scale remedy. It is recommended that a larger volume of soil undergo the solidification process and tailings from the retort area be tested. Several hundred cubic yards of material should be treated. This large-scale field test would have to be conducted at the RDM site. In addition to mobilizing standard excavation and earthmoving equipment, a pug mill and OPC would have to be transported to the site. During the field trial, the amount of OPC could be further varied to determine a more optimum dosage and to determine if the locally available water is of sufficient quality.

FIGURE 1

Ecology & Environment, Inc. GIS Department Project:
\\prtbhp1\projects\Red_Devil_Mine\Maps\MXDs\2013\TreatabilityTestSampLocs_As_TLCPx.mxd Date: 1/17/2014



Treatability Test Sample Locations
Approximate Area of Tailings Containing Arsenic above TCLP Threshold

RED DEVIL MINE

Red Devil, Alaska

Figure 1
Treatability Test Sample Locations
Main Processing Area

0 37.5 75 150 225
Feet
0 10 20 40 60 80
Meters

N

Image Source: Aero-Metric, Inc. 2010a

ATTACHMENT A

This attachment was provided by a third party lab. It is not fully accessible. If you need assistance with this appendix, please contact the BLM Alaska Public Information Center 907-271-5960, BLM_AK_AKSO_Public_Room@blm.gov.

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Chicago
2417 Bond Street
University Park, IL 60484
Tel: (708)534-5200

TestAmerica Job ID: 500-64525-1
Client Project/Site: RDM Treatability

For:
Ecology and Environment, Inc.
33 West Monroe St.
Suite 550
Chicago, Illinois 60603

Attn: Neil Brown

Authorized for release by:
10/15/2013 1:02:26 PM

Richard Wright, Project Manager II
(708)534-5200
richard.wright@testamericainc.com

Table of Contents

Job ID: 500-64525-1

Laboratory: TestAmerica Chicago

Narrative

Job Narrative
500-64525-1

Comments
No additional comments.

Receipt
The samples were received on 10/8/2013 11:50 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 3.4° C.

Metals
No analytical or quality issues were noted.

General Chemistry
No analytical or quality issues were noted.

Detection Summary

Client: Ecology and Environment, Inc.
Project/Site: RDM Treatability

TestAmerica Job ID: 500-64525-1

Client Sample ID: RDM-1096-CS01 — Lab Sample ID: 500-64525-1

Analyte	Result	Qualifier	NONE	NONE	Unit	Dil Fac	D	Method	Prep Type
Bulk Density	2.1				g/cc	1		D5057-90	Total/NA

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Arsenic	9400		11	2.1	mg/Kg	10	☼	6010B	Total/NA
Mercury	1100000		180000	86000	ug/Kg	10000	☼	7471A	Total/NA

Client Sample ID: RDM-1096-CS02 — Lab Sample ID: 500-64525-2

Analyte	Result	Qualifier	NONE	NONE	Unit	Dil Fac	D	Method	Prep Type
Bulk Density	2.3				g/cc	1		D5057-90	Total/NA

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Arsenic	7700		10	2.0	mg/Kg	10	☼	6010B	Total/NA
Mercury	890000		170000	78000	ug/Kg	10000	☼	7471A	Total/NA

Client Sample ID: RDM-1096-CS03 — Lab Sample ID: 500-64525-3

Analyte	Result	Qualifier	NONE	NONE	Unit	Dil Fac	D	Method	Prep Type
Bulk Density	2.2				g/cc	1		D5057-90	Total/NA

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Arsenic	6700		11	2.1	mg/Kg	10	☼	6010B	Total/NA
Mercury	2000000		170000	79000	ug/Kg	10000	☼	7471A	Total/NA

Client Sample ID: RDM-1096-CS04 — Lab Sample ID: 500-64525-4

Analyte	Result	Qualifier	NONE	NONE	Unit	Dil Fac	D	Method	Prep Type
Bulk Density	2.2				g/cc	1		D5057-90	Total/NA

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Arsenic	4800		9.4	1.9	mg/Kg	10	☼	6010B	Total/NA
Mercury	560000		170000	81000	ug/Kg	10000	☼	7471A	Total/NA

This Detection Summary does not include radiochemical test results.

Method Summary

Client: Ecology and Environment, Inc.
Project/Site: RDM Treatability

TestAmerica Job ID: 500-64525-1

Method	Method Description	Protocol	Laboratory
6010B	Metals (ICP)	SW846	TAL CHI
7471A	Mercury (CVAA)	SW846	TAL CHI
D5057-90	Specific Gravity and Bulk Density (Screening)	ASTM	TAL CHI
Moisture	Percent Moisture	EPA	TAL CHI

Protocol References:

ASTM = ASTM International

EPA = US Environmental Protection Agency

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL CHI = TestAmerica Chicago, 2417 Bond Street, University Park, IL 60484, TEL (708)534-5200

Sample Summary

Client: Ecology and Environment, Inc.
Project/Site: RDM Treatability

TestAmerica Job ID: 500-64525-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
500-64525-1	RDM-1096-CS01	Solid	10/07/13 11:22	10/08/13 11:50
500-64525-2	RDM-1096-CS02	Solid	10/07/13 11:26	10/08/13 11:50
500-64525-3	RDM-1096-CS03	Solid	10/07/13 11:30	10/08/13 11:50
500-64525-4	RDM-1096-CS04	Solid	10/07/13 11:34	10/08/13 11:50

Client Sample Results

Client: Ecology and Environment, Inc.
Project/Site: RDM Treatability

TestAmerica Job ID: 500-64525-1

Client Sample ID: RDM-1096-CS01
Date Collected: 10/07/13 11:22
Date Received: 10/08/13 11:50

Lab Sample ID: 500-64525-1
Matrix: Solid
Percent Solids: 91.3

Method: 6010B - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	9400		11	2.1	mg/Kg	☼	10/08/13 16:30	10/11/13 11:02	10

Method: 7471A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	1100000		180000	86000	ug/Kg	☼	10/09/13 15:30	10/10/13 15:43	10000

General Chemistry

Analyte	Result	Qualifier	NONE	NONE	Unit	D	Prepared	Analyzed	Dil Fac
Bulk Density	2.1				g/cc			10/10/13 18:24	1

Client Sample Results

Client: Ecology and Environment, Inc.
Project/Site: RDM Treatability

TestAmerica Job ID: 500-64525-1

Client Sample ID: RDM-1096-CS02
Date Collected: 10/07/13 11:26
Date Received: 10/08/13 11:50

Lab Sample ID: 500-64525-2
Matrix: Solid
Percent Solids: 94.5

Method: 6010B - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	7700		10	2.0	mg/Kg	☼	10/08/13 16:30	10/11/13 11:06	10

Method: 7471A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	890000		170000	78000	ug/Kg	☼	10/09/13 15:30	10/10/13 15:41	10000

General Chemistry

Analyte	Result	Qualifier	NONE	NONE	Unit	D	Prepared	Analyzed	Dil Fac
Bulk Density	2.3				g/cc			10/10/13 18:31	1

Client Sample Results

Client: Ecology and Environment, Inc.
Project/Site: RDM Treatability

TestAmerica Job ID: 500-64525-1

Client Sample ID: RDM-1096-CS03
Date Collected: 10/07/13 11:30
Date Received: 10/08/13 11:50

Lab Sample ID: 500-64525-3
Matrix: Solid
Percent Solids: 89.2

Method: 6010B - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	6700		11	2.1	mg/Kg	☼	10/08/13 16:30	10/11/13 11:10	10

Method: 7471A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	2000000		170000	79000	ug/Kg	☼	10/09/13 15:30	10/10/13 15:39	10000

General Chemistry

Analyte	Result	Qualifier	NONE	NONE	Unit	D	Prepared	Analyzed	Dil Fac
Bulk Density	2.2				g/cc			10/10/13 18:39	1

Client Sample Results

Client: Ecology and Environment, Inc.
Project/Site: RDM Treatability

TestAmerica Job ID: 500-64525-1

Client Sample ID: RDM-1096-CS04
Date Collected: 10/07/13 11:34
Date Received: 10/08/13 11:50

Lab Sample ID: 500-64525-4
Matrix: Solid
Percent Solids: 89.6

Method: 6010B - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	4800		9.4	1.9	mg/Kg	☼	10/08/13 16:30	10/11/13 11:14	10

Method: 7471A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	560000		170000	81000	ug/Kg	☼	10/09/13 15:30	10/10/13 15:37	10000

General Chemistry

Analyte	Result	Qualifier	NONE	NONE	Unit	D	Prepared	Analyzed	Dil Fac
Bulk Density	2.2				g/cc			10/10/13 18:47	1

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative error ratio
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Metals

Prep Batch: 206170

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-64525-1	RDM-1096-CS01	Total/NA	Solid	3050B	
500-64525-2	RDM-1096-CS02	Total/NA	Solid	3050B	
500-64525-3	RDM-1096-CS03	Total/NA	Solid	3050B	
500-64525-4	RDM-1096-CS04	Total/NA	Solid	3050B	

Prep Batch: 206296

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-64525-1	RDM-1096-CS01	Total/NA	Solid	7471A	
500-64525-2	RDM-1096-CS02	Total/NA	Solid	7471A	
500-64525-3	RDM-1096-CS03	Total/NA	Solid	7471A	
500-64525-4	RDM-1096-CS04	Total/NA	Solid	7471A	
LCS 500-206296/13-A	Lab Control Sample	Total/NA	Solid	7471A	
MB 500-206296/12-A	Method Blank	Total/NA	Solid	7471A	

Analysis Batch: 206639

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-64525-1	RDM-1096-CS01	Total/NA	Solid	7471A	206296
500-64525-2	RDM-1096-CS02	Total/NA	Solid	7471A	206296
500-64525-3	RDM-1096-CS03	Total/NA	Solid	7471A	206296
500-64525-4	RDM-1096-CS04	Total/NA	Solid	7471A	206296
LCS 500-206296/13-A	Lab Control Sample	Total/NA	Solid	7471A	206296
MB 500-206296/12-A	Method Blank	Total/NA	Solid	7471A	206296

Analysis Batch: 206682

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-64525-1	RDM-1096-CS01	Total/NA	Solid	6010B	206170
500-64525-2	RDM-1096-CS02	Total/NA	Solid	6010B	206170
500-64525-3	RDM-1096-CS03	Total/NA	Solid	6010B	206170
500-64525-4	RDM-1096-CS04	Total/NA	Solid	6010B	206170

General Chemistry

Analysis Batch: 206273

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-64525-1	RDM-1096-CS01	Total/NA	Solid	Moisture	
500-64525-2	RDM-1096-CS02	Total/NA	Solid	Moisture	
500-64525-3	RDM-1096-CS03	Total/NA	Solid	Moisture	
500-64525-4	RDM-1096-CS04	Total/NA	Solid	Moisture	

Analysis Batch: 206838

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-64525-1	RDM-1096-CS01	Total/NA	Solid	D5057-90	
500-64525-2	RDM-1096-CS02	Total/NA	Solid	D5057-90	
500-64525-3	RDM-1096-CS03	Total/NA	Solid	D5057-90	
500-64525-4	RDM-1096-CS04	Total/NA	Solid	D5057-90	

Client: Ecology and Environment, Inc.
Project/Site: RDM Treatability

TestAmerica Job ID: 500-64525-1

Method: 7471A - Mercury (CVAA)

Lab Sample ID: MB 500-206296/12-A
Matrix: Solid
Analysis Batch: 206639

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 206296

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<17		17	7.9	ug/Kg		10/09/13 15:30	10/10/13 13:20	1

Lab Sample ID: LCS 500-206296/13-A
Matrix: Solid
Analysis Batch: 206639

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 206296

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Mercury	167	176		ug/Kg		105	80 - 120

Lab Chronicle

Client: Ecology and Environment, Inc.
Project/Site: RDM Treatability

TestAmerica Job ID: 500-64525-1

Client Sample ID: RDM-1096-CS01

Lab Sample ID: 500-64525-1

Date Collected: 10/07/13 11:22
Matrix: Solid
Date Received: 10/08/13 11:50
Percent Solids: 91.3

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	7471A			206296	10/09/13 15:30	BJB	TAL CHI
Total/NA	Analysis	7471A		10000	206639	10/10/13 15:43	BJB	TAL CHI
Total/NA	Prep	3050B			206170	10/08/13 16:30	RLL	TAL CHI
Total/NA	Analysis	6010B		10	206682	10/11/13 11:02	LEG	TAL CHI
Total/NA	Analysis	Moisture		1	206273	10/09/13 09:53	CMV	TAL CHI
Total/NA	Analysis	D5057-90		1	206838	10/10/13 18:24	NLR	TAL CHI

Client Sample ID: RDM-1096-CS02

Lab Sample ID: 500-64525-2

Date Collected: 10/07/13 11:26
Matrix: Solid
Date Received: 10/08/13 11:50
Percent Solids: 94.5

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	7471A			206296	10/09/13 15:30	BJB	TAL CHI
Total/NA	Analysis	7471A		10000	206639	10/10/13 15:41	BJB	TAL CHI
Total/NA	Prep	3050B			206170	10/08/13 16:30	RLL	TAL CHI
Total/NA	Analysis	6010B		10	206682	10/11/13 11:06	LEG	TAL CHI
Total/NA	Analysis	Moisture		1	206273	10/09/13 09:53	CMV	TAL CHI
Total/NA	Analysis	D5057-90		1	206838	10/10/13 18:31	NLR	TAL CHI

Client Sample ID: RDM-1096-CS03

Lab Sample ID: 500-64525-3

Date Collected: 10/07/13 11:30
Matrix: Solid
Date Received: 10/08/13 11:50
Percent Solids: 89.2

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	7471A			206296	10/09/13 15:30	BJB	TAL CHI
Total/NA	Analysis	7471A		10000	206639	10/10/13 15:39	BJB	TAL CHI
Total/NA	Prep	3050B			206170	10/08/13 16:30	RLL	TAL CHI
Total/NA	Analysis	6010B		10	206682	10/11/13 11:10	LEG	TAL CHI
Total/NA	Analysis	Moisture		1	206273	10/09/13 09:53	CMV	TAL CHI
Total/NA	Analysis	D5057-90		1	206838	10/10/13 18:39	NLR	TAL CHI

Client Sample ID: RDM-1096-CS04

Lab Sample ID: 500-64525-4

Date Collected: 10/07/13 11:34
Matrix: Solid
Date Received: 10/08/13 11:50
Percent Solids: 89.6

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	7471A			206296	10/09/13 15:30	BJB	TAL CHI
Total/NA	Analysis	7471A		10000	206639	10/10/13 15:37	BJB	TAL CHI
Total/NA	Prep	3050B			206170	10/08/13 16:30	RLL	TAL CHI
Total/NA	Analysis	6010B		10	206682	10/11/13 11:14	LEG	TAL CHI
Total/NA	Analysis	Moisture		1	206273	10/09/13 09:53	CMV	TAL CHI
Total/NA	Analysis	D5057-90		1	206838	10/10/13 18:47	NLR	TAL CHI

Lab Chronicle

Client: Ecology and Environment, Inc.
Project/Site: RDM Treatability

TestAmerica Job ID: 500-64525-1

Laboratory References:

TAL CHI = TestAmerica Chicago, 2417 Bond Street, University Park, IL 60484, TEL (708)534-5200

Certification Summary

Client: Ecology and Environment, Inc.
Project/Site: RDM Treatability

TestAmerica Job ID: 500-64525-1

Laboratory: TestAmerica Chicago

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
Alabama	State Program	4	40461	04-30-14
California	NELAP	9	01132CA	04-30-14
Georgia	State Program	4	N/A	04-30-14
Hawaii	State Program	9	N/A	04-30-14
Illinois	NELAP	5	100201	04-30-14
Indiana	State Program	5	C-IL-02	04-30-14
Iowa	State Program	7	82	05-01-14
Kansas	NELAP	7	E-10161	10-31-13
Kentucky	State Program	4	90023	12-31-13
Kentucky (UST)	State Program	4	66	04-30-14
Louisiana	NELAP	6	30720	06-30-14
Massachusetts	State Program	1	M-IL035	06-30-14
Mississippi	State Program	4	N/A	04-30-14
North Carolina DENR	State Program	4	291	12-31-13
North Dakota	State Program	8	R-194	04-30-14
Oklahoma	State Program	6	8908	08-31-14
South Carolina	State Program	4	77001	10-30-13 *
Texas	NELAP	6	T104704252-09-TX	02-28-14
USDA	Federal		P330-12-00038	02-06-15
Wisconsin	State Program	5	999580010	08-31-14
Wyoming	State Program	8	8TMS-Q	04-30-14

* Expired certification is currently pending renewal and is considered valid.

TestAmerica

THE LEADER IN ENVIRONMENTAL T

2417 Bond Street, University Park, IL 6048
Phone: 708.534.5200 Fax: 708.534.5

500-64525 COC

Chain of Custody Record

Lab Job #: 500-64525

Chain of Custody Number:

Page _____ of _____

Temperature °C of Cooler: 3.4

(optional) Report To		(optional) Bill To	
Contact:	Neil Brown	Contact:	
Company:	E+E	Company:	
Address:	33 W Monroe St, Ste 1410	Address:	
Address:	Chicago, IL 60603	Address:	
Phone:	312-578-9243	Phone:	
Fax:	312-578-9345	Fax:	
E-Mail:	nbrown@ene.com	PO#/Reference#	

Client	Ecology and Environment	Client Project #	TEE-001096-0070-17-03TTO
Project Name	RDM Treatability study		
Project Location/State	AK	Lab Project #	
Sampler	Bill Jess	Lab PM	

Preservative Key
1. HCL, Cool to 4°
2. H2SO4, Cool to 4°
3. HNO3, Cool to 4°
4. NaOH, Cool to 4°
5. NaOH/Zn, Cool to 4°
6. NaHSO4
7. Cool to 4°
8. None
9. Other

Lab ID	MS/MSD	Sample ID	Sampling Date	Sampling Time	# of Containers	Matrix	Preservative	Parameter: Total Arsenic (6010B)	Total Mercury (7471)	Bulk Density (ASTM D-5057-10)	Percent Moisture	Comments
1		RDM-1096-CS01	10/7/13	1122	2	SO		X	X	X	X	Hg vapor >37K ng/m3
2		RDM-1096-CS02		1126	2	SO		X	X	X	X	Hg vapor 70 ng/m3
3		RDM-1096-CS03		1130	2	SO		X	X	X	X	Hg vapor 112 ng/m3
4		RDM-1096-CS04		1134	2	SO		X	X	X	X	Hg vapor 56 ng/m3
											485	10/7/13
												BKG Hg vapor = 24 ng/m3

10/7/13

Turnaround Time Required (Business Days)

___ 1 Day ___ 2 Days ___ 5 Days ___ 7 Days X 10 Days ___ 15 Days _____ Other

Requested Due Date _____

Sample Disposal

[ ] Return to Client [X] Disposal by Lab [ ] Archive for _____ Months (A fee may be assessed if samples are retained longer than 1 month)

Relinquished By	Company	Date	Time	Received By	Company	Date	Time
	E+E	10/8/13	946		TA	10/8/13	946
	TA	10/8/13	1150		TA-CHI	10/8/13	1150

Lab Courier: TA

Shipped:

Hand Delivered:

Matrix Key

WW – Wastewater	SE – Sediment
W – Water	SO – Soil
S – Soil	L – Leachate
SL – Sludge	WI – Wipe
MS – Miscellaneous	DW – Drinking Water
OL – Oil	O – Other
A – Air	

Client Comments

Lab Comments:

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

2417 Bond Street, University Park, IL 60484
Phone: 708.534.5200 Fax: 708.534.5211

(optional)

Report To
Contact: Neil Brown
Company: EnE
Address: 33 W. Monroe St., Ste 1410
Address: Chicago, IL 60603
Phone: 312-578-9243
Fax: 312-578-9345
E-Mail: nbrown@ene.com

(optional)

Bill To
Contact:
Company:
Address:
Address:
Phone:
Fax:
PO#/Reference#

Chain of Custody Record

Lab Job #: 500-64525

Chain of Custody Number:

Page _____ of _____

Temperature °C of Cooler: 3.4

Client	Client Project #
Ecology and Environment	EE-001096-0070-17-03TTO
Project Name: RDM Treatability Study	
Project Location/State: AK	Lab Project #
Sampler: Bill Sass	Lab PM

Preservative Key
1. HCL, Cool to 4°
2. H2SO4, Cool to 4°
3. HNO3, Cool to 4°
4. NaOH, Cool to 4°
5. NaOH/Zn, Cool to 4°
6. NaHSO4
7. Cool to 4°
8. None
9. Other

Lab ID	MS/MSD	Sample ID	Sampling Date	Sampling Time	# of Containers	Matrix	Preservative	Parameter: Grain Size ASTM D-422-63(2007)	Comments
1		RDM-1096-CS01	10/7/13	1122	1	SO		X	Hg vapor >37K ng/m³
2		RDM-1096-CS02		1126	1	SO		X	Hg vapor 70 ng/m³
3		RDM-1096-CS03		1130	1	SO		X	Hg vapor 112 ng/m³
4		RDM-1096-CS04		1134	1	SO		X	Hg vapor 56 ng/m³
							MS	10/7/13	
									BKG Hg vapor = 24 ng/m³

10/7/13

Turnaround Time Required (Business Days)
___ 1 Day ___ 2 Days ___ 5 Days ___ 7 Days X 10 Days ___ 15 Days _____ Other
Requested Due Date _____

Sample Disposal
[ ] Return to Client [X] Disposal by Lab [ ] Archive for _____ Months (A fee may be assessed if samples are retained longer than 1 month)

Relinquished By	Company	Date	Time	Received By	Company	Date	Time
	EnE	10/8/13	946		TA	10/8/13	946
	TA	10/8/13	1150		TA CHI	10/8/13	1150

Lab Courier
Shipped
Hand Delivered

Matrix Key
WW – Wastewater
W – Water
S – Soil
SL – Sludge
MS – Miscellaneous
OL – Oil
A – Air
SE – Sediment
SO – Soil
L – Leachate
WI – Wipe
DW – Drinking Water
O – Other

Client Comments

Lab Comments:

10/15/2013

Login Sample Receipt Checklist

Client: Ecology and Environment, Inc.

Job Number: 500-64525-1

Login Number: 64525

List Source: TestAmerica Chicago

List Number: 1

Creator: Scott, Sherri L

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	3.4
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

Job Number: 500-64525-2

Job Description: RDM Treatability

For:
Ecology and Environment, Inc.
33 West Monroe St.
Suite 550
Chicago, IL 60603

Attention: Neil Brown

Approved for release.
Richard C Wright
Project Manager II
10/17/2013 8:57 AM

Richard C Wright, Project Manager II
2417 Bond Street, University Park, IL, 60484
richard.wright@testamericainc.com
10/17/2013

These test results meet all the requirements of NELAC for accredited parameters.

The Lab Certification ID# is 100201.

All questions regarding this test report should be directed to the TestAmerica Project Manager whose signature appears on this report. All pages of this report are integral parts of the analytical data. Therefore, this report should be reproduced only in its entirety.

Reporting limits are adjusted for sample size used, dilutions and moisture content if applicable.

Comments
No additional comments.

Receipt
The samples were received on 10/8/2013 11:50 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 3.4° C.

Geotechnical
No analytical or quality issues were noted.

METHOD SUMMARY

Client: Ecology and Environment, Inc. Job Number: 500-64525-2

Description	Lab Location	Method	Preparation Method
Matrix: Solid			
Grain Size	TAL BUR	ASTM D422	

Lab References:

TAL BUR = TestAmerica Burlington

Method References:

ASTM = ASTM International

METHOD / ANALYST SUMMARY

Client: Ecology and Environment, Inc. Job Number: 500-64525-2

Method	Analyst	Analyst ID
ASTM D422	Degree, Steven L	SLD

SAMPLE SUMMARY

Client: Ecology and Environment, Inc. Job Number: 500-64525-2

Lab Sample ID	Client Sample ID	Client Matrix	Date/Time Sampled	Date/Time Received
500-64525-1	RDM-1096-CS01	Solid	10/07/2013 1122	10/08/2013 1150
500-64525-2	RDM-1096-CS02	Solid	10/07/2013 1126	10/08/2013 1150
500-64525-3	RDM-1096-CS03	Solid	10/07/2013 1130	10/08/2013 1150
500-64525-4	RDM-1096-CS04	Solid	10/07/2013 1134	10/08/2013 1150

SAMPLE RESULTS

Client: Ecology and Environment, Inc. Job Number: 500-64525-2

Client Sample ID: **RDM-1096-CS01**

Lab Sample ID: 500-64525-1 Date Sampled: 10/07/2013 1122
Client Matrix: Solid Date Received: 10/08/2013 1150

D422 Grain Size

Analysis Method:	D422	Analysis Batch:	200-62722	Instrument ID:	D422_import
	N/A	Prep Batch:	N/A	Lab File ID:	500-64525-A-1.txt
Dilution:	1.0			Initial Weight/Volume:	197.65 g
Analysis Date:	10/10/2013 2153			Final Weight/Volume:	
Prep Date:	N/A				

Analyte	DryWt Corrected: N	Result (% Passing)	Qualifier	NONE	NONE
Sieve Size 3 inch - Percent Finer		100.0			
Sieve Size 2 inch - Percent Finer		100.0			
Sieve Size 1.5 inch - Percent Finer		100.0			
Sieve Size 1 inch - Percent Finer		100.0			
Sieve Size 0.75 inch - Percent Finer		100.0			
Sieve Size 0.375 inch - Percent Finer		66.5			
Sieve Size #4 - Percent Finer		49.7			
Sieve Size #10 - Percent Finer		38.6			
Sieve Size #20 - Percent Finer		32.3			
Sieve Size #40 - Percent Finer		26.7			
Sieve Size #60 - Percent Finer		22.2			
Sieve Size #80 - Percent Finer		20.0			
Sieve Size #100 - Percent Finer		18.6			
Sieve Size #200 - Percent Finer		14.6			
Hydrometer Reading 1 - Percent Finer		9.0			
Hydrometer Reading 2 - Percent Finer		7.1			
Hydrometer Reading 3 - Percent Finer		5.8			
Hydrometer Reading 4 - Percent Finer		4.4			
Hydrometer Reading 5 - Percent Finer		3.5			
Hydrometer Reading 6 - Percent Finer		1.7			
Hydrometer Reading 7 - Percent Finer		1.1			

Client: Ecology and Environment, Inc. Job Number: 500-64525-2

Client Sample ID: **RDM-1096-CS01**

Lab Sample ID: 500-64525-1 Date Sampled: 10/07/2013 1122
Client Matrix: Solid Date Received: 10/08/2013 1150

D422 Grain Size

Analysis Method:	D422	Analysis Batch:	200-62722	Instrument ID:	D422_import
	N/A	Prep Batch:	N/A	Lab File ID:	500-64525-A-1.txt
Dilution:	1.0			Initial Weight/Volume:	197.65 g
Analysis Date:	10/10/2013 2153			Final Weight/Volume:	
Prep Date:	N/A				

Analyte	DryWt Corrected: N	Result (%)	Qualifier	NONE	NONE
Gravel		50.3			
Sand		35.1			
Coarse Sand		11.1			
Medium Sand		11.9			
Fine Sand		12.1			
Silt		11.1			
Clay		3.5			

Client: Ecology and Environment, Inc. Job Number: 500-64525-2

Client Sample ID: **RDM-1096-CS01**

Lab Sample ID: 500-64525-1 Date Sampled: 10/07/2013 1122
Client Matrix: Solid Date Received: 10/08/2013 1150

D422 Grain Size

Analysis Method:	D422	Analysis Batch:	200-62722	Instrument ID:	D422_import
	N/A	Prep Batch:	N/A	Lab File ID:	500-64525-A-1.txt
Dilution:	1.0			Initial Weight/Volume:	197.65 g
Analysis Date:	10/10/2013 2153			Final Weight/Volume:	
Prep Date:	N/A				

Analyte	DryWt Corrected: N	Result (um)	Qualifier	NONE	NONE
Hydrometer Reading 1 - Particle Size		33.2			
Hydrometer Reading 2 - Particle Size		21.4			
Hydrometer Reading 3 - Particle Size		12.6			
Hydrometer Reading 4 - Particle Size		9.0			
Hydrometer Reading 5 - Particle Size		6.5			
Hydrometer Reading 6 - Particle Size		3.2			
Hydrometer Reading 7 - Particle Size		1.4			

Client: Ecology and Environment, Inc. Job Number: 500-64525-2

Client Sample ID: **RDM-1096-CS02**

Lab Sample ID: 500-64525-2 Date Sampled: 10/07/2013 1126
Client Matrix: Solid Date Received: 10/08/2013 1150

D422 Grain Size

Analysis Method:	D422	Analysis Batch:	200-62722	Instrument ID:	D422_import
	N/A	Prep Batch:	N/A	Lab File ID:	500-64525-A-2.txt
Dilution:	1.0			Initial Weight/Volume:	191.64 g
Analysis Date:	10/10/2013 2155			Final Weight/Volume:	
Prep Date:	N/A				

Analyte	DryWt Corrected: N	Result (% Passing)	Qualifier	NONE	NONE
Sieve Size 3 inch - Percent Finer		100.0			
Sieve Size 2 inch - Percent Finer		100.0			
Sieve Size 1.5 inch - Percent Finer		100.0			
Sieve Size 1 inch - Percent Finer		100.0			
Sieve Size 0.75 inch - Percent Finer		89.2			
Sieve Size 0.375 inch - Percent Finer		69.7			
Sieve Size #4 - Percent Finer		52.7			
Sieve Size #10 - Percent Finer		39.5			
Sieve Size #20 - Percent Finer		33.1			
Sieve Size #40 - Percent Finer		28.4			
Sieve Size #60 - Percent Finer		24.6			
Sieve Size #80 - Percent Finer		22.6			
Sieve Size #100 - Percent Finer		21.3			
Sieve Size #200 - Percent Finer		17.6			
Hydrometer Reading 1 - Percent Finer		11.2			
Hydrometer Reading 2 - Percent Finer		9.4			
Hydrometer Reading 3 - Percent Finer		8.1			
Hydrometer Reading 4 - Percent Finer		6.2			
Hydrometer Reading 5 - Percent Finer		4.9			
Hydrometer Reading 6 - Percent Finer		3.5			
Hydrometer Reading 7 - Percent Finer		2.0			

Client: Ecology and Environment, Inc. Job Number: 500-64525-2

Client Sample ID: **RDM-1096-CS02**

Lab Sample ID: 500-64525-2 Date Sampled: 10/07/2013 1126
Client Matrix: Solid Date Received: 10/08/2013 1150

D422 Grain Size

Analysis Method:	D422	Analysis Batch:	200-62722	Instrument ID:	D422_import
	N/A	Prep Batch:	N/A	Lab File ID:	500-64525-A-2.txt
Dilution:	1.0			Initial Weight/Volume:	191.64 g
Analysis Date:	10/10/2013 2155			Final Weight/Volume:	
Prep Date:	N/A				

Analyte	DryWt Corrected: N	Result (%)	Qualifier	NONE	NONE
Gravel		47.3			
Sand		35.1			
Coarse Sand		13.2			
Medium Sand		11.1			
Fine Sand		10.8			
Silt		12.7			
Clay		4.9			

Client: Ecology and Environment, Inc. Job Number: 500-64525-2

Client Sample ID: **RDM-1096-CS02**

Lab Sample ID: 500-64525-2 Date Sampled: 10/07/2013 1126
Client Matrix: Solid Date Received: 10/08/2013 1150

D422 Grain Size

Analysis Method:	D422	Analysis Batch:	200-62722	Instrument ID:	D422_import
	N/A	Prep Batch:	N/A	Lab File ID:	500-64525-A-2.txt
Dilution:	1.0			Initial Weight/Volume:	191.64 g
Analysis Date:	10/10/2013 2155			Final Weight/Volume:	
Prep Date:	N/A				

Analyte	DryWt Corrected: N	Result (um)	Qualifier	NONE	NONE
Hydrometer Reading 1 - Particle Size		32.3			
Hydrometer Reading 2 - Particle Size		20.9			
Hydrometer Reading 3 - Particle Size		12.3			
Hydrometer Reading 4 - Particle Size		8.8			
Hydrometer Reading 5 - Particle Size		6.5			
Hydrometer Reading 6 - Particle Size		3.1			
Hydrometer Reading 7 - Particle Size		1.3			

Client: Ecology and Environment, Inc. Job Number: 500-64525-2

Client Sample ID: **RDM-1096-CS03**

Lab Sample ID: 500-64525-3 Date Sampled: 10/07/2013 1130
Client Matrix: Solid Date Received: 10/08/2013 1150

D422 Grain Size

Analysis Method:	D422	Analysis Batch:	200-62722	Instrument ID:	D422_import
	N/A	Prep Batch:	N/A	Lab File ID:	500-64525-A-3.txt
Dilution:	1.0			Initial Weight/Volume:	196.21 g
Analysis Date:	10/10/2013 2156			Final Weight/Volume:	
Prep Date:	N/A				

Analyte	DryWt Corrected: N	Result (% Passing)	Qualifier	NONE	NONE
Sieve Size 3 inch - Percent Finer		100.0			
Sieve Size 2 inch - Percent Finer		100.0			
Sieve Size 1.5 inch - Percent Finer		100.0			
Sieve Size 1 inch - Percent Finer		100.0			
Sieve Size 0.75 inch - Percent Finer		100.0			
Sieve Size 0.375 inch - Percent Finer		63.8			
Sieve Size #4 - Percent Finer		52.0			
Sieve Size #10 - Percent Finer		40.0			
Sieve Size #20 - Percent Finer		34.5			
Sieve Size #40 - Percent Finer		29.5			
Sieve Size #60 - Percent Finer		25.5			
Sieve Size #80 - Percent Finer		23.5			
Sieve Size #100 - Percent Finer		22.2			
Sieve Size #200 - Percent Finer		18.6			
Hydrometer Reading 1 - Percent Finer		10.2			
Hydrometer Reading 2 - Percent Finer		8.4			
Hydrometer Reading 3 - Percent Finer		6.6			
Hydrometer Reading 4 - Percent Finer		5.3			
Hydrometer Reading 5 - Percent Finer		3.9			
Hydrometer Reading 6 - Percent Finer		2.5			
Hydrometer Reading 7 - Percent Finer		1.6			

Client: Ecology and Environment, Inc. Job Number: 500-64525-2

Client Sample ID: **RDM-1096-CS03**

Lab Sample ID: 500-64525-3 Date Sampled: 10/07/2013 1130
Client Matrix: Solid Date Received: 10/08/2013 1150

D422 Grain Size

Analysis Method:	D422	Analysis Batch:	200-62722	Instrument ID:	D422_import
	N/A	Prep Batch:	N/A	Lab File ID:	500-64525-A-3.txt
Dilution:	1.0			Initial Weight/Volume:	196.21 g
Analysis Date:	10/10/2013 2156			Final Weight/Volume:	
Prep Date:	N/A				

Analyte	DryWt Corrected: N	Result (%)	Qualifier	NONE	NONE
Gravel		48.0			
Sand		33.4			
Coarse Sand		12.0			
Medium Sand		10.5			
Fine Sand		10.9			
Silt		14.7			
Clay		3.9			

Client: Ecology and Environment, Inc. Job Number: 500-64525-2

Client Sample ID: **RDM-1096-CS03**

Lab Sample ID: 500-64525-3 Date Sampled: 10/07/2013 1130
Client Matrix: Solid Date Received: 10/08/2013 1150

D422 Grain Size

Analysis Method:	D422	Analysis Batch:	200-62722	Instrument ID:	D422_import
	N/A	Prep Batch:	N/A	Lab File ID:	500-64525-A-3.txt
Dilution:	1.0			Initial Weight/Volume:	196.21 g
Analysis Date:	10/10/2013 2156			Final Weight/Volume:	
Prep Date:	N/A				

Analyte	DryWt Corrected: N	Result (um)	Qualifier	NONE	NONE
Hydrometer Reading 1 - Particle Size		32.7			
Hydrometer Reading 2 - Particle Size		21.1			
Hydrometer Reading 3 - Particle Size		12.4			
Hydrometer Reading 4 - Particle Size		9.1			
Hydrometer Reading 5 - Particle Size		6.5			
Hydrometer Reading 6 - Particle Size		3.2			
Hydrometer Reading 7 - Particle Size		1.4			

Client: Ecology and Environment, Inc. Job Number: 500-64525-2

Client Sample ID: **RDM-1096-CS04**

Lab Sample ID: 500-64525-4 Date Sampled: 10/07/2013 1134
Client Matrix: Solid Date Received: 10/08/2013 1150

D422 Grain Size

Analysis Method:	D422	Analysis Batch:	200-62722	Instrument ID:	D422_import
	N/A	Prep Batch:	N/A	Lab File ID:	500-64525-A-4.txt
Dilution:	1.0			Initial Weight/Volume:	190.15 g
Analysis Date:	10/10/2013 2158			Final Weight/Volume:	
Prep Date:	N/A				

Analyte	DryWt Corrected: N	Result (% Passing)	Qualifier	NONE	NONE
Sieve Size 3 inch - Percent Finer		100.0			
Sieve Size 2 inch - Percent Finer		100.0			
Sieve Size 1.5 inch - Percent Finer		100.0			
Sieve Size 1 inch - Percent Finer		100.0			
Sieve Size 0.75 inch - Percent Finer		85.9			
Sieve Size 0.375 inch - Percent Finer		67.1			
Sieve Size #4 - Percent Finer		54.3			
Sieve Size #10 - Percent Finer		44.9			
Sieve Size #20 - Percent Finer		39.2			
Sieve Size #40 - Percent Finer		34.3			
Sieve Size #60 - Percent Finer		30.1			
Sieve Size #80 - Percent Finer		27.9			
Sieve Size #100 - Percent Finer		26.4			
Sieve Size #200 - Percent Finer		22.2			
Hydrometer Reading 1 - Percent Finer		12.1			
Hydrometer Reading 2 - Percent Finer		9.9			
Hydrometer Reading 3 - Percent Finer		8.1			
Hydrometer Reading 4 - Percent Finer		6.2			
Hydrometer Reading 5 - Percent Finer		5.3			
Hydrometer Reading 6 - Percent Finer		3.5			
Hydrometer Reading 7 - Percent Finer		2.5			

Client: Ecology and Environment, Inc. Job Number: 500-64525-2

Client Sample ID: **RDM-1096-CS04**

Lab Sample ID: 500-64525-4 Date Sampled: 10/07/2013 1134
Client Matrix: Solid Date Received: 10/08/2013 1150

D422 Grain Size

Analysis Method:	D422	Analysis Batch:	200-62722	Instrument ID:	D422_import
	N/A	Prep Batch:	N/A	Lab File ID:	500-64525-A-4.txt
Dilution:	1.0			Initial Weight/Volume:	190.15 g
Analysis Date:	10/10/2013 2158			Final Weight/Volume:	
Prep Date:	N/A				

Analyte	DryWt Corrected: N	Result (%)	Qualifier	NONE	NONE
Gravel		45.7			
Sand		32.1			
Coarse Sand		9.4			
Medium Sand		10.6			
Fine Sand		12.1			
Silt		16.9			
Clay		5.3			

Client: Ecology and Environment, Inc. Job Number: 500-64525-2

Client Sample ID: **RDM-1096-CS04**

Lab Sample ID: 500-64525-4 Date Sampled: 10/07/2013 1134
Client Matrix: Solid Date Received: 10/08/2013 1150

D422 Grain Size

Analysis Method:	D422	Analysis Batch:	200-62722	Instrument ID:	D422_import
	N/A	Prep Batch:	N/A	Lab File ID:	500-64525-A-4.txt
Dilution:	1.0			Initial Weight/Volume:	190.15 g
Analysis Date:	10/10/2013 2158			Final Weight/Volume:	
Prep Date:	N/A				

Analyte	DryWt Corrected: N	Result (um)	Qualifier	NONE	NONE
Hydrometer Reading 1 - Particle Size		32.0			
Hydrometer Reading 2 - Particle Size		20.8			
Hydrometer Reading 3 - Particle Size		12.3			
Hydrometer Reading 4 - Particle Size		9.0			
Hydrometer Reading 5 - Particle Size		6.2			
Hydrometer Reading 6 - Particle Size		3.2			
Hydrometer Reading 7 - Particle Size		1.3			

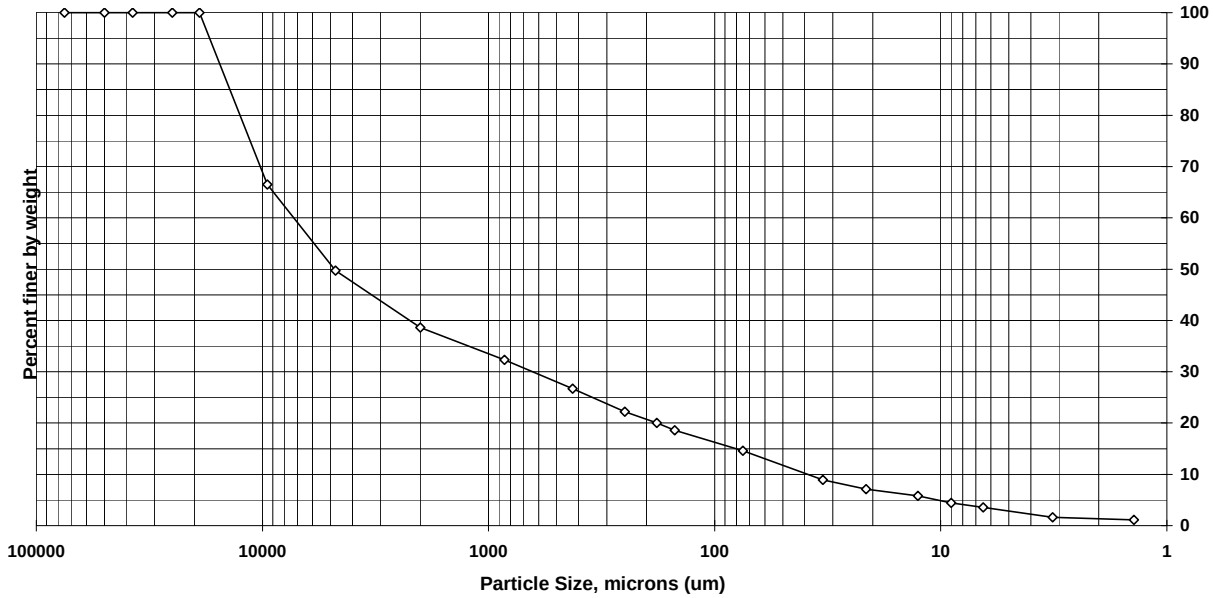
Particle Size of Soils by ASTM D422

				Date Received:	10/8/2013
Sample ID:	RDM-1096-CS01	**Percent Solids:**	90.2%	**Start Date:**	10/10/2013
Lab ID:	500-64525-A-1	**Specific Gravity:**	2.650	**End Date:**	10/14/2013

Shape (> #10): angular

Non-soil material: plant

Hardness (> #10): hard



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	66.5	33.5
#4	4750	49.7	16.8
#10	2000	38.6	11.1
#20	850	32.3	6.3
#40	425	26.7	5.6
#60	250	22.2	4.5
#80	180	20.0	2.2
#100	150	18.6	1.4
#200	75	14.6	4.0
Hyd1	33.2	9.0	5.6
Hyd2	21.4	7.1	1.8
Hyd3	12.6	5.8	1.3
Hyd4	9	4.4	1.4
Hyd5	6.5	3.5	0.9
Hyd6	3.2	1.7	1.9
Hyd7	1.4	1.1	0.5

Soil Classification	Percent of sample
Gravel	50.3
Sand	35.1
Coarse Sand	11.1
Medium Sand	11.9
Fine Sand	12.1
Silt	11.1
Clay	3.5

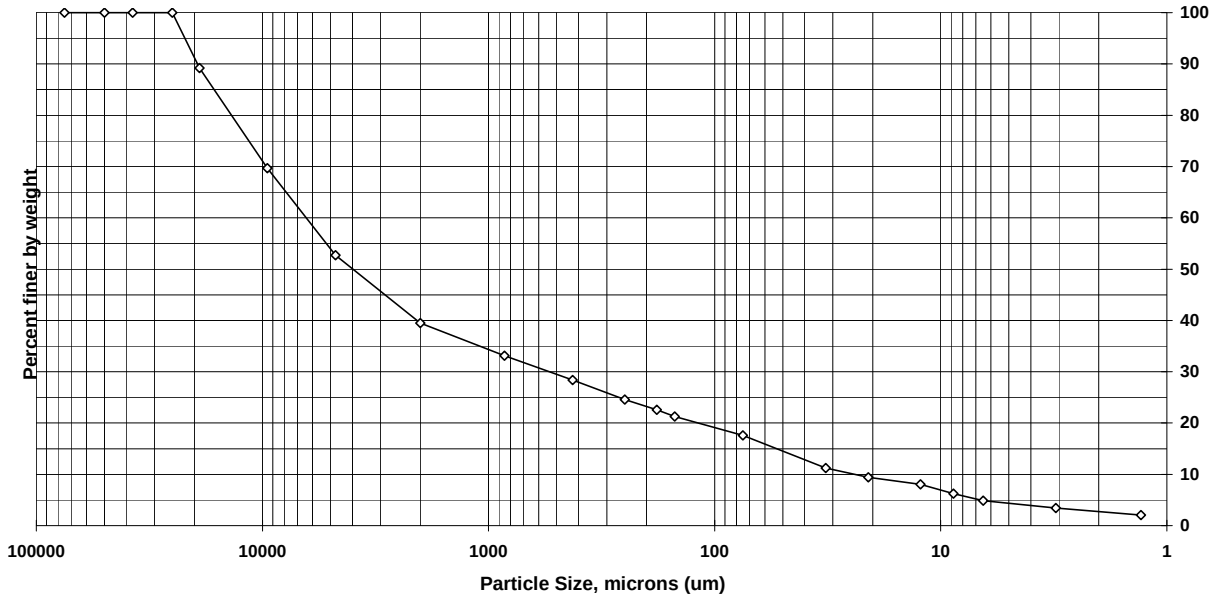
Particle Size of Soils by ASTM D422

				Date Received:	10/8/2013
Sample ID:	RDM-1096-CS02	**Percent Solids:**	92.6%	**Start Date:**	10/10/2013
Lab ID:	500-64525-A-2	**Specific Gravity:**	2.650	**End Date:**	10/14/2013

Shape (> #10): angular

Non-soil material: plant

Hardness (> #10): hard



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	89.2	10.8
3/8 inch	9500	69.7	19.5
#4	4750	52.7	17.0
#10	2000	39.5	13.2
#20	850	33.1	6.4
#40	425	28.4	4.7
#60	250	24.6	3.8
#80	180	22.6	2.0
#100	150	21.3	1.3
#200	75	17.6	3.7
Hyd1	32.3	11.2	6.4
Hyd2	20.9	9.4	1.8
Hyd3	12.3	8.1	1.4
Hyd4	8.8	6.2	1.8
Hyd5	6.5	4.9	1.3
Hyd6	3.1	3.5	1.4
Hyd7	1.3	2.0	1.4

Soil Classification	Percent of sample
Gravel	47.3
Sand	35.1
Coarse Sand	13.2
Medium Sand	11.1
Fine Sand	10.8
Silt	12.7
Clay	4.9

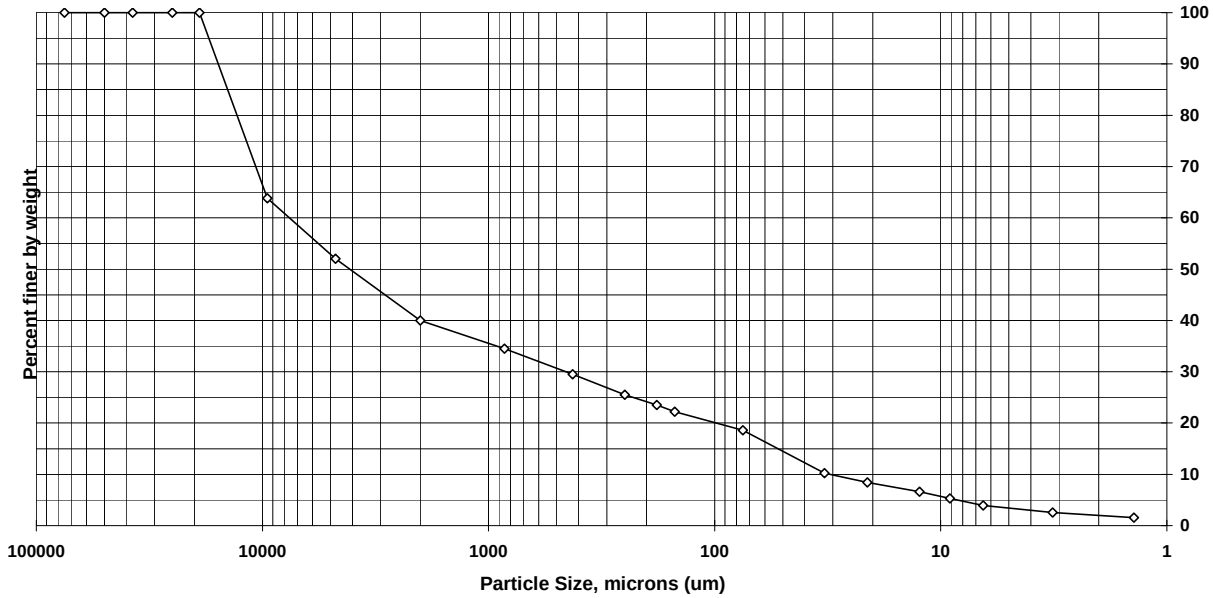
Particle Size of Soils by ASTM D422

				Date Received:	10/8/2013
Sample ID:	RDM-1096-CS03	**Percent Solids:**	91.6%	**Start Date:**	10/10/2013
Lab ID:	500-64525-A-3	**Specific Gravity:**	2.650	**End Date:**	10/14/2013

Shape (> #10): angular

Non-soil material: n/a

Hardness (> #10): hard



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	63.8	36.2
#4	4750	52.0	11.8
#10	2000	40.0	12.0
#20	850	34.5	5.5
#40	425	29.5	5.0
#60	250	25.5	4.0
#80	180	23.5	2.0
#100	150	22.2	1.3
#200	75	18.6	3.6
Hyd1	32.7	10.2	8.4
Hyd2	21.1	8.4	1.8
Hyd3	12.4	6.6	1.8
Hyd4	9.1	5.3	1.3
Hyd5	6.5	3.9	1.3
Hyd6	3.2	2.5	1.4
Hyd7	1.4	1.6	1.0

Soil Classification	Percent of sample
Gravel	48.0
Sand	33.4
Coarse Sand	12.0
Medium Sand	10.5
Fine Sand	10.9
Silt	14.7
Clay	3.9

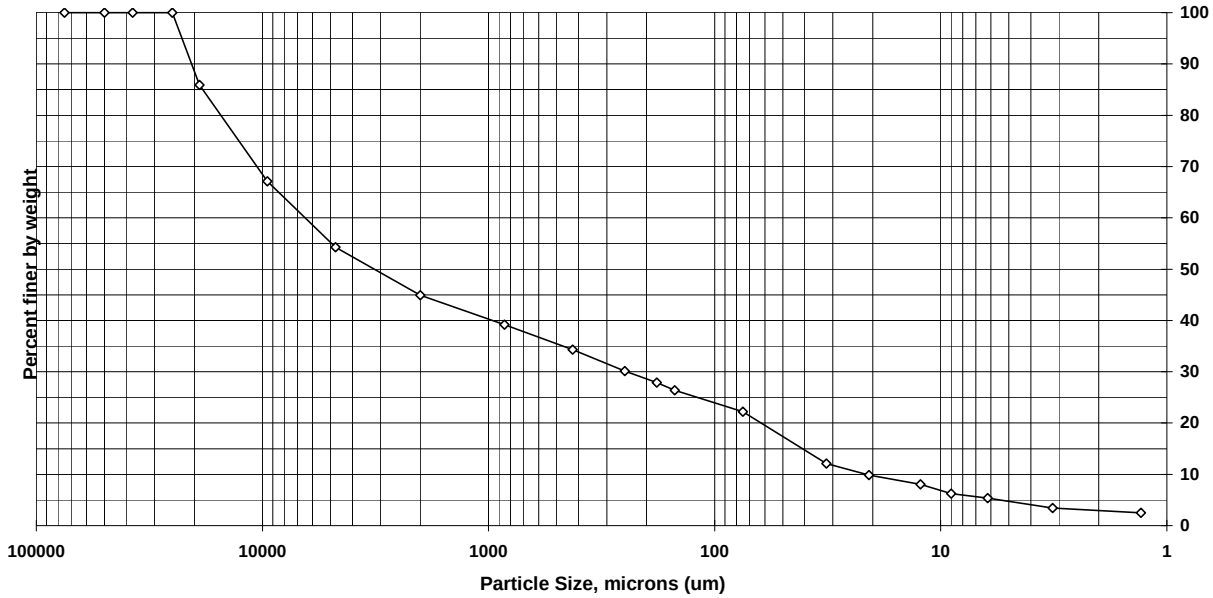
Particle Size of Soils by ASTM D422

				Date Received:	10/8/2013
Sample ID:	RDM-1096-CS04	**Percent Solids:**	93.9%	**Start Date:**	10/10/2013
Lab ID:	500-64525-A-4	**Specific Gravity:**	2.650	**End Date:**	10/14/2013

Shape (> #10): angular

Non-soil material: n/a

Hardness (> #10): hard



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	85.9	14.1
3/8 inch	9500	67.1	18.8
#4	4750	54.3	12.8
#10	2000	44.9	9.4
#20	850	39.2	5.7
#40	425	34.3	4.9
#60	250	30.1	4.2
#80	180	27.9	2.2
#100	150	26.4	1.5
#200	75	22.2	4.2
Hyd1	32	12.1	10.1
Hyd2	20.8	9.9	2.3
Hyd3	12.3	8.1	1.8
Hyd4	9	6.2	1.8
Hyd5	6.2	5.3	0.9
Hyd6	3.2	3.5	1.9
Hyd7	1.3	2.5	1.0

Soil Classification	Percent of sample
Gravel	45.7
Sand	32.1
Coarse Sand	9.4
Medium Sand	10.6
Fine Sand	12.1
Silt	16.9
Clay	5.3

Sediment Grain Size - D422

Client	
Client Sample ID	RDM-1096-CS01
Lab Sample ID	500-64525-A-1

Date Received	10/8/2013
Start Date	10/10/2013 21:53
End Date	10/14/2013 16:18

Dry Weight Determination

Tin Weight	1.03	g
Wet Sample + Tin	20.66	g
Dry Sample + Tin	18.74	g
% Moisture	9.78	%

Non-soil material:	plant
Shape (> #10):	angular
Hardness (> #10):	hard

Date/Time in oven	10/10/2013 21:54
Date/Time out of oven	10/11/2013 14:31

Sample Weights	Tare (g)	Pan+Samp (g)	Samp (g)
Sample Weight (Wet)		197.65	197.65
Sample Weight (Oven Dried)			178

Sample Split (oven dried)	Tare (g)	Pan+Samp (g)	Samp (g)
Sample >=#10			109
Sample <#10			69
% Passing #10			34.9

Hydrometer Data

Serial Number	540534
Calib. Date (mm/dd/yyyy)	03/12/2013
Low Temp (C)	17.0
Reading at Low Temp	1.0050
High Temp (C)	23.0
Reading at High Temp	1.0040
Hydrometer Cal Slope	-0.000166667
Hydrometer Cal Intercept	1.007833333
Default Soil Gravity	2.6500

Gravel/Sand Fraction (Sieves)

Sample Fraction	Size (um)	Pan Tare (g)	Pan+Sample (g)	Sample		% Finer	Classification	Sub Class
3 inch	75000			0.00	g	100.0	Gravel	
2 inch	50000			0.00	g	100.0	Gravel	
1.5 inch	37500			0.00	g	100.0	Gravel	
1 inch	25000			0.00	g	100.0	Gravel	
3/4 inch	19000			0.00	g	100.0	Gravel	
3/8 inch	9500	447.40	507.01	59.61	g	66.5	Gravel	
#4	4750	488.16	518.06	29.90	g	49.7	Gravel	
#10	2000	462.80	482.49	19.69	g	38.6	Sand	Coarse
#20	850	381.18	392.46	11.28	g	32.3	Sand	Medium
#40	425	352.71	362.71	10.00	g	26.7	Sand	Medium
#60	250	350.79	358.81	8.02	g	22.2	Sand	Fine
#80	180	329.99	333.89	3.90	g	20.0	Sand	Fine
#100	150	327.03	329.57	2.54	g	18.6	Sand	Fine
#200	75	306.18	313.29	7.11	g	14.6	Sand	Fine
				0.00	g	14.6		

Adjusted Hydrometer Sample Mass

Hydrometer Sample Mass (g)	178

Silt/Clay Fraction (Hydrometer Test)

Hydrometer Test Time (min)	Actual	Spec. Gravity	Temp C	Particle Size (Micron)	% Finer	Classification	Sub Class
2	2	1.0140	22.5	33.2	8.95	Silt	
5	5	1.0120	22.5	21.4	7.14	Silt	
15	15	1.0105	22.5	12.6	5.79	Silt	
30	30	1.0090	22.5	9	4.44	Silt	
60	59	1.0080	22.5	6.5	3.53	Silt	
250	256	1.0060	22.0	3.2	1.65	Clay	
1440	1440	1.0055	21.5	1.4	1.13	Clay	

Sediment Grain Size - D422

Client	
Client Sample ID	RDM-1096-CS02
Lab Sample ID	500-64525-A-2

Date Received	10/8/2013
Start Date	10/10/2013 21:55
End Date	10/14/2013 16:10

Dry Weight Determination

Tin Weight	0.99	g
Wet Sample + Tin	34.10	g
Dry Sample + Tin	31.66	g
% Moisture	7.37	%

Non-soil material:	plant
Shape (> #10):	angular
Hardness (> #10):	hard

Date/Time in oven	10/10/2013 21:56
Date/Time out of oven	10/11/2013 14:33

Sample Weights	Tare (g)	Pan+Samp (g)	Samp (g)
Sample Weight (Wet)		191.64	191.64
Sample Weight (Oven Dried)			178

Sample Split (oven dried)	Tare (g)	Pan+Samp (g)	Samp (g)
Sample >=#10			108
Sample <#10			70
% Passing #10			36.5

Hydrometer Data

Serial Number	540534
Calib. Date (mm/dd/yyyy)	03/12/2013
Low Temp (C)	17.0
Reading at Low Temp	1.0050
High Temp (C)	23.0
Reading at High Temp	1.0040
Hydrometer Cal Slope	-0.000166667
Hydrometer Cal Intercept	1.007833333
Default Soil Gravity	2.6500

Gravel/Sand Fraction (Sieves)

Sample Fraction	Size (um)	Pan Tare (g)	Pan+Sample (g)	Sample		% Finer	Classification	Sub Class
3 inch	75000			0.00	g	100.0	Gravel	
2 inch	50000			0.00	g	100.0	Gravel	
1.5 inch	37500			0.00	g	100.0	Gravel	
1 inch	25000			0.00	g	100.0	Gravel	
3/4 inch	19000	457.75	477.04	19.29	g	89.2	Gravel	
3/8 inch	9500	447.40	482.12	34.72	g	69.7	Gravel	
#4	4750	488.16	518.44	30.28	g	52.7	Gravel	
#10	2000	462.80	486.33	23.53	g	39.5	Sand	Coarse
#20	850	389.92	401.30	11.38	g	33.1	Sand	Medium
#40	425	355.01	363.39	8.38	g	28.4	Sand	Medium
#60	250	346.03	352.77	6.74	g	24.6	Sand	Fine
#80	180	331.89	335.42	3.53	g	22.6	Sand	Fine
#100	150	331.23	333.60	2.37	g	21.3	Sand	Fine
#200	75	320.62	327.21	6.59	g	17.6	Sand	Fine
				0.00	g	17.6		

Adjusted Hydrometer Sample Mass

Hydrometer Sample Mass (g)	178

Silt/Clay Fraction (Hydrometer Test)

Hydrometer Test Time (min)	Actual	Spec. Gravity	Temp C	Particle Size (Micron)	% Finer	Classification	Sub Class
2	2	1.0165	22.5	32.3	11.2	Silt	
5	5	1.0145	22.5	20.9	9.4	Silt	
15	15	1.0130	22.5	12.3	8.05	Silt	
30	30	1.0110	22.5	8.8	6.24	Silt	
60	58	1.0095	22.5	6.5	4.89	Silt	
250	256	1.0080	22.0	3.1	3.46	Clay	
1440	1440	1.0065	21.5	1.3	2.03	Clay	

Sediment Grain Size - D422

Client	
Client Sample ID	RDM-1096-CS03
Lab Sample ID	500-64525-A-3

Date Received	10/8/2013
Start Date	10/10/2013 21:56
End Date	10/14/2013 16:22

Dry Weight Determination

Tin Weight	0.98	g
Wet Sample + Tin	20.34	g
Dry Sample + Tin	18.71	g
% Moisture	8.42	%

Non-soil material:	n/a
Shape (> #10):	angular
Hardness (> #10):	hard

Date/Time in oven	10/10/2013 21:58
Date/Time out of oven	10/11/2013 14:33

Sample Weights	Tare (g)	Pan+Samp (g)	Samp (g)
Sample Weight (Wet)		196.21	196.21
Sample Weight (Oven Dried)			180

Sample Split (oven dried)	Tare (g)	Pan+Samp (g)	Samp (g)
Sample >=#10			108
Sample <#10			72
% Passing #10			36.7

Hydrometer Data

Serial Number	540534
Calib. Date (mm/dd/yyyy)	03/12/2013
Low Temp (C)	17.0
Reading at Low Temp	1.0050
High Temp (C)	23.0
Reading at High Temp	1.0040
Hydrometer Cal Slope	-0.000166667
Hydrometer Cal Intercept	1.007833333
Default Soil Gravity	2.6500

Gravel/Sand Fraction (Sieves)

Sample Fraction	Size (um)	Pan Tare (g)	Pan+Sample (g)	Sample		% Finer	Classification	Sub Class
3 inch	75000			0.00	g	100.0	Gravel	
2 inch	50000			0.00	g	100.0	Gravel	
1.5 inch	37500			0.00	g	100.0	Gravel	
1 inch	25000			0.00	g	100.0	Gravel	
3/4 inch	19000			0.00	g	100.0	Gravel	
3/8 inch	9500	447.40	512.52	65.12	g	63.8	Gravel	
#4	4750	488.16	509.43	21.27	g	52.0	Gravel	
#10	2000	462.80	484.42	21.62	g	40.0	Sand	Coarse
#20	850	381.18	391.04	9.86	g	34.5	Sand	Medium
#40	425	352.71	361.71	9.00	g	29.5	Sand	Medium
#60	250	350.79	358.00	7.21	g	25.5	Sand	Fine
#80	180	329.99	333.62	3.63	g	23.5	Sand	Fine
#100	150	327.03	329.43	2.40	g	22.2	Sand	Fine
#200	75	306.18	312.65	6.47	g	18.6	Sand	Fine
				0.00	g	18.6		

Adjusted Hydrometer Sample Mass

Hydrometer Sample Mass (g)	180

Silt/Clay Fraction (Hydrometer Test)

Hydrometer Test Time (min)	Actual	Spec. Gravity	Temp C	Particle Size (Micron)	% Finer	Classification	Sub Class
2	2	1.0155	22.5	32.7	10.2	Silt	
5	5	1.0135	22.5	21.1	8.4	Silt	
15	15	1.0115	22.5	12.4	6.62	Silt	
30	29	1.0100	22.5	9.1	5.28	Silt	
60	58	1.0085	22.5	6.5	3.94	Silt	
250	250	1.0070	22.0	3.2	2.53	Clay	
1440	1434	1.0060	21.5	1.4	1.56	Clay	

TestAmerica Burlington

Sediment Grain Size - D422

Client	
Client Sample ID	RDM-1096-CS04
Lab Sample ID	500-64525-A-4

Date Received	10/8/2013
Start Date	10/10/2013 21:58
End Date	10/14/2013 16:22

Dry Weight Determination

Tin Weight	0.99	g
Wet Sample + Tin	34.35	g
Dry Sample + Tin	32.30	g
% Moisture	6.15	%

Non-soil material:	n/a
Shape (> #10):	angular
Hardness (> #10):	hard

Date/Time in oven	10/10/2013 21:59
Date/Time out of oven	10/11/2013 14:33

Sample Weights	Tare (g)	Pan+Samp (g)	Samp (g)
Sample Weight (Wet)		190.15	190.15
Sample Weight (Oven Dried)			178

Sample Split (oven dried)	Tare (g)	Pan+Samp (g)	Samp (g)
Sample >=#10			98.2
Sample <#10			79.8
% Passing #10			42

Hydrometer Data

Serial Number	540534
Calib. Date (mm/dd/yyyy)	03/12/2013
Low Temp (C)	17.0
Reading at Low Temp	1.0050
High Temp (C)	23.0
Reading at High Temp	1.0040
Hydrometer Cal Slope	-0.000166667
Hydrometer Cal Intercept	1.007833333
Default Soil Gravity	2.6500

Gravel/Sand Fraction (Sieves)

Sample Fraction	Size (um)	Pan Tare (g)	Pan+Sample (g)	Sample		% Finer	Classification	Sub Class
3 inch	75000			0.00	g	100.0	Gravel	
2 inch	50000			0.00	g	100.0	Gravel	
1.5 inch	37500			0.00	g	100.0	Gravel	
1 inch	25000			0.00	g	100.0	Gravel	
3/4 inch	19000	457.77	482.89	25.12	g	85.9	Gravel	
3/8 inch	9500	447.40	480.91	33.51	g	67.1	Gravel	
#4	4750	488.16	511.00	22.84	g	54.3	Gravel	
#10	2000	462.80	479.55	16.75	g	44.9	Sand	Coarse
#20	850	389.92	400.00	10.08	g	39.2	Sand	Medium
#40	425	355.01	363.80	8.79	g	34.3	Sand	Medium
#60	250	346.03	353.50	7.47	g	30.1	Sand	Fine
#80	180	331.89	335.81	3.92	g	27.9	Sand	Fine
#100	150	331.23	333.92	2.69	g	26.4	Sand	Fine
#200	75	320.62	328.04	7.42	g	22.2	Sand	Fine
				0.00	g	22.2		

Adjusted Hydrometer Sample Mass

Hydrometer Sample Mass (g)	178

Silt/Clay Fraction (Hydrometer Test)

Hydrometer Test Time (min)	Actual	Spec. Gravity	Temp C	Particle Size (Micron)	% Finer	Classification	Sub Class
2	2	1.0175	22.5	32	12.1	Silt	
5	5	1.0150	22.5	20.8	9.85	Silt	
15	15	1.0130	22.5	12.3	8.05	Silt	
30	29	1.0110	22.5	9	6.24	Silt	
60	63	1.0100	22.5	6.2	5.34	Silt	
250	250	1.0080	22.0	3.2	3.46	Clay	
1440	1434	1.0070	21.5	1.3	2.48	Clay	

DATA REPORTING QUALIFIERS

Lab Section	Qualifier	Description

QUALITY CONTROL RESULTS

Client: Ecology and Environment, Inc. Job Number: 500-64525-2

QC Association Summary

Lab Sample ID	Client Sample ID	Report Basis	Client Matrix	Method	Prep Batch
Geotechnical					
Analysis Batch:200-62722					
500-64525-1	RDM-1096-CS01	T	Solid	D422	
500-64525-2	RDM-1096-CS02	T	Solid	D422	
500-64525-3	RDM-1096-CS03	T	Solid	D422	
500-64525-4	RDM-1096-CS04	T	Solid	D422	

Report Basis
T = Total

TestAmerica

THE LEADER IN ENVIRONMENTAL T

2417 Bond Street, University Park, IL 6048
Phone: 708.534.5200 Fax: 708.534.5

500-64525 COC

Chain of Custody Record

Lab Job #: 500-64525

Chain of Custody Number:

Page _____ of _____

Temperature °C of Cooler: 3.4

Report To (optional)		Bill To (optional)	
Contact:	Neil Brown	Contact:	
Company:	E+E	Company:	
Address:	33 W Monroe St, Ste 1410	Address:	
Address:	Chicago, IL 60603	Address:	
Phone:	312-578-9243	Phone:	
Fax:	312-578-9345	Fax:	
E-Mail:	nbrown@ene.com	PO#/Reference#	

Client	Client Project #
Ecology and Environment	EE-001096-0070-17-03TTO
Project Name	
RDM Treatability Study	
Project Location/State	Lab Project #
AK	
Sampler	Lab PM
Bill Sass	

Preservative Key
1. HCL, Cool to 4°
2. H2SO4, Cool to 4°
3. HNO3, Cool to 4°
4. NaOH, Cool to 4°
5. NaOH/Zn, Cool to 4°
6. NaHSO4
7. Cool to 4°
8. None
9. Other

Lab ID	MS/MSD	Sample ID	Sampling Date	Sampling Time	# of Containers	Matrix	Total Arsenic (6010B)	Total Mercury (7471)	Bulk Density (ASTM D-5057-10)	Percent Moisture	Comments
1		RDM-1096-CS01	10/7/13	1122	2	SO	X	X	X	X	Hg vapor >37K ng/m3
2		RDM-1096-CS02		1126	2	SO	X	X	X	X	Hg vapor 70 ng/m3
3		RDM-1096-CS03		1130	2	SO	X	X	X	X	Hg vapor 112 ng/m3
4		RDM-1096-CS04		1134	2	SO	X	X	X	X	Hg vapor 56 ng/m3
											1455 10/7/13
											BKG Hg vapor = 24 ng/m3

10/7/13

Turnaround Time Required (Business Days)

___ 1 Day ___ 2 Days ___ 5 Days ___ 7 Days X 10 Days ___ 15 Days _____ Other

Requested Due Date _____

Sample Disposal

[ ] Return to Client [X] Disposal by Lab [ ] Archive for _____ Months (A fee may be assessed if samples are retained longer than 1 month)

Relinquished By	Company	Date	Time	Received By	Company	Date	Time
	E+E	10/8/13	946		TA	10/8/13	946
	TA	10/8/13	1150		TA-CHI	10/8/13	1150

Lab Courier TA

Shipped

Hand Delivered

Matrix Key

WW – Wastewater	SE – Sediment
W – Water	SO – Soil
S – Soil	L – Leachate
SL – Sludge	WI – Wipe
MS – Miscellaneous	DW – Drinking Water
OL – Oil	O – Other
A – Air	

Client Comments

Lab Comments:

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

2417 Bond Street, University Park, IL 60484
Phone: 708.534.5200 Fax: 708.534.5211

Chain of Custody Record

Lab Job #: 500-64625

Chain of Custody Number:

Page _____ of _____

Temperature °C of Cooler: 3.4

(optional) Report To		(optional) Bill To	
Contact:	Neil Brown	Contact:	
Company:	E+E	Company:	
Address:	33 W. Monroe St., Ste 1410	Address:	
Address:	Chicago, IL 60603	Address:	
Phone:	312-578-9243	Phone:	
Fax:	312-578-9345	Fax:	
E-Mail:	nbrown@ene.com	PO#/Reference#	

Client	Client Project #	Preservative
Ecology and Environment	EE-001096-0070-17-03TTO	
Project Name		**Parameter**
RDM Treatability Study		Grain Size ASTM D-422-63(2007)
Project Location/State	**Lab Project #**	
AK		
Sampler	**Lab PM**	
Bill Sass		

Preservative Key
1. HCL, Cool to 4°
2. H2SO4, Cool to 4°
3. HNO3, Cool to 4°
4. NaOH, Cool to 4°
5. NaOH/Zn, Cool to 4°
6. NaHSO4
7. Cool to 4°
8. None
9. Other

Lab ID	MS/MSD	Sample ID	Sampling Date	Sampling Time	# of Containers	Matrix	Grain Size ASTM D-422-63(2007)	Comments
1		RDM-1096-CS01	10/7/13	1122	1	SO	X	Hg vapor >37K ng/m³
2		RDM-1096-CS02		1126	1	SO	X	Hg vapor 70 ng/m³
3		RDM-1096-CS03		1130	1	SO	X	Hg vapor 112 ng/m³
4		RDM-1096-CS04		1134	1	SO	X	Hg vapor 56 ng/m³
							MWB 10/7/13	
								BKG Hg vapor = 24 ng/m³

10/7/13

Turnaround Time Required (Business Days)

___ 1 Day ___ 2 Days ___ 5 Days ___ 7 Days X 10 Days ___ 15 Days _____ Other

Requested Due Date _____

Sample Disposal: [ ] Return to Client [X] Disposal by Lab [ ] Archive for _____ Months (A fee may be assessed if samples are retained longer than 1 month)

Relinquished By	Company	Date	Time	Received By	Company	Date	Time
	E+E	10/8/13	946		TA	10/8/13	946
	TA	10/8/13	1150		TA CHI	10/8/13	1150

Lab Courier: TA

Shipped:

Hand Delivered:

Matrix Key

WW – Wastewater	SE – Sediment
W – Water	SO – Soil
S – Soil	L – Leachate
SL – Sludge	WI – Wipe
MS – Miscellaneous	DW – Drinking Water
OL – Oil	O – Other
A – Air	

Client Comments:

Lab Comments:

10/17/2013

TestAmerica Chicago
2417 Bond Street
University Park, IL 60484
Phone (708) 534-5200 Fax (708) 534-5211

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Client Information (Sub Contract Lab)	Sampler:	Lab PM: Wright, Richard C	Carrier Tracking No(s):	COC No: 500-40798.1
Client Contact: Shipping/Receiving	Phone:	E-Mail: richard.wright@testamericainc.com		Page: Page 1 of 1
Company: TestAmerica Laboratories, Inc.		**Analysis Requested**		Job #: 500-64525-2
Address: 30 Community Drive, Suite 11,	Due Date Requested: 10/18/2013			
City: South Burlington	TAT Requested (days):			
State, Zip: VT, 05403				
Phone: 802-660-1990(Tel)	PO #:			
Email:	WO #:			
Project Name: RDM Treatability	Project #: 50008755			
Site:	SSOW#:			

Preservation Codes:
A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA
M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2SO3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - ph 4-5, Z - other (specify)

Other:

Sample Identification - Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	D422/ Routine List	Total Number of containers	Special Instructions/Note:
			Preservation Code:						
RDM-1096-CS01 (500-64525-1)	10/7/13	11:22 Central		Solid			X	1	
RDM-1096-CS02 (500-64525-2)	10/7/13	11:26 Central		Solid			X	1	
RDM-1096-CS03 (500-64525-3)	10/7/13	11:30 Central		Solid			X	1	
RDM-1096-CS04 (500-64525-4)	10/7/13	11:34 Central		Solid			X	1	

500-64525 Chain of Custody

Possible Hazard Identification
Unconfirmed

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ *Return To Client* ☐ *Disposal By Lab* ☐ *Archive For ________ Months*

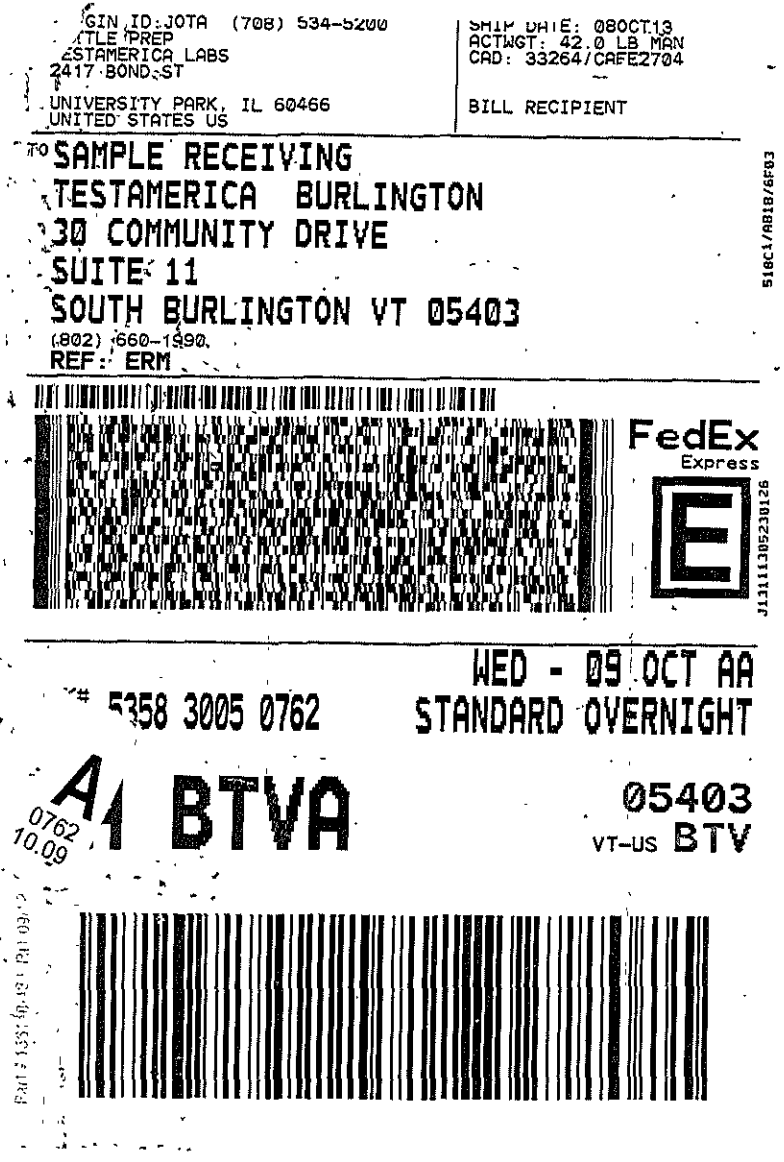
Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
[signature]	10/09/13 1600	TAL-Chicago	Steph [signature]	1010 10/9/13	TA-Bur
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No
Custody Seal No.:
Cooler Temperature(s) °C and Other Remarks: 2.0c



ORIGIN ID:JOTA (708) 534-5200
BOTTLE PREP
TESTAMERICA LABS
2417 BOND ST
UNIVERSITY PARK, IL 60466
UNITED STATES US

SHIP DATE: 08OCT13
ACTWGT: 42.0 LB MAN
CAD: 33264/CAFE2704

BILL RECIPIENT

TO SAMPLE RECEIVING
TESTAMERICA BURLINGTON
30 COMMUNITY DRIVE
SUITE 11
SOUTH BURLINGTON VT 05403
(802) 660-1990
REF: ERM

518C1/AB18/6F03

FedEx Express

J131113052301 26

TRK# 5358 3005 0762

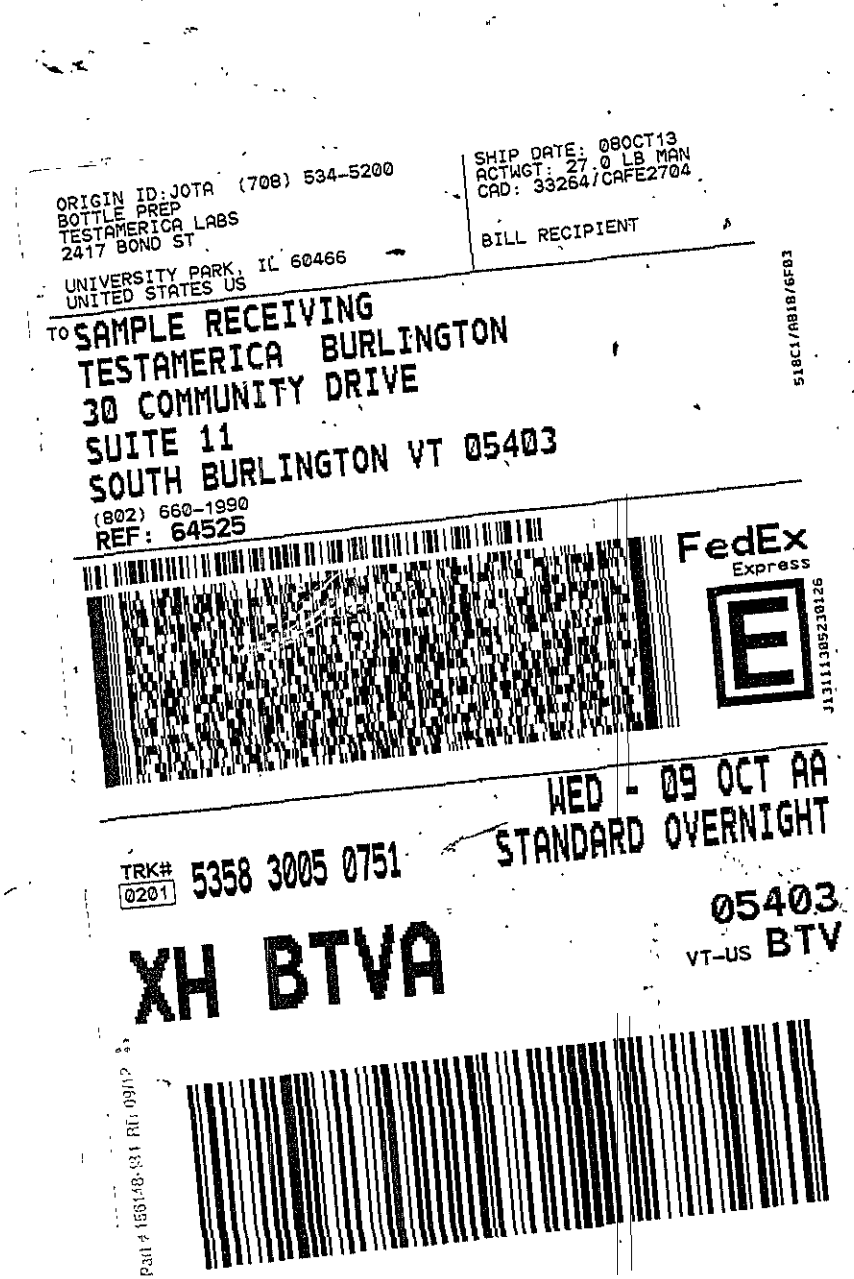
WED - 09 OCT AA
STANDARD OVERNIGHT

A1 BTVA

0762
10.09

05403
VT-US BTV

Part # 158148-931 Rev 09/12



ORIGIN ID:JOTA (708) 534-5200
BOTTLE PREP
TESTAMERICA LABS
2417 BOND ST
UNIVERSITY PARK, IL 60466
UNITED STATES US

SHIP DATE: 08OCT13
ACTWGT: 27.0 LB MAN
CAD: 33264/CAFE2704

BILL RECIPIENT

TO SAMPLE RECEIVING
TESTAMERICA BURLINGTON
30 COMMUNITY DRIVE
SUITE 11
SOUTH BURLINGTON VT 05403
(802) 660-1990
REF: 64525

518C1/AB18/6F03

FedEx Express

J131113052301 26

TRK# 0201 5358 3005 0751

WED - 09 OCT AA
STANDARD OVERNIGHT

XH BTVA

05403
VT-US BTV

Part # 158148-931 Rev 09/12

Login Sample Receipt Checklist

Client: Ecology and Environment, Inc.

Job Number: 500-64525-2

Login Number: 64525

List Source: TestAmerica Chicago

List Number: 1

Creator: Scott, Sherri L

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	3.4
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Login Sample Receipt Checklist

Client: Ecology and Environment, Inc.

Job Number: 500-64525-2

Login Number: 64525
List Number: 1
Creator: Gagne, Eric M

List Source: TestAmerica Burlington
List Creation: 10/10/13 08:46 AM

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	Lab does not accept radioactive samples.
The cooler's custody seal, if present, is intact.	True	775351, 352, 353 & 354
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	2.0ºC. IR GUN ID 181. CF -0.2
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	Received project as a subcontract.
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Chicago
2417 Bond Street
University Park, IL 60484
Tel: (708)534-5200

TestAmerica Job ID: 500-64525-3
Client Project/Site: RDM Treatability

For:
Ecology and Environment, Inc.
33 West Monroe St.
Suite 550
Chicago, Illinois 60603

Attn: Neil Brown

Authorized for release by:
10/28/2013 8:10:11 AM

Richard Wright, Project Manager II
(708)534-5200
richard.wright@testamericainc.com

Table of Contents

Client: Ecology and Environment, Inc.
Project/Site: RDM Treatability

TestAmerica Job ID: 500-64525-3

Job ID: 500-64525-3

Laboratory: TestAmerica Chicago

Narrative

Job Narrative
500-64525-3

Comments
No additional comments.

Receipt
The samples were received on 10/8/2013 11:50 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 3.4° C.

Metals
No analytical or quality issues were noted.

Detection Summary

Client: Ecology and Environment, Inc.
Project/Site: RDM Treatability

TestAmerica Job ID: 500-64525-3

Client Sample ID: RDM-1096-CS01 — Lab Sample ID: 500-64525-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Arsenic	11		0.050	0.010	mg/L	1		6010B	TCLP
Mercury	0.0071		0.0020	0.00020	mg/L	1		7470A	TCLP

Client Sample ID: RDM-1096-CS03 — Lab Sample ID: 500-64525-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Arsenic	11		0.050	0.010	mg/L	1		6010B	TCLP
Mercury	0.0025		0.0020	0.00020	mg/L	1		7470A	TCLP

This Detection Summary does not include radiochemical test results.

Method Summary

Client: Ecology and Environment, Inc.
Project/Site: RDM Treatability

TestAmerica Job ID: 500-64525-3

Method	Method Description	Protocol	Laboratory
6010B	Metals (ICP)	SW846	TAL CHI
7470A	Mercury (CVAA)	SW846	TAL CHI

Protocol References:

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL CHI = TestAmerica Chicago, 2417 Bond Street, University Park, IL 60484, TEL (708)534-5200

Sample Summary

Client: Ecology and Environment, Inc.
Project/Site: RDM Treatability

TestAmerica Job ID: 500-64525-3

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
500-64525-1	RDM-1096-CS01	Solid	10/07/13 11:22	10/08/13 11:50
500-64525-3	RDM-1096-CS03	Solid	10/07/13 11:30	10/08/13 11:50

Client: Ecology and Environment, Inc.
Project/Site: RDM Treatability

TestAmerica Job ID: 500-64525-3

Client Sample ID: RDM-1096-CS01
Date Collected: 10/07/13 11:22
Date Received: 10/08/13 11:50

Lab Sample ID: 500-64525-1
Matrix: Solid

Method: 6010B - Metals (ICP) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	11		0.050	0.010	mg/L		10/24/13 08:30	10/25/13 12:41	1

Method: 7470A - Mercury (CVAA) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.0071		0.0020	0.00020	mg/L		10/24/13 15:00	10/25/13 12:08	1

Client: Ecology and Environment, Inc.
Project/Site: RDM Treatability

TestAmerica Job ID: 500-64525-3

Client Sample ID: RDM-1096-CS03
Date Collected: 10/07/13 11:30
Date Received: 10/08/13 11:50

Lab Sample ID: 500-64525-3
Matrix: Solid

Method: 6010B - Metals (ICP) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	11		0.050	0.010	mg/L		10/24/13 08:30	10/25/13 12:47	1

Method: 7470A - Mercury (CVAA) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.0025		0.0020	0.00020	mg/L		10/24/13 15:00	10/25/13 12:10	1

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative error ratio
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Metals

Leach Batch: 208364

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-64525-1	RDM-1096-CS01	TCLP	Solid	1311	
500-64525-3	RDM-1096-CS03	TCLP	Solid	1311	
LB 500-208364/1-B LB	Method Blank	TCLP	Solid	1311	
LB 500-208364/1-C LB	Method Blank	TCLP	Solid	1311	

Prep Batch: 208510

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-64525-1	RDM-1096-CS01	TCLP	Solid	3010A	208364
500-64525-3	RDM-1096-CS03	TCLP	Solid	3010A	208364
LB 500-208364/1-B LB	Method Blank	TCLP	Solid	3010A	208364
LCS 500-208510/2-A	Lab Control Sample	Total/NA	Solid	3010A	

Prep Batch: 208537

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-64525-1	RDM-1096-CS01	TCLP	Solid	7470A	208364
500-64525-3	RDM-1096-CS03	TCLP	Solid	7470A	208364
LB 500-208364/1-C LB	Method Blank	TCLP	Solid	7470A	208364
LCS 500-208537/13-A	Lab Control Sample	Total/NA	Solid	7470A	
MB 500-208537/12-A	Method Blank	Total/NA	Solid	7470A	

Analysis Batch: 208781

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-64525-1	RDM-1096-CS01	TCLP	Solid	7470A	208537
500-64525-3	RDM-1096-CS03	TCLP	Solid	7470A	208537
LB 500-208364/1-C LB	Method Blank	TCLP	Solid	7470A	208537
LCS 500-208537/13-A	Lab Control Sample	Total/NA	Solid	7470A	208537
MB 500-208537/12-A	Method Blank	Total/NA	Solid	7470A	208537

Analysis Batch: 208791

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-64525-1	RDM-1096-CS01	TCLP	Solid	6010B	208510
500-64525-3	RDM-1096-CS03	TCLP	Solid	6010B	208510
LB 500-208364/1-B LB	Method Blank	TCLP	Solid	6010B	208510
LCS 500-208510/2-A	Lab Control Sample	Total/NA	Solid	6010B	208510

Method: 6010B - Metals (ICP)

Lab Sample ID: LCS 500-208510/2-A
Matrix: Solid
Analysis Batch: 208791

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 208510

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	0.100	0.108		mg/L		108	80 - 120

Lab Sample ID: LB 500-208364/1-B LB
Matrix: Solid
Analysis Batch: 208791

Client Sample ID: Method Blank
Prep Type: TCLP
Prep Batch: 208510

Analyte	LB Result	LB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	<0.050		0.050	0.010	mg/L		10/24/13 08:30	10/25/13 10:12	1

Method: 7470A - Mercury (CVAA)

Lab Sample ID: MB 500-208537/12-A
Matrix: Solid
Analysis Batch: 208781

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 208537

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.00020		0.00020	0.000020	mg/L		10/24/13 15:00	10/25/13 11:14	1

Lab Sample ID: LCS 500-208537/13-A
Matrix: Solid
Analysis Batch: 208781

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 208537

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Mercury	0.00200	0.00190		mg/L		95	80 - 120

Lab Sample ID: LB 500-208364/1-C LB
Matrix: Solid
Analysis Batch: 208781

Client Sample ID: Method Blank
Prep Type: TCLP
Prep Batch: 208537

Analyte	LB Result	LB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.00020		0.00020	0.000020	mg/L		10/24/13 15:00	10/25/13 11:34	1

Lab Chronicle

Client: Ecology and Environment, Inc.
Project/Site: RDM Treatability

TestAmerica Job ID: 500-64525-3

Client Sample ID: RDM-1096-CS01

Lab Sample ID: 500-64525-1

Date Collected: 10/07/13 11:22

Matrix: Solid

Date Received: 10/08/13 11:50

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			208364	10/23/13 12:50	LAH	TAL CHI
TCLP	Prep	7470A			208537	10/24/13 15:00	BJB	TAL CHI
TCLP	Analysis	7470A		1	208781	10/25/13 12:08	BJB	TAL CHI
TCLP	Leach	1311			208364	10/23/13 12:50	LAH	TAL CHI
TCLP	Prep	3010A			208510	10/24/13 08:30	MJP	TAL CHI
TCLP	Analysis	6010B		1	208791	10/25/13 12:41	PJ1	TAL CHI

Client Sample ID: RDM-1096-CS03

Lab Sample ID: 500-64525-3

Date Collected: 10/07/13 11:30

Matrix: Solid

Date Received: 10/08/13 11:50

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			208364	10/23/13 12:50	LAH	TAL CHI
TCLP	Prep	7470A			208537	10/24/13 15:00	BJB	TAL CHI
TCLP	Analysis	7470A		1	208781	10/25/13 12:10	BJB	TAL CHI
TCLP	Leach	1311			208364	10/23/13 12:50	LAH	TAL CHI
TCLP	Prep	3010A			208510	10/24/13 08:30	MJP	TAL CHI
TCLP	Analysis	6010B		1	208791	10/25/13 12:47	PJ1	TAL CHI

Laboratory References:

TAL CHI = TestAmerica Chicago, 2417 Bond Street, University Park, IL 60484, TEL (708)534-5200

Certification Summary

Client: Ecology and Environment, Inc.
Project/Site: RDM Treatability

TestAmerica Job ID: 500-64525-3

Laboratory: TestAmerica Chicago

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
Alabama	State Program	4	40461	04-30-14
California	NELAP	9	01132CA	04-30-14
Georgia	State Program	4	N/A	04-30-14
Hawaii	State Program	9	N/A	04-30-14
Illinois	NELAP	5	100201	04-30-14
Indiana	State Program	5	C-IL-02	04-30-14
Iowa	State Program	7	82	05-01-14
Kansas	NELAP	7	E-10161	10-31-13
Kentucky	State Program	4	90023	12-31-13
Kentucky (UST)	State Program	4	66	04-30-14
Louisiana	NELAP	6	30720	06-30-14
Massachusetts	State Program	1	M-IL035	06-30-14
Mississippi	State Program	4	N/A	04-30-14
North Carolina DENR	State Program	4	291	12-31-13
North Dakota	State Program	8	R-194	04-30-14
Oklahoma	State Program	6	8908	08-31-14
South Carolina	State Program	4	77001	04-30-14
Texas	NELAP	6	T104704252-09-TX	02-28-14
USDA	Federal		P330-12-00038	02-06-15
Wisconsin	State Program	5	999580010	08-31-14
Wyoming	State Program	8	8TMS-Q	04-30-14

TestAmerica

THE LEADER IN ENVIRONMENTAL T

2417 Bond Street, University Park, IL 6048
Phone: 708.534.5200 Fax: 708.534.5

500-64525 COC

Chain of Custody Record

Lab Job #: 500-64525

Chain of Custody Number:

Page _____ of _____

Temperature °C of Cooler: 3.4

(optional) Report To		(optional) Bill To	
Contact:	Neil Brown	Contact:	
Company:	E+E	Company:	
Address:	33 W Monroe St, Ste 1410	Address:	
Address:	Chicago, IL 60603	Address:	
Phone:	312-578-9243	Phone:	
Fax:	312-578-9345	Fax:	
E-Mail:	nbrown@ene.com	PO#/Reference#	

Client	Ecology and Environment
Client Project #	EE-001096-0070-17-03770
Project Name	RDM Treatability study
Project Location/State	AK
Lab Project #	
Sampler	Bill Jess
Lab PM	

Preservative Key
1. HCL, Cool to 4°
2. H2SO4, Cool to 4°
3. HNO3, Cool to 4°
4. NaOH, Cool to 4°
5. NaOH/Zn, Cool to 4°
6. NaHSO4
7. Cool to 4°
8. None
9. Other

Lab ID	MS/MSD	Sample ID	Sampling Date	Sampling Time	# of Containers	Matrix	Preservative	Total Arsenic (6010B)	Total Mercury (7471)	Bulk Density (ASTM D-5057-10)	Percent Moisture	Comments
1		RDM-1096-CS01	10/7/13	1122	2	SO		X	X	X	X	Hg vapor >37K ng/m3
2		RDM-1096-CS02		1126	2	SO		X	X	X	X	Hg vapor 70 ng/m3
3		RDM-1096-CS03		1130	2	SO		X	X	X	X	Hg vapor 112 ng/m3
4		RDM-1096-CS04		1134	2	SO		X	X	X	X	Hg vapor 56 ng/m3
											485	10/7/13
												BKG Hg vapor = 24 ng/m3

10/7/13

Turnaround Time Required (Business Days)
___ 1 Day ___ 2 Days ___ 5 Days ___ 7 Days X 10 Days ___ 15 Days _____ Other
Requested Due Date _____

Sample Disposal
[ ] Return to Client [X] Disposal by Lab [ ] Archive for _____ Months (A fee may be assessed if samples are retained longer than 1 month)

Relinquished By	Company	Date	Time	Received By	Company	Date	Time
	E+E	10/8/13	946		TA	10/8/13	946
	TA	10/8/13	1150		TA-CHI	10/8/13	1150

Lab Courier: TA
Shipped:
Hand Delivered:

Matrix Key
WW – Wastewater
W – Water
S – Soil
SL – Sludge
MS – Miscellaneous
OL – Oil
A – Air
SE – Sediment
SO – Soil
L – Leachate
WI – Wipe
DW – Drinking Water
O – Other

Client Comments

Lab Comments:

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

2417 Bond Street, University Park, IL 60484
Phone: 708.534.5200 Fax: 708.534.5211

Chain of Custody Record

Lab Job #: 500-64525

Chain of Custody Number:

Page _____ of _____

Temperature °C of Cooler: 3.4

(optional) Report To	(optional) Bill To
Contact: Neil Brown	Contact:
Company: EnE	Company:
Address: 33 W. Monroe St., Ste 1410	Address:
Address: Chicago, IL 60603	Address:
Phone: 312-578-9243	Phone:
Fax: 312-578-9345	Fax:
E-Mail: nbrown@ene.com	PO#/Reference#

Client	Client Project #	Preservative
Ecology and Environment	EE-001096-0070-17-03TTO	
Project Name: RDM Treatability Study		Parameter: Grain Size ASTM D-422-63(2007)
Project Location/State: AK	Lab Project #	
Sampler: Bill Sass	Lab PM	

Preservative Key
1. HCL, Cool to 4°
2. H2SO4, Cool to 4°
3. HNO3, Cool to 4°
4. NaOH, Cool to 4°
5. NaOH/Zn, Cool to 4°
6. NaHSO4
7. Cool to 4°
8. None
9. Other

Lab ID	MS/MSD	Sample ID	Sampling Date	Sampling Time	# of Containers	Matrix	Grain Size	Comments
1		RDM-1096-CS01	10/7/13	1122	1	SO	X	Hg vapor >37K ng/m³
2		RDM-1096-CS02		1126	1	SO	X	Hg vapor 70 ng/m³
3		RDM-1096-CS03		1130	1	SO	X	Hg vapor 112 ng/m³
4		RDM-1096-CS04		1134	1	SO	X	Hg vapor 56 ng/m³
								MS 10/7/13
								BKG Hg vapor = 24 ng/m³

William Sass 10/7/13

Turnaround Time Required (Business Days)
___ 1 Day ___ 2 Days ___ 5 Days ___ 7 Days X 10 Days ___ 15 Days _____ Other
Requested Due Date _____

Sample Disposal
[ ] Return to Client [X] Disposal by Lab [ ] Archive for _____ Months (A fee may be assessed if samples are retained longer than 1 month)

Relinquished By	Company	Date	Time	Received By	Company	Date	Time
William Sass	EnE	10/8/13	946		TA	10/8/13	946
	TA	10/8/13	1150		TA CHI	10/8/13	1150

Lab Courier: JT
Shipped:
Hand Delivered:

Matrix Key
WW – Wastewater
W – Water
S – Soil
SL – Sludge
MS – Miscellaneous
OL – Oil
A – Air
SE – Sediment
SO – Soil
L – Leachate
WI – Wipe
DW – Drinking Water
O – Other

Client Comments

Lab Comments:

Login Sample Receipt Checklist

Client: Ecology and Environment, Inc.

Job Number: 500-64525-3

Login Number: 64525

List Source: TestAmerica Chicago

List Number: 1

Creator: Scott, Sherri L

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	3.4
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Chicago
2417 Bond Street
University Park, IL 60484
Tel: (708)534-5200

TestAmerica Job ID: 500-67721-1
Client Project/Site: RDM Treatability

For:
Ecology and Environment, Inc.
33 West Monroe St.
Suite 1410
Chicago, Illinois 60603

Attn: Neil Brown

Authorized for release by:
12/5/2013 1:24:59 PM

Richard Wright, Senior Project Manager
(708)534-5200
richard.wright@testamericainc.com

Table of Contents

Job ID: 500-67721-1

Laboratory: TestAmerica Chicago

Narrative

Job Narrative
500-67721-1

Comments
No additional comments.

Receipt
The samples were received on 11/29/2013 11:50 AM; the samples arrived in good condition, properly preserved and, where required, on ice.

Metals
No analytical or quality issues were noted.

Detection Summary

Client: Ecology and Environment, Inc.
Project/Site: RDM Treatability

TestAmerica Job ID: 500-67721-1

Client Sample ID: RDM-CS01-1 — Lab Sample ID: 500-67721-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Arsenic	0.30		0.050	0.010	mg/L	1		6010B	TCLP
Mercury	0.00086	B	0.00020	0.000020	mg/L	1		7470A	TCLP

Client Sample ID: RDM-CS01-2 — Lab Sample ID: 500-67721-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Arsenic	1.7		0.050	0.010	mg/L	1		6010B	TCLP
Mercury	0.20	B	0.020	0.0020	mg/L	100		7470A	TCLP

Client Sample ID: RDM-CS01-3 — Lab Sample ID: 500-67721-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Arsenic	0.23		0.050	0.010	mg/L	1		6010B	TCLP
Mercury	0.0011	B	0.00020	0.000020	mg/L	1		7470A	TCLP

Client Sample ID: RDM-CS01-4 — Lab Sample ID: 500-67721-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Arsenic	0.69		0.050	0.010	mg/L	1		6010B	TCLP
Mercury	0.11	B	0.020	0.0020	mg/L	100		7470A	TCLP

Client Sample ID: RDM-CS03-5 — Lab Sample ID: 500-67721-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Arsenic	0.58		0.050	0.010	mg/L	1		6010B	TCLP
Mercury	0.00013	J B	0.00020	0.000020	mg/L	1		7470A	TCLP

Client Sample ID: RDM-CS03-6 — Lab Sample ID: 500-67721-6

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Arsenic	2.1		0.050	0.010	mg/L	1		6010B	TCLP
Mercury	0.0032	B	0.00020	0.000020	mg/L	1		7470A	TCLP

Client Sample ID: RDM-CS03-7 — Lab Sample ID: 500-67721-7

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Arsenic	0.37		0.050	0.010	mg/L	1		6010B	TCLP
Mercury	0.030	B	0.0020	0.00020	mg/L	10		7470A	TCLP

Client Sample ID: RDM-CS03-8 — Lab Sample ID: 500-67721-8

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Arsenic	0.52		0.050	0.010	mg/L	1		6010B	TCLP
Mercury	0.064	B	0.020	0.0020	mg/L	100		7470A	TCLP

This Detection Summary does not include radiochemical test results.

Method Summary

Client: Ecology and Environment, Inc.
Project/Site: RDM Treatability

TestAmerica Job ID: 500-67721-1

Method	Method Description	Protocol	Laboratory
6010B	Metals (ICP)	SW846	TAL CHI
7470A	Mercury (CVAA)	SW846	TAL CHI
Moisture	Percent Moisture	EPA	TAL CHI

Protocol References:

EPA = US Environmental Protection Agency

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL CHI = TestAmerica Chicago, 2417 Bond Street, University Park, IL 60484, TEL (708)534-5200

Sample Summary

Client: Ecology and Environment, Inc.
Project/Site: RDM Treatability

TestAmerica Job ID: 500-67721-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
500-67721-1	RDM-CS01-1	Solid	11/29/13 09:07	11/29/13 11:50
500-67721-2	RDM-CS01-2	Solid	11/29/13 09:08	11/29/13 11:50
500-67721-3	RDM-CS01-3	Solid	11/29/13 09:09	11/29/13 11:50
500-67721-4	RDM-CS01-4	Solid	11/29/13 09:10	11/29/13 11:50
500-67721-5	RDM-CS03-5	Solid	11/29/13 09:11	11/29/13 11:50
500-67721-6	RDM-CS03-6	Solid	11/29/13 09:12	11/29/13 11:50
500-67721-7	RDM-CS03-7	Solid	11/29/13 09:13	11/29/13 11:50
500-67721-8	RDM-CS03-8	Solid	11/29/13 09:14	11/29/13 11:50

Client: Ecology and Environment, Inc.
Project/Site: RDM Treatability

TestAmerica Job ID: 500-67721-1

Client Sample ID: RDM-CS01-1
Date Collected: 11/29/13 09:07
Date Received: 11/29/13 11:50

Lab Sample ID: 500-67721-1
Matrix: Solid

Method: 6010B - Metals (ICP) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.30		0.050	0.010	mg/L		12/04/13 09:30	12/04/13 16:05	1

Method: 7470A - Mercury (CVAA) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.00086	B	0.00020	0.000020	mg/L		12/04/13 12:00	12/05/13 09:08	1

Client Sample Results

Client: Ecology and Environment, Inc.
Project/Site: RDM Treatability

TestAmerica Job ID: 500-67721-1

Client Sample ID: RDM-CS01-2
Date Collected: 11/29/13 09:08
Date Received: 11/29/13 11:50

Lab Sample ID: 500-67721-2
Matrix: Solid

Method: 6010B - Metals (ICP) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	1.7		0.050	0.010	mg/L		12/04/13 09:30	12/04/13 16:11	1

Method: 7470A - Mercury (CVAA) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.20	B	0.020	0.0020	mg/L		12/04/13 12:00	12/05/13 10:19	100

Client: Ecology and Environment, Inc.
Project/Site: RDM Treatability

TestAmerica Job ID: 500-67721-1

Client Sample ID: RDM-CS01-3
Date Collected: 11/29/13 09:09
Date Received: 11/29/13 11:50

Lab Sample ID: 500-67721-3
Matrix: Solid

Method: 6010B - Metals (ICP) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.23		0.050	0.010	mg/L		12/04/13 09:30	12/04/13 16:17	1

Method: 7470A - Mercury (CVAA) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.0011	B	0.00020	0.000020	mg/L		12/04/13 12:00	12/05/13 09:12	1

Client: Ecology and Environment, Inc.
Project/Site: RDM Treatability

TestAmerica Job ID: 500-67721-1

Client Sample ID: RDM-CS01-4
Date Collected: 11/29/13 09:10
Date Received: 11/29/13 11:50

Lab Sample ID: 500-67721-4
Matrix: Solid

Method: 6010B - Metals (ICP) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.69		0.050	0.010	mg/L		12/04/13 09:30	12/04/13 16:38	1

Method: 7470A - Mercury (CVAA) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.11	B	0.020	0.0020	mg/L		12/04/13 12:00	12/05/13 10:21	100

Client: Ecology and Environment, Inc.
Project/Site: RDM Treatability

TestAmerica Job ID: 500-67721-1

Client Sample ID: RDM-CS03-5
Date Collected: 11/29/13 09:11
Date Received: 11/29/13 11:50

Lab Sample ID: 500-67721-5
Matrix: Solid

Method: 6010B - Metals (ICP) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.58		0.050	0.010	mg/L		12/04/13 09:30	12/04/13 16:45	1

Method: 7470A - Mercury (CVAA) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.00013	J B	0.00020	0.000020	mg/L		12/04/13 12:00	12/05/13 09:18	1

Client: Ecology and Environment, Inc.
Project/Site: RDM Treatability

TestAmerica Job ID: 500-67721-1

Client Sample ID: RDM-CS03-6
Date Collected: 11/29/13 09:12
Date Received: 11/29/13 11:50

Lab Sample ID: 500-67721-6
Matrix: Solid

Method: 6010B - Metals (ICP) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	2.1		0.050	0.010	mg/L		12/04/13 09:30	12/04/13 16:51	1

Method: 7470A - Mercury (CVAA) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.0032	B	0.00020	0.000020	mg/L		12/04/13 12:00	12/05/13 09:21	1

Client: Ecology and Environment, Inc.
Project/Site: RDM Treatability

TestAmerica Job ID: 500-67721-1

Client Sample ID: RDM-CS03-7
Date Collected: 11/29/13 09:13
Date Received: 11/29/13 11:50

Lab Sample ID: 500-67721-7
Matrix: Solid

Method: 6010B - Metals (ICP) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.37		0.050	0.010	mg/L		12/04/13 09:30	12/04/13 16:57	1

Method: 7470A - Mercury (CVAA) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.030	B	0.0020	0.00020	mg/L		12/04/13 12:00	12/05/13 10:23	10

Client: Ecology and Environment, Inc.
Project/Site: RDM Treatability

TestAmerica Job ID: 500-67721-1

Client Sample ID: RDM-CS03-8
Date Collected: 11/29/13 09:14
Date Received: 11/29/13 11:50

Lab Sample ID: 500-67721-8
Matrix: Solid

Method: 6010B - Metals (ICP) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.52		0.050	0.010	mg/L		12/04/13 09:30	12/04/13 17:03	1

Method: 7470A - Mercury (CVAA) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.064	B	0.020	0.0020	mg/L		12/04/13 12:00	12/05/13 10:25	100

Definitions/Glossary

Client: Ecology and Environment, Inc.
Project/Site: RDM Treatability

TestAmerica Job ID: 500-67721-1

Qualifiers

Metals

Qualifier	Qualifier Description
B	Compound was found in the blank and sample.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative error ratio
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Metals

Leach Batch: 214648

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-67721-1	RDM-CS01-1	TCLP	Solid	1311	
500-67721-2	RDM-CS01-2	TCLP	Solid	1311	
500-67721-3	RDM-CS01-3	TCLP	Solid	1311	
500-67721-4	RDM-CS01-4	TCLP	Solid	1311	
500-67721-5	RDM-CS03-5	TCLP	Solid	1311	
500-67721-6	RDM-CS03-6	TCLP	Solid	1311	
500-67721-7	RDM-CS03-7	TCLP	Solid	1311	
500-67721-8	RDM-CS03-8	TCLP	Solid	1311	
LB 500-214648/1-B LB	Method Blank	TCLP	Solid	1311	
LB 500-214648/1-C LB	Method Blank	TCLP	Solid	1311	

Prep Batch: 214790

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-67721-1	RDM-CS01-1	TCLP	Solid	7470A	214648
500-67721-2	RDM-CS01-2	TCLP	Solid	7470A	214648
500-67721-3	RDM-CS01-3	TCLP	Solid	7470A	214648
500-67721-4	RDM-CS01-4	TCLP	Solid	7470A	214648
500-67721-5	RDM-CS03-5	TCLP	Solid	7470A	214648
500-67721-6	RDM-CS03-6	TCLP	Solid	7470A	214648
500-67721-7	RDM-CS03-7	TCLP	Solid	7470A	214648
500-67721-8	RDM-CS03-8	TCLP	Solid	7470A	214648
LB 500-214648/1-B LB	Method Blank	TCLP	Solid	7470A	214648
LCS 500-214790/13-A	Lab Control Sample	Total/NA	Solid	7470A	
MB 500-214790/12-A	Method Blank	Total/NA	Solid	7470A	

Prep Batch: 214806

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-67721-1	RDM-CS01-1	TCLP	Solid	3010A	214648
500-67721-2	RDM-CS01-2	TCLP	Solid	3010A	214648
500-67721-3	RDM-CS01-3	TCLP	Solid	3010A	214648
500-67721-4	RDM-CS01-4	TCLP	Solid	3010A	214648
500-67721-5	RDM-CS03-5	TCLP	Solid	3010A	214648
500-67721-6	RDM-CS03-6	TCLP	Solid	3010A	214648
500-67721-7	RDM-CS03-7	TCLP	Solid	3010A	214648
500-67721-8	RDM-CS03-8	TCLP	Solid	3010A	214648
LB 500-214648/1-C LB	Method Blank	TCLP	Solid	3010A	214648
LCS 500-214806/3-A	Lab Control Sample	Total/NA	Solid	3010A	

Analysis Batch: 214911

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-67721-1	RDM-CS01-1	TCLP	Solid	6010B	214806
500-67721-2	RDM-CS01-2	TCLP	Solid	6010B	214806
500-67721-3	RDM-CS01-3	TCLP	Solid	6010B	214806
500-67721-4	RDM-CS01-4	TCLP	Solid	6010B	214806
500-67721-5	RDM-CS03-5	TCLP	Solid	6010B	214806
500-67721-6	RDM-CS03-6	TCLP	Solid	6010B	214806
500-67721-7	RDM-CS03-7	TCLP	Solid	6010B	214806
500-67721-8	RDM-CS03-8	TCLP	Solid	6010B	214806
LB 500-214648/1-C LB	Method Blank	TCLP	Solid	6010B	214806
LCS 500-214806/3-A	Lab Control Sample	Total/NA	Solid	6010B	214806

Metals (Continued)

Analysis Batch: 214981

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-67721-1	RDM-CS01-1	TCLP	Solid	7470A	214790
500-67721-2	RDM-CS01-2	TCLP	Solid	7470A	214790
500-67721-3	RDM-CS01-3	TCLP	Solid	7470A	214790
500-67721-4	RDM-CS01-4	TCLP	Solid	7470A	214790
500-67721-5	RDM-CS03-5	TCLP	Solid	7470A	214790
500-67721-6	RDM-CS03-6	TCLP	Solid	7470A	214790
500-67721-7	RDM-CS03-7	TCLP	Solid	7470A	214790
500-67721-8	RDM-CS03-8	TCLP	Solid	7470A	214790
LB 500-214648/1-B LB	Method Blank	TCLP	Solid	7470A	214790
LCS 500-214790/13-A	Lab Control Sample	Total/NA	Solid	7470A	214790
MB 500-214790/12-A	Method Blank	Total/NA	Solid	7470A	214790

General Chemistry

Analysis Batch: 214309

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-67721-1	RDM-CS01-1	Total/NA	Solid	Moisture	
500-67721-2	RDM-CS01-2	Total/NA	Solid	Moisture	
500-67721-3	RDM-CS01-3	Total/NA	Solid	Moisture	
500-67721-4	RDM-CS01-4	Total/NA	Solid	Moisture	
500-67721-5	RDM-CS03-5	Total/NA	Solid	Moisture	
500-67721-6	RDM-CS03-6	Total/NA	Solid	Moisture	
500-67721-7	RDM-CS03-7	Total/NA	Solid	Moisture	
500-67721-8	RDM-CS03-8	Total/NA	Solid	Moisture	
500-67721-8 DU	RDM-CS03-8	Total/NA	Solid	Moisture	

Method: 6010B - Metals (ICP)

Lab Sample ID: LCS 500-214806/3-A
Matrix: Solid
Analysis Batch: 214911

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 214806

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	0.100	0.105		mg/L		105	80 - 120

Lab Sample ID: LB 500-214648/1-C LB
Matrix: Solid
Analysis Batch: 214911

Client Sample ID: Method Blank
Prep Type: TCLP
Prep Batch: 214806

Analyte	LB Result	LB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	<0.050		0.050	0.010	mg/L		12/04/13 09:30	12/04/13 15:22	1

Method: 7470A - Mercury (CVAA)

Lab Sample ID: MB 500-214790/12-A
Matrix: Solid
Analysis Batch: 214981

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 214790

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.00020		0.00020	0.000020	mg/L		12/04/13 12:00	12/05/13 08:43	1

Lab Sample ID: LCS 500-214790/13-A
Matrix: Solid
Analysis Batch: 214981

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 214790

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Mercury	0.00200	0.00218		mg/L		109	80 - 120

Lab Sample ID: LB 500-214648/1-B LB
Matrix: Solid
Analysis Batch: 214981

Client Sample ID: Method Blank
Prep Type: TCLP
Prep Batch: 214790

Analyte	LB Result	LB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.0000283	J	0.00020	0.000020	mg/L		12/04/13 12:00	12/05/13 08:53	1

Lab Chronicle

Client: Ecology and Environment, Inc.
Project/Site: RDM Treatability

TestAmerica Job ID: 500-67721-1

Client Sample ID: RDM-CS01-1

Lab Sample ID: 500-67721-1

Date Collected: 11/29/13 09:07

Matrix: Solid

Date Received: 11/29/13 11:50

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			214648	12/03/13 15:30	MJP	TAL CHI
TCLP	Prep	3010A			214806	12/04/13 09:30	MJP	TAL CHI
TCLP	Analysis	6010B		1	214911	12/04/13 16:05	LEG	TAL CHI
TCLP	Leach	1311			214648	12/03/13 15:30	MJP	TAL CHI
TCLP	Prep	7470A			214790	12/04/13 12:00	BJB	TAL CHI
TCLP	Analysis	7470A		1	214981	12/05/13 09:08	BJB	TAL CHI
Total/NA	Analysis	Moisture		1	214309	11/30/13 13:12	CMV	TAL CHI

Client Sample ID: RDM-CS01-2

Lab Sample ID: 500-67721-2

Date Collected: 11/29/13 09:08

Matrix: Solid

Date Received: 11/29/13 11:50

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			214648	12/03/13 15:30	MJP	TAL CHI
TCLP	Prep	3010A			214806	12/04/13 09:30	MJP	TAL CHI
TCLP	Analysis	6010B		1	214911	12/04/13 16:11	LEG	TAL CHI
TCLP	Leach	1311			214648	12/03/13 15:30	MJP	TAL CHI
TCLP	Prep	7470A			214790	12/04/13 12:00	BJB	TAL CHI
TCLP	Analysis	7470A		100	214981	12/05/13 10:19	BJB	TAL CHI
Total/NA	Analysis	Moisture		1	214309	11/30/13 13:12	CMV	TAL CHI

Client Sample ID: RDM-CS01-3

Lab Sample ID: 500-67721-3

Date Collected: 11/29/13 09:09

Matrix: Solid

Date Received: 11/29/13 11:50

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			214648	12/03/13 15:30	MJP	TAL CHI
TCLP	Prep	3010A			214806	12/04/13 09:30	MJP	TAL CHI
TCLP	Analysis	6010B		1	214911	12/04/13 16:17	LEG	TAL CHI
TCLP	Leach	1311			214648	12/03/13 15:30	MJP	TAL CHI
TCLP	Prep	7470A			214790	12/04/13 12:00	BJB	TAL CHI
TCLP	Analysis	7470A		1	214981	12/05/13 09:12	BJB	TAL CHI
Total/NA	Analysis	Moisture		1	214309	11/30/13 13:12	CMV	TAL CHI

Client Sample ID: RDM-CS01-4

Lab Sample ID: 500-67721-4

Date Collected: 11/29/13 09:10

Matrix: Solid

Date Received: 11/29/13 11:50

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			214648	12/03/13 15:30	MJP	TAL CHI
TCLP	Prep	3010A			214806	12/04/13 09:30	MJP	TAL CHI
TCLP	Analysis	6010B		1	214911	12/04/13 16:38	LEG	TAL CHI
TCLP	Leach	1311			214648	12/03/13 15:30	MJP	TAL CHI

Lab Chronicle

Client: Ecology and Environment, Inc.
Project/Site: RDM Treatability

TestAmerica Job ID: 500-67721-1

Client Sample ID: RDM-CS01-4

Lab Sample ID: 500-67721-4

Date Collected: 11/29/13 09:10
Matrix: Solid
Date Received: 11/29/13 11:50

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Prep	7470A			214790	12/04/13 12:00	BJB	TAL CHI
TCLP	Analysis	7470A		100	214981	12/05/13 10:21	BJB	TAL CHI
Total/NA	Analysis	Moisture		1	214309	11/30/13 13:12	CMV	TAL CHI

Client Sample ID: RDM-CS03-5

Lab Sample ID: 500-67721-5

Date Collected: 11/29/13 09:11
Matrix: Solid
Date Received: 11/29/13 11:50

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			214648	12/03/13 15:30	MJP	TAL CHI
TCLP	Prep	3010A			214806	12/04/13 09:30	MJP	TAL CHI
TCLP	Analysis	6010B		1	214911	12/04/13 16:45	LEG	TAL CHI
TCLP	Leach	1311			214648	12/03/13 15:30	MJP	TAL CHI
TCLP	Prep	7470A			214790	12/04/13 12:00	BJB	TAL CHI
TCLP	Analysis	7470A		1	214981	12/05/13 09:18	BJB	TAL CHI
Total/NA	Analysis	Moisture		1	214309	11/30/13 13:12	CMV	TAL CHI

Client Sample ID: RDM-CS03-6

Lab Sample ID: 500-67721-6

Date Collected: 11/29/13 09:12
Matrix: Solid
Date Received: 11/29/13 11:50

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			214648	12/03/13 15:30	MJP	TAL CHI
TCLP	Prep	3010A			214806	12/04/13 09:30	MJP	TAL CHI
TCLP	Analysis	6010B		1	214911	12/04/13 16:51	LEG	TAL CHI
TCLP	Leach	1311			214648	12/03/13 15:30	MJP	TAL CHI
TCLP	Prep	7470A			214790	12/04/13 12:00	BJB	TAL CHI
TCLP	Analysis	7470A		1	214981	12/05/13 09:21	BJB	TAL CHI
Total/NA	Analysis	Moisture		1	214309	11/30/13 13:12	CMV	TAL CHI

Client Sample ID: RDM-CS03-7

Lab Sample ID: 500-67721-7

Date Collected: 11/29/13 09:13
Matrix: Solid
Date Received: 11/29/13 11:50

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			214648	12/03/13 15:30	MJP	TAL CHI
TCLP	Prep	3010A			214806	12/04/13 09:30	MJP	TAL CHI
TCLP	Analysis	6010B		1	214911	12/04/13 16:57	LEG	TAL CHI
TCLP	Leach	1311			214648	12/03/13 15:30	MJP	TAL CHI
TCLP	Prep	7470A			214790	12/04/13 12:00	BJB	TAL CHI
TCLP	Analysis	7470A		10	214981	12/05/13 10:23	BJB	TAL CHI
Total/NA	Analysis	Moisture		1	214309	11/30/13 13:12	CMV	TAL CHI

Lab Chronicle

Client: Ecology and Environment, Inc.
Project/Site: RDM Treatability

TestAmerica Job ID: 500-67721-1

Client Sample ID: RDM-CS03-8
Date Collected: 11/29/13 09:14
Date Received: 11/29/13 11:50

Lab Sample ID: 500-67721-8
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			214648	12/03/13 15:30	MJP	TAL CHI
TCLP	Prep	3010A			214806	12/04/13 09:30	MJP	TAL CHI
TCLP	Analysis	6010B		1	214911	12/04/13 17:03	LEG	TAL CHI
TCLP	Leach	1311			214648	12/03/13 15:30	MJP	TAL CHI
TCLP	Prep	7470A			214790	12/04/13 12:00	BJB	TAL CHI
TCLP	Analysis	7470A		100	214981	12/05/13 10:25	BJB	TAL CHI
Total/NA	Analysis	Moisture		1	214309	11/30/13 13:12	CMV	TAL CHI

Laboratory References:

TAL CHI = TestAmerica Chicago, 2417 Bond Street, University Park, IL 60484, TEL (708)534-5200

Certification Summary

Client: Ecology and Environment, Inc.
Project/Site: RDM Treatability

TestAmerica Job ID: 500-67721-1

Laboratory: TestAmerica Chicago

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
Alabama	State Program	4	40461	04-30-14
California	NELAP	9	01132CA	04-30-14
Georgia	State Program	4	N/A	04-30-14
Hawaii	State Program	9	N/A	04-30-14
Illinois	NELAP	5	100201	04-30-14
Indiana	State Program	5	C-IL-02	04-30-14
Iowa	State Program	7	82	05-01-14
Kansas	NELAP	7	E-10161	10-31-14
Kentucky	State Program	4	90023	12-31-13
Kentucky (UST)	State Program	4	66	04-30-14
Louisiana	NELAP	6	30720	06-30-14
Massachusetts	State Program	1	M-IL035	06-30-14
Mississippi	State Program	4	N/A	04-30-14
North Carolina DENR	State Program	4	291	12-31-13 *
North Dakota	State Program	8	R-194	04-30-14
Oklahoma	State Program	6	8908	08-31-14
South Carolina	State Program	4	77001	04-30-14
Texas	NELAP	6	T104704252-09-TX	02-28-14
USDA	Federal		P330-12-00038	02-06-15
Wisconsin	State Program	5	999580010	08-31-14
Wyoming	State Program	8	8TMS-Q	04-30-14

* Expired certification is currently pending renewal and is considered valid.

TestAmerica

THE LEADER IN ENVIRONMENTA

2417 Bond Street, University Park, IL 6
Phone: 708.534.5200 Fax: 708.5

500-67721 COC

(optional)

Report To
Contact: Neil Brown
Company: Ecology and Environment
Address: 33 W. Monroe st, Ste 1410
Address: Chicago, IL 60603
Phone: 312-578-9243
Fax:
E-Mail: Nbrown@ene.com

(optional)

Bill To
Contact:
Company:
Address:
Address:
Phone:
Fax:
PO#/Reference#

Chain of Custody Record

Lab Job #: 500-67721

Chain of Custody Number:

Page _____ of _____

Temperature °C of Cooler:

Client	Client Project #
Ecology and Environment	BLM-RDM
Project Name: RDM Treatability	
Project Location/State: Red Devil, AK	Lab Project #
Sampler: Bill Sars	Lab PM: Richard Wright

Preservative Key
1. HCL, Cool to 4°
2. H2SO4, Cool to 4°
3. HNO3, Cool to 4°
4. NaOH, Cool to 4°
5. NaOH/Zn, Cool to 4°
6. NaHSO4
7. Cool to 4°
8. None
9. Other

Lab ID	MS/MSD	Sample ID	Sampling Date	Sampling Time	# of Containers	Matrix	Preservative	Parameter: TCLP Arsenic, Mercury	Comments
1		RDM-CS01-1	11/29/13	0907	1	S		X	
2		RDM-CS01-2	11/29/13	0908	1	S		X	
3		RDM-CS01-3	11/29/13	0909	1	S		X	
4		RDM-CS01-4	11/29/13	0910	1	S		X	
5		RDM-CS03-5	11/29/13	0911	1	S		X	
6		RDM-CS03-6	11/29/13	0912	1	S		X	
7		RDM-CS03-7	11/29/13	0913	1	S		X	
8		RDM-CS03-8	11/29/13	0914	1	S		X	

Turnaround Time Required (Business Days)
___ 1 Day ___ 2 Days ___ 5 Days ___ 7 Days X 10 Days ___ 15 Days _____ Other
Requested Due Date _____

Sample Disposal
☐ Return to Client ☒ Disposal by Lab ☐ Archive for _____ Months (A fee may be assessed if samples are retained longer than 1 month)

Relinquished By	Company	Date	Time	Received By	Company	Date	Time
[signature]	EXE	11/29/13	1150	[signature]	TAL	11/29/13	1150
Relinquished By	Company	Date	Time	Received By	Company	Date	Time
Relinquished By	Company	Date	Time	Received By	Company	Date	Time

Lab Courier
Shipped
Hand Delivered E&E

Matrix Key
WW – Wastewater
W – Water
S – Soil
SL – Sludge
MS – Miscellaneous
OL – Oil
A – Air
SE – Sediment
SO – Soil
L – Leachate
WI – Wipe
DW – Drinking Water
O – Other

Client Comments

Lab Comments:

TAL-4124-500 (1209)

12/5/2013

Login Sample Receipt Checklist

Client: Ecology and Environment, Inc.

Job Number: 500-67721-1

Login Number: 67721

List Source: TestAmerica Chicago

List Number: 1

Creator: Lunt, Jeff T

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	N/A	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	False	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

ATTACHMENT B

Table B-1 Summary of Treatability Study Field Test Data
Red Devil Mine Site, Treatability Study
Red Devil, Alaska

Sample Location:	13TS01				13TS03			
Sample ID:	**CS01-1**	**CS01-2**	**CS01-3**	**CS01-4**	**CS01-5**	**CS03-6**	**CS03-7**	**CS03-8**
pH (standard units)								
t = 0 minutes	4.5	4	11	4	11	4	11	4
t = 2.5 minutes	5.5	4	11	4	11	4	11	4
t = 5 minutes	11	4	11	4	11	4	11	4
Temperature (^{o}F)								
t = 0 minutes	53	50	53	49	57	56	57	58
t = 2.5 minutes	52	63	51	63	58	67	59	70
t = 5 minutes	49	63	49	65	58	68	60	67
Compression Strength (tons per square foot)								
Pre-solidification	0.5				2.25			
t = 24 hours	>4.5	2.75	>4.5	>4.5	>4.5	2.75	>4.5	3
t = 3 days	>4.5	2.75	>4.5	4	>4.5	2.75	>4.5	3.25
t = 7 days	>4.5	2.75	>4.5	>4.5	>4.5	>4.5	>4.5	>4.5
Appearance								
t = 5 minutes	Gray, clumps	Dark Grey, granular	Dark Grey, clumps	Dark Grey, granular	Gray, clumps	Blackish green, granular	Dark Grey, granular	Blackish green, granular
t = 24 hours	No Change	Turned Brown	No Change	Turned Brown	No Change	Turned Brown	No Change	Turned Brown
t = 3 days	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change
t = 7 days	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change