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EBS-OR-47182

May 8, 2020

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CASE NARRATIVE
Work Order # 20-04072-OR

SAMPLE RECEIPT

This work order contains nine solid samples received 04/25/2020. Samples were analyzed for Isotopic Plutonium, Plutonium-241, Neptunium-237, Americium-241/243, Curium-243/244, Total Strontium, Technetium-99, Tritium, Carbon-14, Promethium-147, Nickel-59/63, Iron-55 and by Gamma Spectroscopy.

<u>CLIENT ID</u>	<u>LAB ID</u>	<u>CLIENT ID</u>	<u>LAB ID</u>
B1-06202A-FSWC-040-CV	20-04072-04	B2-08201-CJWC-A018-CV 0 5-1 0	20-04072-09
B1-06214A-FSFC-001-CV	20-04072-05	L2-10214C-RJGS-001-SM-A	20-04072-10
B2-08101A-BJFC-007-CV 0 0-0 5	20-04072-06	L1-12109L-CJGS-001-SB-A	20-04072-11
B2-08101A-BJFC-007-CV 0 5-1 0	20-04072-07	L1-12106L-CJGS-001-SB-A	20-04072-12
B2-08201-CJWC-A018-CV 0 0-0 5	20-04072-08		

ANALYTICAL METHODS

Isotopic Plutonium and Plutonium-241 were analyzed using Method EML Pu-02 Modified. Neptunium-237 was analyzed using EIChrOM Method ACW08 Modified. Americium and Curium were analyzed using Method EML Am-01 Modified. Total Strontium was analyzed using EIChrOM Method SRW01 Modified. Technetium-99 was analyzed using EIChrOM Method TCS01 Modified. Tritium was performed using Method LANL ER-210 Modified. Carbon-14 was performed using EPA Method 520.0 Modified. Promethium-147 was performed using Method EML Pm-01 Modified. Nickel-59/63 was performed using Method ASTM 3500-Ni Modified. Iron-55 was performed using EML Method Fe-01-01 Modified. Gamma Spectroscopy was performed using EPA Method 901.1 Modified.

Laboratory qualifiers are as follows:

U - Result is less than the MDA.

ANALYTICAL RESULTS

Combined Standard Uncertainty is reported at 1-sigma value.

ANALYTICAL RESULTS CONTINUED

Minimum Detectable Activity (MDA) values for data represented in this report are sample-specific. MDA measurements are determined based on factors and conditions including instrument settings, aliquot size and matrix type.

ISOTOPIC PLUTONIUM

Samples were prepared by removing representative aliquots followed by mixed acid digestions as appropriate. Plutonium was selectively extracted by ion exchange. Plutonium was eluted, micro-precipitated and mounted on micro-porous filter media. Sample activities were determined by alpha spectroscopy using energy specific regions of interest for Plutonium-238 and Plutonium-239. Chemical recovery was determined using a Plutonium-242 tracer. Activity of the Plutonium-242 tracer was determined by alpha spectroscopy using an energy specific region of interest.

Samples demonstrated acceptable results for all Plutonium analyses. Chemical recovery was acceptable for all samples. The Plutonium-238 and Plutonium-239/240 method blank demonstrated acceptable results. Results for the Plutonium-238 and Plutonium-239/240 duplicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Plutonium-238 and Plutonium-239 laboratory control sample demonstrated an acceptable percent recovery.

PLUTONIUM-241

Following sample analysis for Isotopic Plutonium, filter media used was dissolved. Dissolved samples were placed into scintillation vials, scintillation cocktail was added and Plutonium-241 was determined by liquid scintillation counting. Analytical tracer recovery was determined by yields from the Isotopic Plutonium tracer.

Samples demonstrated acceptable results for all Plutonium-241 analyses. All sample results demonstrated slightly high method detection limits. Chemical recovery was acceptable for all samples. The Plutonium-241 method blank demonstrated an acceptable result. Results for the Plutonium-241 duplicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Plutonium-241 laboratory control sample demonstrated an acceptable percent recovery.

NEPTUNIUM-237

Samples were prepared by removing representative aliquots followed by mixed acid digestions as appropriate. Sample residues were dissolved in dilute acid and Neptunium was selectively separated using Eichrom stabilized selective resins. Neptunium was eluted, micro-precipitated and mounted on micro-porous filter media. Sample activities were determined by alpha spectroscopy using an energy specific region of interest for Neptunium-237 activity. A Neptunium-239 tracer was used for chemical yields, which was determined by beta proportional counting.

Samples demonstrated acceptable results for all Neptunium-237 analyses. Chemical recovery was acceptable for all samples. The Neptunium-237 method blank demonstrated an acceptable result. Results for the Neptunium-237 duplicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Neptunium-237 laboratory control sample demonstrated an acceptable percent recovery.

ANALYTICAL RESULTS CONTINUED

AMERICIUM-241

Samples were prepared by removing representative aliquots followed by mixed acid digestions as appropriate. Samples were co-precipitated with Calcium Phosphate. Precipitates were nitrate converted using Nitric acid and Aluminum Nitrate. The Americium fractions were separated from other elements using the Eichrom, TRU and UTEVA resins. The separated Americium fractions were mounted on a membrane filter by micro-precipitation and counted on the alpha spectroscopy system. Analytical tracer recovery was determined using an Americium-243 standard and subsequent activity determination by alpha spectroscopy.

Samples demonstrated acceptable results for all Americium-241 analyses. Chemical recovery was acceptable for all samples. The Americium-241 method blank demonstrated an acceptable result. Results for the Americium-241 duplicate demonstrated an acceptable relative percent difference and normalized difference. Results for the Americium-241 laboratory control sample demonstrated an acceptable percent recovery.

AMERICIUM-243

Samples were prepared by removing representative aliquots followed by mixed acid digestions as appropriate. Samples were co-precipitated with Calcium Phosphate. Precipitates were nitrate converted using Nitric acid and Aluminum Nitrate. The Americium fractions were separated from other elements using the Eichrom, TRU and UTEVA resins. The separated Americium fractions were mounted on a membrane filter by micro-precipitation and counted on the alpha spectroscopy system. Analytical tracer recovery was determined using a Curium-244 standard and subsequent activity determination by alpha spectroscopy.

Samples demonstrated acceptable results for all Americium-243 analyses. Chemical recovery was low for laboratory fraction -06 (Client ID: B2-08101A-BJFC-007-CV 0 0-0 5). Chemical recovery was acceptable for all other samples. The Americium-243 method blank demonstrated an acceptable result. Results for the Americium-243 duplicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Americium-243 laboratory control sample demonstrated an acceptable percent recovery.

CURIUM-243/244

Samples were prepared by removing representative aliquots followed by mixed acid digestions as appropriate. Samples were co-precipitated with Calcium Phosphate. Precipitates were nitrate converted using Nitric acid and Aluminum Nitrate. The Curium fractions were separated from other elements using the Eichrom, TRU and UTEVA resins. The separated Curium fractions were mounted on a membrane filter by micro-precipitation and counted on the alpha spectroscopy system. Analytical tracer recovery was determined using an Americium-243 standard and subsequent activity determination by alpha spectroscopy.

Samples demonstrated acceptable results for all Curium-243/244 analyses. Chemical recovery was acceptable for all samples. The Curium-243/244 method blank demonstrated an acceptable result. Results for the Curium-243/244 duplicate demonstrated an acceptable relative percent difference and normalized difference. Results for the Curium-244 laboratory control sample demonstrated an acceptable percent recovery.

ANALYTICAL RESULTS CONTINUED

TOTAL STRONTIUM

Samples were prepared by acid digestion as appropriate for the matrix. Digested samples were acidified and selectively extracted and precipitated. Precipitates were then mounted on 47mm filters. Filters were reweighed to determine aliquot size. Sample activities were determined by gas flow proportional counting.

Samples demonstrated acceptable results for all Total Strontium analyses. Strontium-90 is reported from Total Strontium assuming secular equilibrium. Chemical recovery was acceptable for all samples. The Total Strontium method blank demonstrated an acceptable result. Results for the Total Strontium duplicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Total Strontium laboratory control sample demonstrated an acceptable percent recovery.

TECHNETIUM-99

A representative aliquot was removed from each sample followed by leaching in acids. Samples were prepared by oxidative reactions with Nitric acid and Hydrogen Peroxide. After complete oxidization, Technetium was selectively extracted using Eichrom stabilized resins. Special cleanup chemistry was conducted for complete removal of interferences associated with Uranium. Processed resins were transferred to liquid scintillation vials, scintillation cocktail was added, and samples were counted by beta liquid scintillation.

Samples demonstrated acceptable results for all Technetium-99 analyses. The Technetium-99 method blank demonstrated an acceptable result. Results for the Technetium-99 duplicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Technetium-99 laboratory control sample demonstrated an acceptable percent recovery.

TRITIUM

A representative aliquot of each sample was equilibrated with Tritium free water. Equilibrates were transferred into round-bottomed distillation flasks and attached to single stage stills. A portion of each middle distillation fraction was transferred to a liquid scintillation vial and cocktail was added. Samples were counted by beta liquid scintillation.

Samples demonstrated acceptable results for all Tritium analyses. The Tritium method blank demonstrated an acceptable result. Results for the Tritium duplicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Tritium laboratory control sample demonstrated an acceptable percent recovery.

CARBON-14

A representative aliquot of each sample was placed into a 1-liter reaction vessel. A carbonate solution was added. Samples were oxidized using Potassium Permanganate. Carbon Dioxide was evolved and Carbon-14 was captured into Harvey brand, Carb-Sorb cocktail. Carbon-14 beta emissions were then determined by beta liquid scintillation using an energy selective region.

ANALYTICAL RESULTS CONTINUED

CARBON-14 CONTINUED

Samples demonstrated acceptable results for all Carbon-14 analyses. The Carbon-14 method blank demonstrated an acceptable result. Results for the Carbon-14 duplicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Carbon-14 laboratory control sample demonstrated an acceptable percent recovery.

PROMETHIUM-147

Samples were prepared by leaching in HNO_3 . Aliquots were taken to near dryness. Sample residues were dissolved in deionized water. The pH of each sample was adjusted with HNO_3 . Samples were extracted with scintillation extractant. Organic phase of each sample was transferred to scintillation vials. Promethium-147 was determined by liquid scintillation counting.

Samples demonstrated acceptable results for all Promethium-147 analyses. The Promethium-147 method blank demonstrated an acceptable result. Results for the Promethium-147 duplicate demonstrated an acceptable relative percent difference and normalized difference. Results for the Promethium-147 laboratory control sample demonstrated an acceptable percent recovery.

NICKEL-63

A representative aliquot of each sample was prepared by leaching in acids. Aliquots were placed into appropriately sized beakers. Stable elemental Nickel carrier was added to each sample prior to digestion. Samples were digested in concentrated Nitric acid. After digestion, each sample pH was adjusted and Nickel-63 was precipitated selectively with Dimethylglyoxime. Precipitates were selectively separated, redissolved, and residual acid was effectively neutralized. Sample residuals were placed into scintillation vials, scintillation cocktail was added, and Nickel-63 activity was determined by beta liquid scintillation.

Samples demonstrated acceptable results for all Nickel-63 analyses. The Nickel-63 method blank demonstrated an acceptable result. Results for the Nickel-63 duplicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Nickel-63 laboratory control sample demonstrated an acceptable percent recovery.

NICKEL-59

Representative aliquots were removed from samples and placed into Petri geometry containers. Samples were counted by low-energy photon spectroscopy.

Samples demonstrated acceptable results for all Nickel-59 analyses. The Nickel-59 method blank demonstrated an acceptable result. Results for the Nickel-59 replicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Iron-55 laboratory control sample demonstrated a statistically acceptable percent recovery.

ANALYTICAL RESULTS CONTINUED

IRON-55

Representative aliquots were removed from samples and placed into Petri geometry containers. Samples were counted by low-energy photon spectroscopy.

Samples demonstrated acceptable results for all Iron-55 analyses. The Iron-55 method blank demonstrated an acceptable result. Results for the Iron-55 replicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Iron-55 laboratory control sample demonstrated an acceptable percent recovery.

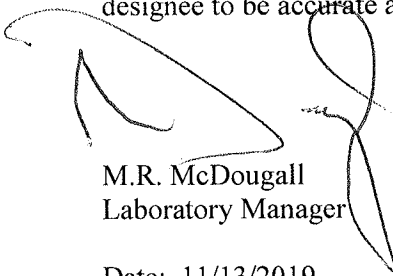
GAMMA SPECTROSCOPY

Samples for Gamma Spectroscopy analysis were prepared by transferring a known mass of each homogenized sample to a standard geometry container. Samples were counted on High Purity Germanium (HPGe) gamma ray detectors.

Samples demonstrated acceptable results for all gamma-emitting radionuclides as reported. Cobalt-60 results for laboratory fraction -08 (Client ID: B2-08201-CJWC-A018-CV 0 0-0 5) demonstrated a slightly high method detection limit. The method blank demonstrated acceptable results for all radionuclides as reported. Results for the Bismuth-214 and Potassium-40 replicate demonstrated an acceptable relative percent difference and normalized difference. Results for the Thorium-234 replicate demonstrated a high relative percent; however, normalized difference is within acceptable limits for the analytical technique. Results for the Cobalt-60 and Cesium-137 laboratory control sample demonstrated an acceptable percent recovery.

CERTIFICATION OF ACCURACY

I certify that this data report is in compliance with the terms and conditions of the Purchase Order, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hard copy data package has been authorized by the cognizant project manager or his/her designee to be accurate as verified by the following signature.



M.R. McDougall
Laboratory Manager

Date: 11/13/2019

Eberline Analytical wants and encourages your feedback regarding our performance providing radioanalytical services. Please visit <http://eberlineanalytical.com/> to provide us with feedback on our services.

Eberline Analytical

Final Report of Analysis

Report To:

Gerald Wood
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2701 Deborah Ave
Zion, IL 60099

Work Order Details:

SDG: 20-04072
Purchase Order: 677116
Analysis Category: ENVIRONMENTAL
Sample Matrix: SO

Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Qualifier	Report Units
20-04072-01	LCS	KNOWN	04/25/20 00:00	4/25/2020	4/30/2020	20-04072	Americium-241	EML Am-01 Modified	5.55E+00	1.66E-01				pCi/g
20-04072-01	LCS	SPIKE	04/25/20 00:00	4/25/2020	4/30/2020	20-04072	Americium-241	EML Am-01 Modified	5.47E+00	1.01E+00	1.10E+00	1.40E-01		pCi/g
20-04072-02	MBL	BLANK	04/25/20 00:00	4/25/2020	4/30/2020	20-04072	Americium-241	EML Am-01 Modified	6.96E-02	7.57E-02	7.59E-02	9.09E-02	U	pCi/g
20-04072-03	DUP	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/30/2020	20-04072	Americium-241	EML Am-01 Modified	7.52E-02	8.00E-02	8.02E-02	1.11E-01	U	pCi/g
20-04072-04	DO	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/30/2020	20-04072	Americium-241	EML Am-01 Modified	6.44E-02	8.10E-02	8.12E-02	1.29E-01	U	pCi/g
20-04072-05	TRG	B1-06214A-FSFC-001-CV	05/05/18 15:15	4/25/2020	4/30/2020	20-04072	Americium-241	EML Am-01 Modified	-4.34E-04	4.60E-02	4.60E-02	1.37E-01	U	pCi/g
20-04072-06	TRG	B2-08101A-BJFC-007-CV 0 0-0 5	05/09/12 14:22	4/25/2020	4/30/2020	20-04072	Americium-241	EML Am-01 Modified	4.23E-02	5.13E-02	5.14E-02	6.24E-02	U	pCi/g
20-04072-07	TRG	B2-08101A-BJFC-007-CV 0 5-1 0	05/09/12 14:22	4/25/2020	4/30/2020	20-04072	Americium-241	EML Am-01 Modified	2.06E-02	5.15E-02	5.16E-02	1.07E-01	U	pCi/g
20-04072-08	TRG	B2-08201-CJWC-A018-CV 0 0-0 5	05/10/12 12:56	4/25/2020	4/30/2020	20-04072	Americium-241	EML Am-01 Modified	-1.29E-02	4.50E-02	4.50E-02	1.27E-01	U	pCi/g
20-04072-09	TRG	B2-08201-CJWC-A018-CV 0 5-1 0	05/10/12 12:56	4/25/2020	4/30/2020	20-04072	Americium-241	EML Am-01 Modified	1.73E-02	5.61E-02	5.61E-02	1.16E-01	U	pCi/g
20-04072-10	TRG	L2-10214C-RJGS-001-SM-A	05/07/19 07:45	4/25/2020	4/30/2020	20-04072	Americium-241	EML Am-01 Modified	3.36E-02	5.17E-02	5.18E-02	8.85E-02	U	pCi/g
20-04072-11	TRG	L1-12109L-CJGS-001-SB-A	08/21/19 10:25	4/25/2020	4/30/2020	20-04072	Americium-241	EML Am-01 Modified	6.61E-02	6.77E-02	6.79E-02	9.05E-02	U	pCi/g
20-04072-12	TRG	L1-12106L-CJGS-001-SB-A	08/14/19 13:30	4/25/2020	4/30/2020	20-04072	Americium-241	EML Am-01 Modified	4.47E-02	6.86E-02	6.87E-02	1.02E-01	U	pCi/g
20-04072-01	LCS	KNOWN	04/25/20 00:00	4/25/2020	4/30/2020	20-04072	Americium-243	EML Am-01 Modified	6.05E+00	1.82E-01				pCi/g
20-04072-01	LCS	SPIKE	04/25/20 00:00	4/25/2020	4/30/2020	20-04072	Americium-243	EML Am-01 Modified	5.41E+00	7.46E-01	1.10E+00	9.62E-02		pCi/g
20-04072-02	MBL	BLANK	04/25/20 00:00	4/25/2020	4/30/2020	20-04072	Americium-243	EML Am-01 Modified	5.60E-02	6.78E-02	6.83E-02	8.26E-02	U	pCi/g
20-04072-03	DUP	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/30/2020	20-04072	Americium-243	EML Am-01 Modified	7.10E-02	7.33E-02	7.40E-02	7.74E-02	U	pCi/g
20-04072-04	DO	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/30/2020	20-04072	Americium-243	EML Am-01 Modified	2.85E-02	6.17E-02	6.18E-02	1.22E-01	U	pCi/g
20-04072-05	TRG	B1-06214A-FSFC-001-CV	05/05/18 15:15	4/25/2020	4/30/2020	20-04072	Americium-243	EML Am-01 Modified	4.43E-02	5.81E-02	5.84E-02	8.86E-02	U	pCi/g
20-04072-06	TRG	B2-08101A-BJFC-007-CV 0 0-0 5	05/09/12 14:22	4/25/2020	4/30/2020	20-04072	Americium-243	EML Am-01 Modified	2.02E-01	3.46E-01	3.47E-01	6.07E-01	U	pCi/g
20-04072-07	TRG	B2-08101A-BJFC-007-CV 0 5-1 0	05/09/12 14:22	4/25/2020	4/30/2020	20-04072	Americium-243	EML Am-01 Modified	5.82E-02	7.03E-02	7.09E-02	8.58E-02	U	pCi/g
20-04072-08	TRG	B2-08201-CJWC-A018-CV 0 0-0 5	05/10/12 12:56	4/25/2020	4/30/2020	20-04072	Americium-243	EML Am-01 Modified	1.14E-01	1.16E-01	1.17E-01	1.56E-01	U	pCi/g
20-04072-09	TRG	B2-08201-CJWC-A018-CV 0 5-1 0	05/10/12 12:56	4/25/2020	4/30/2020	20-04072	Americium-243	EML Am-01 Modified	6.77E-02	7.96E-02	8.03E-02	1.17E-01	U	pCi/g
20-04072-10	TRG	L2-10214C-RJGS-001-SM-A	05/07/19 07:45	4/25/2020	4/30/2020	20-04072	Americium-243	EML Am-01 Modified	1.41E-02	3.38E-02	3.39E-02	7.10E-02	U	pCi/g
20-04072-11	TRG	L1-12109L-CJGS-001-SB-A	08/21/19 10:25	4/25/2020	4/30/2020	20-04072	Americium-243	EML Am-01 Modified	-1.41E-02	3.49E-02	3.50E-02	9.95E-02	U	pCi/g
20-04072-12	TRG	L1-12106L-CJGS-001-SB-A	08/14/19 13:30	4/25/2020	4/30/2020	20-04072	Americium-243	EML Am-01 Modified	-2.63E-02	4.75E-02	4.77E-02	1.46E-01	U	pCi/g

CU=Counting Uncertainty;CSU=Combined Standard Uncertainty (1-sigma);MDA=Minimal Detected Activity;LCS=Laboratory Control Sample;MBL=Blank;DUP=Duplicate;TRG=Normal Sample;DO=Duplicate Original;U=Non-detect



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Eberline Analytical

Final Report of Analysis

Report To:

Gerald Wood
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Work Order Details:

SDG: 20-04072
Purchase Order: 677116
Analysis Category: ENVIRONMENTAL
Sample Matrix: SO

Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Qualifier	Report Units
20-04072-01	LCS	KNOWN	04/25/20 00:00	4/25/2020	4/30/2020	20-04072	Curium-243/244	EML Am-01 Modified	5.99E+00	1.08E-01				pCi/g
20-04072-01	LCS	SPIKE	04/25/20 00:00	4/25/2020	4/30/2020	20-04072	Curium-243/244	EML Am-01 Modified	5.83E+00	1.07E+00	1.28E+00	1.07E-01		pCi/g
20-04072-02	MBL	BLANK	04/25/20 00:00	4/25/2020	4/30/2020	20-04072	Curium-243/244	EML Am-01 Modified	1.14E-01	9.99E-02	1.01E-01	1.14E-01		pCi/g
20-04072-03	DUP	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/30/2020	20-04072	Curium-243/244	EML Am-01 Modified	2.29E-02	4.96E-02	4.96E-02	9.78E-02	U	pCi/g
20-04072-04	DO	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/30/2020	20-04072	Curium-243/244	EML Am-01 Modified	2.12E-02	4.60E-02	4.60E-02	9.08E-02	U	pCi/g
20-04072-05	TRG	B1-06214A-FSFC-001-CV	05/05/18 15:15	4/25/2020	4/30/2020	20-04072	Curium-243/244	EML Am-01 Modified	3.47E-02	6.62E-02	6.63E-02	1.22E-01	U	pCi/g
20-04072-06	TRG	B2-08101A-BJFC-007-CV 0 0-0 5	05/09/12 14:22	4/25/2020	4/30/2020	20-04072	Curium-243/244	EML Am-01 Modified	1.24E-02	2.98E-02	2.98E-02	6.24E-02	U	pCi/g
20-04072-07	TRG	B2-08101A-BJFC-007-CV 0 5-1 0	05/09/12 14:22	4/25/2020	4/30/2020	20-04072	Curium-243/244	EML Am-01 Modified	8.35E-02	7.99E-02	8.06E-02	8.57E-02	U	pCi/g
20-04072-08	TRG	B2-08201-CJWC-A018-CV 0 0-0 5	05/10/12 12:56	4/25/2020	4/30/2020	20-04072	Curium-243/244	EML Am-01 Modified	4.05E-02	6.63E-02	6.64E-02	1.16E-01	U	pCi/g
20-04072-09	TRG	B2-08201-CJWC-A018-CV 0 5-1 0	05/10/12 12:56	4/25/2020	4/30/2020	20-04072	Curium-243/244	EML Am-01 Modified	6.71E-02	7.25E-02	7.30E-02	1.05E-01	U	pCi/g
20-04072-10	TRG	L2-10214C-RJGS-001-SM-A	05/07/19 07:45	4/25/2020	4/30/2020	20-04072	Curium-243/244	EML Am-01 Modified	1.53E-02	4.19E-02	4.19E-02	8.65E-02	U	pCi/g
20-04072-11	TRG	L1-12109L-CJGS-001-SB-A	08/21/19 10:25	4/25/2020	4/30/2020	20-04072	Curium-243/244	EML Am-01 Modified	2.31E-02	4.97E-02	4.98E-02	9.66E-02	U	pCi/g
20-04072-12	TRG	L1-12106L-CJGS-001-SB-A	08/14/19 13:30	4/25/2020	4/30/2020	20-04072	Curium-243/244	EML Am-01 Modified	4.59E-02	7.04E-02	7.06E-02	1.05E-01	U	pCi/g
20-04072-01	LCS	KNOWN	04/25/20 00:00	4/25/2020	4/27/2020	20-04072	Carbon-14	EPA 520.0 Modified	1.32E+03	3.70E+01				pCi/g
20-04072-01	LCS	SPIKE	04/25/20 00:00	4/25/2020	4/27/2020	20-04072	Carbon-14	EPA 520.0 Modified	1.30E+03	9.67E+00	1.81E+02	4.08E+00		pCi/g
20-04072-02	MBL	BLANK	04/25/20 00:00	4/25/2020	4/27/2020	20-04072	Carbon-14	EPA 520.0 Modified	-3.73E-01	4.65E-01	4.68E-01	7.99E-01	U	pCi/g
20-04072-03	DUP	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Carbon-14	EPA 520.0 Modified	-5.57E-01	3.64E-01	3.72E-01	6.32E-01	U	pCi/g
20-04072-04	DO	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Carbon-14	EPA 520.0 Modified	-4.31E-01	3.70E-01	3.75E-01	6.39E-01	U	pCi/g
20-04072-05	TRG	B1-06214A-FSFC-001-CV	05/05/18 15:15	4/25/2020	4/28/2020	20-04072	Carbon-14	EPA 520.0 Modified	-6.32E-01	3.49E-01	3.60E-01	6.09E-01	U	pCi/g
20-04072-06	TRG	B2-08101A-BJFC-007-CV 0 0-0 5	05/09/12 14:22	4/25/2020	4/28/2020	20-04072	Carbon-14	EPA 520.0 Modified	-4.56E-01	3.63E-01	3.69E-01	6.28E-01	U	pCi/g
20-04072-07	TRG	B2-08101A-BJFC-007-CV 0 5-1 0	05/09/12 14:22	4/25/2020	4/28/2020	20-04072	Carbon-14	EPA 520.0 Modified	-2.87E-01	4.03E-01	4.04E-01	6.91E-01	U	pCi/g
20-04072-08	TRG	B2-08201-CJWC-A018-CV 0 0-0 5	05/10/12 12:56	4/25/2020	4/28/2020	20-04072	Carbon-14	EPA 520.0 Modified	-6.71E-01	3.91E-01	4.02E-01	6.81E-01	U	pCi/g
20-04072-09	TRG	B2-08201-CJWC-A018-CV 0 5-1 0	05/10/12 12:56	4/25/2020	4/28/2020	20-04072	Carbon-14	EPA 520.0 Modified	-5.32E-01	3.69E-01	3.77E-01	6.41E-01	U	pCi/g
20-04072-10	TRG	L2-10214C-RJGS-001-SM-A	05/07/19 07:45	4/25/2020	4/28/2020	20-04072	Carbon-14	EPA 520.0 Modified	-4.72E-01	3.76E-01	3.81E-01	6.50E-01	U	pCi/g
20-04072-11	TRG	L1-12109L-CJGS-001-SB-A	08/21/19 10:25	4/25/2020	4/28/2020	20-04072	Carbon-14	EPA 520.0 Modified	-4.92E-01	3.91E-01	3.97E-01	6.77E-01	U	pCi/g
20-04072-12	TRG	L1-12106L-CJGS-001-SB-A	08/14/19 13:30	4/25/2020	4/28/2020	20-04072	Carbon-14	EPA 520.0 Modified	-3.28E-01	3.68E-01	3.71E-01	6.33E-01	U	pCi/g

CU=Counting Uncertainty;CSU=Combined Standard Uncertainty (1-sigma);MDA=Minimal Detected Activity;LCS=Laboratory Control Sample;MBL=Blank;DUP=Duplicate;TRG=Normal Sample;DO=Duplicate Original;U=Non-detect



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Eberline Analytical Final Report of Analysis			Report To:						Work Order Details:						
			Gerald Wood						SDG:		20-04072				
			Zion Solutions						Purchase Order:		677116				
			2701 Deborah Ave						Analysis Category:		ENVIRONMENTAL				
			Zion, IL 60099						Sample Matrix:		SO				
Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Qualifier	Report Units	
20-04072-01	LCS	KNOWN	04/25/20 00:00	4/25/2020	4/28/2020	20-04072	Iron-55	EML Fe-01-01 Modified	4.08E+03	3.50E+02				pCi/g	
20-04072-01	LCS	SPIKE	04/25/20 00:00	4/25/2020	4/28/2020	20-04072	Iron-55	EML Fe-01-01 Modified	3.41E+03	2.32E+02	6.33E+02	2.51E+02		pCi/g	
20-04072-02	MBL	BLANK	04/25/20 00:00	4/25/2020	4/28/2020	20-04072	Iron-55	EML Fe-01-01 Modified	5.18E+00	1.92E+01	1.92E+01	3.01E+01	U	pCi/g	
20-04072-03	DUP	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/28/2020	20-04072	Iron-55	EML Fe-01-01 Modified	3.19E-02	1.31E-01	1.31E-01	2.15E-01	U	pCi/g	
20-04072-04	DO	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/28/2020	20-04072	Iron-55	EML Fe-01-01 Modified	-3.00E-02	1.41E-01	1.41E-01	2.23E-01	U	pCi/g	
20-04072-05	TRG	B1-06214A-FSFC-001-CV	05/05/18 15:15	4/25/2020	4/28/2020	20-04072	Iron-55	EML Fe-01-01 Modified	6.56E-02	1.89E-01	1.89E-01	3.14E-01	U	pCi/g	
20-04072-06	TRG	B2-08101A-BJFC-007-CV 0 0-0 5	05/09/12 14:22	4/25/2020	4/28/2020	20-04072	Iron-55	EML Fe-01-01 Modified	7.56E-01	2.76E+00	2.76E+00	4.46E+00	U	pCi/g	
20-04072-07	TRG	B2-08101A-BJFC-007-CV 0 5-1 0	05/09/12 14:22	4/25/2020	4/29/2020	20-04072	Iron-55	EML Fe-01-01 Modified	-1.76E+00	2.08E+00	2.10E+00	3.04E+00	U	pCi/g	
20-04072-08	TRG	B2-08201-CJWC-A018-CV 0 0-0 5	05/10/12 12:56	4/25/2020	4/29/2020	20-04072	Iron-55	EML Fe-01-01 Modified	-1.79E-01	3.22E+00	3.22E+00	5.12E+00	U	pCi/g	
20-04072-09	TRG	B2-08201-CJWC-A018-CV 0 5-1 0	05/10/12 12:56	4/25/2020	4/29/2020	20-04072	Iron-55	EML Fe-01-01 Modified	1.34E+00	2.55E+00	2.56E+00	4.30E+00	U	pCi/g	
20-04072-10	TRG	L2-10214C-RJGS-001-SM-A	05/07/19 07:45	4/25/2020	4/29/2020	20-04072	Iron-55	EML Fe-01-01 Modified	5.91E-02	6.71E-02	6.79E-02	1.15E-01	U	pCi/g	
20-04072-11	TRG	L1-12109L-CJGS-001-SB-A	08/21/19 10:25	4/25/2020	4/29/2020	20-04072	Iron-55	EML Fe-01-01 Modified	-1.82E-02	3.86E-01	3.86E-01	6.15E-01	U	pCi/g	
20-04072-12	TRG	L1-12106L-CJGS-001-SB-A	08/14/19 13:30	4/25/2020	4/29/2020	20-04072	Iron-55	EML Fe-01-01 Modified	1.85E-01	2.37E-01	2.39E-01	4.04E-01	U	pCi/g	
20-04072-01	LCS	KNOWN	04/25/20 00:00	4/25/2020	4/30/2020	20-04072	Tritium	LANL ER-210 Modified	3.61E+02	1.30E+01				pCi/g	
20-04072-01	LCS	SPIKE	04/25/20 00:00	4/25/2020	4/30/2020	20-04072	Tritium	LANL ER-210 Modified	3.69E+02	6.96E+00	2.18E+01	3.62E+00		pCi/g	
20-04072-02	MBL	BLANK	04/25/20 00:00	4/25/2020	4/30/2020	20-04072	Tritium	LANL ER-210 Modified	2.05E+00	2.16E+00	2.16E+00	3.62E+00	U	pCi/g	
20-04072-03	DUP	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/30/2020	20-04072	Tritium	LANL ER-210 Modified	1.85E+00	2.36E+00	2.37E+00	3.98E+00	U	pCi/g	
20-04072-04	DO	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/30/2020	20-04072	Tritium	LANL ER-210 Modified	3.70E+00	2.42E+00	2.42E+00	3.98E+00	U	pCi/g	
20-04072-05	TRG	B1-06214A-FSFC-001-CV	05/05/18 15:15	4/25/2020	5/1/2020	20-04072	Tritium	LANL ER-210 Modified	3.86E+00	2.40E+00	2.41E+00	3.94E+00	U	pCi/g	
20-04072-06	TRG	B2-08101A-BJFC-007-CV 0 0-0 5	05/09/12 14:22	4/25/2020	5/1/2020	20-04072	Tritium	LANL ER-210 Modified	4.97E+00	3.43E+00	3.44E+00	5.67E+00	U	pCi/g	
20-04072-07	TRG	B2-08101A-BJFC-007-CV 0 5-1 0	05/09/12 14:22	4/25/2020	5/1/2020	20-04072	Tritium	LANL ER-210 Modified	6.35E+00	5.68E+00	5.69E+00	9.48E+00	U	pCi/g	
20-04072-08	TRG	B2-08201-CJWC-A018-CV 0 0-0 5	05/10/12 12:56	4/25/2020	5/1/2020	20-04072	Tritium	LANL ER-210 Modified	4.02E+00	3.34E+00	3.35E+00	5.56E+00	U	pCi/g	
20-04072-09	TRG	B2-08201-CJWC-A018-CV 0 5-1 0	05/10/12 12:56	4/25/2020	5/1/2020	20-04072	Tritium	LANL ER-210 Modified	6.41E+00	3.46E+00	3.47E+00	5.64E+00		pCi/g	
20-04072-10	TRG	L2-10214C-RJGS-001-SM-A	05/07/19 07:45	4/25/2020	5/1/2020	20-04072	Tritium	LANL ER-210 Modified	2.74E+00	2.28E+00	2.28E+00	3.79E+00	U	pCi/g	
20-04072-11	TRG	L1-12109L-CJGS-001-SB-A	08/21/19 10:25	4/25/2020	5/1/2020	20-04072	Tritium	LANL ER-210 Modified	8.51E+00	2.36E+00	2.41E+00	3.67E+00		pCi/g	
20-04072-12	TRG	L1-12106L-CJGS-001-SB-A	08/14/19 13:30	4/25/2020	5/1/2020	20-04072	Tritium	LANL ER-210 Modified	1.50E+00	2.16E+00	2.16E+00	3.64E+00	U	pCi/g	

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			Gerald Wood						SDG:	20-04072					
			Zion Solutions						Purchase Order:	677116					
			2701 Deborah Ave						Analysis Category:	ENVIRONMENTAL					
			Zion, IL 60099						Sample Matrix:	SO					
Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte		Method	Result	CU	CSU	MDA	Qualifier	Report Units
20-04072-01	LCS	KNOWN	04/25/20 00:00	4/25/2020	4/28/2020	20-04072	Iron-55		ASTM 3500-Ni Modified	4.08E+03	3.50E+02				pCi/g
20-04072-01	LCS	SPIKE	04/25/20 00:00	4/25/2020	4/28/2020	20-04072	Iron-55		ASTM 3500-Ni Modified	3.05E+03	2.42E+02	3.20E+02	2.94E+02		pCi/g
20-04072-02	MBL	BLANK	04/25/20 00:00	4/25/2020	4/28/2020	20-04072	Nickel-59		ASTM 3500-Ni Modified	-2.65E+00	1.49E+01	1.49E+01	2.28E+01	U	pCi/g
20-04072-03	DUP	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/28/2020	20-04072	Nickel-59		ASTM 3500-Ni Modified	-2.89E-02	7.41E-02	7.41E-02	1.11E-01	U	pCi/g
20-04072-04	DO	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/28/2020	20-04072	Nickel-59		ASTM 3500-Ni Modified	1.46E-02	7.26E-02	7.27E-02	1.15E-01	U	pCi/g
20-04072-05	TRG	B1-06214A-FSFC-001-CV	05/05/18 15:15	4/25/2020	4/28/2020	20-04072	Nickel-59		ASTM 3500-Ni Modified	-4.18E-03	9.97E-02	9.97E-02	1.53E-01	U	pCi/g
20-04072-06	TRG	B2-08101A-BJFC-007-CV 0 0-0 5	05/09/12 14:22	4/25/2020	4/28/2020	20-04072	Nickel-59		ASTM 3500-Ni Modified	1.10E-02	2.98E-01	2.98E-01	4.67E-01	U	pCi/g
20-04072-07	TRG	B2-08101A-BJFC-007-CV 0 5-1 0	05/09/12 14:22	4/25/2020	4/29/2020	20-04072	Nickel-59		ASTM 3500-Ni Modified	7.38E-02	1.97E-01	1.97E-01	3.17E-01	U	pCi/g
20-04072-08	TRG	B2-08201-CJWC-A018-CV 0 0-0 5	05/10/12 12:56	4/25/2020	4/29/2020	20-04072	Nickel-59		ASTM 3500-Ni Modified	1.08E-01	3.31E-01	3.31E-01	5.28E-01	U	pCi/g
20-04072-09	TRG	B2-08201-CJWC-A018-CV 0 5-1 0	05/10/12 12:56	4/25/2020	4/29/2020	20-04072	Nickel-59		ASTM 3500-Ni Modified	3.79E-02	2.76E-01	2.76E-01	4.38E-01	U	pCi/g
20-04072-10	TRG	L2-10214C-RJGS-001-SM-A	05/07/19 07:45	4/25/2020	4/29/2020	20-04072	Nickel-59		ASTM 3500-Ni Modified	-6.28E-03	4.68E-02	4.68E-02	7.12E-02	U	pCi/g
20-04072-11	TRG	L1-12109L-CJGS-001-SB-A	08/21/19 10:25	4/25/2020	4/29/2020	20-04072	Nickel-59		ASTM 3500-Ni Modified	1.80E-01	2.62E-01	2.63E-01	4.32E-01	U	pCi/g
20-04072-12	TRG	L1-12106L-CJGS-001-SB-A	08/14/19 13:30	4/25/2020	4/29/2020	20-04072	Nickel-59		ASTM 3500-Ni Modified	-1.36E-01	1.78E-01	1.78E-01	2.52E-01	U	pCi/g
20-04072-01	LCS	KNOWN	04/25/20 00:00	4/25/2020	4/30/2020	20-04072	Nickel-63		ASTM 3500-Ni Modified	1.46E+03	4.39E+01				pCi/g
20-04072-01	LCS	SPIKE	04/25/20 00:00	4/25/2020	4/30/2020	20-04072	Nickel-63		ASTM 3500-Ni Modified	1.48E+03	9.06E+00	8.76E+01	2.19E+00		pCi/g
20-04072-02	MBL	BLANK	04/25/20 00:00	4/25/2020	4/30/2020	20-04072	Nickel-63		ASTM 3500-Ni Modified	-8.58E-01	1.28E+00	1.28E+00	2.22E+00	U	pCi/g
20-04072-03	DUP	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/30/2020	20-04072	Nickel-63		ASTM 3500-Ni Modified	9.36E-01	1.30E+00	1.31E+00	2.20E+00	U	pCi/g
20-04072-04	DO	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/30/2020	20-04072	Nickel-63		ASTM 3500-Ni Modified	1.45E+00	1.32E+00	1.32E+00	2.20E+00	U	pCi/g
20-04072-05	TRG	B1-06214A-FSFC-001-CV	05/05/18 15:15	4/25/2020	4/30/2020	20-04072	Nickel-63		ASTM 3500-Ni Modified	2.70E-01	1.37E+00	1.37E+00	2.33E+00	U	pCi/g
20-04072-06	TRG	B2-08101A-BJFC-007-CV 0 0-0 5	05/09/12 14:22	4/25/2020	4/30/2020	20-04072	Nickel-63		ASTM 3500-Ni Modified	4.56E-01	1.39E+00	1.39E+00	2.36E+00	U	pCi/g
20-04072-07	TRG	B2-08101A-BJFC-007-CV 0 5-1 0	05/09/12 14:22	4/25/2020	4/30/2020	20-04072	Nickel-63		ASTM 3500-Ni Modified	7.46E-01	1.42E+00	1.42E+00	2.41E+00	U	pCi/g
20-04072-08	TRG	B2-08201-CJWC-A018-CV 0 0-0 5	05/10/12 12:56	4/25/2020	4/30/2020	20-04072	Nickel-63		ASTM 3500-Ni Modified	-6.62E-01	1.41E+00	1.41E+00	2.44E+00	U	pCi/g
20-04072-09	TRG	B2-08201-CJWC-A018-CV 0 5-1 0	05/10/12 12:56	4/25/2020	4/30/2020	20-04072	Nickel-63		ASTM 3500-Ni Modified	5.54E-01	1.41E+00	1.41E+00	2.38E+00	U	pCi/g
20-04072-10	TRG	L2-10214C-RJGS-001-SM-A	05/07/19 07:45	4/25/2020	4/30/2020	20-04072	Nickel-63		ASTM 3500-Ni Modified	-1.73E-01	1.30E+00	1.30E+00	2.24E+00	U	pCi/g
20-04072-11	TRG	L1-12109L-CJGS-001-SB-A	08/21/19 10:25	4/25/2020	4/30/2020	20-04072	Nickel-63		ASTM 3500-Ni Modified	7.13E-01	1.36E+00	1.36E+00	2.30E+00	U	pCi/g
20-04072-12	TRG	L1-12106L-CJGS-001-SB-A	08/14/19 13:30	4/25/2020	4/30/2020	20-04072	Nickel-63		ASTM 3500-Ni Modified	-1.09E+00	1.24E+00	1.24E+00	2.16E+00	U	pCi/g

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			2701 Deborah Ave					Analysis Category:	ENVIRONMENTAL					
			Zion, IL 60099					Sample Matrix:	SO					
Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Qualifier	Report Units
20-04072-01	LCS	KNOWN	04/25/20 00:00	4/25/2020	4/29/2020	20-04072	Neptunium-237	EIChroM ACW08 Mod	1.02E+01	3.67E-01				pCi/g
20-04072-01	LCS	SPIKE	04/25/20 00:00	4/25/2020	4/29/2020	20-04072	Neptunium-237	EIChroM ACW08 Mod	1.17E+01	9.71E-01	1.67E+00	1.19E-01		pCi/g
20-04072-02	MBL	BLANK	04/25/20 00:00	4/25/2020	4/29/2020	20-04072	Neptunium-237	EIChroM ACW08 Mod	5.84E-02	8.35E-02	8.37E-02	1.37E-01	U	pCi/g
20-04072-03	DUP	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/29/2020	20-04072	Neptunium-237	EIChroM ACW08 Mod	-2.75E-03	3.22E-02	3.22E-02	6.75E-02	U	pCi/g
20-04072-04	DO	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/29/2020	20-04072	Neptunium-237	EIChroM ACW08 Mod	4.76E-02	5.74E-02	5.76E-02	7.02E-02	U	pCi/g
20-04072-05	TRG	B1-06214A-FSFC-001-CV	05/05/18 15:15	4/25/2020	4/29/2020	20-04072	Neptunium-237	EIChroM ACW08 Mod	2.94E-02	4.98E-02	4.99E-02	8.80E-02	U	pCi/g
20-04072-06	TRG	B2-08101A-BJFC-007-CV 0 0-0 5	05/09/12 14:22	4/25/2020	4/29/2020	20-04072	Neptunium-237	EIChroM ACW08 Mod	7.53E-02	7.65E-02	7.70E-02	1.03E-01	U	pCi/g
20-04072-07	TRG	B2-08101A-BJFC-007-CV 0 5-1 0	05/09/12 14:22	4/25/2020	4/29/2020	20-04072	Neptunium-237	EIChroM ACW08 Mod	4.84E-02	6.93E-02	6.95E-02	1.14E-01	U	pCi/g
20-04072-08	TRG	B2-08201-CJWC-A018-CV 0 0-0 5	05/10/12 12:56	4/25/2020	4/29/2020	20-04072	Neptunium-237	EIChroM ACW08 Mod	4.18E-02	5.04E-02	5.07E-02	6.17E-02	U	pCi/g
20-04072-09	TRG	B2-08201-CJWC-A018-CV 0 5-1 0	05/10/12 12:56	4/25/2020	4/29/2020	20-04072	Neptunium-237	EIChroM ACW08 Mod	4.72E-02	7.22E-02	7.24E-02	1.23E-01	U	pCi/g
20-04072-10	TRG	L2-10214C-RJGS-001-SM-A	05/07/19 07:45	4/25/2020	4/29/2020	20-04072	Neptunium-237	EIChroM ACW08 Mod	7.03E-02	6.64E-02	6.69E-02	8.17E-02	U	pCi/g
20-04072-11	TRG	L1-12109L-CJGS-001-SB-A	08/21/19 10:25	4/25/2020	4/29/2020	20-04072	Neptunium-237	EIChroM ACW08 Mod	4.14E-02	4.99E-02	5.01E-02	6.10E-02	U	pCi/g
20-04072-12	TRG	L1-12106L-CJGS-001-SB-A	08/14/19 13:30	4/25/2020	4/29/2020	20-04072	Neptunium-237	EIChroM ACW08 Mod	1.52E-02	5.68E-02	5.68E-02	1.23E-01	U	pCi/g
20-04072-01	LCS	KNOWN	04/25/20 00:00	4/25/2020	4/29/2020	20-04072	Promethium-147	EML Pm-01 Modified	5.99E+01	1.62E+00				pCi/g
20-04072-01	LCS	SPIKE	04/25/20 00:00	4/25/2020	4/29/2020	20-04072	Promethium-147	EML Pm-01 Modified	5.89E+01	1.77E+00	9.02E+00	1.51E+00		pCi/g
20-04072-02	MBL	BLANK	04/25/20 00:00	4/25/2020	4/29/2020	20-04072	Promethium-147	EML Pm-01 Modified	5.01E-01	8.91E-01	8.94E-01	1.51E+00	U	pCi/g
20-04072-03	DUP	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/29/2020	20-04072	Promethium-147	EML Pm-01 Modified	1.47E+00	1.41E+00	1.43E+00	2.36E+00	U	pCi/g
20-04072-04	DO	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/29/2020	20-04072	Promethium-147	EML Pm-01 Modified	1.63E+00	1.46E+00	1.48E+00	2.44E+00	U	pCi/g
20-04072-05	TRG	B1-06214A-FSFC-001-CV	05/05/18 15:15	4/25/2020	4/30/2020	20-04072	Promethium-147	EML Pm-01 Modified	1.38E+00	1.52E+00	1.53E+00	2.55E+00	U	pCi/g
20-04072-06	TRG	B2-08101A-BJFC-007-CV 0 0-0 5	05/09/12 14:22	4/25/2020	4/30/2020	20-04072	Promethium-147	EML Pm-01 Modified	1.34E+01	7.54E+00	7.80E+00	1.24E+01		pCi/g
20-04072-07	TRG	B2-08101A-BJFC-007-CV 0 5-1 0	05/09/12 14:22	4/25/2020	4/30/2020	20-04072	Promethium-147	EML Pm-01 Modified	1.17E+01	7.08E+00	7.30E+00	1.17E+01	U	pCi/g
20-04072-08	TRG	B2-08201-CJWC-A018-CV 0 0-0 5	05/10/12 12:56	4/25/2020	4/30/2020	20-04072	Promethium-147	EML Pm-01 Modified	7.99E+00	7.19E+00	7.29E+00	1.20E+01	U	pCi/g
20-04072-09	TRG	B2-08201-CJWC-A018-CV 0 5-1 0	05/10/12 12:56	4/25/2020	4/30/2020	20-04072	Promethium-147	EML Pm-01 Modified	1.10E+01	7.27E+00	7.46E+00	1.20E+01	U	pCi/g
20-04072-10	TRG	L2-10214C-RJGS-001-SM-A	05/07/19 07:45	4/25/2020	4/30/2020	20-04072	Promethium-147	EML Pm-01 Modified	9.09E-01	1.18E+00	1.19E+00	1.99E+00	U	pCi/g
20-04072-11	TRG	L1-12109L-CJGS-001-SB-A	08/21/19 10:25	4/25/2020	4/30/2020	20-04072	Promethium-147	EML Pm-01 Modified	1.66E+00	1.14E+00	1.17E+00	1.90E+00	U	pCi/g
20-04072-12	TRG	L1-12106L-CJGS-001-SB-A	08/14/19 13:30	4/25/2020	4/30/2020	20-04072	Promethium-147	EML Pm-01 Modified	7.42E-02	1.04E+00	1.04E+00	1.78E+00	U	pCi/g

CU=Counting Uncertainty;CSU=Combined Standard Uncertainty (1-sigma);MDA=Minimal Detected Activity;LCS=Laboratory Control Sample;MBL=Blank;DUP=Duplicate;TRG=Normal Sample;DO=Duplicate Original;U=Non-detect



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601 SCARBORO ROAD OAK RIDGE, TN 37830 865/481-0683 FAX 865/483-4621

Eberline Analytical Final Report of Analysis			Report To:						Work Order Details:						
			Gerald Wood Zion Solutions 2701 Deborah Ave Zion, IL 60099						SDG:	20-04072					
									Purchase Order:	677116					
									Analysis Category:	ENVIRONMENTAL					
									Sample Matrix:	SO					
Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Qualifier	Report Units	
20-04072-01	LCS	KNOWN	04/25/20 00:00	4/25/2020	4/30/2020	20-04072	Plutonium-238	EML Pu-02 Modified	7.13E+00	1.50E-01				pCi/g	
20-04072-01	LCS	SPIKE	04/25/20 00:00	4/25/2020	4/30/2020	20-04072	Plutonium-238	EML Pu-02 Modified	5.64E+00	7.02E-01	8.87E-01	1.36E-01		pCi/g	
20-04072-02	MBL	BLANK	04/25/20 00:00	4/25/2020	4/30/2020	20-04072	Plutonium-238	EML Pu-02 Modified	-1.22E-02	5.21E-02	5.21E-02	1.45E-01	U	pCi/g	
20-04072-03	DUP	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/30/2020	20-04072	Plutonium-238	EML Pu-02 Modified	7.21E-02	9.43E-02	9.45E-02	1.52E-01	U	pCi/g	
20-04072-04	DO	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/30/2020	20-04072	Plutonium-238	EML Pu-02 Modified	5.50E-02	7.41E-02	7.42E-02	1.16E-01	U	pCi/g	
20-04072-05	TRG	B1-06214A-FSFC-001-CV	05/05/18 15:15	4/25/2020	4/30/2020	20-04072	Plutonium-238	EML Pu-02 Modified	-2.76E-03	3.23E-02	3.23E-02	6.77E-02	U	pCi/g	
20-04072-06	TRG	B2-08101A-BJFC-007-CV 0 0-0 5	05/09/12 14:22	4/25/2020	4/30/2020	20-04072	Plutonium-238	EML Pu-02 Modified	-8.11E-03	4.81E-02	4.81E-02	1.14E-01	U	pCi/g	
20-04072-07	TRG	B2-08101A-BJFC-007-CV 0 5-1 0	05/09/12 14:22	4/25/2020	4/30/2020	20-04072	Plutonium-238	EML Pu-02 Modified	-1.77E-02	4.37E-02	4.37E-02	1.25E-01	U	pCi/g	
20-04072-08	TRG	B2-08201-CJWC-A018-CV 0 0-0 5	05/10/12 12:56	4/25/2020	4/30/2020	20-04072	Plutonium-238	EML Pu-02 Modified	-2.84E-02	5.91E-02	5.92E-02	1.75E-01	U	pCi/g	
20-04072-09	TRG	B2-08201-CJWC-A018-CV 0 5-1 0	05/10/12 12:56	4/25/2020	4/30/2020	20-04072	Plutonium-238	EML Pu-02 Modified	-2.21E-02	6.72E-02	6.72E-02	1.83E-01	U	pCi/g	
20-04072-10	TRG	L2-10214C-RJGS-001-SM-A	05/07/19 07:45	4/25/2020	4/30/2020	20-04072	Plutonium-238	EML Pu-02 Modified	3.03E-02	8.41E-02	8.42E-02	1.82E-01	U	pCi/g	
20-04072-11	TRG	L1-12109L-CJGS-001-SB-A	08/21/19 10:25	4/25/2020	4/30/2020	20-04072	Plutonium-238	EML Pu-02 Modified	1.84E-02	6.63E-02	6.63E-02	1.50E-01	U	pCi/g	
20-04072-12	TRG	L1-12106L-CJGS-001-SB-A	08/14/19 13:30	4/25/2020	4/30/2020	20-04072	Plutonium-238	EML Pu-02 Modified	-2.11E-02	3.38E-02	3.38E-02	1.06E-01	U	pCi/g	
20-04072-01	LCS	KNOWN	04/25/20 00:00	4/25/2020	4/30/2020	20-04072	Plutonium-239/240	EML Pu-02 Modified	5.63E+00	1.80E-01				pCi/g	
20-04072-01	LCS	SPIKE	04/25/20 00:00	4/25/2020	4/30/2020	20-04072	Plutonium-239/240	EML Pu-02 Modified	5.93E+00	7.24E-01	9.21E-01	8.31E-02		pCi/g	
20-04072-02	MBL	BLANK	04/25/20 00:00	4/25/2020	4/30/2020	20-04072	Plutonium-239/240	EML Pu-02 Modified	-1.47E-02	3.81E-02	3.82E-02	1.28E-01	U	pCi/g	
20-04072-03	DUP	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/30/2020	20-04072	Plutonium-239/240	EML Pu-02 Modified	-3.56E-03	4.03E-02	4.03E-02	1.23E-01	U	pCi/g	
20-04072-04	DO	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/30/2020	20-04072	Plutonium-239/240	EML Pu-02 Modified	3.60E-02	6.36E-02	6.37E-02	1.15E-01	U	pCi/g	
20-04072-05	TRG	B1-06214A-FSFC-001-CV	05/05/18 15:15	4/25/2020	4/30/2020	20-04072	Plutonium-239/240	EML Pu-02 Modified	0.00E+00	4.43E-02	4.43E-02	9.58E-02	U	pCi/g	
20-04072-06	TRG	B2-08101A-BJFC-007-CV 0 0-0 5	05/09/12 14:22	4/25/2020	4/30/2020	20-04072	Plutonium-239/240	EML Pu-02 Modified	0.00E+00	6.21E-02	6.21E-02	1.34E-01	U	pCi/g	
20-04072-07	TRG	B2-08101A-BJFC-007-CV 0 5-1 0	05/09/12 14:22	4/25/2020	4/30/2020	20-04072	Plutonium-239/240	EML Pu-02 Modified	-3.32E-03	3.89E-02	3.89E-02	8.16E-02	U	pCi/g	
20-04072-08	TRG	B2-08201-CJWC-A018-CV 0 0-0 5	05/10/12 12:56	4/25/2020	4/30/2020	20-04072	Plutonium-239/240	EML Pu-02 Modified	1.72E-02	5.27E-02	5.27E-02	1.25E-01	U	pCi/g	
20-04072-09	TRG	B2-08201-CJWC-A018-CV 0 5-1 0	05/10/12 12:56	4/25/2020	4/30/2020	20-04072	Plutonium-239/240	EML Pu-02 Modified	4.02E-02	8.70E-02	8.71E-02	1.72E-01	U	pCi/g	
20-04072-10	TRG	L2-10214C-RJGS-001-SM-A	05/07/19 07:45	4/25/2020	4/30/2020	20-04072	Plutonium-239/240	EML Pu-02 Modified	-5.12E-03	5.98E-02	5.98E-02	1.26E-01	U	pCi/g	
20-04072-11	TRG	L1-12109L-CJGS-001-SB-A	08/21/19 10:25	4/25/2020	4/30/2020	20-04072	Plutonium-239/240	EML Pu-02 Modified	1.88E-02	4.51E-02	4.51E-02	9.45E-02	U	pCi/g	
20-04072-12	TRG	L1-12106L-CJGS-001-SB-A	08/14/19 13:30	4/25/2020	4/30/2020	20-04072	Plutonium-239/240	EML Pu-02 Modified	1.02E-02	3.11E-02	3.11E-02	7.38E-02	U	pCi/g	

CU=Counting Uncertainty;CSU=Combined Standard Uncertainty (1-sigma);MDA=Minimal Detected Activity;LCS=Laboratory Control Sample;MBL=Blank;DUP=Duplicate;TRG=Normal Sample;DO=Duplicate Original;U=Non-detect



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Eberline Analytical Final Report of Analysis			Report To:						Work Order Details:						
			Gerald Wood Zion Solutions 2701 Deborah Ave Zion, IL 60099						SDG:	20-04072					
									Purchase Order:	677116					
									Analysis Category:	ENVIRONMENTAL					
			Sample Matrix:						SO						
Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Qualifier	Report Units	
20-04072-01	LCS	KNOWN	04/25/20 00:00	4/25/2020	5/1/2020	20-04072	Plutonium-241	EML Pu-02 Modified	2.83E+02	1.30E+01				pCi/g	
20-04072-01	LCS	SPIKE	04/25/20 00:00	4/25/2020	5/1/2020	20-04072	Plutonium-241	EML Pu-02 Modified	3.08E+02	8.37E+00	2.64E+01	7.08E+00		pCi/g	
20-04072-02	MBL	BLANK	04/25/20 00:00	4/25/2020	5/1/2020	20-04072	Plutonium-241	EML Pu-02 Modified	-1.57E+00	4.81E+00	4.81E+00	8.28E+00		pCi/g	
20-04072-03	DUP	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	5/1/2020	20-04072	Plutonium-241	EML Pu-02 Modified	-1.14E+00	5.83E+00	5.84E+00	1.00E+01	U	pCi/g	
20-04072-04	DO	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	5/1/2020	20-04072	Plutonium-241	EML Pu-02 Modified	1.51E+00	5.85E+00	5.85E+00	9.95E+00	U	pCi/g	
20-04072-05	TRG	B1-06214A-FSFC-001-CV	05/05/18 15:15	4/25/2020	5/1/2020	20-04072	Plutonium-241	EML Pu-02 Modified	9.59E-01	3.72E+00	3.72E+00	6.33E+00	U	pCi/g	
20-04072-06	TRG	B2-08101A-BJFC-007-CV 0 0-0 5	05/09/12 14:22	4/25/2020	5/1/2020	20-04072	Plutonium-241	EML Pu-02 Modified	-1.47E+00	7.51E+00	7.52E+00	1.29E+01	U	pCi/g	
20-04072-07	TRG	B2-08101A-BJFC-007-CV 0 5-1 0	05/09/12 14:22	4/25/2020	5/1/2020	20-04072	Plutonium-241	EML Pu-02 Modified	2.44E+00	7.59E+00	7.59E+00	1.29E+01	U	pCi/g	
20-04072-08	TRG	B2-08201-CJWC-A018-CV 0 0-0 5	05/10/12 12:56	4/25/2020	5/1/2020	20-04072	Plutonium-241	EML Pu-02 Modified	7.81E+00	9.44E+00	9.46E+00	1.59E+01	U	pCi/g	
20-04072-09	TRG	B2-08201-CJWC-A018-CV 0 5-1 0	05/10/12 12:56	4/25/2020	5/1/2020	20-04072	Plutonium-241	EML Pu-02 Modified	-8.68E+00	1.01E+01	1.01E+01	1.76E+01	U	pCi/g	
20-04072-10	TRG	L2-10214C-RJGS-001-SM-A	05/07/19 07:45	4/25/2020	5/1/2020	20-04072	Plutonium-241	EML Pu-02 Modified	-1.04E+00	8.03E+00	8.03E+00	1.38E+01	U	pCi/g	
20-04072-11	TRG	L1-12109L-CJGS-001-SB-A	08/21/19 10:25	4/25/2020	5/1/2020	20-04072	Plutonium-241	EML Pu-02 Modified	-7.34E-01	5.65E+00	5.65E+00	9.68E+00	U	pCi/g	
20-04072-12	TRG	L1-12106L-CJGS-001-SB-A	08/14/19 13:30	4/25/2020	5/1/2020	20-04072	Plutonium-241	EML Pu-02 Modified	-4.80E+00	4.25E+00	4.27E+00	7.44E+00	U	pCi/g	
20-04072-01	LCS	KNOWN	04/25/20 00:00	4/25/2020	5/1/2020	20-04072	Technetium-99	EiChroM TCS01 Modified	1.01E+03	2.22E+01				pCi/g	
20-04072-01	LCS	SPIKE	04/25/20 00:00	4/25/2020	5/1/2020	20-04072	Technetium-99	EiChroM TCS01 Modified	1.04E+03	5.96E+00	1.04E+02	1.42E+00		pCi/g	
20-04072-02	MBL	BLANK	04/25/20 00:00	4/25/2020	5/1/2020	20-04072	Technetium-99	EiChroM TCS01 Modified	2.58E-01	8.27E-01	8.28E-01	1.41E+00	U	pCi/g	
20-04072-03	DUP	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	5/1/2020	20-04072	Technetium-99	EiChroM TCS01 Modified	1.00E+00	6.85E-01	6.92E-01	1.14E+00	U	pCi/g	
20-04072-04	DO	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	5/1/2020	20-04072	Technetium-99	EiChroM TCS01 Modified	1.79E+00	7.12E-01	7.34E-01	1.16E+00		pCi/g	
20-04072-05	TRG	B1-06214A-FSFC-001-CV	05/05/18 15:15	4/25/2020	5/1/2020	20-04072	Technetium-99	EiChroM TCS01 Modified	1.49E+00	6.88E-01	7.04E-01	1.13E+00		pCi/g	
20-04072-06	TRG	B2-08101A-BJFC-007-CV 0 0-0 5	05/09/12 14:22	4/25/2020	5/1/2020	20-04072	Technetium-99	EiChroM TCS01 Modified	2.07E+00	6.99E-01	7.28E-01	1.13E+00		pCi/g	
20-04072-07	TRG	B2-08101A-BJFC-007-CV 0 5-1 0	05/09/12 14:22	4/25/2020	5/1/2020	20-04072	Technetium-99	EiChroM TCS01 Modified	1.29E+00	7.36E-01	7.47E-01	1.21E+00		pCi/g	
20-04072-08	TRG	B2-08201-CJWC-A018-CV 0 0-0 5	05/10/12 12:56	4/25/2020	5/1/2020	20-04072	Technetium-99	EiChroM TCS01 Modified	9.57E-01	5.63E-01	5.71E-01	9.30E-01		pCi/g	
20-04072-09	TRG	B2-08201-CJWC-A018-CV 0 5-1 0	05/10/12 12:56	4/25/2020	5/1/2020	20-04072	Technetium-99	EiChroM TCS01 Modified	1.71E+00	6.65E-01	6.87E-01	1.08E+00		pCi/g	
20-04072-10	TRG	L2-10214C-RJGS-001-SM-A	05/07/19 07:45	4/25/2020	5/1/2020	20-04072	Technetium-99	EiChroM TCS01 Modified	1.46E+00	6.40E-01	6.56E-01	1.04E+00		pCi/g	
20-04072-11	TRG	L1-12109L-CJGS-001-SB-A	08/21/19 10:25	4/25/2020	5/1/2020	20-04072	Technetium-99	EiChroM TCS01 Modified	1.73E+00	7.60E-01	7.80E-01	1.24E+00		pCi/g	
20-04072-12	TRG	L1-12106L-CJGS-001-SB-A	08/14/19 13:30	4/25/2020	5/1/2020	20-04072	Technetium-99	EiChroM TCS01 Modified	1.17E+00	5.13E-01	5.26E-01	8.38E-01		pCi/g	

CU=Counting Uncertainty;CSU=Combined Standard Uncertainty (1-sigma);MDA=Minimal Detected Activity;LCS=Laboratory Control Sample;MBL=Blank;DUP=Duplicate;TRG=Normal Sample;DO=Duplicate Original;U=Non-detect



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Eberline Analytical Final Report of Analysis			Report To:					Work Order Details:						
			Gerald Wood					SDG:	20-04072					
			Zion Solutions					Purchase Order:	677116					
			2701 Deborah Ave					Analysis Category:	ENVIRONMENTAL					
			Zion, IL 60099					Sample Matrix:	SO					
Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Qualifier	Report Units
20-04072-01	LCS	KNOWN	04/25/20 00:00	4/25/2020	4/29/2020	20-04072	Strontium-90	EiChroM SRW01 Modified	5.02E+01	2.81E-01				pCi/g
20-04072-01	LCS	SPIKE	04/25/20 00:00	4/25/2020	4/29/2020	20-04072	Strontium-90	EiChroM SRW01 Modified	5.18E+01	1.42E+00	1.81E+01	6.90E-01		pCi/g
20-04072-02	MBL	BLANK	04/25/20 00:00	4/25/2020	4/29/2020	20-04072	Strontium-90	EiChroM SRW01 Modified	1.96E-02	2.87E-02	2.95E-02	5.93E-02	U	pCi/g
20-04072-03	DUP	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/29/2020	20-04072	Strontium-90	EiChroM SRW01 Modified	-5.27E-03	3.58E-02	3.58E-02	7.73E-02	U	pCi/g
20-04072-04	DO	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/29/2020	20-04072	Strontium-90	EiChroM SRW01 Modified	9.38E-03	3.70E-02	3.72E-02	7.85E-02	U	pCi/g
20-04072-05	TRG	B1-06214A-FSFC-001-CV	05/05/18 15:15	4/25/2020	4/29/2020	20-04072	Strontium-90	EiChroM SRW01 Modified	4.13E-02	2.90E-02	3.23E-02	5.70E-02	U	pCi/g
20-04072-06	TRG	B2-08101A-BJFC-007-CV 0 0-0 5	05/09/12 14:22	4/25/2020	4/29/2020	20-04072	Strontium-90	EiChroM SRW01 Modified	2.48E-02	3.32E-02	3.43E-02	6.82E-02	U	pCi/g
20-04072-07	TRG	B2-08101A-BJFC-007-CV 0 5-1 0	05/09/12 14:22	4/25/2020	4/29/2020	20-04072	Strontium-90	EiChroM SRW01 Modified	-8.90E-04	3.25E-02	3.25E-02	6.96E-02	U	pCi/g
20-04072-08	TRG	B2-08201-CJWC-A018-CV 0 0-0 5	05/10/12 12:56	4/25/2020	4/29/2020	20-04072	Strontium-90	EiChroM SRW01 Modified	-2.77E-02	2.69E-02	2.86E-02	6.12E-02	U	pCi/g
20-04072-09	TRG	B2-08201-CJWC-A018-CV 0 5-1 0	05/10/12 12:56	4/25/2020	4/29/2020	20-04072	Strontium-90	EiChroM SRW01 Modified	3.48E-03	2.83E-02	2.83E-02	6.04E-02	U	pCi/g
20-04072-10	TRG	L2-10214C-RJGS-001-SM-A	05/07/19 07:45	4/25/2020	4/29/2020	20-04072	Strontium-90	EiChroM SRW01 Modified	-9.40E-03	3.41E-02	3.42E-02	7.39E-02	U	pCi/g
20-04072-11	TRG	L1-12109L-CJGS-001-SB-A	08/21/19 10:25	4/25/2020	4/29/2020	20-04072	Strontium-90	EiChroM SRW01 Modified	-2.56E-02	3.76E-02	3.86E-02	8.28E-02	U	pCi/g
20-04072-12	TRG	L1-12106L-CJGS-001-SB-A	08/14/19 13:30	4/25/2020	4/29/2020	20-04072	Strontium-90	EiChroM SRW01 Modified	2.42E-02	3.09E-02	3.20E-02	6.34E-02	U	pCi/g
20-04072-01	LCS	KNOWN	04/25/20 00:00	4/25/2020	4/27/2020	20-04072	Cobalt-60	EPA 901.1 Modified	2.62E+02	1.02E+01				pCi/g
20-04072-01	LCS	KNOWN	04/25/20 00:00	4/25/2020	4/27/2020	20-04072	Cesium-137	EPA 901.1 Modified	1.94E+02	7.96E+00				pCi/g
20-04072-01	LCS	SPIKE	04/25/20 00:00	4/25/2020	4/27/2020	20-04072	Cobalt-60	EPA 901.1 Modified	2.37E+02	1.45E+01	1.89E+01	2.39E+00		pCi/g
20-04072-01	LCS	SPIKE	04/25/20 00:00	4/25/2020	4/27/2020	20-04072	Cesium-137	EPA 901.1 Modified	1.56E+02	1.37E+01	1.59E+01	1.57E+00		pCi/g

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601 SCARBORO ROAD OAK RIDGE, TN 37830 865/481-0683 FAX 865/483-4621

Eberline Analytical Final Report of Analysis			Report To:						Work Order Details:						
			Gerald Wood						SDG:		20-04072				
			Zion Solutions						Purchase Order:		677116				
			2701 Deborah Ave						Analysis Category:		ENVIRONMENTAL				
			Zion, IL 60099						Sample Matrix:		SO				
Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Qualifier	Report Units	
20-04072-02	MBL	BLANK	04/25/20 00:00	4/25/2020	4/27/2020	20-04072	Actinium-228	EPA 901.1 Modified	-1.34E-02	7.02E-02	7.02E-02	1.12E-01	U	pCi/g	
20-04072-02	MBL	BLANK	04/25/20 00:00	4/25/2020	4/27/2020	20-04072	Silver-108m	EPA 901.1 Modified	-1.07E-02	3.23E-02	3.23E-02	3.11E-02	U	pCi/g	
20-04072-02	MBL	BLANK	04/25/20 00:00	4/25/2020	4/27/2020	20-04072	Barium-133	EPA 901.1 Modified	-1.49E-02	3.36E-02	3.36E-02	3.93E-02	U	pCi/g	
20-04072-02	MBL	BLANK	04/25/20 00:00	4/25/2020	4/27/2020	20-04072	Bismuth-214	EPA 901.1 Modified	-1.14E-02	6.22E-02	6.22E-02	9.39E-02	U	pCi/g	
20-04072-02	MBL	BLANK	04/25/20 00:00	4/25/2020	4/27/2020	20-04072	Cobalt-60	EPA 901.1 Modified	5.05E-03	2.55E-02	2.55E-02	4.40E-02	U	pCi/g	
20-04072-02	MBL	BLANK	04/25/20 00:00	4/25/2020	4/27/2020	20-04072	Cesium-134	EPA 901.1 Modified	2.32E-03	2.89E-02	2.89E-02	3.62E-02	U	pCi/g	
20-04072-02	MBL	BLANK	04/25/20 00:00	4/25/2020	4/27/2020	20-04072	Cesium-137	EPA 901.1 Modified	1.42E-02	2.86E-02	2.87E-02	5.01E-02	U	pCi/g	
20-04072-02	MBL	BLANK	04/25/20 00:00	4/25/2020	4/27/2020	20-04072	Europium-152	EPA 901.1 Modified	7.98E-02	7.05E-02	7.06E-02	9.37E-02	U	pCi/g	
20-04072-02	MBL	BLANK	04/25/20 00:00	4/25/2020	4/27/2020	20-04072	Europium-154	EPA 901.1 Modified	1.97E-02	6.70E-02	6.70E-02	4.51E-02	U	pCi/g	
20-04072-02	MBL	BLANK	04/25/20 00:00	4/25/2020	4/27/2020	20-04072	Europium-155	EPA 901.1 Modified	9.34E-03	4.73E-02	4.73E-02	6.30E-02	U	pCi/g	
20-04072-02	MBL	BLANK	04/25/20 00:00	4/25/2020	4/27/2020	20-04072	Holmium-166m	EPA 901.1 Modified	3.65E-02	4.29E-02	4.29E-02	3.72E-02	U	pCi/g	
20-04072-02	MBL	BLANK	04/25/20 00:00	4/25/2020	4/27/2020	20-04072	Iodine-129	EPA 901.1 Modified	-2.51E-03	5.23E-02	5.23E-02	7.37E-02	U	pCi/g	
20-04072-02	MBL	BLANK	04/25/20 00:00	4/25/2020	4/27/2020	20-04072	Potassium-40	EPA 901.1 Modified	3.19E-01	2.51E-01	2.52E-01	5.75E-01	U	pCi/g	
20-04072-02	MBL	BLANK	04/25/20 00:00	4/25/2020	4/27/2020	20-04072	Manganese-54	EPA 901.1 Modified	7.72E-03	2.13E-02	2.13E-02	3.63E-02	U	pCi/g	
20-04072-02	MBL	BLANK	04/25/20 00:00	4/25/2020	4/27/2020	20-04072	Molybdenum-93	EPA 901.1 Modified	-6.89E-03	2.12E-02	2.12E-02	3.08E-02	U	pCi/g	
20-04072-02	MBL	BLANK	04/25/20 00:00	4/25/2020	4/27/2020	20-04072	Niobium-94	EPA 901.1 Modified	1.50E-02	2.37E-02	2.37E-02	3.65E-02	U	pCi/g	
20-04072-02	MBL	BLANK	04/25/20 00:00	4/25/2020	4/27/2020	20-04072	Lead-210	EPA 901.1 Modified	3.17E-01	4.58E-01	4.58E-01	6.69E-01	U	pCi/g	
20-04072-02	MBL	BLANK	04/25/20 00:00	4/25/2020	4/27/2020	20-04072	Lead-212	EPA 901.1 Modified	2.73E-02	4.45E-02	4.45E-02	6.52E-02	U	pCi/g	
20-04072-02	MBL	BLANK	04/25/20 00:00	4/25/2020	4/27/2020	20-04072	Lead-214	EPA 901.1 Modified	2.00E-02	5.02E-02	5.02E-02	7.53E-02	U	pCi/g	
20-04072-02	MBL	BLANK	04/25/20 00:00	4/25/2020	4/27/2020	20-04072	Promethium-145	EPA 901.1 Modified	3.32E-02	6.87E-02	6.87E-02	9.40E-02	U	pCi/g	
20-04072-02	MBL	BLANK	04/25/20 00:00	4/25/2020	4/27/2020	20-04072	Radium-226	EPA 901.1 Modified	-1.14E-02	6.22E-02	6.22E-02	9.39E-02	U	pCi/g	
20-04072-02	MBL	BLANK	04/25/20 00:00	4/25/2020	4/27/2020	20-04072	Antimony-125	EPA 901.1 Modified	1.99E-02	4.96E-02	4.96E-02	9.23E-02	U	pCi/g	
20-04072-02	MBL	BLANK	04/25/20 00:00	4/25/2020	4/27/2020	20-04072	Thorium-234	EPA 901.1 Modified	7.38E-01	4.14E-01	4.15E-01	6.72E-01	U	pCi/g	
20-04072-02	MBL	BLANK	04/25/20 00:00	4/25/2020	4/27/2020	20-04072	Thallium-208	EPA 901.1 Modified	8.23E-02	6.42E-02	6.44E-02	1.28E-01	U	pCi/g	
20-04072-02	MBL	BLANK	04/25/20 00:00	4/25/2020	4/27/2020	20-04072	Uranium-235	EPA 901.1 Modified	8.75E-02	1.50E-01	1.50E-01	2.15E-01	U	pCi/g	

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Eberline Analytical Final Report of Analysis			Report To:						Work Order Details:						
			Gerald Wood Zion Solutions 2701 Deborah Ave Zion, IL 60099						SDG:	20-04072					
									Purchase Order:	677116					
									Analysis Category:	ENVIRONMENTAL					
									Sample Matrix:	SO					
Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Qualifier	Report Units	
20-04072-03	DUP	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Actinium-228	EPA 901.1 Modified	3.56E-01	2.24E-01	2.24E-01	5.24E-01	U	pCi/g	
20-04072-03	DUP	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Silver-108m	EPA 901.1 Modified	1.25E-02	4.64E-02	4.64E-02	7.07E-02	U	pCi/g	
20-04072-03	DUP	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Barium-133	EPA 901.1 Modified	1.50E-03	2.56E-02	2.57E-02	1.41E-01	U	pCi/g	
20-04072-03	DUP	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Bismuth-214	EPA 901.1 Modified	3.97E-01	1.88E-01	1.89E-01	2.74E-01		pCi/g	
20-04072-03	DUP	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Cobalt-60	EPA 901.1 Modified	3.90E-02	8.20E-02	8.21E-02	1.20E-01	U	pCi/g	
20-04072-03	DUP	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Cesium-134	EPA 901.1 Modified	-2.78E-01	1.81E-01	1.82E-01	1.76E-01	U	pCi/g	
20-04072-03	DUP	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Cesium-137	EPA 901.1 Modified	-3.81E-03	5.23E-02	5.23E-02	8.14E-02	U	pCi/g	
20-04072-03	DUP	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Europium-152	EPA 901.1 Modified	-2.06E-01	2.83E-01	2.83E-01	2.37E-01	U	pCi/g	
20-04072-03	DUP	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Europium-154	EPA 901.1 Modified	1.01E-01	1.56E-01	1.56E-01	1.24E-01	U	pCi/g	
20-04072-03	DUP	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Europium-155	EPA 901.1 Modified	1.92E-01	9.66E-02	9.71E-02	2.57E-01	U	pCi/g	
20-04072-03	DUP	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Holmium-166m	EPA 901.1 Modified	7.09E-02	4.66E-02	4.67E-02	9.07E-02	U	pCi/g	
20-04072-03	DUP	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Iodine-129	EPA 901.1 Modified	-9.48E-02	1.40E-01	1.40E-01	2.12E-01	U	pCi/g	
20-04072-03	DUP	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Potassium-40	EPA 901.1 Modified	5.33E+00	1.33E+00	1.36E+00	1.17E+00		pCi/g	
20-04072-03	DUP	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Manganese-54	EPA 901.1 Modified	-1.27E-01	2.81E-01	2.81E-01	4.02E-01	U	pCi/g	
20-04072-03	DUP	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Molybdenum-93	EPA 901.1 Modified	4.05E-03	4.95E-02	4.95E-02	8.09E-02	U	pCi/g	
20-04072-03	DUP	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Niobium-94	EPA 901.1 Modified	3.53E-02	3.29E-02	3.30E-02	7.25E-02	U	pCi/g	
20-04072-03	DUP	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Lead-210	EPA 901.1 Modified	7.39E-01	1.03E+00	1.03E+00	1.73E+00	U	pCi/g	
20-04072-03	DUP	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Lead-212	EPA 901.1 Modified	3.69E-01	1.43E-01	1.44E-01	2.13E-01		pCi/g	
20-04072-03	DUP	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Lead-214	EPA 901.1 Modified	4.16E-01	1.57E-01	1.59E-01	2.60E-01		pCi/g	
20-04072-03	DUP	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Promethium-145	EPA 901.1 Modified	2.20E-02	1.30E-01	1.30E-01	2.16E-01	U	pCi/g	
20-04072-03	DUP	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Radium-226	EPA 901.1 Modified	3.97E-01	1.88E-01	1.89E-01	2.74E-01		pCi/g	
20-04072-03	DUP	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Antimony-125	EPA 901.1 Modified	1.79E-02	7.68E-02	7.68E-02	3.30E-01	U	pCi/g	
20-04072-03	DUP	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Thorium-234	EPA 901.1 Modified	2.06E+00	9.35E-01	9.41E-01	1.65E+00	U	pCi/g	
20-04072-03	DUP	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Thallium-208	EPA 901.1 Modified	2.57E-01	1.41E-01	1.42E-01	2.77E-01	U	pCi/g	
20-04072-03	DUP	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Uranium-235	EPA 901.1 Modified	9.50E-02	2.66E-01	2.66E-01	4.10E-01	U	pCi/g	

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			Gerald Wood Zion Solutions 2701 Deborah Ave Zion, IL 60099						SDG:	20-04072					
									Purchase Order:	677116					
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									Sample Matrix:	SO					
Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Qualifier	Report Units	
20-04072-04	DO	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Actinium-228	EPA 901.1 Modified	4.58E-01	1.84E-01	1.86E-01	5.56E-01	U	pCi/g	
20-04072-04	DO	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Silver-108m	EPA 901.1 Modified	9.84E-03	3.48E-02	3.48E-02	6.21E-02	U	pCi/g	
20-04072-04	DO	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Barium-133	EPA 901.1 Modified	-1.08E-01	1.24E-01	1.25E-01	1.25E-01	U	pCi/g	
20-04072-04	DO	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Bismuth-214	EPA 901.1 Modified	3.95E-01	1.24E-01	1.26E-01	2.81E-01		pCi/g	
20-04072-04	DO	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Cobalt-60	EPA 901.1 Modified	1.48E-02	5.69E-02	5.69E-02	1.08E-01	U	pCi/g	
20-04072-04	DO	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Cesium-134	EPA 901.1 Modified	4.12E-02	6.30E-02	6.31E-02	1.57E-01	U	pCi/g	
20-04072-04	DO	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Cesium-137	EPA 901.1 Modified	1.37E-01	8.16E-02	8.19E-02	1.23E-01		pCi/g	
20-04072-04	DO	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Europium-152	EPA 901.1 Modified	-4.18E-01	2.79E-01	2.80E-01	2.32E-01	U	pCi/g	
20-04072-04	DO	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Europium-154	EPA 901.1 Modified	-3.08E-02	1.08E-01	1.08E-01	1.23E-01	U	pCi/g	
20-04072-04	DO	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Europium-155	EPA 901.1 Modified	1.47E-01	1.48E-01	1.48E-01	2.41E-01	U	pCi/g	
20-04072-04	DO	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Holmium-166m	EPA 901.1 Modified	2.05E-02	9.15E-02	9.15E-02	8.70E-02	U	pCi/g	
20-04072-04	DO	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Iodine-129	EPA 901.1 Modified	-1.46E-02	1.39E-01	1.39E-01	2.25E-01	U	pCi/g	
20-04072-04	DO	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Potassium-40	EPA 901.1 Modified	5.71E+00	1.33E+00	1.36E+00	1.03E+00		pCi/g	
20-04072-04	DO	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Manganese-54	EPA 901.1 Modified	-3.94E-02	2.94E-01	2.94E-01	3.94E-01	U	pCi/g	
20-04072-04	DO	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Molybdenum-93	EPA 901.1 Modified	1.65E-02	5.15E-02	5.15E-02	8.71E-02	U	pCi/g	
20-04072-04	DO	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Niobium-94	EPA 901.1 Modified	-6.70E-03	5.79E-02	5.79E-02	7.05E-02	U	pCi/g	
20-04072-04	DO	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Lead-210	EPA 901.1 Modified	1.52E+00	1.36E+00	1.36E+00	2.25E+00	U	pCi/g	
20-04072-04	DO	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Lead-212	EPA 901.1 Modified	3.09E-01	1.09E-01	1.10E-01	2.26E-01		pCi/g	
20-04072-04	DO	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Lead-214	EPA 901.1 Modified	4.22E-01	1.26E-01	1.28E-01	3.22E-01		pCi/g	
20-04072-04	DO	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Promethium-145	EPA 901.1 Modified	5.31E-02	1.32E-01	1.33E-01	2.22E-01	U	pCi/g	
20-04072-04	DO	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Radium-226	EPA 901.1 Modified	3.95E-01	1.24E-01	1.26E-01	2.81E-01		pCi/g	
20-04072-04	DO	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Antimony-125	EPA 901.1 Modified	1.54E-01	1.81E-01	1.81E-01	3.19E-01	U	pCi/g	
20-04072-04	DO	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Thorium-234	EPA 901.1 Modified	1.20E+00	1.43E+00	1.43E+00	2.40E+00	U	pCi/g	
20-04072-04	DO	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Thallium-208	EPA 901.1 Modified	3.67E-01	1.71E-01	1.72E-01	2.42E-01		pCi/g	
20-04072-04	DO	B1-06202A-FSWC-040-CV	06/18/18 10:30	4/25/2020	4/27/2020	20-04072	Uranium-235	EPA 901.1 Modified	8.27E-02	2.71E-01	2.71E-01	4.15E-01	U	pCi/g	

CU=Counting Uncertainty;CSU=Combined Standard Uncertainty (1-sigma);MDA=Minimal Detected Activity;LCS=Laboratory Control Sample;MBL=Blank;DUP=Duplicate;TRG=Normal Sample;DO=Duplicate Original;U=Non-detect



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601 SCARBORO ROAD OAK RIDGE, TN 37830 865/481-0683 FAX 865/483-4621

Eberline Analytical Final Report of Analysis			Report To:					Work Order Details:						
			Gerald Wood					SDG:	20-04072					
			Zion Solutions					Purchase Order:	677116					
			2701 Deborah Ave					Analysis Category:	ENVIRONMENTAL					
			Zion, IL 60099					Sample Matrix:	SO					
Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Qualifier	Report Units
20-04072-05	TRG	B1-06214A-FSFC-001-CV	05/05/18 15:15	4/25/2020	4/27/2020	20-04072	Actinium-228	EPA 901.1 Modified	-1.27E-01	1.49E-01	1.49E-01	8.49E-01	U	pCi/g
20-04072-05	TRG	B1-06214A-FSFC-001-CV	05/05/18 15:15	4/25/2020	4/27/2020	20-04072	Silver-108m	EPA 901.1 Modified	3.17E-02	1.22E-01	1.22E-01	1.39E-01	U	pCi/g
20-04072-05	TRG	B1-06214A-FSFC-001-CV	05/05/18 15:15	4/25/2020	4/27/2020	20-04072	Barium-133	EPA 901.1 Modified	1.07E-02	6.60E-02	6.60E-02	2.75E-01	U	pCi/g
20-04072-05	TRG	B1-06214A-FSFC-001-CV	05/05/18 15:15	4/25/2020	4/27/2020	20-04072	Bismuth-214	EPA 901.1 Modified	7.03E-01	2.65E-01	2.67E-01	2.56E-01		pCi/g
20-04072-05	TRG	B1-06214A-FSFC-001-CV	05/05/18 15:15	4/25/2020	4/27/2020	20-04072	Cobalt-60	EPA 901.1 Modified	-5.41E-02	1.85E-01	1.85E-01	2.88E-01	U	pCi/g
20-04072-05	TRG	B1-06214A-FSFC-001-CV	05/05/18 15:15	4/25/2020	4/27/2020	20-04072	Cesium-134	EPA 901.1 Modified	-4.09E-02	9.97E-02	9.97E-02	3.59E-01	U	pCi/g
20-04072-05	TRG	B1-06214A-FSFC-001-CV	05/05/18 15:15	4/25/2020	4/27/2020	20-04072	Cesium-137	EPA 901.1 Modified	2.89E-03	1.48E-01	1.48E-01	2.07E-01	U	pCi/g
20-04072-05	TRG	B1-06214A-FSFC-001-CV	05/05/18 15:15	4/25/2020	4/27/2020	20-04072	Europium-152	EPA 901.1 Modified	-3.69E-01	5.24E-01	5.25E-01	3.08E-01	U	pCi/g
20-04072-05	TRG	B1-06214A-FSFC-001-CV	05/05/18 15:15	4/25/2020	4/27/2020	20-04072	Europium-154	EPA 901.1 Modified	-3.41E-01	4.60E-01	4.60E-01	1.72E-01	U	pCi/g
20-04072-05	TRG	B1-06214A-FSFC-001-CV	05/05/18 15:15	4/25/2020	4/27/2020	20-04072	Europium-155	EPA 901.1 Modified	2.44E-01	2.07E-01	2.08E-01	3.25E-01	U	pCi/g
20-04072-05	TRG	B1-06214A-FSFC-001-CV	05/05/18 15:15	4/25/2020	4/27/2020	20-04072	Holmium-166m	EPA 901.1 Modified	-3.48E-02	1.83E-01	1.83E-01	1.39E-01	U	pCi/g
20-04072-05	TRG	B1-06214A-FSFC-001-CV	05/05/18 15:15	4/25/2020	4/27/2020	20-04072	Iodine-129	EPA 901.1 Modified	2.86E-02	2.40E-01	2.40E-01	3.60E-01	U	pCi/g
20-04072-05	TRG	B1-06214A-FSFC-001-CV	05/05/18 15:15	4/25/2020	4/27/2020	20-04072	Potassium-40	EPA 901.1 Modified	6.45E+00	1.84E+00	1.87E+00	8.62E-01		pCi/g
20-04072-05	TRG	B1-06214A-FSFC-001-CV	05/05/18 15:15	4/25/2020	4/27/2020	20-04072	Manganese-54	EPA 901.1 Modified	4.62E-01	4.28E-01	4.28E-01	8.84E-01	U	pCi/g
20-04072-05	TRG	B1-06214A-FSFC-001-CV	05/05/18 15:15	4/25/2020	4/27/2020	20-04072	Molybdenum-93	EPA 901.1 Modified	3.42E-02	1.02E-01	1.02E-01	1.37E-01	U	pCi/g
20-04072-05	TRG	B1-06214A-FSFC-001-CV	05/05/18 15:15	4/25/2020	4/27/2020	20-04072	Niobium-94	EPA 901.1 Modified	2.32E-02	1.21E-01	1.21E-01	1.79E-01	U	pCi/g
20-04072-05	TRG	B1-06214A-FSFC-001-CV	05/05/18 15:15	4/25/2020	4/27/2020	20-04072	Lead-210	EPA 901.1 Modified	1.38E+00	1.56E+00	1.56E+00	2.45E+00	U	pCi/g
20-04072-05	TRG	B1-06214A-FSFC-001-CV	05/05/18 15:15	4/25/2020	4/27/2020	20-04072	Lead-212	EPA 901.1 Modified	7.02E-01	2.39E-01	2.42E-01	3.38E-01		pCi/g
20-04072-05	TRG	B1-06214A-FSFC-001-CV	05/05/18 15:15	4/25/2020	4/27/2020	20-04072	Lead-214	EPA 901.1 Modified	5.56E-01	2.39E-01	2.41E-01	4.17E-01		pCi/g
20-04072-05	TRG	B1-06214A-FSFC-001-CV	05/05/18 15:15	4/25/2020	4/27/2020	20-04072	Promethium-145	EPA 901.1 Modified	-2.11E-01	2.32E-01	2.32E-01	3.16E-01	U	pCi/g
20-04072-05	TRG	B1-06214A-FSFC-001-CV	05/05/18 15:15	4/25/2020	4/27/2020	20-04072	Radium-226	EPA 901.1 Modified	7.03E-01	2.65E-01	2.67E-01	2.56E-01		pCi/g
20-04072-05	TRG	B1-06214A-FSFC-001-CV	05/05/18 15:15	4/25/2020	4/27/2020	20-04072	Antimony-125	EPA 901.1 Modified	4.16E-01	4.52E-01	4.52E-01	7.29E-01	U	pCi/g
20-04072-05	TRG	B1-06214A-FSFC-001-CV	05/05/18 15:15	4/25/2020	4/27/2020	20-04072	Thorium-234	EPA 901.1 Modified	2.43E+00	1.33E+00	1.33E+00	2.19E+00	U	pCi/g
20-04072-05	TRG	B1-06214A-FSFC-001-CV	05/05/18 15:15	4/25/2020	4/27/2020	20-04072	Thallium-208	EPA 901.1 Modified	4.50E-01	2.41E-01	2.42E-01	4.10E-01		pCi/g
20-04072-05	TRG	B1-06214A-FSFC-001-CV	05/05/18 15:15	4/25/2020	4/27/2020	20-04072	Uranium-235	EPA 901.1 Modified	5.84E-01	4.01E-01	4.02E-01	6.81E-01	U	pCi/g

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			Gerald Wood					SDG:	20-04072					
			Zion Solutions					Purchase Order:	677116					
			2701 Deborah Ave					Analysis Category:	ENVIRONMENTAL					
			Zion, IL 60099					Sample Matrix:	SO					
Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Qualifier	Report Units
20-04072-06	TRG	B2-08101A-BJFC-007-CV 0 0-0 5	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Actinium-228	EPA 901.1 Modified	7.82E-01	8.24E-01	8.25E-01	1.38E+00	U	pCi/g
20-04072-06	TRG	B2-08101A-BJFC-007-CV 0 0-0 5	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Silver-108m	EPA 901.1 Modified	-7.38E-02	2.77E-01	2.77E-01	2.37E-01	U	pCi/g
20-04072-06	TRG	B2-08101A-BJFC-007-CV 0 0-0 5	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Barium-133	EPA 901.1 Modified	2.93E-01	5.75E-01	5.76E-01	7.52E-01	U	pCi/g
20-04072-06	TRG	B2-08101A-BJFC-007-CV 0 0-0 5	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Bismuth-214	EPA 901.1 Modified	1.34E+00	4.57E-01	4.62E-01	3.37E-01		pCi/g
20-04072-06	TRG	B2-08101A-BJFC-007-CV 0 0-0 5	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Cobalt-60	EPA 901.1 Modified	-5.83E-01	5.59E-01	5.60E-01	7.34E-01	U	pCi/g
20-04072-06	TRG	B2-08101A-BJFC-007-CV 0 0-0 5	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Cesium-134	EPA 901.1 Modified	4.82E-01	1.88E+00	1.88E+00	3.99E+00	U	pCi/g
20-04072-06	TRG	B2-08101A-BJFC-007-CV 0 0-0 5	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Cesium-137	EPA 901.1 Modified	1.15E-01	2.37E-01	2.37E-01	3.78E-01	U	pCi/g
20-04072-06	TRG	B2-08101A-BJFC-007-CV 0 0-0 5	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Europium-152	EPA 901.1 Modified	2.89E-01	8.81E-01	8.81E-01	9.93E-01	U	pCi/g
20-04072-06	TRG	B2-08101A-BJFC-007-CV 0 0-0 5	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Europium-154	EPA 901.1 Modified	4.41E-01	9.70E-01	9.70E-01	6.53E-01	U	pCi/g
20-04072-06	TRG	B2-08101A-BJFC-007-CV 0 0-0 5	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Europium-155	EPA 901.1 Modified	6.54E-02	1.28E+00	1.28E+00	1.85E+00	U	pCi/g
20-04072-06	TRG	B2-08101A-BJFC-007-CV 0 0-0 5	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Holmium-166m	EPA 901.1 Modified	3.81E-01	2.78E-01	2.79E-01	3.12E-01	U	pCi/g
20-04072-06	TRG	B2-08101A-BJFC-007-CV 0 0-0 5	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Iodine-129	EPA 901.1 Modified	2.64E-01	6.11E-01	6.11E-01	9.18E-01	U	pCi/g
20-04072-06	TRG	B2-08101A-BJFC-007-CV 0 0-0 5	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Potassium-40	EPA 901.1 Modified	8.56E+00	3.05E+00	3.08E+00	3.60E+00		pCi/g
20-04072-06	TRG	B2-08101A-BJFC-007-CV 0 0-0 5	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Manganese-54	EPA 901.1 Modified	-1.66E+01	1.31E+02	1.31E+02	1.78E+02	U	pCi/g
20-04072-06	TRG	B2-08101A-BJFC-007-CV 0 0-0 5	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Molybdenum-93	EPA 901.1 Modified	6.50E-02	3.10E-01	3.10E-01	4.58E-01	U	pCi/g
20-04072-06	TRG	B2-08101A-BJFC-007-CV 0 0-0 5	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Niobium-94	EPA 901.1 Modified	1.74E-02	1.98E-01	1.98E-01	2.70E-01	U	pCi/g
20-04072-06	TRG	B2-08101A-BJFC-007-CV 0 0-0 5	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Lead-210	EPA 901.1 Modified	4.33E+00	4.51E+00	4.51E+00	7.13E+00	U	pCi/g
20-04072-06	TRG	B2-08101A-BJFC-007-CV 0 0-0 5	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Lead-212	EPA 901.1 Modified	1.07E+00	4.84E-01	4.88E-01	7.40E-01		pCi/g
20-04072-06	TRG	B2-08101A-BJFC-007-CV 0 0-0 5	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Lead-214	EPA 901.1 Modified	1.33E+00	4.24E-01	4.30E-01	1.24E+00		pCi/g
20-04072-06	TRG	B2-08101A-BJFC-007-CV 0 0-0 5	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Promethium-145	EPA 901.1 Modified	3.88E-01	6.81E-01	6.81E-01	1.06E+00	U	pCi/g
20-04072-06	TRG	B2-08101A-BJFC-007-CV 0 0-0 5	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Radium-226	EPA 901.1 Modified	1.34E+00	4.57E-01	4.62E-01	3.37E-01		pCi/g
20-04072-06	TRG	B2-08101A-BJFC-007-CV 0 0-0 5	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Antimony-125	EPA 901.1 Modified	-1.51E+00	3.40E+00	3.40E+00	4.75E+00	U	pCi/g
20-04072-06	TRG	B2-08101A-BJFC-007-CV 0 0-0 5	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Thorium-234	EPA 901.1 Modified	7.69E+00	3.52E+00	3.54E+00	5.86E+00	U	pCi/g
20-04072-06	TRG	B2-08101A-BJFC-007-CV 0 0-0 5	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Thallium-208	EPA 901.1 Modified	3.80E-01	6.33E-01	6.33E-01	9.84E-01	U	pCi/g
20-04072-06	TRG	B2-08101A-BJFC-007-CV 0 0-0 5	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Uranium-235	EPA 901.1 Modified	2.58E-01	1.08E+00	1.08E+00	1.65E+00	U	pCi/g

CU=Counting Uncertainty;CSU=Combined Standard Uncertainty (1-sigma);MDA=Minimal Detected Activity;LCS=Laboratory Control Sample;MBL=Blank;DUP=Duplicate;TRG=Normal Sample;DO=Duplicate Original;U=Non-detect



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			Gerald Wood					SDG:	20-04072					
			Zion Solutions					Purchase Order:	677116					
			2701 Deborah Ave					Analysis Category:	ENVIRONMENTAL					
			Zion, IL 60099					Sample Matrix:	SO					
Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Qualifier	Report Units
20-04072-07	TRG	B2-08101A-BJFC-007-CV 0 5-1 0	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Actinium-228	EPA 901.1 Modified	1.48E+00	6.73E-01	6.77E-01	1.21E+00		pCi/g
20-04072-07	TRG	B2-08101A-BJFC-007-CV 0 5-1 0	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Silver-108m	EPA 901.1 Modified	-1.03E-01	1.41E-01	1.41E-01	2.06E-01	U	pCi/g
20-04072-07	TRG	B2-08101A-BJFC-007-CV 0 5-1 0	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Barium-133	EPA 901.1 Modified	8.29E-02	1.69E-01	1.69E-01	4.70E-01	U	pCi/g
20-04072-07	TRG	B2-08101A-BJFC-007-CV 0 5-1 0	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Bismuth-214	EPA 901.1 Modified	1.22E+00	6.96E-01	6.98E-01	1.08E+00		pCi/g
20-04072-07	TRG	B2-08101A-BJFC-007-CV 0 5-1 0	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Cobalt-60	EPA 901.1 Modified	1.19E-01	4.80E-01	4.80E-01	7.55E-01	U	pCi/g
20-04072-07	TRG	B2-08101A-BJFC-007-CV 0 5-1 0	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Cesium-134	EPA 901.1 Modified	0.00E+00	1.27E+00	1.27E+00	3.23E+00	U	pCi/g
20-04072-07	TRG	B2-08101A-BJFC-007-CV 0 5-1 0	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Cesium-137	EPA 901.1 Modified	-1.22E-01	2.28E-01	2.28E-01	3.10E-01	U	pCi/g
20-04072-07	TRG	B2-08101A-BJFC-007-CV 0 5-1 0	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Europium-152	EPA 901.1 Modified	-2.32E-01	8.27E-01	8.27E-01	9.63E-01	U	pCi/g
20-04072-07	TRG	B2-08101A-BJFC-007-CV 0 5-1 0	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Europium-154	EPA 901.1 Modified	-1.58E-01	8.76E-01	8.76E-01	6.04E-01	U	pCi/g
20-04072-07	TRG	B2-08101A-BJFC-007-CV 0 5-1 0	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Europium-155	EPA 901.1 Modified	1.69E+00	1.08E+00	1.08E+00	1.65E+00	U	pCi/g
20-04072-07	TRG	B2-08101A-BJFC-007-CV 0 5-1 0	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Holmium-166m	EPA 901.1 Modified	8.14E-02	3.02E-01	3.02E-01	2.88E-01	U	pCi/g
20-04072-07	TRG	B2-08101A-BJFC-007-CV 0 5-1 0	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Iodine-129	EPA 901.1 Modified	3.45E-01	3.43E-01	3.43E-01	5.53E-01	U	pCi/g
20-04072-07	TRG	B2-08101A-BJFC-007-CV 0 5-1 0	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Potassium-40	EPA 901.1 Modified	1.15E+01	3.01E+00	3.07E+00	1.92E+00		pCi/g
20-04072-07	TRG	B2-08101A-BJFC-007-CV 0 5-1 0	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Manganese-54	EPA 901.1 Modified	-1.12E+02	1.23E+02	1.23E+02	1.52E+02	U	pCi/g
20-04072-07	TRG	B2-08101A-BJFC-007-CV 0 5-1 0	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Molybdenum-93	EPA 901.1 Modified	3.27E-02	2.06E-01	2.06E-01	3.48E-01	U	pCi/g
20-04072-07	TRG	B2-08101A-BJFC-007-CV 0 5-1 0	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Niobium-94	EPA 901.1 Modified	1.51E-01	1.20E-01	1.21E-01	2.46E-01	U	pCi/g
20-04072-07	TRG	B2-08101A-BJFC-007-CV 0 5-1 0	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Lead-210	EPA 901.1 Modified	3.88E+00	4.40E+00	4.40E+00	7.34E+00	U	pCi/g
20-04072-07	TRG	B2-08101A-BJFC-007-CV 0 5-1 0	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Lead-212	EPA 901.1 Modified	7.44E-01	2.85E-01	2.88E-01	7.47E-01	U	pCi/g
20-04072-07	TRG	B2-08101A-BJFC-007-CV 0 5-1 0	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Lead-214	EPA 901.1 Modified	9.94E-01	4.58E-01	4.61E-01	7.75E-01		pCi/g
20-04072-07	TRG	B2-08101A-BJFC-007-CV 0 5-1 0	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Promethium-145	EPA 901.1 Modified	2.32E-01	5.73E-01	5.73E-01	7.98E-01	U	pCi/g
20-04072-07	TRG	B2-08101A-BJFC-007-CV 0 5-1 0	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Radium-226	EPA 901.1 Modified	1.22E+00	6.96E-01	6.98E-01	1.08E+00		pCi/g
20-04072-07	TRG	B2-08101A-BJFC-007-CV 0 5-1 0	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Antimony-125	EPA 901.1 Modified	1.05E+00	2.55E+00	2.55E+00	4.60E+00	U	pCi/g
20-04072-07	TRG	B2-08101A-BJFC-007-CV 0 5-1 0	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Thonium-234	EPA 901.1 Modified	3.08E+00	3.34E+00	3.35E+00	4.83E+00	U	pCi/g
20-04072-07	TRG	B2-08101A-BJFC-007-CV 0 5-1 0	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Thallium-208	EPA 901.1 Modified	3.96E-01	6.22E-01	6.22E-01	1.04E+00	U	pCi/g
20-04072-07	TRG	B2-08101A-BJFC-007-CV 0 5-1 0	05/09/12 14:22	4/25/2020	4/27/2020	20-04072	Uranium-235	EPA 901.1 Modified	1.48E-01	9.48E-01	9.48E-01	1.30E+00	U	pCi/g

CU=Counting Uncertainty;CSU=Combined Standard Uncertainty (1-sigma);MDA=Minimal Detected Activity;LCS=Laboratory Control Sample;MBL=Blank;DUP=Duplicate;TRG=Normal Sample;DO=Duplicate Original;U=Non-detect



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Eberline Analytical Final Report of Analysis			Report To:					Work Order Details:						
			Gerald Wood					SDG:	20-04072					
			Zion Solutions					Purchase Order:	677116					
			2701 Deborah Ave					Analysis Category:	ENVIRONMENTAL					
			Zion, IL 60099					Sample Matrix:	SO					
Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Qualifier	Report Units
20-04072-08	TRG	B2-08201-CJWC-A018-CV 0 0-0 5	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Actinium-228	EPA 901.1 Modified	1.89E+00	1.33E+00	1.34E+00	2.70E+00	U	pCi/g
20-04072-08	TRG	B2-08201-CJWC-A018-CV 0 0-0 5	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Silver-108m	EPA 901.1 Modified	-1.60E-01	3.91E-01	3.91E-01	4.55E-01	U	pCi/g
20-04072-08	TRG	B2-08201-CJWC-A018-CV 0 0-0 5	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Barium-133	EPA 901.1 Modified	1.34E-01	2.59E-01	2.59E-01	9.98E-01	U	pCi/g
20-04072-08	TRG	B2-08201-CJWC-A018-CV 0 0-0 5	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Bismuth-214	EPA 901.1 Modified	1.31E+00	6.33E-01	6.36E-01	9.56E-01		pCi/g
20-04072-08	TRG	B2-08201-CJWC-A018-CV 0 0-0 5	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Cobalt-60	EPA 901.1 Modified	-8.17E-01	1.52E+00	1.52E+00	1.60E+00	U	pCi/g
20-04072-08	TRG	B2-08201-CJWC-A018-CV 0 0-0 5	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Cesium-134	EPA 901.1 Modified	-5.14E+00	6.77E+00	6.77E+00	7.60E+00	U	pCi/g
20-04072-08	TRG	B2-08201-CJWC-A018-CV 0 0-0 5	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Cesium-137	EPA 901.1 Modified	8.97E-02	4.50E-01	4.50E-01	6.93E-01	U	pCi/g
20-04072-08	TRG	B2-08201-CJWC-A018-CV 0 0-0 5	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Europium-152	EPA 901.1 Modified	-1.78E+00	2.31E+00	2.31E+00	1.19E+00	U	pCi/g
20-04072-08	TRG	B2-08201-CJWC-A018-CV 0 0-0 5	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Europium-154	EPA 901.1 Modified	-2.01E-01	1.86E+00	1.86E+00	8.00E-01	U	pCi/g
20-04072-08	TRG	B2-08201-CJWC-A018-CV 0 0-0 5	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Europium-155	EPA 901.1 Modified	4.58E-01	1.26E+00	1.26E+00	1.94E+00	U	pCi/g
20-04072-08	TRG	B2-08201-CJWC-A018-CV 0 0-0 5	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Holmium-166m	EPA 901.1 Modified	3.42E-01	5.13E-01	5.13E-01	3.33E-01	U	pCi/g
20-04072-08	TRG	B2-08201-CJWC-A018-CV 0 0-0 5	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Iodine-129	EPA 901.1 Modified	-1.99E-02	7.20E-01	7.20E-01	1.08E+00	U	pCi/g
20-04072-08	TRG	B2-08201-CJWC-A018-CV 0 0-0 5	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Potassium-40	EPA 901.1 Modified	6.63E+00	4.17E+00	4.18E+00	5.44E+00		pCi/g
20-04072-08	TRG	B2-08201-CJWC-A018-CV 0 0-0 5	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Manganese-54	EPA 901.1 Modified	-2.99E+01	2.03E+02	2.03E+02	3.28E+02	U	pCi/g
20-04072-08	TRG	B2-08201-CJWC-A018-CV 0 0-0 5	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Molybdenum-93	EPA 901.1 Modified	-2.37E-01	5.55E-01	5.55E-01	7.95E-01	U	pCi/g
20-04072-08	TRG	B2-08201-CJWC-A018-CV 0 0-0 5	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Niobium-94	EPA 901.1 Modified	2.62E-01	3.39E-01	3.39E-01	5.03E-01	U	pCi/g
20-04072-08	TRG	B2-08201-CJWC-A018-CV 0 0-0 5	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Lead-210	EPA 901.1 Modified	6.20E+00	4.99E+00	5.00E+00	8.26E+00	U	pCi/g
20-04072-08	TRG	B2-08201-CJWC-A018-CV 0 0-0 5	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Lead-212	EPA 901.1 Modified	8.14E-01	3.71E-01	3.73E-01	1.02E+00	U	pCi/g
20-04072-08	TRG	B2-08201-CJWC-A018-CV 0 0-0 5	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Lead-214	EPA 901.1 Modified	1.25E+00	7.13E-01	7.16E-01	1.26E+00	U	pCi/g
20-04072-08	TRG	B2-08201-CJWC-A018-CV 0 0-0 5	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Promethium-145	EPA 901.1 Modified	-2.10E-01	7.80E-01	7.80E-01	1.14E+00	U	pCi/g
20-04072-08	TRG	B2-08201-CJWC-A018-CV 0 0-0 5	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Radium-226	EPA 901.1 Modified	1.31E+00	6.33E-01	6.36E-01	9.56E-01		pCi/g
20-04072-08	TRG	B2-08201-CJWC-A018-CV 0 0-0 5	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Antimony-125	EPA 901.1 Modified	-2.89E-01	6.44E+00	6.44E+00	9.17E+00	U	pCi/g
20-04072-08	TRG	B2-08201-CJWC-A018-CV 0 0-0 5	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Thorium-234	EPA 901.1 Modified	7.28E+00	4.18E+00	4.20E+00	6.66E+00		pCi/g
20-04072-08	TRG	B2-08201-CJWC-A018-CV 0 0-0 5	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Thallium-208	EPA 901.1 Modified	5.36E-01	9.57E-01	9.58E-01	1.57E+00	U	pCi/g
20-04072-08	TRG	B2-08201-CJWC-A018-CV 0 0-0 5	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Uranium-235	EPA 901.1 Modified	7.87E-01	1.10E+00	1.10E+00	1.81E+00	U	pCi/g

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Eberline Analytical Final Report of Analysis			Report To:					Work Order Details:						
			Gerald Wood					SDG:	20-04072					
			Zion Solutions					Purchase Order:	677116					
			2701 Deborah Ave					Analysis Category:	ENVIRONMENTAL					
			Zion, IL 60099					Sample Matrix:	SO					
Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Qualifier	Report Units
20-04072-09	TRG	B2-08201-CJWC-A018-CV 0 5-1 0	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Actinium-228	EPA 901.1 Modified	-2.94E-01	8.38E-01	8.38E-01	1.11E+00	U	pCi/g
20-04072-09	TRG	B2-08201-CJWC-A018-CV 0 5-1 0	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Silver-108m	EPA 901.1 Modified	1.31E-01	1.19E-01	1.19E-01	2.29E-01	U	pCi/g
20-04072-09	TRG	B2-08201-CJWC-A018-CV 0 5-1 0	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Barium-133	EPA 901.1 Modified	-5.55E-02	1.21E-01	1.21E-01	6.16E-01	U	pCi/g
20-04072-09	TRG	B2-08201-CJWC-A018-CV 0 5-1 0	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Bismuth-214	EPA 901.1 Modified	9.88E-01	4.95E-01	4.98E-01	8.46E-01		pCi/g
20-04072-09	TRG	B2-08201-CJWC-A018-CV 0 5-1 0	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Cobalt-60	EPA 901.1 Modified	6.65E-02	1.81E-01	1.81E-01	8.74E-01	U	pCi/g
20-04072-09	TRG	B2-08201-CJWC-A018-CV 0 5-1 0	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Cesium-134	EPA 901.1 Modified	0.00E+00	1.33E+00	1.33E+00	4.46E+00	U	pCi/g
20-04072-09	TRG	B2-08201-CJWC-A018-CV 0 5-1 0	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Cesium-137	EPA 901.1 Modified	2.52E-01	2.28E-01	2.28E-01	4.02E-01	U	pCi/g
20-04072-09	TRG	B2-08201-CJWC-A018-CV 0 5-1 0	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Europium-152	EPA 901.1 Modified	8.30E-02	6.27E-01	6.27E-01	1.02E+00	U	pCi/g
20-04072-09	TRG	B2-08201-CJWC-A018-CV 0 5-1 0	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Europium-154	EPA 901.1 Modified	4.39E-01	8.07E-01	8.07E-01	6.61E-01	U	pCi/g
20-04072-09	TRG	B2-08201-CJWC-A018-CV 0 5-1 0	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Europium-155	EPA 901.1 Modified	-8.71E-02	1.16E+00	1.16E+00	1.69E+00	U	pCi/g
20-04072-09	TRG	B2-08201-CJWC-A018-CV 0 5-1 0	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Holmium-166m	EPA 901.1 Modified	2.90E-02	3.43E-01	3.43E-01	2.93E-01	U	pCi/g
20-04072-09	TRG	B2-08201-CJWC-A018-CV 0 5-1 0	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Iodine-129	EPA 901.1 Modified	-3.76E-01	5.87E-01	5.87E-01	8.14E-01	U	pCi/g
20-04072-09	TRG	B2-08201-CJWC-A018-CV 0 5-1 0	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Potassium-40	EPA 901.1 Modified	8.11E+00	3.11E+00	3.14E+00	3.93E+00		pCi/g
20-04072-09	TRG	B2-08201-CJWC-A018-CV 0 5-1 0	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Manganese-54	EPA 901.1 Modified	-5.06E+01	1.56E+02	1.56E+02	1.90E+02	U	pCi/g
20-04072-09	TRG	B2-08201-CJWC-A018-CV 0 5-1 0	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Molybdenum-93	EPA 901.1 Modified	-8.88E-02	3.31E-01	3.31E-01	4.46E-01	U	pCi/g
20-04072-09	TRG	B2-08201-CJWC-A018-CV 0 5-1 0	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Niobium-94	EPA 901.1 Modified	-7.09E-02	2.12E-01	2.12E-01	2.82E-01	U	pCi/g
20-04072-09	TRG	B2-08201-CJWC-A018-CV 0 5-1 0	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Lead-210	EPA 901.1 Modified	4.42E+00	3.86E+00	3.87E+00	6.32E+00	U	pCi/g
20-04072-09	TRG	B2-08201-CJWC-A018-CV 0 5-1 0	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Lead-212	EPA 901.1 Modified	3.96E-01	3.85E-01	3.86E-01	6.35E-01	U	pCi/g
20-04072-09	TRG	B2-08201-CJWC-A018-CV 0 5-1 0	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Lead-214	EPA 901.1 Modified	9.67E-01	4.55E-01	4.57E-01	9.06E-01		pCi/g
20-04072-09	TRG	B2-08201-CJWC-A018-CV 0 5-1 0	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Promethium-145	EPA 901.1 Modified	9.01E-02	6.14E-01	6.14E-01	9.28E-01	U	pCi/g
20-04072-09	TRG	B2-08201-CJWC-A018-CV 0 5-1 0	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Radium-226	EPA 901.1 Modified	9.88E-01	4.95E-01	4.98E-01	8.46E-01		pCi/g
20-04072-09	TRG	B2-08201-CJWC-A018-CV 0 5-1 0	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Antimony-125	EPA 901.1 Modified	-1.17E+00	3.21E+00	3.21E+00	4.56E+00	U	pCi/g
20-04072-09	TRG	B2-08201-CJWC-A018-CV 0 5-1 0	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Thorium-234	EPA 901.1 Modified	5.06E+00	3.29E+00	3.30E+00	5.36E+00	U	pCi/g
20-04072-09	TRG	B2-08201-CJWC-A018-CV 0 5-1 0	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Thallium-208	EPA 901.1 Modified	7.44E-01	5.68E-01	5.69E-01	9.58E-01	U	pCi/g
20-04072-09	TRG	B2-08201-CJWC-A018-CV 0 5-1 0	05/10/12 12:56	4/25/2020	4/27/2020	20-04072	Uranium-235	EPA 901.1 Modified	1.69E-01	9.78E-01	9.78E-01	1.49E+00	U	pCi/g

CU=Counting Uncertainty;CSU=Combined Standard Uncertainty (1-sigma);MDA=Minimal Detected Activity;LCS=Laboratory Control Sample;MBL=Blank;DUP=Duplicate;TRG=Normal Sample;DO=Duplicate Original;U=Non-detect



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601 SCARBORO ROAD OAK RIDGE, TN 37830 865/481-0683 FAX 865/483-4621

Eberline Analytical Final Report of Analysis			Report To:					Work Order Details:						
			Gerald Wood					SDG:	20-04072					
			Zion Solutions					Purchase Order:	677116					
			2701 Deborah Ave					Analysis Category:	ENVIRONMENTAL					
			Zion, IL 60099					Sample Matrix:	SO					
Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Qualifier	Report Units
20-04072-10	TRG	L2-10214C-RJGS-001-SM-A	05/07/19 07:45	4/25/2020	4/27/2020	20-04072	Actinium-228	EPA 901.1 Modified	2.05E-01	8.86E-02	8.92E-02	1.84E-01		pCi/g
20-04072-10	TRG	L2-10214C-RJGS-001-SM-A	05/07/19 07:45	4/25/2020	4/27/2020	20-04072	Silver-108m	EPA 901.1 Modified	2.26E-02	1.67E-02	1.67E-02	3.00E-02	U	pCi/g
20-04072-10	TRG	L2-10214C-RJGS-001-SM-A	05/07/19 07:45	4/25/2020	4/27/2020	20-04072	Barium-133	EPA 901.1 Modified	4.61E-03	3.41E-02	3.41E-02	4.72E-02	U	pCi/g
20-04072-10	TRG	L2-10214C-RJGS-001-SM-A	05/07/19 07:45	4/25/2020	4/27/2020	20-04072	Bismuth-214	EPA 901.1 Modified	1.82E-01	4.48E-02	4.58E-02	1.49E-01		pCi/g
20-04072-10	TRG	L2-10214C-RJGS-001-SM-A	05/07/19 07:45	4/25/2020	4/27/2020	20-04072	Cobalt-60	EPA 901.1 Modified	2.65E-01	3.39E-02	3.65E-02	4.51E-02		pCi/g
20-04072-10	TRG	L2-10214C-RJGS-001-SM-A	05/07/19 07:45	4/25/2020	4/27/2020	20-04072	Cesium-134	EPA 901.1 Modified	-1.57E-01	4.61E-02	4.68E-02	3.57E-02	U	pCi/g
20-04072-10	TRG	L2-10214C-RJGS-001-SM-A	05/07/19 07:45	4/25/2020	4/27/2020	20-04072	Cesium-137	EPA 901.1 Modified	2.18E+00	2.50E-01	2.74E-01	5.19E-02		pCi/g
20-04072-10	TRG	L2-10214C-RJGS-001-SM-A	05/07/19 07:45	4/25/2020	4/27/2020	20-04072	Europium-152	EPA 901.1 Modified	1.33E-02	6.46E-02	6.46E-02	7.87E-02	U	pCi/g
20-04072-10	TRG	L2-10214C-RJGS-001-SM-A	05/07/19 07:45	4/25/2020	4/27/2020	20-04072	Europium-154	EPA 901.1 Modified	4.61E-02	5.72E-02	5.72E-02	4.12E-02	U	pCi/g
20-04072-10	TRG	L2-10214C-RJGS-001-SM-A	05/07/19 07:45	4/25/2020	4/27/2020	20-04072	Europium-155	EPA 901.1 Modified	-8.47E-03	4.60E-02	4.60E-02	6.57E-02	U	pCi/g
20-04072-10	TRG	L2-10214C-RJGS-001-SM-A	05/07/19 07:45	4/25/2020	4/27/2020	20-04072	Holmium-166m	EPA 901.1 Modified	5.79E-03	2.77E-02	2.77E-02	2.78E-02	U	pCi/g
20-04072-10	TRG	L2-10214C-RJGS-001-SM-A	05/07/19 07:45	4/25/2020	4/27/2020	20-04072	Iodine-129	EPA 901.1 Modified	9.89E-03	2.49E-02	2.49E-02	7.80E-02	U	pCi/g
20-04072-10	TRG	L2-10214C-RJGS-001-SM-A	05/07/19 07:45	4/25/2020	4/27/2020	20-04072	Potassium-40	EPA 901.1 Modified	5.09E+00	6.51E-01	7.02E-01	4.74E-01		pCi/g
20-04072-10	TRG	L2-10214C-RJGS-001-SM-A	05/07/19 07:45	4/25/2020	4/27/2020	20-04072	Manganese-54	EPA 901.1 Modified	7.01E-03	3.94E-02	3.94E-02	5.91E-02	U	pCi/g
20-04072-10	TRG	L2-10214C-RJGS-001-SM-A	05/07/19 07:45	4/25/2020	4/27/2020	20-04072	Molybdenum-93	EPA 901.1 Modified	-1.32E-02	1.69E-02	1.69E-02	2.01E-02	U	pCi/g
20-04072-10	TRG	L2-10214C-RJGS-001-SM-A	05/07/19 07:45	4/25/2020	4/27/2020	20-04072	Niobium-94	EPA 901.1 Modified	2.40E-02	1.67E-02	1.68E-02	2.53E-02	U	pCi/g
20-04072-10	TRG	L2-10214C-RJGS-001-SM-A	05/07/19 07:45	4/25/2020	4/27/2020	20-04072	Lead-210	EPA 901.1 Modified	4.98E-01	4.11E-01	4.12E-01	6.82E-01	U	pCi/g
20-04072-10	TRG	L2-10214C-RJGS-001-SM-A	05/07/19 07:45	4/25/2020	4/27/2020	20-04072	Lead-212	EPA 901.1 Modified	2.12E-01	5.56E-02	5.66E-02	7.94E-02		pCi/g
20-04072-10	TRG	L2-10214C-RJGS-001-SM-A	05/07/19 07:45	4/25/2020	4/27/2020	20-04072	Lead-214	EPA 901.1 Modified	2.10E-01	5.98E-02	6.07E-02	1.09E-01		pCi/g
20-04072-10	TRG	L2-10214C-RJGS-001-SM-A	05/07/19 07:45	4/25/2020	4/27/2020	20-04072	Promethium-145	EPA 901.1 Modified	-4.66E-02	4.65E-02	4.66E-02	7.14E-02	U	pCi/g
20-04072-10	TRG	L2-10214C-RJGS-001-SM-A	05/07/19 07:45	4/25/2020	4/27/2020	20-04072	Radium-226	EPA 901.1 Modified	1.82E-01	4.48E-02	4.58E-02	1.49E-01		pCi/g
20-04072-10	TRG	L2-10214C-RJGS-001-SM-A	05/07/19 07:45	4/25/2020	4/27/2020	20-04072	Antimony-125	EPA 901.1 Modified	3.80E-02	7.98E-02	7.99E-02	1.18E-01	U	pCi/g
20-04072-10	TRG	L2-10214C-RJGS-001-SM-A	05/07/19 07:45	4/25/2020	4/27/2020	20-04072	Thorium-234	EPA 901.1 Modified	8.17E-01	2.93E-01	2.96E-01	4.86E-01	U	pCi/g
20-04072-10	TRG	L2-10214C-RJGS-001-SM-A	05/07/19 07:45	4/25/2020	4/27/2020	20-04072	Thallium-208	EPA 901.1 Modified	1.80E-01	5.83E-02	5.91E-02	9.63E-02		pCi/g
20-04072-10	TRG	L2-10214C-RJGS-001-SM-A	05/07/19 07:45	4/25/2020	4/27/2020	20-04072	Uranium-235	EPA 901.1 Modified	1.17E-01	1.05E-01	1.05E-01	1.57E-01	U	pCi/g

CU=Counting Uncertainty;CSU=Combined Standard Uncertainty (1-sigma);MDA=Minimal Detected Activity;LCS=Laboratory Control Sample;MBL=Blank;DUP=Duplicate;TRG=Normal Sample;DO=Duplicate Original;U=Non-detect



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			Gerald Wood					SDG:	20-04072					
			Zion Solutions					Purchase Order:	677116					
			2701 Deborah Ave					Analysis Category:	ENVIRONMENTAL					
			Zion, IL 60099					Sample Matrix:	SO					
Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Qualifier	Report Units
20-04072-11	TRG	L1-12109L-CJGS-001-SB-A	08/21/19 10:25	4/25/2020	4/27/2020	20-04072	Actinium-228	EPA 901.1 Modified	1.11E+00	2.50E-01	2.57E-01	4.54E-01		pCi/g
20-04072-11	TRG	L1-12109L-CJGS-001-SB-A	08/21/19 10:25	4/25/2020	4/27/2020	20-04072	Silver-108m	EPA 901.1 Modified	2.57E-03	4.71E-02	4.71E-02	7.80E-02	U	pCi/g
20-04072-11	TRG	L1-12109L-CJGS-001-SB-A	08/21/19 10:25	4/25/2020	4/27/2020	20-04072	Barium-133	EPA 901.1 Modified	8.15E-03	2.98E-02	2.98E-02	1.50E-01	U	pCi/g
20-04072-11	TRG	L1-12109L-CJGS-001-SB-A	08/21/19 10:25	4/25/2020	4/27/2020	20-04072	Bismuth-214	EPA 901.1 Modified	1.24E+00	1.90E-01	2.00E-01	2.55E-01		pCi/g
20-04072-11	TRG	L1-12109L-CJGS-001-SB-A	08/21/19 10:25	4/25/2020	4/27/2020	20-04072	Cobalt-60	EPA 901.1 Modified	9.43E-02	7.75E-02	7.76E-02	1.18E-01	U	pCi/g
20-04072-11	TRG	L1-12109L-CJGS-001-SB-A	08/21/19 10:25	4/25/2020	4/27/2020	20-04072	Cesium-134	EPA 901.1 Modified	4.83E-02	5.80E-02	5.81E-02	1.47E-01	U	pCi/g
20-04072-11	TRG	L1-12109L-CJGS-001-SB-A	08/21/19 10:25	4/25/2020	4/27/2020	20-04072	Cesium-137	EPA 901.1 Modified	1.47E-01	8.15E-02	8.18E-02	1.31E-01		pCi/g
20-04072-11	TRG	L1-12109L-CJGS-001-SB-A	08/21/19 10:25	4/25/2020	4/27/2020	20-04072	Europium-152	EPA 901.1 Modified	-2.05E-03	1.31E-01	1.31E-01	2.52E-01	U	pCi/g
20-04072-11	TRG	L1-12109L-CJGS-001-SB-A	08/21/19 10:25	4/25/2020	4/27/2020	20-04072	Europium-154	EPA 901.1 Modified	-1.19E-01	2.01E-01	2.01E-01	1.31E-01	U	pCi/g
20-04072-11	TRG	L1-12109L-CJGS-001-SB-A	08/21/19 10:25	4/25/2020	4/27/2020	20-04072	Europium-155	EPA 901.1 Modified	1.01E+00	1.84E-01	1.91E-01	2.67E-01		pCi/g
20-04072-11	TRG	L1-12109L-CJGS-001-SB-A	08/21/19 10:25	4/25/2020	4/27/2020	20-04072	Holmium-166m	EPA 901.1 Modified	2.38E-01	8.51E-02	8.60E-02	1.38E-01		pCi/g
20-04072-11	TRG	L1-12109L-CJGS-001-SB-A	08/21/19 10:25	4/25/2020	4/27/2020	20-04072	Iodine-129	EPA 901.1 Modified	-1.11E-01	2.16E-01	2.17E-01	3.07E-01	U	pCi/g
20-04072-11	TRG	L1-12109L-CJGS-001-SB-A	08/21/19 10:25	4/25/2020	4/27/2020	20-04072	Potassium-40	EPA 901.1 Modified	2.59E+01	2.65E+00	2.96E+00	1.93E+00		pCi/g
20-04072-11	TRG	L1-12109L-CJGS-001-SB-A	08/21/19 10:25	4/25/2020	4/27/2020	20-04072	Manganese-54	EPA 901.1 Modified	1.33E-01	1.23E-01	1.23E-01	1.76E-01	U	pCi/g
20-04072-11	TRG	L1-12109L-CJGS-001-SB-A	08/21/19 10:25	4/25/2020	4/27/2020	20-04072	Molybdenum-93	EPA 901.1 Modified	1.49E-02	6.62E-02	6.62E-02	9.11E-02	U	pCi/g
20-04072-11	TRG	L1-12109L-CJGS-001-SB-A	08/21/19 10:25	4/25/2020	4/27/2020	20-04072	Niobium-94	EPA 901.1 Modified	2.92E-02	6.45E-02	6.45E-02	9.12E-02	U	pCi/g
20-04072-11	TRG	L1-12109L-CJGS-001-SB-A	08/21/19 10:25	4/25/2020	4/27/2020	20-04072	Lead-210	EPA 901.1 Modified	2.40E+00	1.43E+00	1.43E+00	2.34E+00		pCi/g
20-04072-11	TRG	L1-12109L-CJGS-001-SB-A	08/21/19 10:25	4/25/2020	4/27/2020	20-04072	Lead-214	EPA 901.1 Modified	1.15E+00	1.89E-01	1.98E-01	2.88E-01		pCi/g
20-04072-11	TRG	L1-12109L-CJGS-001-SB-A	08/21/19 10:25	4/25/2020	4/27/2020	20-04072	Promethium-145	EPA 901.1 Modified	1.35E+00	2.32E-01	2.42E-01	3.27E-01		pCi/g
20-04072-11	TRG	L1-12109L-CJGS-001-SB-A	08/21/19 10:25	4/25/2020	4/27/2020	20-04072	Radium-226	EPA 901.1 Modified	4.47E-02	1.81E-01	1.81E-01	2.63E-01	U	pCi/g
20-04072-11	TRG	L1-12109L-CJGS-001-SB-A	08/21/19 10:25	4/25/2020	4/27/2020	20-04072	Antimony-125	EPA 901.1 Modified	1.24E+00	1.90E-01	2.00E-01	2.55E-01		pCi/g
20-04072-11	TRG	L1-12109L-CJGS-001-SB-A	08/21/19 10:25	4/25/2020	4/27/2020	20-04072	Thorium-234	EPA 901.1 Modified	-1.85E-01	1.95E-01	1.96E-01	2.67E-01	U	pCi/g
20-04072-11	TRG	L1-12109L-CJGS-001-SB-A	08/21/19 10:25	4/25/2020	4/27/2020	20-04072	Thallium-208	EPA 901.1 Modified	6.92E+00	1.33E+00	1.37E+00	1.97E+00	U	pCi/g
20-04072-11	TRG	L1-12109L-CJGS-001-SB-A	08/21/19 10:25	4/25/2020	4/27/2020	20-04072	Uranium-235	EPA 901.1 Modified	9.01E-01	1.88E-01	1.93E-01	3.50E-01		pCi/g
20-04072-11	TRG	L1-12109L-CJGS-001-SB-A	08/21/19 10:25	4/25/2020	4/27/2020	20-04072		EPA 901.1 Modified	5.96E-01	3.59E-01	3.60E-01	5.40E-01	U	pCi/g

CU=Counting Uncertainty;CSU=Combined Standard Uncertainty (1-sigma);MDA=Minimal Detected Activity;LCS=Laboratory Control Sample;MBL=Blank;DUP=Duplicate;TRG=Normal Sample;DO=Duplicate Original;U=Non-detect



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Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Qualifier	Report Units
20-04072-12	TRG	L1-12106L-CJGS-001-SB-A	08/14/19 13:30	4/25/2020	4/27/2020	20-04072	Actinium-228	EPA 901.1 Modified	5.36E-01	1.52E-01	1.54E-01	3.38E-01		pCi/g
20-04072-12	TRG	L1-12106L-CJGS-001-SB-A	08/14/19 13:30	4/25/2020	4/27/2020	20-04072	Silver-108m	EPA 901.1 Modified	4.17E-03	2.76E-02	2.76E-02	4.45E-02	U	pCi/g
20-04072-12	TRG	L1-12106L-CJGS-001-SB-A	08/14/19 13:30	4/25/2020	4/27/2020	20-04072	Barium-133	EPA 901.1 Modified	-3.19E-01	1.03E-01	1.05E-01	6.63E-02	U	pCi/g
20-04072-12	TRG	L1-12106L-CJGS-001-SB-A	08/14/19 13:30	4/25/2020	4/27/2020	20-04072	Bismuth-214	EPA 901.1 Modified	6.70E-01	1.24E-01	1.29E-01	1.96E-01		pCi/g
20-04072-12	TRG	L1-12106L-CJGS-001-SB-A	08/14/19 13:30	4/25/2020	4/27/2020	20-04072	Cobalt-60	EPA 901.1 Modified	2.89E-02	5.38E-02	5.38E-02	7.28E-02	U	pCi/g
20-04072-12	TRG	L1-12106L-CJGS-001-SB-A	08/14/19 13:30	4/25/2020	4/27/2020	20-04072	Cesium-134	EPA 901.1 Modified	1.56E-02	3.25E-02	3.25E-02	7.48E-02	U	pCi/g
20-04072-12	TRG	L1-12106L-CJGS-001-SB-A	08/14/19 13:30	4/25/2020	4/27/2020	20-04072	Cesium-137	EPA 901.1 Modified	1.92E-01	6.43E-02	6.50E-02	9.63E-02		pCi/g
20-04072-12	TRG	L1-12106L-CJGS-001-SB-A	08/14/19 13:30	4/25/2020	4/27/2020	20-04072	Europium-152	EPA 901.1 Modified	1.34E-01	1.31E-01	1.31E-01	1.51E-01	U	pCi/g
20-04072-12	TRG	L1-12106L-CJGS-001-SB-A	08/14/19 13:30	4/25/2020	4/27/2020	20-04072	Europium-154	EPA 901.1 Modified	1.57E-02	1.25E-01	1.25E-01	7.86E-02	U	pCi/g
20-04072-12	TRG	L1-12106L-CJGS-001-SB-A	08/14/19 13:30	4/25/2020	4/27/2020	20-04072	Europium-155	EPA 901.1 Modified	6.02E-02	6.89E-02	6.90E-02	1.15E-01	U	pCi/g
20-04072-12	TRG	L1-12106L-CJGS-001-SB-A	08/14/19 13:30	4/25/2020	4/27/2020	20-04072	Holmium-166m	EPA 901.1 Modified	6.21E-02	6.76E-02	6.77E-02	9.36E-02	U	pCi/g
20-04072-12	TRG	L1-12106L-CJGS-001-SB-A	08/14/19 13:30	4/25/2020	4/27/2020	20-04072	Iodine-129	EPA 901.1 Modified	9.17E-02	8.74E-02	8.76E-02	1.23E-01	U	pCi/g
20-04072-12	TRG	L1-12106L-CJGS-001-SB-A	08/14/19 13:30	4/25/2020	4/27/2020	20-04072	Potassium-40	EPA 901.1 Modified	1.95E+01	2.02E+00	2.25E+00	1.14E+00		pCi/g
20-04072-12	TRG	L1-12106L-CJGS-001-SB-A	08/14/19 13:30	4/25/2020	4/27/2020	20-04072	Manganese-54	EPA 901.1 Modified	3.61E-02	7.05E-02	7.05E-02	1.09E-01	U	pCi/g
20-04072-12	TRG	L1-12106L-CJGS-001-SB-A	08/14/19 13:30	4/25/2020	4/27/2020	20-04072	Molybdenum-93	EPA 901.1 Modified	1.21E-02	2.17E-02	2.17E-02	5.50E-02	U	pCi/g
20-04072-12	TRG	L1-12106L-CJGS-001-SB-A	08/14/19 13:30	4/25/2020	4/27/2020	20-04072	Niobium-94	EPA 901.1 Modified	-3.10E-03	4.05E-02	4.05E-02	5.95E-02	U	pCi/g
20-04072-12	TRG	L1-12106L-CJGS-001-SB-A	08/14/19 13:30	4/25/2020	4/27/2020	20-04072	Lead-210	EPA 901.1 Modified	1.41E+00	1.05E+00	1.06E+00	1.75E+00	U	pCi/g
20-04072-12	TRG	L1-12106L-CJGS-001-SB-A	08/14/19 13:30	4/25/2020	4/27/2020	20-04072	Lead-212	EPA 901.1 Modified	4.37E-01	9.77E-02	1.00E-01	1.33E-01		pCi/g
20-04072-12	TRG	L1-12106L-CJGS-001-SB-A	08/14/19 13:30	4/25/2020	4/27/2020	20-04072	Lead-214	EPA 901.1 Modified	6.06E-01	1.21E-01	1.25E-01	2.08E-01		pCi/g
20-04072-12	TRG	L1-12106L-CJGS-001-SB-A	08/14/19 13:30	4/25/2020	4/27/2020	20-04072	Promethium-145	EPA 901.1 Modified	-2.10E-01	1.25E-01	1.25E-01	1.45E-01	U	pCi/g
20-04072-12	TRG	L1-12106L-CJGS-001-SB-A	08/14/19 13:30	4/25/2020	4/27/2020	20-04072	Radium-226	EPA 901.1 Modified	6.70E-01	1.24E-01	1.29E-01	1.96E-01		pCi/g
20-04072-12	TRG	L1-12106L-CJGS-001-SB-A	08/14/19 13:30	4/25/2020	4/27/2020	20-04072	Antimony-125	EPA 901.1 Modified	3.25E-02	1.02E-01	1.03E-01	1.69E-01	U	pCi/g
20-04072-12	TRG	L1-12106L-CJGS-001-SB-A	08/14/19 13:30	4/25/2020	4/27/2020	20-04072	Thorium-234	EPA 901.1 Modified	1.10E+00	7.84E-01	7.86E-01	1.30E+00	U	pCi/g
20-04072-12	TRG	L1-12106L-CJGS-001-SB-A	08/14/19 13:30	4/25/2020	4/27/2020	20-04072	Thallium-208	EPA 901.1 Modified	5.15E-01	1.24E-01	1.26E-01	2.10E-01		pCi/g
20-04072-12	TRG	L1-12106L-CJGS-001-SB-A	08/14/19 13:30	4/25/2020	4/27/2020	20-04072	Uranium-235	EPA 901.1 Modified	-1.06E-01	2.46E-01	2.46E-01	3.09E-01	U	pCi/g

CU=Counting Uncertainty;CSU=Combined Standard Uncertainty (1-sigma);MDA=Minimal Detected Activity;LCS=Laboratory Control Sample;MBL=Blank;DUP=Duplicate;TRG=Normal Sample;DO=Duplicate Original;U=Non-detect



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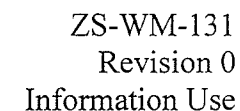
601 SCARBORO ROAD OAK RIDGE, TN 37830 865/481-0683 FAX 865/483-4621

20-04072

REC'D APR 25 2020

Attachment 1 - Chain-of-Custody Form

Sample ID	Sample Log	Matrix	Sample Type	Sample Container				Sample Date	Sample Time	Analysis Type	Preservative	Remarks
				Vol	Unit	Type	Qty					
B2-06207C-JFCCV-002- 0.0-0.5	NA	NA	Concrete	120.18	gm	Plastic bag	1	11-19-2012	1045	FULL SUITE and 5 ROC	NA	NA
B2-06207C-JFCCV-002- 0.5-1.0	NA	NA	Concrete	129.04	gm	Plastic bag	1	11-19-2012	1045	FULL SUITE and 5 ROC	NA	NA
B2-06104C-JFCCV-003- 0.5-1.0	NA	NA	Concrete	115.89	gm	Plastic bag	1	11-12-2012	1008	FULL SUITE and 5 ROC	NA	NA
B2-06104C-JFCCV-003- 1.0-1.5	NA	NA	Concrete	118.77	gm	Plastic bag	1	11-12-2012	1008	FULL SUITE and 5 ROC	NA	NA
B1-06201A-FSFC-009-CV	NA	NA	Concrete	298.87	gm	Plastic bag	1	06-07-2018	1130	FULL SUITE and 5 ROC	NA	NA
B1-06201A-FSWC-041-CV	NA	NA	Concrete	231.42	gm	Plastic bag	1	06-18-2018	0900	FULL SUITE and 5 ROC	NA	NA
B1-06201A-FSWC-050-CV	NA	NA	Concrete	259.58	gm	Plastic bag	1	06-07-2018	1300	FULL SUITE and 5 ROC	NA	NA
B1-06202A-FSFC-028-CV	NA	NA	Concrete	244.20	gm	Plastic bag	1	06-18-2018	1450	FULL SUITE and 5 ROC	NA	NA
B1-06202A-FSWC-033CV	NA	NA	Concrete	274.50	gm	Plastic bag	1	06-18-2018	1344	FULL SUITE and 5 ROC	NA	NA
B1-06202A-FSWC-040-CV	NA	NA	Concrete	389.08	gm	Plastic bag	1	06-18-2018	1030	FULL SUITE and 5 ROC	NA	NA
B1-06214A-FSFC-001-CV	NA	NA	Concrete	298.3	gm	Plastic bag	1	05-05-2018	1515	FULL SUITE and 5 ROC	NA	NA
Laboratory: 1.1. Eberline Labs				Date Submitted To Lab: NA				Ship Container No.: NA		Cooler Temperature: NA		Airbill Number: Fed Ex Priority Overnight 8132 0229 0060
Relinquished by: <i>Cheryl M. Baldwin</i>				Date: 04/24/2020		Time: 1145		Received by: <i>Richard F. Rickert</i>		Date: 04/24/2020		Time: 1145
Relinquished by: <i>Richard F. Rickert</i>				Date: 04/24/2020		Time: 1600		Received by: <i>Fed Ex Priority Overnight</i>		Date: 04/24/2020		Time: 1600
Relinquished by: <i>Fed Ex</i>				Date: 4/25/20		Time: 9:10am		Received by: <i>E. Towery</i>		Date: 4/25/20		Time: 910am
Comments FULL SUITE and 5 ROC EXPEDITE												



20-04072
REC'D APR 25 2020

Sample ID	Sample Log	Matrix	Sample Type	Sample Container				Sample Date	Sample Time	Analysis Type	Preservative	Remarks
				Vol	Unit	Type	Qty					
B2-08101A-BJFC-007-CV 0.0-0.5	NA	NA	Concrete	120.18	gms	Plastic	1	05-09-2012	1422	FULL SUITE and 5 ROC	NA	NA
B2-08101A-BJFC-007-CV 0.5-1.0	NA	NA	Concrete	175.02	gms	Plastic	1	05-09-2012	1422	FULL SUITE and 5 ROC	NA	NA
B2-08201-CJWC-A018-CV 0.0-0.5	NA	NA	Concrete	123.37	gms	Plastic	1	05-10-2012	1256	FULL SUITE and 5 ROC	NA	NA
B2-08201-CJWC-A018-CV 0.5-1.0	NA	NA	Concrete	132.37	gms	Plastic	1	05-10-2012	1256	FULL SUITE and 5 ROC	NA	NA
L2-10214C-RJGS-001-SM-A	NA	NA	Sediment	561.53	gms	Marinelli	1	05-07-2019	0745	FULL SUITE and 5 ROC	NA	NA
L1-12109L-CJGS-001-SB-A	NA	NA	Soil	145.65	gms	Marinelli	1	08-21-2019	1025	FULL SUITE and 5 ROC	NA	NA
L1-12106L-CJGS-001-SB-A	NA	NA	Soil	174.32	gms	Marinelli	1	08-14-2019	1330	FULL SUITE and 5 ROC	NA	NA
Laboratory: 1.1. Eberline Labs			Date Submitted To Lab: NA				Ship Container No.: NA		Cooler Temperature: NA		Airbill Number: 62d Ex Priority Overnight 8132 0329 00	
Relinquished by: <i>Deby Baldwin</i>			Date: 04/24/2020		Time: 1145		Received by: <i>Richard F. Rickett</i>		Date: 04/24/2020		Time: 1145	
Relinquished by: <i>Richard F. Rickett</i>			Date: 04/24/2020		Time: 1600		Received by: <i>Fed Ex Priority Overnight</i>		Date: 04/24/2020		Time: 1600	
Relinquished by: Fed Ex			Date: 4/25/20		Time: 9:10am		Received by: <i>E Touery</i>		Date: 4/25/20		Time: 9:10am	
Comments FULL SUITE and 5 ROC EXPEDITE												



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EBS-OR-43643

April 25, 2018

Patricia Giza
Zion Solutions, LLC
101 Shiloh Blvd
Zion, IL 60099

CASE NARRATIVE
Work Order # 18-04027-OR

SAMPLE RECEIPT

This work order contains three solid samples relogged 04/05/2018 at the request of the client. Samples were analyzed for Neptunium-237.

CLIENT ID

LAB ID

B105105CJFC005CV	18-04027-04
B105100CJFC005CV	18-04027-05
B105107CJWC006CV	18-04027-06

ANALYTICAL METHODS

Neptunium-237 was analyzed using EIChroM Method ACW08 Modified.

Laboratory qualifiers are as follows:

U - Result is less than the MDA.

ANALYTICAL RESULTS

Combined Standard Uncertainty is reported at 1-sigma value.

Minimum Detectable Activity (MDA) values for data represented in this report are sample-specific. MDA measurements are determined based on factors and conditions including instrument settings, aliquot size and matrix type.

SPECIAL CIRCUMSTANCES

Samples were reanalyzed at the request of the client. Sample results from the first analytical attempt versus the second analytical attempt are statistically equivalent. Previous pseudo positives are most likely due to naturally occurring Uranium in the samples.

ANALYTICAL RESULTS CONTINUED

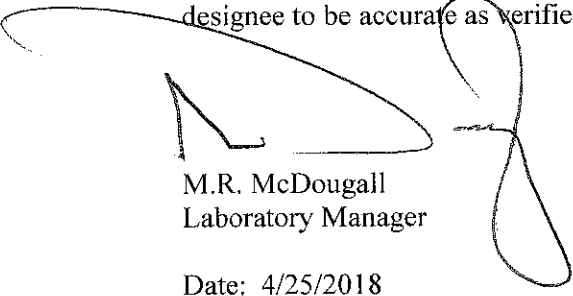
NEPTUNIUM-237

Samples were prepared by removing representative aliquots followed by mixed acid digestions and dilutions as appropriate. Aliquots from dilutions were taken and co-precipitated with Calcium Phosphate. Sample residues were dissolved in dilute acid and Neptunium was selectively separated using EIChroM stabilized selective resins. Neptunium was eluted, micro-precipitated and mounted on micro-porous filter media. Sample activities were then determined by alpha spectroscopy using an energy specific region of interest for Neptunium-237 activity. A Neptunium-239 tracer was used to determine chemical yields by beta proportional counting.

Samples demonstrated acceptable results for all Neptunium-237 analyses. All results demonstrated slightly high method detection limits. Chemical recovery was acceptable for all samples. The Neptunium-237 method blank demonstrated an acceptable result. Results for the Neptunium-237 duplicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Neptunium-237 laboratory control sample demonstrated an acceptable percent recovery.

CERTIFICATION OF ACCURACY

I certify that this data report is in compliance with the terms and conditions of the Purchase Order, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hard copy data package has been authorized by the cognizant project manager or his/her designee to be accurate as verified by the following signature.



M.R. McDougall
Laboratory Manager

Date: 4/25/2018

Eberline Analytical wants and encourages your feedback regarding our performance providing radioanalytical services. Please visit <http://eberlineanalytical.com/> to provide us with feedback on our services.

Eberline Analytical Final Report of Analysis			Report To:						Work Order Details:					
			Patricia Giza						SDG:	18-04027				
			Zion Solutions, LLC						Purchase Order:	677116				
			101 Shiloh Blvd						Analysis Category:	ENVIRONMENTAL				
			Zion, IL 60099						Sample Matrix:	SO				
Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Qualifier	Report Units
18-04027-01	LCS	KNOWN	04/06/18 00:00	4/5/2018	4/10/2018	18-04027	Neptunium-237	EiChroM ACW08 Mod	9.53E+00	3.43E-01				pCi/g
18-04027-01	LCS	SPIKE	04/06/18 00:00	4/5/2018	4/10/2018	18-04027	Neptunium-237	EiChroM ACW08 Mod	1.19E+01	9.94E-01	1.70E+00	1.12E-01		pCi/g
18-04027-02	MBL	BLANK	04/06/18 00:00	4/5/2018	4/10/2018	18-04027	Neptunium-237	EiChroM ACW08 Mod	-5.45E-03	3.29E-02	3.29E-02	1.04E-01	U	pCi/g
18-04027-03	DUP	B105105CJFC005CV	12/12/17 18:40	4/5/2018	4/10/2018	18-04027	Neptunium-237	EiChroM ACW08 Mod	1.64E-01	2.20E-01	2.21E-01	3.47E-01	U	pCi/g
18-04027-04	DO	B105105CJFC005CV	12/12/17 18:40	4/5/2018	4/10/2018	18-04027	Neptunium-237	EiChroM ACW08 Mod	-1.02E-02	1.20E-01	1.20E-01	2.51E-01	U	pCi/g
18-04027-05	TRG	B105100CJFC005CV	12/12/17 23:07	4/5/2018	4/10/2018	18-04027	Neptunium-237	EiChroM ACW08 Mod	0.00E+00	1.62E-01	1.62E-01	3.51E-01	U	pCi/g
18-04027-06	TRG	B105107CJWC006CV	12/18/17 19:00	4/5/2018	4/10/2018	18-04027	Neptunium-237	EiChroM ACW08 Mod	-1.64E-01	1.43E-01	1.44E-01	5.16E-01	U	pCi/g

CU=Counting Uncertainty;CSU=Combined Standard Uncertainty (1-sigma);MDA=Minimal Detected Activity;LCS=Laboratory Control Sample;MBL=Blank;DUP=Duplicate;TRG=Normal Sample;DO=Duplicate Original;U=Non-detect



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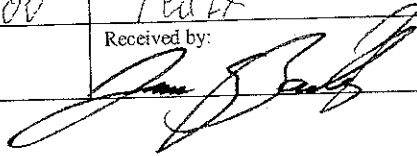
601 SCARBORO ROAD OAK RIDGE, TN 37830 865/481-0683 FAX 865/483-4621

REC'D FEB 15 2018

18-04027

~~18-02067~~ 360 4-5-18

Attachment 1 - EXAMPLE - Chain-of-Custody Form

Sample ID	Sample Log	Matrix	Sample Type	Sample Container				Sample Date	Sample Time	Analysis Type	Preservative	Remarks
				Vol	Unit	Type	Qty					
B105105CJFC005CV	N/A	CONCRETE	CONCRETE	57.94	Cm ³	puck	1	12/12/17	1840	FULL SUITE	NONE	0.0"-0.5" 98.00g
B105105CJFC006CV	N/A	CONCRETE	CONCRETE	57.94	Cm ³	puck	1	12/12/17	1915	FULL SUITE	NONE	0.0"-0.5" 100.32g
B105106CJFC003CV	N/A	CONCRETE	CONCRETE	57.94	Cm ³	puck	1	12/13/17	0100	FULL SUITE	NONE	0.0"-0.5" 109.09g
B105106CJFC004CV	N/A	CONCRETE	CONCRETE	57.94	Cm ³	puck	1	12/13/17	0025	FULL SUITE	NONE	0.0"-0.5" 96.29g
B105107CWFC008CV	N/A	CONCRETE	CONCRETE	57.94	Cm ³	puck	1	12/18/17	1825	FULL SUITE	NONE	0.0"-0.5" 115.16g
B105107CJWC006CV	N/A	CONCRETE	CONCRETE	57.94	Cm ³	puck	1	12/18/17	1900	FULL SUITE	NONE	0.0"-0.5" 101.21g
B105100CJFC003CV	N/A	CONCRETE	CONCRETE	57.94	Cm ³	puck	1	12/12/17	2307	FULL SUITE	NONE	1.5"-2.0" 68.46g
B105100CJFC005CV	N/A	CONCRETE	CONCRETE	57.94	Cm ³	puck	1	12/12/17	2307	FULL SUITE	NONE	0.0"-0.5" 99.88g
Laboratory: EBERLINE LABS				Date Submitted To Lab:				Ship Container No.: N/A		Cooler Temperature: N/A		Airbill Number: Fed Ex 8107 0645 6758
Relinquished by: J. ALEX BOHACHEFF				Date (mm/dd/yyyy): 02/13/2018		Time: 0900		Received by: Rick Ricker T		Date (mm/dd/yyyy): 02/13/2018		Time: 0900
Relinquished by: Richard F. Ricker?				Date (mm/dd/yyyy): 02/13/2018		Time: 16:00		Received by: Fed Ex		Date (mm/dd/yyyy): 02/13/2018		Time: 16:00
Relinquished by:				Date (mm/dd/yyyy):		Time:		Received by: 		Date (mm/dd/yyyy): 2-15-18		Time: 1445
Comments ANALYSIS: FULL SUITE 14 DAY TURN AROUND PO# 677116												



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EBS-OR-43436

March 7, 2018

Alex Bohacheff
Zion Solutions, LLC
101 Shiloh Blvd
Zion, IL 60099

CASE NARRATIVE
Work Order # 18-02067-OR

SAMPLE RECEIPT

This work order contains eight solid samples received 02/15/2018. Samples were analyzed for Isotopic Plutonium, Plutonium-241, Neptunium-237, Americium-241/243, Curium-243/244, Strontium-90, Technetium-99, Tritium, Carbon-14, Promethium-147, Nickel-59/63, Iron-55 and by Gamma Spectroscopy.

<u>CLIENT ID</u>	<u>LAB ID</u>	<u>CLIENT ID</u>	<u>LAB ID</u>
B105105CJFC005CV	18-02067-04	B105107CWFC008CV	18-02067-08
B105105CJFC006CV	18-02067-05	B105107CJWC006CV	18-02067-09
B105106CJFC003CV	18-02067-06	B105100CJFC003CV	18-02067-10
B105106CJFC004CV	18-02067-07	B105100CJFC005CV	18-02067-11

ANALYTICAL METHODS

Isotopic Plutonium and Plutonium-241 were analyzed using Method EML Pu-02 Modified. Neptunium-237 was analyzed using EICRoM Method ACW08 Modified. Americium and Curium were analyzed using Method EML Am-01 Modified. Strontium-90 was analyzed using EICRoM Method SRW01 Modified. Technetium-99 was analyzed using EICRoM Method TCS01 Modified. Tritium was performed using Method LANL ER-210 Modified. Carbon-14 was performed using EPA Method 520.0 Modified. Promethium-147 was performed using Method EML Pm-01 Modified. Nickel-59/63 was performed using Method ASTM 3500-Ni Modified. Iron-55 was performed using EML Method Fe-01-01 Modified. Gamma Spectroscopy was performed using EPA Method 901.1 Modified.

Laboratory qualifiers are as follows:

U - Result is less than the MDA.

ANALYTICAL RESULTS

Combined Standard Uncertainty is reported at 1-sigma value.

Minimum Detectable Activity (MDA) values for data represented in this report are sample-specific. MDA measurements are determined based on factors and conditions including instrument settings, aliquot size and matrix type.

ANALYTICAL RESULTS CONTINUED

SPECIAL CIRCUMSTANCES

Due to the positive nature of these samples, method detection limits are slightly high for some analytes.

ISOTOPIC PLUTONIUM

Samples were prepared by removing representative aliquots followed by acid digestions and dilutions as appropriate. Aliquots were taken from dilutions and Plutonium was selectively extracted by ion exchange. Plutonium was eluted, micro-precipitated and mounted on micro-porous filter media. Sample activities were then determined by alpha spectroscopy using energy specific regions of interest for Plutonium-238 and Plutonium-239. Chemical recovery was determined by the use of a Plutonium-242 tracer. Activity of the Plutonium-242 tracer was determined by alpha spectroscopy using an energy specific region of interest.

Samples demonstrated acceptable results for all Plutonium analyses. Chemical recovery was acceptable for all samples. The Plutonium-238 and Plutonium-239/240 method blank demonstrated acceptable results. Results for the Plutonium-238 duplicate demonstrated a high relative percent difference and normalized difference. Plutonium-238 duplicate variations are within reason due to the non-positive nature of this sample. Results for the Plutonium-239/240 duplicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Plutonium-238 and Plutonium-239 laboratory control sample demonstrated an acceptable percent recovery.

PLUTONIUM-241

Following sample analysis for Isotopic Plutonium, filter media used was dissolved. Dissolved samples were placed into scintillation vials, scintillation cocktail was added and Plutonium-241 was determined by liquid scintillation counting. Analytical tracer recovery was determined by yields from the Isotopic Plutonium tracer.

Samples demonstrated acceptable results for all Plutonium-241 analyses. Chemical recovery was acceptable for all samples. The Plutonium-241 method blank demonstrated an acceptable result. Results for the Plutonium-241 duplicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Plutonium-241 laboratory control sample demonstrated an acceptable percent recovery.

NEPTUNIUM-237

Samples were prepared by removing representative aliquots followed by mixed acid digestions and dilutions as appropriate. Aliquots were taken from dilutions and dried. Sample residues were dissolved in dilute acid and Neptunium was selectively separated using Eichrom stabilized selective resins. Neptunium was eluted, micro-precipitated and mounted on micro-porous filter media. Sample activities were then determined by alpha spectroscopy using an energy specific region of interest for Neptunium-237 activity. A Neptunium-239 tracer was used to determine chemical yields by beta proportional counting.

ANALYTICAL RESULTS CONTINUED

NEPTUNIUM-237 CONTINUED

Samples demonstrated acceptable results for all Neptunium-237 analyses. Chemical recovery was acceptable for all samples. The Neptunium-237 method blank demonstrated an acceptable result. Results for the Neptunium-237 duplicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Neptunium-237 laboratory control sample demonstrated an acceptable percent recovery.

AMERICIUM-241

Samples were prepared by removing representative aliquots followed by mixed acid digestions and dilutions as appropriate. Aliquots were taken from dilutions and were co-precipitated with Calcium Phosphate. Precipitates were nitrate converted using Nitric acid and Aluminum Nitrate. The Americium fractions were separated from other elements using the Eichrom, TRU and UTEVA resins. The separated Americium fractions were then mounted on a membrane filter by micro-precipitation and counted on the alpha spectroscopy system. Analytical tracer recovery was determined by the use of an Americium-243 standard and subsequent activity determination by alpha spectroscopy.

Samples demonstrated acceptable results for all Americium-241 analyses. Chemical recovery was acceptable for all samples. The Americium-241 method blank demonstrated an acceptable result. Results for the Americium-241 duplicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Americium-241 laboratory control sample demonstrated an acceptable percent recovery.

AMERICIUM-243

Samples were prepared by removing representative aliquots followed by mixed acid digestions and dilutions as appropriate. Aliquots were taken from dilutions and were co-precipitated with Calcium Phosphate. Precipitates were nitrate converted using Nitric acid and Aluminum Nitrate. The Americium fractions were separated from other elements using the Eichrom, TRU and UTEVA resins. The separated Americium fractions were then mounted on a membrane filter by micro-precipitation and counted on the alpha spectroscopy system. Analytical tracer recovery was determined by the use of a Curium-244 standard and subsequent activity determination by alpha spectroscopy.

Samples demonstrated acceptable results for all Americium-243 analyses. Chemical recovery was acceptable for all samples. The Americium-243 method blank demonstrated an acceptable result. Results for the Americium-243 duplicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Americium-243 laboratory control sample demonstrated an acceptable percent recovery.

CURIUM-243/244

Samples were prepared by removing representative aliquots followed by mixed acid digestions and dilutions as appropriate. Aliquots were taken from dilutions and were co-precipitated with Calcium Phosphate. Precipitates were nitrate converted using Nitric acid and Aluminum Nitrate. The Curium fractions were separated from other elements using the Eichrom, TRU and UTEVA resins. The separated Curium fractions were then mounted on a membrane filter by micro-precipitation and counted on the alpha spectroscopy system. Analytical tracer recovery was determined by the use of an Americium-243 standard and subsequent activity determination by alpha spectroscopy.

ANALYTICAL RESULTS CONTINUED

CURIUM-243/244 CONTINUED

Samples demonstrated acceptable results for all Curium-243/244 analyses. Chemical recovery was acceptable for all samples. The Curium-243/244 method blank demonstrated an acceptable result. Results for the Curium-243/244 duplicate demonstrated an acceptable relative percent difference and normalized difference. Results for the Curium-244 laboratory control sample demonstrated an acceptable percent recovery.

STRONTIUM-90

Samples were prepared by removing representative aliquots followed by mixed acid digestions and dilutions as appropriate. Aliquots were taken from dilutions and Strontium was selectively precipitated which began the ingrowth time for Yttrium-90. After sufficient ingrowth, an elemental Yttrium carrier was added and Yttrium-90 was selective precipitated. Yttrium-90 was mounted on filter media. Filters were weighed pre and post precipitation to determine chemical recovery. Sample activities were determined by gas flow proportional counting.

Samples demonstrated acceptable results for all Strontium-90 analyses. Chemical recovery was acceptable for all samples. The Strontium-90 method blank demonstrated an acceptable result. Results for the Strontium-90 duplicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Strontium-90 laboratory control sample demonstrated an acceptable percent recovery.

TECHNETIUM-99

Representative aliquots of samples were prepared by oxidative reactions with Nitric acid and Hydrogen Peroxide. After complete oxidization, Technetium was selectively extracted by the use of Eichrom stabilized resins. Special cleanup chemistry was conducted for complete removal of interferences associated with Uranium. Processed resins were then transferred to liquid scintillation vials, scintillation cocktail was added and samples were counted by beta liquid scintillation.

Samples demonstrated acceptable results for all Technetium-99 analyses. The Technetium-99 method blank demonstrated an acceptable result. Results for the Technetium-99 duplicate demonstrated an acceptable relative percent difference and normalized difference. Results for the Technetium-99 laboratory control sample demonstrated an acceptable percent recovery.

TRITIUM

A representative aliquot of each sample was equilibrated with tritium free water. Equilibrates were transferred into round-bottomed distillation flasks and attached to single stage stills. A portion of each middle distillation fraction was transferred to a liquid scintillation vial and cocktail was added. Samples were then counted by beta liquid scintillation.

Samples demonstrated acceptable results for all Tritium analyses. The Tritium method blank demonstrated an acceptable result. Results for the Tritium duplicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Tritium laboratory control sample demonstrated an acceptable percent recovery.

ANALYTICAL RESULTS CONTINUED

CARBON-14

A representative aliquot of each sample was placed into a 1-liter reaction vessel. A carbonate solution was added. Samples were oxidized using Potassium Permanganate. Carbon Dioxide was evolved and Carbon-14 was captured into Harvey brand, Carb-Sorb cocktail. Carbon-14 beta emissions were then determined by beta liquid scintillation using an energy selective region.

Samples demonstrated acceptable results for all Carbon-14 analyses. The Carbon-14 method blank demonstrated an acceptable result. Results for the Carbon-14 duplicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Carbon-14 laboratory control sample demonstrated an acceptable percent recovery.

PROMETHIUM-147

Samples were prepared by leaching a representative aliquot of each solid sample in HNO_3 . Leachates were taken to near dryness. Sample residues were dissolved in deionized water. The pH of each sample was adjusted with HNO_3 . Samples were extracted with scintillation Extractant. Organic phase of each sample was transferred to scintillation vials. Promethium-147 was determined by liquid scintillation counting.

Samples demonstrated acceptable results for all Promethium-147 analyses. The Promethium-147 method blank demonstrated an acceptable result. Results for the Promethium-147 duplicate demonstrated an acceptable relative percent difference and normalized difference. Results for the Promethium-147 laboratory control sample demonstrated an acceptable percent recovery.

NICKEL-63

Samples were prepared by removing representative aliquots followed by mixed acid digestions and dilutions as appropriate. Aliquots were taken from dilutions and were placed into appropriately sized beakers. Stable elemental Nickel carrier was added to each sample prior to digestion. Samples were digested in concentrated Nitric acid. After digestion, sample pH was adjusted and Nickel-63 was precipitated selectively with Dimethylglyoxime. Precipitates were selectively separated, redissolved, and residual acid was effectively neutralized. Sample residuals were placed into scintillation vials, scintillation cocktail was added and Nickel-63 activity was determined by beta liquid scintillation.

Samples demonstrated acceptable results for all Nickel-63 analyses. The Nickel-63 method blank demonstrated an acceptable result. Results for the Nickel-63 duplicate demonstrated a high relative percent difference and normalized difference. Nickel-63 duplicate variations were caused by the somewhat heterogeneous sample nature. Results for the Nickel-63 laboratory control sample demonstrated an acceptable percent recovery.

NICKEL-59

Following Nickel-63 determination by liquid scintillation, sample extractions were then counted by low energy photon spectroscopy for determination of Nickel-59 activity.

ANALYTICAL RESULTS CONTINUED

NICKEL-59 CONTINUED

Samples demonstrated acceptable results for all Nickel-59 analyses. The Nickel-59 method blank demonstrated an acceptable result. Results for the Nickel-59 duplicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Iron-55 laboratory control sample demonstrated an acceptable percent recovery.

IRON-55

Representative aliquots were removed from samples and placed into Petri geometry containers. Samples were then counted by low-energy photon spectroscopy.

Samples demonstrated acceptable results for all Iron-55 analyses. The Iron-55 method blank demonstrated an acceptable result. Results for the Iron-55 replicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Iron-55 laboratory control sample demonstrated an acceptable percent recovery.

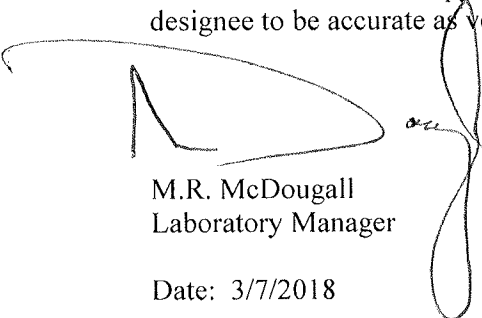
GAMMA SPECTROSCOPY

Samples for Gamma Spectroscopy analysis were prepared by transferring a known mass/aliquot of each homogenized sample to a standard geometry container. Samples were counted on a High Purity Germanium (HPGe) gamma ray detector.

Samples demonstrated acceptable results for all gamma-emitting radionuclides as reported. Some analyses demonstrated results that are greater than the method detection limit. These results are reported from the Canberra Gamma Apex "Nuclide MDA Report" and are not positive. These results are qualified as non-detect (U). The method blank demonstrated acceptable results for all radionuclides as reported. Results for the Cobalt-60, Cesium-137 and Potassium-40 replicate demonstrated an acceptable relative percent difference and normalized difference. Results for the Cobalt-60 and Cesium-137 laboratory control sample demonstrated an acceptable percent recovery.

CERTIFICATION OF ACCURACY

I certify that this data report is in compliance with the terms and conditions of the Purchase Order, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hard copy data package has been authorized by the cognizant project manager or his/her designee to be accurate as verified by the following signature.



M.R. McDougall
Laboratory Manager

Date: 3/7/2018

Eberline Analytical wants and encourages your feedback regarding our performance providing radioanalytical services. Please visit <http://eberlineanalytical.com/> to provide us with feedback on our services.

Eberline Analytical Final Report of Analysis			Report To:						Work Order Details:						
			J Alex Bohacheff						SDG:	18-02067					
			Zion Solutions, LLC						Purchase Order:	677116					
			101 Shiloh Blvd						Analysis Category:	ENVIRONMENTAL					
			Zion, IL 60099						Sample Matrix:	SO					
Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Qualifier	Report Units	
18-02067-01	LCS	KNOWN	02/15/18 00:00	2/15/2018	2/22/2018	18-02067	Americium-241	EML Am-01 Modified	5.65E+00	1.70E-01				pCi/g	
18-02067-01	LCS	SPIKE	02/15/18 00:00	2/15/2018	2/22/2018	18-02067	Americium-241	EML Am-01 Modified	5.29E+00	9.97E-01	1.08E+00	1.01E-01		pCi/g	
18-02067-02	MBL	BLANK	02/15/18 00:00	2/15/2018	2/23/2018	18-02067	Americium-241	EML Am-01 Modified	2.88E-02	9.11E-02	9.12E-02	1.93E-01	U	pCi/g	
18-02067-03	DUP	B105105CJFC005CV	12/12/17 18:40	2/15/2018	2/22/2018	18-02067	Americium-241	EML Am-01 Modified	1.48E-02	5.31E-02	5.31E-02	1.20E-01	U	pCi/g	
18-02067-04	DO	B105105CJFC005CV	12/12/17 18:40	2/15/2018	2/22/2018	18-02067	Americium-241	EML Am-01 Modified	-2.49E-02	4.21E-02	4.21E-02	1.48E-01	U	pCi/g	
18-02067-05	TRG	B105105CJFC006CV	12/12/17 19:15	2/15/2018	2/22/2018	18-02067	Americium-241	EML Am-01 Modified	2.07E-02	6.12E-02	6.13E-02	1.33E-01	U	pCi/g	
18-02067-06	TRG	B105106CJFC003CV	12/13/17 01:00	2/15/2018	2/22/2018	18-02067	Americium-241	EML Am-01 Modified	-3.53E-04	3.75E-02	3.75E-02	1.11E-01	U	pCi/g	
18-02067-07	TRG	B105106CJFC004CV	12/13/17 00:25	2/15/2018	2/22/2018	18-02067	Americium-241	EML Am-01 Modified	3.25E-02	5.75E-02	5.75E-02	1.04E-01	U	pCi/g	
18-02067-08	TRG	B105107CWFC008CV	12/18/17 18:25	2/15/2018	2/22/2018	18-02067	Americium-241	EML Am-01 Modified	5.94E-02	1.82E-01	1.82E-01	4.30E-01	U	pCi/g	
18-02067-09	TRG	B105107CJWC006CV	12/18/17 19:00	2/15/2018	2/22/2018	18-02067	Americium-241	EML Am-01 Modified	4.49E-02	1.87E-01	1.87E-01	4.81E-01	U	pCi/g	
18-02067-10	TRG	B105100CJFC003CV	12/12/17 23:07	2/15/2018	2/22/2018	18-02067	Americium-241	EML Am-01 Modified	6.37E-02	7.69E-02	7.70E-02	1.08E-01	U	pCi/g	
18-02067-11	TRG	B105100CJFC005CV	12/12/17 23:07	2/15/2018	2/22/2018	18-02067	Americium-241	EML Am-01 Modified	6.78E-02	7.39E-02	7.41E-02	8.86E-02	U	pCi/g	
18-02067-01	LCS	KNOWN	02/15/18 00:00	2/15/2018	2/23/2018	18-02067	Americium-243	EML Am-01 Modified	6.73E+00	2.02E-01				pCi/g	
18-02067-01	LCS	SPIKE	02/15/18 00:00	2/15/2018	2/23/2018	18-02067	Americium-243	EML Am-01 Modified	7.28E+00	1.14E+00	1.57E+00	1.62E-01		pCi/g	
18-02067-02	MBL	BLANK	02/15/18 00:00	2/15/2018	2/23/2018	18-02067	Americium-243	EML Am-01 Modified	1.40E-01	1.34E-01	1.35E-01	1.43E-01	U	pCi/g	
18-02067-03	DUP	B105105CJFC006CV	12/12/17 19:15	2/15/2018	2/23/2018	18-02067	Americium-243	EML Am-01 Modified	7.80E-02	9.93E-02	1.00E-01	1.48E-01	U	pCi/g	
18-02067-04	TRG	B105105CJFC005CV	12/12/17 18:40	2/15/2018	2/23/2018	18-02067	Americium-243	EML Am-01 Modified	7.16E-02	1.03E-01	1.03E-01	1.68E-01	U	pCi/g	
18-02067-05	DO	B105105CJFC006CV	12/12/17 19:15	2/15/2018	2/23/2018	18-02067	Americium-243	EML Am-01 Modified	4.18E-03	5.84E-02	5.84E-02	1.67E-01	U	pCi/g	
18-02067-06	TRG	B105106CJFC003CV	12/13/17 01:00	2/15/2018	2/23/2018	18-02067	Americium-243	EML Am-01 Modified	7.37E-02	7.99E-02	8.07E-02	9.62E-02	U	pCi/g	
18-02067-07	TRG	B105106CJFC004CV	12/13/17 00:25	2/15/2018	2/23/2018	18-02067	Americium-243	EML Am-01 Modified	1.67E-01	1.33E-01	1.35E-01	1.20E-01		pCi/g	
18-02067-08	TRG	B105107CWFC008CV	12/18/17 18:25	2/15/2018	2/23/2018	18-02067	Americium-243	EML Am-01 Modified	2.62E-01	4.01E-01	4.03E-01	5.97E-01	U	pCi/g	
18-02067-09	TRG	B105107CJWC006CV	12/18/17 19:00	2/15/2018	2/23/2018	18-02067	Americium-243	EML Am-01 Modified	3.85E-01	4.40E-01	4.43E-01	5.79E-01	U	pCi/g	
18-02067-10	TRG	B105100CJFC003CV	12/12/17 23:07	2/15/2018	2/23/2018	18-02067	Americium-243	EML Am-01 Modified	6.50E-02	7.82E-02	7.88E-02	1.10E-01	U	pCi/g	
18-02067-11	TRG	B105100CJFC005CV	12/12/17 23:07	2/15/2018	2/23/2018	18-02067	Americium-243	EML Am-01 Modified	1.59E-01	1.29E-01	1.31E-01	1.43E-01		pCi/g	

CU=Counting Uncertainty;CSU=Combined Standard Uncertainty (1-sigma);MDA=Minimal Detected Activity;LCS=Laboratory Control Sample;MBL=Blank;DUP=Duplicate;TRG=Normal Sample;DO=Duplicate Original;U=Non-detect



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601 SCARBORO ROAD OAK RIDGE, TN 37830 865/481-0683 FAX 865/483-4621

Eberline Analytical Final Report of Analysis			Report To:						Work Order Details:						
			J Alex Bohacheff						SDG:	18-02067					
			Zion Solutions, LLC						Purchase Order:	677116					
			101 Shiloh Blvd						Analysis Category:	ENVIRONMENTAL					
			Zion, IL 60099						Sample Matrix:	SO					
Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Qualifier	Report Units	
18-02067-01	LCS	KNOWN	02/15/18 00:00	2/15/2018	2/22/2018	18-02067	Curium-243/244	EML Am-01 Modified	6.30E+00	1.13E-01				pCi/g	
18-02067-01	LCS	SPIKE	02/15/18 00:00	2/15/2018	2/22/2018	18-02067	Curium-243/244	EML Am-01 Modified	5.67E+00	1.06E+00	1.26E+00	1.06E-01		pCi/g	
18-02067-02	MBL	BLANK	02/15/18 00:00	2/15/2018	2/23/2018	18-02067	Curium-243/244	EML Am-01 Modified	3.31E-02	9.07E-02	9.08E-02	1.87E-01	U	pCi/g	
18-02067-03	DUP	B105105CJFC005CV	12/12/17 18:40	2/15/2018	2/22/2018	18-02067	Curium-243/244	EML Am-01 Modified	-6.24E-03	3.70E-02	3.70E-02	8.78E-02	U	pCi/g	
18-02067-04	DO	B105105CJFC005CV	12/12/17 18:40	2/15/2018	2/22/2018	18-02067	Curium-243/244	EML Am-01 Modified	-6.54E-03	3.95E-02	3.95E-02	1.25E-01	U	pCi/g	
18-02067-05	TRG	B105105CJFC006CV	12/12/17 19:15	2/15/2018	2/22/2018	18-02067	Curium-243/244	EML Am-01 Modified	2.45E-02	6.13E-02	6.13E-02	1.28E-01	U	pCi/g	
18-02067-06	TRG	B105106CJFC003CV	12/13/17 01:00	2/15/2018	2/22/2018	18-02067	Curium-243/244	EML Am-01 Modified	-1.21E-02	3.69E-02	3.69E-02	1.00E-01	U	pCi/g	
18-02067-07	TRG	B105106CJFC004CV	12/13/17 00:25	2/15/2018	2/22/2018	18-02067	Curium-243/244	EML Am-01 Modified	-1.93E-02	3.10E-02	3.11E-02	9.74E-02	U	pCi/g	
18-02067-08	TRG	B105107CWFC008CV	12/18/17 18:25	2/15/2018	2/22/2018	18-02067	Curium-243/244	EML Am-01 Modified	9.06E-02	2.51E-01	2.52E-01	5.43E-01	U	pCi/g	
18-02067-09	TRG	B105107CJWC006CV	12/18/17 19:00	2/15/2018	2/22/2018	18-02067	Curium-243/244	EML Am-01 Modified	4.52E-02	1.88E-01	1.89E-01	4.84E-01	U	pCi/g	
18-02067-10	TRG	B105100CJFC003CV	12/12/17 23:07	2/15/2018	2/22/2018	18-02067	Curium-243/244	EML Am-01 Modified	7.68E-02	8.69E-02	8.74E-02	1.22E-01	U	pCi/g	
18-02067-11	TRG	B105100CJFC005CV	12/12/17 23:07	2/15/2018	2/22/2018	18-02067	Curium-243/244	EML Am-01 Modified	1.09E-01	9.14E-02	9.23E-02	7.78E-02		pCi/g	
18-02067-01	LCS	KNOWN	02/15/18 00:00	2/15/2018	2/19/2018	18-02067	Carbon-14	EPA 520.0 Modified	1.35E+03	3.78E+01				pCi/g	
18-02067-01	LCS	SPIKE	02/15/18 00:00	2/15/2018	2/19/2018	18-02067	Carbon-14	EPA 520.0 Modified	1.37E+03	1.43E+01	1.91E+02	5.75E+00		pCi/g	
18-02067-02	MBL	BLANK	02/15/18 00:00	2/15/2018	2/19/2018	18-02067	Carbon-14	EPA 520.0 Modified	2.20E-01	3.35E+00	3.35E+00	5.72E+00	U	pCi/g	
18-02067-03	DUP	B105105CJFC005CV	12/12/17 18:40	2/15/2018	2/19/2018	18-02067	Carbon-14	EPA 520.0 Modified	6.84E+00	3.11E+00	3.25E+00	5.08E+00		pCi/g	
18-02067-04	DO	B105105CJFC005CV	12/12/17 18:40	2/15/2018	2/19/2018	18-02067	Carbon-14	EPA 520.0 Modified	2.30E+00	2.95E+00	2.97E+00	4.97E+00	U	pCi/g	
18-02067-05	TRG	B105105CJFC006CV	12/12/17 19:15	2/15/2018	2/19/2018	18-02067	Carbon-14	EPA 520.0 Modified	1.57E-01	2.39E+00	2.39E+00	4.08E+00	U	pCi/g	
18-02067-06	TRG	B105106CJFC003CV	12/13/17 01:00	2/15/2018	2/19/2018	18-02067	Carbon-14	EPA 520.0 Modified	8.52E-01	3.25E+00	3.25E+00	5.53E+00	U	pCi/g	
18-02067-07	TRG	B105106CJFC004CV	12/13/17 00:25	2/15/2018	2/19/2018	18-02067	Carbon-14	EPA 520.0 Modified	1.60E+00	2.73E+00	2.74E+00	4.61E+00	U	pCi/g	
18-02067-08	TRG	B105107CWFC008CV	12/18/17 18:25	2/15/2018	2/19/2018	18-02067	Carbon-14	EPA 520.0 Modified	2.87E+01	1.18E+01	1.24E+01	1.91E+01		pCi/g	
18-02067-09	TRG	B105107CJWC006CV	12/18/17 19:00	2/15/2018	2/19/2018	18-02067	Carbon-14	EPA 520.0 Modified	1.11E+01	1.32E+01	1.33E+01	2.22E+01	U	pCi/g	
18-02067-10	TRG	B105100CJFC003CV	12/12/17 23:07	2/15/2018	2/19/2018	18-02067	Carbon-14	EPA 520.0 Modified	8.06E-01	3.08E+00	3.08E+00	5.23E+00	U	pCi/g	
18-02067-11	TRG	B105100CJFC005CV	12/12/17 23:07	2/15/2018	2/20/2018	18-02067	Carbon-14	EPA 520.0 Modified	2.04E+00	2.42E+00	2.44E+00	4.07E+00	U	pCi/g	

CU=Counting Uncertainty;CSU=Combined Standard Uncertainty (1-sigma);MDA=Minimal Detected Activity;LCS=Laboratory Control Sample;MBL=Blank;DUP=Duplicate;TRG=Normal Sample;DO=Duplicate Original;U=Non-detect



EBERLINE ANALYTICAL CORPORATION

601 SCARBORO ROAD OAK RIDGE, TN 37830 865/481-0683 FAX 865/483-4621

Eberline Analytical Final Report of Analysis			Report To:						Work Order Details:						
			J Alex Bohacheff						SDG: 18-02067						
			Zion Solutions, LLC						Purchase Order: 677116						
			101 Shiloh Blvd						Analysis Category: ENVIRONMENTAL						
			Zion, IL 60099						Sample Matrix: SO						
Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Qualifier	Report Units	
18-02067-01	LCS	KNOWN	02/15/18 00:00	2/15/2018	2/19/2018	18-02067	Iron-55	EML Fe-01-01 Modified	7.74E+03	3.25E+02				pCi/g	
18-02067-01	LCS	SPIKE	02/15/18 00:00	2/15/2018	2/19/2018	18-02067	Iron-55	EML Fe-01-01 Modified	6.72E+03	7.95E+02	1.41E+03	3.07E+02		pCi/g	
18-02067-02	MBL	BLANK	02/15/18 00:00	2/15/2018	2/19/2018	18-02067	Iron-55	EML Fe-01-01 Modified	-1.32E-01	2.37E+00	2.37E+00	3.75E+00	U	pCi/g	
18-02067-03	DUP	B105105CJFC005CV	12/12/17 18:40	2/15/2018	2/19/2018	18-02067	Iron-55	EML Fe-01-01 Modified	2.58E+00	6.95E+00	6.96E+00	1.10E+01	U	pCi/g	
18-02067-04	DO	B105105CJFC005CV	12/12/17 18:40	2/15/2018	2/19/2018	18-02067	Iron-55	EML Fe-01-01 Modified	-9.50E-02	6.66E+00	6.66E+00	1.04E+01	U	pCi/g	
18-02067-05	TRG	B105105CJFC006CV	12/12/17 19:15	2/15/2018	2/19/2018	18-02067	Iron-55	EML Fe-01-01 Modified	1.18E+01	1.78E+01	1.79E+01	2.72E+01	U	pCi/g	
18-02067-06	TRG	B105106CJFC003CV	12/13/17 01:00	2/15/2018	2/19/2018	18-02067	Iron-55	EML Fe-01-01 Modified	9.84E-01	3.44E+00	3.44E+00	7.14E+00	U	pCi/g	
18-02067-07	TRG	B105106CJFC004CV	12/13/17 00:25	2/15/2018	2/20/2018	18-02067	Iron-55	EML Fe-01-01 Modified	-1.79E+00	1.52E+01	1.52E+01	2.32E+01	U	pCi/g	
18-02067-08	TRG	B105107CWFC008CV	12/18/17 18:25	2/15/2018	2/20/2018	18-02067	Iron-55	EML Fe-01-01 Modified	-1.27E+01	1.92E+01	1.93E+01	2.87E+01	U	pCi/g	
18-02067-09	TRG	B105107CJWC006CV	12/18/17 19:00	2/15/2018	2/20/2018	18-02067	Iron-55	EML Fe-01-01 Modified	-8.22E+00	3.73E+01	3.73E+01	5.61E+01	U	pCi/g	
18-02067-10	TRG	B105100CJFC003CV	12/12/17 23:07	2/15/2018	2/20/2018	18-02067	Iron-55	EML Fe-01-01 Modified	-5.92E-01	2.32E+00	2.32E+00	3.55E+00	U	pCi/g	
18-02067-11	TRG	B105100CJFC005CV	12/12/17 23:07	2/15/2018	2/20/2018	18-02067	Iron-55	EML Fe-01-01 Modified	-3.74E-01	3.57E+00	3.57E+00	5.63E+00	U	pCi/g	
18-02067-01	LCS	KNOWN	02/15/18 00:00	2/15/2018	2/25/2018	18-02067	Tritium	LANL ER-210 Modified	2.25E+02	8.10E+00				pCi/g	
18-02067-01	LCS	SPIKE	02/15/18 00:00	2/15/2018	2/25/2018	18-02067	Tritium	LANL ER-210 Modified	2.01E+02	5.47E+00	1.25E+01	3.72E+00		pCi/g	
18-02067-02	MBL	BLANK	02/15/18 00:00	2/15/2018	2/25/2018	18-02067	Tritium	LANL ER-210 Modified	-1.91E-01	2.10E+00	2.10E+00	3.63E+00	U	pCi/g	
18-02067-03	DUP	B105105CJFC005CV	12/12/17 18:40	2/15/2018	2/25/2018	18-02067	Tritium	LANL ER-210 Modified	3.34E+00	1.85E+01	1.85E+01	3.17E+01	U	pCi/g	
18-02067-04	DO	B105105CJFC005CV	12/12/17 18:40	2/15/2018	2/25/2018	18-02067	Tritium	LANL ER-210 Modified	5.07E+00	1.88E+01	1.88E+01	3.21E+01	U	pCi/g	
18-02067-05	TRG	B105105CJFC006CV	12/12/17 19:15	2/15/2018	2/25/2018	18-02067	Tritium	LANL ER-210 Modified	2.23E+01	1.95E+01	1.96E+01	3.26E+01	U	pCi/g	
18-02067-06	TRG	B105106CJFC003CV	12/13/17 01:00	2/15/2018	2/25/2018	18-02067	Tritium	LANL ER-210 Modified	3.68E+01	1.50E+01	1.52E+01	2.41E+01		pCi/g	
18-02067-07	TRG	B105106CJFC004CV	12/13/17 00:25	2/15/2018	2/25/2018	18-02067	Tritium	LANL ER-210 Modified	2.35E+01	2.23E+01	2.23E+01	3.72E+01	U	pCi/g	
18-02067-08	TRG	B105107CWFC008CV	12/18/17 18:25	2/15/2018	2/25/2018	18-02067	Tritium	LANL ER-210 Modified	-7.73E+00	1.68E+01	1.68E+01	2.94E+01	U	pCi/g	
18-02067-09	TRG	B105107CJWC006CV	12/18/17 19:00	2/15/2018	2/25/2018	18-02067	Tritium	LANL ER-210 Modified	9.23E+00	2.06E+01	2.06E+01	3.51E+01	U	pCi/g	
18-02067-10	TRG	B105100CJFC003CV	12/12/17 23:07	2/15/2018	2/27/2018	18-02067	Tritium	LANL ER-210 Modified	4.70E+01	2.20E+01	2.22E+01	3.57E+01		pCi/g	
18-02067-11	TRG	B105100CJFC005CV	12/12/17 23:07	2/15/2018	2/25/2018	18-02067	Tritium	LANL ER-210 Modified	1.22E+01	1.38E+01	1.38E+01	2.32E+01	U	pCi/g	

CU=Counting Uncertainty;CSU=Combined Standard Uncertainty (1-sigma);MDA=Minimal Detected Activity;LCS=Laboratory Control Sample;MBL=Blank;DUP=Duplicate;TRG=Normal Sample;DO=Duplicate Original;U=Non-detect



EBERLINE ANALYTICAL CORPORATION

601 SCARBORO ROAD OAK RIDGE, TN 37830 865/481-0683 FAX 865/483-4621

Eberline Analytical Final Report of Analysis			Report To:						Work Order Details:						
			J Alex Bohacheff						SDG:	18-02067					
			Zion Solutions, LLC						Purchase Order:	677116					
			101 Shiloh Blvd						Analysis Category:	ENVIRONMENTAL					
			Zion, IL 60099						Sample Matrix:	SO					
Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Qualifier	Report Units	
18-02067-01	LCS	KNOWN	02/15/18 00:00	2/15/2018	2/19/2018	18-02067	Iron-55	ASTM 3500-Ni Modified	7.74E+03	3.25E+02				pCi/g	
18-02067-01	LCS	SPIKE	02/15/18 00:00	2/15/2018	2/19/2018	18-02067	Iron-55	ASTM 3500-Ni Modified	6.72E+03	7.95E+02	9.20E+02	3.07E+02		pCi/g	
18-02067-02	MBL	BLANK	02/15/18 00:00	2/15/2018	2/19/2018	18-02067	Nickel-59	ASTM 3500-Ni Modified	-1.43E+00	1.90E+00	1.91E+00	2.80E+00	U	pCi/g	
18-02067-03	DUP	B105105CJFC005CV	12/12/17 18:40	2/15/2018	2/19/2018	18-02067	Nickel-59	ASTM 3500-Ni Modified	-1.75E+00	5.07E+00	5.07E+00	7.71E+00	U	pCi/g	
18-02067-04	DO	B105105CJFC005CV	12/12/17 18:40	2/15/2018	2/19/2018	18-02067	Nickel-59	ASTM 3500-Ni Modified	-1.19E+00	5.04E+00	5.04E+00	7.73E+00	U	pCi/g	
18-02067-05	TRG	B105105CJFC006CV	12/12/17 19:15	2/15/2018	2/19/2018	18-02067	Nickel-59	ASTM 3500-Ni Modified	8.73E+00	1.38E+01	1.38E+01	2.11E+01	U	pCi/g	
18-02067-06	TRG	B105106CJFC003CV	12/13/17 01:00	2/15/2018	2/19/2018	18-02067	Nickel-59	ASTM 3500-Ni Modified	6.32E+00	6.51E+00	6.53E+00	1.08E+01	U	pCi/g	
18-02067-07	TRG	B105106CJFC004CV	12/13/17 00:25	2/15/2018	2/20/2018	18-02067	Nickel-59	ASTM 3500-Ni Modified	9.28E+00	1.18E+01	1.18E+01	1.83E+01	U	pCi/g	
18-02067-08	TRG	B105107CWFC008CV	12/18/17 18:25	2/15/2018	2/20/2018	18-02067	Nickel-59	ASTM 3500-Ni Modified	-8.80E+00	1.53E+01	1.53E+01	2.28E+01	U	pCi/g	
18-02067-09	TRG	B105107CJWC006CV	12/18/17 19:00	2/15/2018	2/20/2018	18-02067	Nickel-59	ASTM 3500-Ni Modified	1.51E+01	2.97E+01	2.97E+01	4.49E+01	U	pCi/g	
18-02067-10	TRG	B105100CJFC003CV	12/12/17 23:07	2/15/2018	2/20/2018	18-02067	Nickel-59	ASTM 3500-Ni Modified	8.60E-01	1.63E+00	1.63E+00	2.65E+00	U	pCi/g	
18-02067-11	TRG	B105100CJFC005CV	12/12/17 23:07	2/15/2018	2/20/2018	18-02067	Nickel-59	ASTM 3500-Ni Modified	1.76E+00	2.49E+00	2.49E+00	4.26E+00	U	pCi/g	
18-02067-01	LCS	KNOWN	02/15/18 00:00	2/15/2018	2/24/2018	18-02067	Nickel-63	ASTM 3500-Ni Modified	1.52E+03	4.57E+01				pCi/g	
18-02067-01	LCS	SPIKE	02/15/18 00:00	2/15/2018	2/24/2018	18-02067	Nickel-63	ASTM 3500-Ni Modified	1.55E+03	9.41E+00	9.18E+01	2.15E+00		pCi/g	
18-02067-02	MBL	BLANK	02/15/18 00:00	2/15/2018	2/24/2018	18-02067	Nickel-63	ASTM 3500-Ni Modified	-6.08E-01	1.23E+00	1.23E+00	2.14E+00	U	pCi/g	
18-02067-03	DUP	B105105CJFC005CV	12/12/17 18:40	2/15/2018	2/24/2018	18-02067	Nickel-63	ASTM 3500-Ni Modified	2.51E+01	5.15E+00	5.36E+00	7.91E+00		pCi/g	
18-02067-04	DO	B105105CJFC005CV	12/12/17 18:40	2/15/2018	2/25/2018	18-02067	Nickel-63	ASTM 3500-Ni Modified	3.99E+01	5.09E+00	5.61E+00	7.33E+00		pCi/g	
18-02067-05	TRG	B105105CJFC006CV	12/12/17 19:15	2/15/2018	2/24/2018	18-02067	Nickel-63	ASTM 3500-Ni Modified	8.15E+01	6.55E+00	8.11E+00	8.52E+00		pCi/g	
18-02067-06	TRG	B105106CJFC003CV	12/13/17 01:00	2/15/2018	2/24/2018	18-02067	Nickel-63	ASTM 3500-Ni Modified	6.88E+02	1.32E+01	4.25E+01	8.42E+00		pCi/g	
18-02067-07	TRG	B105106CJFC004CV	12/13/17 00:25	2/15/2018	2/24/2018	18-02067	Nickel-63	ASTM 3500-Ni Modified	7.58E+02	1.36E+01	4.66E+01	8.19E+00		pCi/g	
18-02067-08	TRG	B105107CWFC008CV	12/18/17 18:25	2/15/2018	2/25/2018	18-02067	Nickel-63	ASTM 3500-Ni Modified	3.14E+02	9.33E+00	2.07E+01	7.99E+00		pCi/g	
18-02067-09	TRG	B105107CJWC006CV	12/18/17 19:00	2/15/2018	2/24/2018	18-02067	Nickel-63	ASTM 3500-Ni Modified	2.76E+03	2.43E+01	1.64E+02	7.91E+00		pCi/g	
18-02067-10	TRG	B105100CJFC003CV	12/12/17 23:07	2/15/2018	2/25/2018	18-02067	Nickel-63	ASTM 3500-Ni Modified	1.80E+01	5.35E+00	5.45E+00	8.50E+00		pCi/g	
18-02067-11	TRG	B105100CJFC005CV	12/12/17 23:07	2/15/2018	2/25/2018	18-02067	Nickel-63	ASTM 3500-Ni Modified	1.38E+02	7.46E+00	1.10E+01	8.53E+00		pCi/g	

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			J Alex Bohacheff						SDG:	18-02067					
			Zion Solutions, LLC						Purchase Order:	677116					
			101 Shiloh Blvd						Analysis Category:	ENVIRONMENTAL					
			Zion, IL 60099						Sample Matrix:	SO					
Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Qualifier	Report Units	
18-02067-01	LCS	KNOWN	02/15/18 00:00	2/15/2018	2/20/2018	18-02067	Neptunium-237	EiChroM ACW08 Mod	9.52E+00	3.43E-01				pCi/g	
18-02067-01	LCS	SPIKE	02/15/18 00:00	2/15/2018	2/20/2018	18-02067	Neptunium-237	EiChroM ACW08 Mod	1.02E+01	8.21E-01	1.43E+00	9.31E-02		pCi/g	
18-02067-02	MBL	BLANK	02/15/18 00:00	2/15/2018	2/20/2018	18-02067	Neptunium-237	EiChroM ACW08 Mod	4.55E-03	2.94E-02	2.94E-02	8.02E-02	U	pCi/g	
18-02067-03	DUP	B105105CJFC005CV	12/12/17 18:40	2/15/2018	2/20/2018	18-02067	Neptunium-237	EiChroM ACW08 Mod	-1.06E-02	4.52E-02	4.52E-02	1.26E-01	U	pCi/g	
18-02067-04	DO	B105105CJFC005CV	12/12/17 18:40	2/15/2018	2/20/2018	18-02067	Neptunium-237	EiChroM ACW08 Mod	1.27E-01	8.48E-02	8.61E-02	6.00E-02		pCi/g	
18-02067-05	TRG	B105105CJFC006CV	12/12/17 19:15	2/15/2018	2/20/2018	18-02067	Neptunium-237	EiChroM ACW08 Mod	-3.08E-03	3.60E-02	3.60E-02	7.56E-02	U	pCi/g	
18-02067-06	TRG	B105106CJFC003CV	12/13/17 01:00	2/15/2018	2/20/2018	18-02067	Neptunium-237	EiChroM ACW08 Mod	2.51E-03	3.50E-02	3.50E-02	1.00E-01	U	pCi/g	
18-02067-07	TRG	B105106CJFC004CV	12/13/17 00:25	2/15/2018	2/20/2018	18-02067	Neptunium-237	EiChroM ACW08 Mod	-3.32E-02	3.25E-02	3.27E-02	1.14E-01	U	pCi/g	
18-02067-08	TRG	B105107CWFC008CV	12/18/17 18:25	2/15/2018	2/20/2018	18-02067	Neptunium-237	EiChroM ACW08 Mod	-1.17E-01	1.87E-01	1.88E-01	5.90E-01	U	pCi/g	
18-02067-09	TRG	B105107CJWC006CV	12/18/17 19:00	2/15/2018	2/20/2018	18-02067	Neptunium-237	EiChroM ACW08 Mod	4.47E-02	2.05E-01	2.05E-01	4.79E-01	U	pCi/g	
18-02067-10	TRG	B105100CJFC003CV	12/12/17 23:07	2/15/2018	2/20/2018	18-02067	Neptunium-237	EiChroM ACW08 Mod	4.13E-02	5.91E-02	5.93E-02	9.68E-02	U	pCi/g	
18-02067-11	TRG	B105100CJFC005CV	12/12/17 23:07	2/15/2018	2/20/2018	18-02067	Neptunium-237	EiChroM ACW08 Mod	2.11E-01	1.03E-01	1.06E-01	6.05E-02		pCi/g	
18-02067-01	LCS	KNOWN	02/15/18 00:00	2/15/2018	2/24/2018	18-02067	Promethium-147	EML Pm-01 Modified	4.53E+01	1.22E+00				pCi/g	
18-02067-01	LCS	SPIKE	02/15/18 00:00	2/15/2018	2/24/2018	18-02067	Promethium-147	EML Pm-01 Modified	4.56E+01	1.64E+00	7.03E+00	1.55E+00		pCi/g	
18-02067-02	MBL	BLANK	02/15/18 00:00	2/15/2018	2/24/2018	18-02067	Promethium-147	EML Pm-01 Modified	5.06E-01	9.05E-01	9.08E-01	1.53E+00	U	pCi/g	
18-02067-03	DUP	B105105CJFC005CV	12/12/17 18:40	2/15/2018	2/24/2018	18-02067	Promethium-147	EML Pm-01 Modified	8.70E-01	8.98E-01	9.08E-01	1.51E+00	U	pCi/g	
18-02067-04	DO	B105105CJFC005CV	12/12/17 18:40	2/15/2018	2/24/2018	18-02067	Promethium-147	EML Pm-01 Modified	8.20E-01	9.10E-01	9.18E-01	1.53E+00	U	pCi/g	
18-02067-05	TRG	B105105CJFC006CV	12/12/17 19:15	2/15/2018	2/24/2018	18-02067	Promethium-147	EML Pm-01 Modified	9.12E-01	8.80E-01	8.91E-01	1.47E+00	U	pCi/g	
18-02067-06	TRG	B105106CJFC003CV	12/13/17 01:00	2/15/2018	2/24/2018	18-02067	Promethium-147	EML Pm-01 Modified	1.03E+00	9.36E-01	9.49E-01	1.56E+00	U	pCi/g	
18-02067-07	TRG	B105106CJFC004CV	12/13/17 00:25	2/15/2018	2/24/2018	18-02067	Promethium-147	EML Pm-01 Modified	3.22E+00	9.28E-01	1.05E+00	1.47E+00		pCi/g	
18-02067-08	TRG	B105107CWFC008CV	12/18/17 18:25	2/15/2018	2/24/2018	18-02067	Promethium-147	EML Pm-01 Modified	2.93E+01	4.06E+00	5.98E+00	5.91E+00		pCi/g	
18-02067-09	TRG	B105107CJWC006CV	12/18/17 19:00	2/15/2018	2/24/2018	18-02067	Promethium-147	EML Pm-01 Modified	1.24E+00	3.52E+00	3.53E+00	5.98E+00	U	pCi/g	
18-02067-10	TRG	B105100CJFC003CV	12/12/17 23:07	2/15/2018	2/24/2018	18-02067	Promethium-147	EML Pm-01 Modified	5.47E-01	8.72E-01	8.76E-01	1.47E+00	U	pCi/g	
18-02067-11	TRG	B105100CJFC005CV	12/12/17 23:07	2/15/2018	2/24/2018	18-02067	Promethium-147	EML Pm-01 Modified	8.61E-01	9.55E-01	9.64E-01	1.60E+00	U	pCi/g	

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			J Alex Bohacheff						SDG:	18-02067					
			Zion Solutions, LLC						Purchase Order:	677116					
			101 Shiloh Blvd						Analysis Category:	ENVIRONMENTAL					
			Zion, IL 60099						Sample Matrix:	SO					
Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Qualifier	Report Units	
18-02067-01	LCS	KNOWN	02/15/18 00:00	2/15/2018	2/22/2018	18-02067	Plutonium-238	EML Pu-02 Modified	5.27E+00	1.11E-01				pCi/g	
18-02067-01	LCS	SPIKE	02/15/18 00:00	2/15/2018	2/22/2018	18-02067	Plutonium-238	EML Pu-02 Modified	4.20E+00	7.53E-01	8.54E-01	8.07E-02		pCi/g	
18-02067-02	MBL	BLANK	02/15/18 00:00	2/15/2018	2/22/2018	18-02067	Plutonium-238	EML Pu-02 Modified	-3.59E-02	4.23E-02	4.25E-02	1.55E-01	U	pCi/g	
18-02067-03	DUP	B105105CJFC005CV	12/12/17 18:40	2/15/2018	2/22/2018	18-02067	Plutonium-238	EML Pu-02 Modified	-1.01E-01	6.36E-02	6.43E-02	2.49E-01	U	pCi/g	
18-02067-04	DO	B105105CJFC005CV	12/12/17 18:40	2/15/2018	2/22/2018	18-02067	Plutonium-238	EML Pu-02 Modified	3.64E-02	5.58E-02	5.59E-02	8.30E-02	U	pCi/g	
18-02067-05	TRG	B105105CJFC006CV	12/12/17 19:15	2/15/2018	2/22/2018	18-02067	Plutonium-238	EML Pu-02 Modified	-6.34E-03	3.83E-02	3.83E-02	1.21E-01	U	pCi/g	
18-02067-06	TRG	B105106CJFC003CV	12/13/17 01:00	2/15/2018	2/22/2018	18-02067	Plutonium-238	EML Pu-02 Modified	7.45E-02	9.68E-02	9.71E-02	1.34E-01	U	pCi/g	
18-02067-07	TRG	B105106CJFC004CV	12/13/17 00:25	2/15/2018	2/22/2018	18-02067	Plutonium-238	EML Pu-02 Modified	1.21E-02	5.05E-02	5.05E-02	1.30E-01	U	pCi/g	
18-02067-08	TRG	B105107CWFC008CV	12/18/17 18:25	2/15/2018	2/22/2018	18-02067	Plutonium-238	EML Pu-02 Modified	-9.63E-02	1.74E-01	1.75E-01	5.33E-01	U	pCi/g	
18-02067-09	TRG	B105107CJWC006CV	12/18/17 19:00	2/15/2018	2/22/2018	18-02067	Plutonium-238	EML Pu-02 Modified	0.00E+00	2.34E-01	2.34E-01	5.07E-01	U	pCi/g	
18-02067-10	TRG	B105100CJFC003CV	12/12/17 23:07	2/15/2018	2/22/2018	18-02067	Plutonium-238	EML Pu-02 Modified	-2.08E-02	5.14E-02	5.14E-02	1.46E-01	U	pCi/g	
18-02067-11	TRG	B105100CJFC005CV	12/12/17 23:07	2/15/2018	2/22/2018	18-02067	Plutonium-238	EML Pu-02 Modified	-4.46E-04	4.71E-02	4.71E-02	1.40E-01	U	pCi/g	
18-02067-01	LCS	KNOWN	02/15/18 00:00	2/15/2018	2/22/2018	18-02067	Plutonium-239/240	EML Pu-02 Modified	7.11E+00	2.28E-01				pCi/g	
18-02067-01	LCS	SPIKE	02/15/18 00:00	2/15/2018	2/22/2018	18-02067	Plutonium-239/240	EML Pu-02 Modified	7.36E+00	1.18E+00	1.37E+00	7.05E-02		pCi/g	
18-02067-02	MBL	BLANK	02/15/18 00:00	2/15/2018	2/22/2018	18-02067	Plutonium-239/240	EML Pu-02 Modified	1.11E-02	5.10E-02	5.10E-02	1.19E-01	U	pCi/g	
18-02067-03	DUP	B105105CJFC005CV	12/12/17 18:40	2/15/2018	2/22/2018	18-02067	Plutonium-239/240	EML Pu-02 Modified	-5.00E-02	5.26E-02	5.28E-02	1.81E-01	U	pCi/g	
18-02067-04	DO	B105105CJFC005CV	12/12/17 18:40	2/15/2018	2/22/2018	18-02067	Plutonium-239/240	EML Pu-02 Modified	1.65E-02	3.96E-02	3.96E-02	8.29E-02	U	pCi/g	
18-02067-05	TRG	B105105CJFC006CV	12/12/17 19:15	2/15/2018	2/22/2018	18-02067	Plutonium-239/240	EML Pu-02 Modified	8.27E-03	5.18E-02	5.18E-02	1.25E-01	U	pCi/g	
18-02067-06	TRG	B105106CJFC003CV	12/13/17 01:00	2/15/2018	2/22/2018	18-02067	Plutonium-239/240	EML Pu-02 Modified	-2.38E-02	5.88E-02	5.88E-02	1.67E-01	U	pCi/g	
18-02067-07	TRG	B105106CJFC004CV	12/13/17 00:25	2/15/2018	2/22/2018	18-02067	Plutonium-239/240	EML Pu-02 Modified	1.21E-02	5.04E-02	5.04E-02	1.29E-01	U	pCi/g	
18-02067-08	TRG	B105107CWFC008CV	12/18/17 18:25	2/15/2018	2/22/2018	18-02067	Plutonium-239/240	EML Pu-02 Modified	3.23E-01	3.56E-01	3.58E-01	4.84E-01	U	pCi/g	
18-02067-09	TRG	B105107CJWC006CV	12/18/17 19:00	2/15/2018	2/22/2018	18-02067	Plutonium-239/240	EML Pu-02 Modified	-4.30E-02	1.73E-01	1.73E-01	4.43E-01	U	pCi/g	
18-02067-10	TRG	B105100CJFC003CV	12/12/17 23:07	2/15/2018	2/22/2018	18-02067	Plutonium-239/240	EML Pu-02 Modified	-1.25E-02	4.99E-02	5.00E-02	1.28E-01	U	pCi/g	
18-02067-11	TRG	B105100CJFC005CV	12/12/17 23:07	2/15/2018	2/22/2018	18-02067	Plutonium-239/240	EML Pu-02 Modified	-1.55E-02	4.93E-02	4.94E-02	1.63E-01	U	pCi/g	

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			Zion Solutions, LLC					Purchase Order:	677116					
			101 Shiloh Blvd					Analysis Category:	ENVIRONMENTAL					
			Zion, IL 60099					Sample Matrix:	SO					
Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Qualifier	Report Units
18-02067-01	LCS	KNOWN	02/15/18 00:00	2/15/2018	2/24/2018	18-02067	Plutonium-241	EML Pu-02 Modified	2.73E+02	1.25E+01				pCi/g
18-02067-01	LCS	SPIKE	02/15/18 00:00	2/15/2018	2/24/2018	18-02067	Plutonium-241	EML Pu-02 Modified	2.05E+02	7.26E+00	1.81E+01	7.05E+00		pCi/g
18-02067-02	MBL	BLANK	02/15/18 00:00	2/15/2018	2/24/2018	18-02067	Plutonium-241	EML Pu-02 Modified	-2.34E-01	3.52E+00	3.52E+00	6.04E+00	U	pCi/g
18-02067-03	DUP	B105105CJFC005CV	12/12/17 18:40	2/15/2018	2/24/2018	18-02067	Plutonium-241	EML Pu-02 Modified	3.22E-01	4.86E+00	4.86E+00	8.31E+00	U	pCi/g
18-02067-04	DO	B105105CJFC005CV	12/12/17 18:40	2/15/2018	2/24/2018	18-02067	Plutonium-241	EML Pu-02 Modified	-1.69E+00	5.06E+00	5.07E+00	8.73E+00	U	pCi/g
18-02067-05	TRG	B105105CJFC006CV	12/12/17 19:15	2/15/2018	2/24/2018	18-02067	Plutonium-241	EML Pu-02 Modified	2.41E+00	4.10E+00	4.10E+00	6.92E+00	U	pCi/g
18-02067-06	TRG	B105106CJFC003CV	12/13/17 01:00	2/15/2018	2/24/2018	18-02067	Plutonium-241	EML Pu-02 Modified	-4.93E+00	5.21E+00	5.22E+00	9.09E+00	U	pCi/g
18-02067-07	TRG	B105106CJFC004CV	12/13/17 00:25	2/15/2018	2/24/2018	18-02067	Plutonium-241	EML Pu-02 Modified	1.50E+00	5.70E+00	5.70E+00	9.70E+00	U	pCi/g
18-02067-08	TRG	B105107CWFC008CV	12/18/17 18:25	2/15/2018	2/24/2018	18-02067	Plutonium-241	EML Pu-02 Modified	-2.23E+01	1.94E+01	1.94E+01	3.39E+01	U	pCi/g
18-02067-09	TRG	B105107CJWC006CV	12/18/17 19:00	2/15/2018	2/24/2018	18-02067	Plutonium-241	EML Pu-02 Modified	1.49E+01	2.08E+01	2.08E+01	3.50E+01	U	pCi/g
18-02067-10	TRG	B105100CJFC003CV	12/12/17 23:07	2/15/2018	2/24/2018	18-02067	Plutonium-241	EML Pu-02 Modified	-1.22E+00	6.11E+00	6.11E+00	1.05E+01	U	pCi/g
18-02067-11	TRG	B105100CJFC005CV	12/12/17 23:07	2/15/2018	2/24/2018	18-02067	Plutonium-241	EML Pu-02 Modified	-2.06E+00	5.13E+00	5.14E+00	8.86E+00	U	pCi/g
18-02067-01	LCS	KNOWN	02/15/18 00:00	2/15/2018	2/26/2018	18-02067	Strontium-90	EiChroM SRW01 Modified	5.05E+01	2.83E-01				pCi/g
18-02067-01	LCS	SPIKE	02/15/18 00:00	2/15/2018	2/26/2018	18-02067	Strontium-90	EiChroM SRW01 Modified	4.13E+01	1.74E+00	5.88E+00	7.75E-01		pCi/g
18-02067-02	MBL	BLANK	02/15/18 00:00	2/15/2018	2/26/2018	18-02067	Strontium-90	EiChroM SRW01 Modified	1.04E-01	4.79E-01	4.80E-01	8.44E-01	U	pCi/g
18-02067-03	DUP	B105105CJFC005CV	12/12/17 18:40	2/15/2018	2/26/2018	18-02067	Strontium-90	EiChroM SRW01 Modified	4.43E-01	4.07E-01	4.11E-01	6.73E-01	U	pCi/g
18-02067-04	DO	B105105CJFC005CV	12/12/17 18:40	2/15/2018	2/26/2018	18-02067	Strontium-90	EiChroM SRW01 Modified	0.00E+00	4.23E-01	4.23E-01	7.58E-01	U	pCi/g
18-02067-05	TRG	B105105CJFC006CV	12/12/17 19:15	2/15/2018	2/26/2018	18-02067	Strontium-90	EiChroM SRW01 Modified	4.72E-01	4.40E-01	4.45E-01	7.30E-01	U	pCi/g
18-02067-06	TRG	B105106CJFC003CV	12/13/17 01:00	2/15/2018	2/26/2018	18-02067	Strontium-90	EiChroM SRW01 Modified	1.64E-01	3.52E-01	3.53E-01	6.13E-01	U	pCi/g
18-02067-07	TRG	B105106CJFC004CV	12/13/17 00:25	2/15/2018	2/26/2018	18-02067	Strontium-90	EiChroM SRW01 Modified	5.42E-01	4.28E-01	4.35E-01	6.98E-01	U	pCi/g
18-02067-08	TRG	B105107CWFC008CV	12/18/17 18:25	2/15/2018	2/26/2018	18-02067	Strontium-90	EiChroM SRW01 Modified	2.57E+00	1.71E+00	1.75E+00	2.74E+00	U	pCi/g
18-02067-09	TRG	B105107CJWC006CV	12/18/17 19:00	2/15/2018	2/26/2018	18-02067	Strontium-90	EiChroM SRW01 Modified	-1.34E-01	1.54E+00	1.54E+00	2.80E+00	U	pCi/g
18-02067-10	TRG	B105100CJFC003CV	12/12/17 23:07	2/15/2018	2/26/2018	18-02067	Strontium-90	EiChroM SRW01 Modified	4.05E-01	4.40E-01	4.44E-01	7.38E-01	U	pCi/g
18-02067-11	TRG	B105100CJFC005CV	12/12/17 23:07	2/15/2018	2/26/2018	18-02067	Strontium-90	EiChroM SRW01 Modified	8.69E-01	4.59E-01	4.74E-01	7.17E-01		pCi/g

CU=Counting Uncertainty;CSU=Combined Standard Uncertainty (1-sigma);MDA=Minimal Detected Activity;LCS=Laboratory Control Sample;MBL=Blank;DUP=Duplicate;TRG=Normal Sample;DO=Duplicate Original;U=Non-detect



EBERLINE ANALYTICAL CORPORATION

601 SCARBORO ROAD OAK RIDGE, TN 37830 865/481-0683 FAX 865/483-4621

Eberline Analytical Final Report of Analysis			Report To:						Work Order Details:						
			J Alex Bohacheff						SDG:	18-02067					
			Zion Solutions, LLC						Purchase Order:	677116					
			101 Shiloh Blvd						Analysis Category:	ENVIRONMENTAL					
			Zion, IL 60099						Sample Matrix:	SO					
Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Qualifier	Report Units	
18-02067-01	LCS	KNOWN	02/15/18 00:00	2/15/2018	2/22/2018	18-02067	Technetium-99	EIChroM TCS01 Modified	1.01E+03	2.22E+01				pCi/g	
18-02067-01	LCS	SPIKE	02/15/18 00:00	2/15/2018	2/22/2018	18-02067	Technetium-99	EIChroM TCS01 Modified	1.04E+03	5.89E+00	1.04E+02	1.39E+00		pCi/g	
18-02067-02	MBL	BLANK	02/15/18 00:00	2/15/2018	2/22/2018	18-02067	Technetium-99	EIChroM TCS01 Modified	-2.58E-01	8.13E-01	8.13E-01	1.40E+00	U	pCi/g	
18-02067-03	DUP	B105105CJFC005CV	12/12/17 18:40	2/15/2018	2/22/2018	18-02067	Technetium-99	EIChroM TCS01 Modified	9.95E-01	6.78E-01	6.85E-01	1.13E+00	U	pCi/g	
18-02067-04	DO	B105105CJFC005CV	12/12/17 18:40	2/15/2018	2/22/2018	18-02067	Technetium-99	EIChroM TCS01 Modified	9.74E-01	6.92E-01	6.99E-01	1.15E+00	U	pCi/g	
18-02067-05	TRG	B105105CJFC006CV	12/12/17 19:15	2/15/2018	2/22/2018	18-02067	Technetium-99	EIChroM TCS01 Modified	2.86E-01	5.10E-01	5.11E-01	8.62E-01	U	pCi/g	
18-02067-06	TRG	B105106CJFC003CV	12/13/17 01:00	2/15/2018	2/22/2018	18-02067	Technetium-99	EIChroM TCS01 Modified	8.47E-01	6.28E-01	6.34E-01	1.05E+00	U	pCi/g	
18-02067-07	TRG	B105106CJFC004CV	12/13/17 00:25	2/15/2018	2/22/2018	18-02067	Technetium-99	EIChroM TCS01 Modified	1.18E+00	7.17E-01	7.26E-01	1.19E+00	U	pCi/g	
18-02067-08	TRG	B105107CWFC008CV	12/18/17 18:25	2/15/2018	2/22/2018	18-02067	Technetium-99	EIChroM TCS01 Modified	4.02E+00	2.53E+00	2.57E+00	4.19E+00	U	pCi/g	
18-02067-09	TRG	B105107CJWC006CV	12/18/17 19:00	2/15/2018	2/22/2018	18-02067	Technetium-99	EIChroM TCS01 Modified	6.15E+00	2.24E+00	2.33E+00	3.63E+00		pCi/g	
18-02067-10	TRG	B105100CJFC003CV	12/12/17 23:07	2/15/2018	2/22/2018	18-02067	Technetium-99	EIChroM TCS01 Modified	9.09E-01	4.69E-01	4.78E-01	7.71E-01		pCi/g	
18-02067-11	TRG	B105100CJFC005CV	12/12/17 23:07	2/15/2018	2/22/2018	18-02067	Technetium-99	EIChroM TCS01 Modified	6.29E-01	4.47E-01	4.51E-01	7.42E-01	U	pCi/g	
18-02067-01	LCS	KNOWN	02/15/18 00:00	2/15/2018	2/16/2018	18-02067	Cobalt-60	EPA 901.1 Modified	2.71E+02	1.06E+01				pCi/g	
18-02067-01	LCS	KNOWN	02/15/18 00:00	2/15/2018	2/16/2018	18-02067	Cesium-137	EPA 901.1 Modified	1.69E+02	6.75E+00				pCi/g	
18-02067-01	LCS	SPIKE	02/15/18 00:00	2/15/2018	2/16/2018	18-02067	Cobalt-60	EPA 901.1 Modified	2.79E+02	1.72E+01	2.24E+01	2.02E+00		pCi/g	
18-02067-01	LCS	SPIKE	02/15/18 00:00	2/15/2018	2/16/2018	18-02067	Cesium-137	EPA 901.1 Modified	1.87E+02	3.09E+01	3.24E+01	2.65E+00		pCi/g	
18-02067-02	MBL	BLANK	02/15/18 00:00	2/15/2018	2/16/2018	18-02067	Silver-108m	EPA 901.1 Modified	7.67E-03	4.10E-02	4.10E-02	4.97E-02	U	pCi/g	
18-02067-02	MBL	BLANK	02/15/18 00:00	2/15/2018	2/16/2018	18-02067	Cobalt-60	EPA 901.1 Modified	1.50E-02	3.50E-02	3.50E-02	6.74E-02	U	pCi/g	
18-02067-02	MBL	BLANK	02/15/18 00:00	2/15/2018	2/16/2018	18-02067	Cesium-134	EPA 901.1 Modified	2.14E-02	3.43E-02	3.44E-02	6.08E-02	U	pCi/g	
18-02067-02	MBL	BLANK	02/15/18 00:00	2/15/2018	2/16/2018	18-02067	Cesium-137	EPA 901.1 Modified	2.84E-02	4.48E-02	4.48E-02	7.63E-02	U	pCi/g	
18-02067-02	MBL	BLANK	02/15/18 00:00	2/15/2018	2/16/2018	18-02067	Europium-152	EPA 901.1 Modified	2.04E-02	1.08E-01	1.08E-01	1.07E-01	U	pCi/g	
18-02067-02	MBL	BLANK	02/15/18 00:00	2/15/2018	2/16/2018	18-02067	Europium-154	EPA 901.1 Modified	5.01E-02	6.73E-02	6.73E-02	5.37E-02	U	pCi/g	
18-02067-02	MBL	BLANK	02/15/18 00:00	2/15/2018	2/16/2018	18-02067	Europium-155	EPA 901.1 Modified	-3.33E-02	5.05E-02	5.05E-02	6.82E-02	U	pCi/g	
18-02067-02	MBL	BLANK	02/15/18 00:00	2/15/2018	2/16/2018	18-02067	Potassium-40	EPA 901.1 Modified	-1.21E-02	4.77E-01	4.77E-01	7.69E-01	U	pCi/g	
18-02067-02	MBL	BLANK	02/15/18 00:00	2/15/2018	2/16/2018	18-02067	Molybdenum-93	EPA 901.1 Modified	3.73E-03	3.74E-02	3.74E-02	5.11E-02	U	pCi/g	
18-02067-02	MBL	BLANK	02/15/18 00:00	2/15/2018	2/16/2018	18-02067	Niobium-94	EPA 901.1 Modified	3.24E-02	3.58E-02	3.58E-02	6.85E-02	U	pCi/g	
18-02067-02	MBL	BLANK	02/15/18 00:00	2/15/2018	2/16/2018	18-02067	Antimony-125	EPA 901.1 Modified	1.74E-02	8.52E-02	8.52E-02	1.37E-01	U	pCi/g	

CU=Counting Uncertainty;CSU=Combined Standard Uncertainty (1-sigma);MDA=Minimal Detected Activity;LCS=Laboratory Control Sample;MBL=Blank;DUP=Duplicate;TRG=Normal Sample;DO=Duplicate Original;U=Non-detect



EBERLINE ANALYTICAL CORPORATION

601 SCARBORO ROAD OAK RIDGE, TN 37830 865/481-0683 FAX 865/483-4621

Eberline Analytical Final Report of Analysis			Report To:						Work Order Details:						
			J Alex Bohacheff Zion Solutions, LLC 101 Shiloh Blvd Zion, IL 60099						SDG:		18-02067				
									Purchase Order:		677116				
									Analysis Category:		ENVIRONMENTAL				
									Sample Matrix:		SO				
Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Qualifier	Report Units	
18-02067-03	DUP	B105105CJFC005CV	12/12/17 18:40	2/15/2018	2/16/2018	18-02067	Silver-108m	EPA 901.1 Modified	-6.83E-02	2.27E-01	2.27E-01	3.35E-01	U	pCi/g	
18-02067-03	DUP	B105105CJFC005CV	12/12/17 18:40	2/15/2018	2/16/2018	18-02067	Cobalt-60	EPA 901.1 Modified	2.30E+00	3.19E-01	3.41E-01	3.87E-01		pCi/g	
18-02067-03	DUP	B105105CJFC005CV	12/12/17 18:40	2/15/2018	2/16/2018	18-02067	Cesium-134	EPA 901.1 Modified	-2.45E-01	8.17E-01	8.17E-01	3.80E-01	U	pCi/g	
18-02067-03	DUP	B105105CJFC005CV	12/12/17 18:40	2/15/2018	2/16/2018	18-02067	Cesium-137	EPA 901.1 Modified	1.16E+03	1.81E+02	1.91E+02	3.33E+00		pCi/g	
18-02067-03	DUP	B105105CJFC005CV	12/12/17 18:40	2/15/2018	2/16/2018	18-02067	Europium-152	EPA 901.1 Modified	-7.64E-01	5.48E+00	5.48E+00	1.79E+00	U	pCi/g	
18-02067-03	DUP	B105105CJFC005CV	12/12/17 18:40	2/15/2018	2/16/2018	18-02067	Europium-154	EPA 901.1 Modified	-1.27E-01	4.40E-01	4.40E-01	5.76E-01	U	pCi/g	
18-02067-03	DUP	B105105CJFC005CV	12/12/17 18:40	2/15/2018	2/16/2018	18-02067	Europium-155	EPA 901.1 Modified	7.87E-01	1.34E+00	1.34E+00	2.14E+00	U	pCi/g	
18-02067-03	DUP	B105105CJFC005CV	12/12/17 18:40	2/15/2018	2/16/2018	18-02067	Potassium-40	EPA 901.1 Modified	6.10E+00	2.25E+00	2.28E+00	2.59E+00		pCi/g	
18-02067-03	DUP	B105105CJFC005CV	12/12/17 18:40	2/15/2018	2/16/2018	18-02067	Molybdenum-93	EPA 901.1 Modified	3.30E-02	2.23E-01	2.23E-01	2.28E-01	U	pCi/g	
18-02067-03	DUP	B105105CJFC005CV	12/12/17 18:40	2/15/2018	2/16/2018	18-02067	Niobium-94	EPA 901.1 Modified	-7.89E-02	2.38E-01	2.38E-01	3.46E-01	U	pCi/g	
18-02067-03	DUP	B105105CJFC005CV	12/12/17 18:40	2/15/2018	2/16/2018	18-02067	Antimony-125	EPA 901.1 Modified	-4.28E+00	5.09E+00	5.09E+00	6.23E+00	U	pCi/g	
18-02067-04	DO	B105105CJFC005CV	12/12/17 18:40	2/15/2018	2/16/2018	18-02067	Silver-108m	EPA 901.1 Modified	-9.28E-02	2.16E-01	2.16E-01	3.08E-01	U	pCi/g	
18-02067-04	DO	B105105CJFC005CV	12/12/17 18:40	2/15/2018	2/16/2018	18-02067	Cobalt-60	EPA 901.1 Modified	2.45E+00	3.11E-01	3.36E-01	2.77E-01		pCi/g	
18-02067-04	DO	B105105CJFC005CV	12/12/17 18:40	2/15/2018	2/16/2018	18-02067	Cesium-134	EPA 901.1 Modified	-5.11E-01	7.13E-01	7.14E-01	3.72E-01	U	pCi/g	
18-02067-04	DO	B105105CJFC005CV	12/12/17 18:40	2/15/2018	2/16/2018	18-02067	Cesium-137	EPA 901.1 Modified	1.15E+03	1.81E+02	1.90E+02	3.58E+00		pCi/g	
18-02067-04	DO	B105105CJFC005CV	12/12/17 18:40	2/15/2018	2/16/2018	18-02067	Europium-152	EPA 901.1 Modified	3.20E+00	5.46E+00	5.46E+00	1.60E+00	U	pCi/g	
18-02067-04	DO	B105105CJFC005CV	12/12/17 18:40	2/15/2018	2/16/2018	18-02067	Europium-154	EPA 901.1 Modified	-1.92E-01	4.42E-01	4.42E-01	6.32E-01	U	pCi/g	
18-02067-04	DO	B105105CJFC005CV	12/12/17 18:40	2/15/2018	2/16/2018	18-02067	Europium-155	EPA 901.1 Modified	-1.66E-01	1.33E+00	1.33E+00	2.10E+00	U	pCi/g	
18-02067-04	DO	B105105CJFC005CV	12/12/17 18:40	2/15/2018	2/16/2018	18-02067	Potassium-40	EPA 901.1 Modified	6.75E+00	2.13E+00	2.16E+00	1.57E+00		pCi/g	
18-02067-04	DO	B105105CJFC005CV	12/12/17 18:40	2/15/2018	2/16/2018	18-02067	Molybdenum-93	EPA 901.1 Modified	-3.92E-02	2.28E-01	2.28E-01	2.16E-01	U	pCi/g	
18-02067-04	DO	B105105CJFC005CV	12/12/17 18:40	2/15/2018	2/16/2018	18-02067	Niobium-94	EPA 901.1 Modified	-2.65E-02	1.98E-01	1.98E-01	2.75E-01	U	pCi/g	
18-02067-04	DO	B105105CJFC005CV	12/12/17 18:40	2/15/2018	2/16/2018	18-02067	Antimony-125	EPA 901.1 Modified	-1.00E+00	5.07E+00	5.07E+00	6.24E+00	U	pCi/g	
18-02067-05	TRG	B105105CJFC006CV	12/12/17 19:15	2/15/2018	2/16/2018	18-02067	Silver-108m	EPA 901.1 Modified	-1.73E-02	8.14E-02	8.14E-02	3.04E-01	U	pCi/g	
18-02067-05	TRG	B105105CJFC006CV	12/12/17 19:15	2/15/2018	2/16/2018	18-02067	Cobalt-60	EPA 901.1 Modified	1.20E+00	2.50E-01	2.58E-01	3.36E-01		pCi/g	
18-02067-05	TRG	B105105CJFC006CV	12/12/17 19:15	2/15/2018	2/16/2018	18-02067	Cesium-134	EPA 901.1 Modified	2.62E-02	1.68E-01	1.68E-01	3.74E-01	U	pCi/g	
18-02067-05	TRG	B105105CJFC006CV	12/12/17 19:15	2/15/2018	2/16/2018	18-02067	Cesium-137	EPA 901.1 Modified	4.52E+01	7.15E+00	7.51E+00	5.49E-01		pCi/g	
18-02067-05	TRG	B105105CJFC006CV	12/12/17 19:15	2/15/2018	2/16/2018	18-02067	Europium-152	EPA 901.1 Modified	-8.61E-01	1.54E+00	1.54E+00	6.93E-01	U	pCi/g	
18-02067-05	TRG	B105105CJFC006CV	12/12/17 19:15	2/15/2018	2/16/2018	18-02067	Europium-154	EPA 901.1 Modified	8.13E-02	3.69E-01	3.69E-01	3.72E-01	U	pCi/g	
18-02067-05	TRG	B105105CJFC006CV	12/12/17 19:15	2/15/2018	2/16/2018	18-02067	Europium-155	EPA 901.1 Modified	2.65E-01	3.20E-01	3.21E-01	5.23E-01	U	pCi/g	
18-02067-05	TRG	B105105CJFC006CV	12/12/17 19:15	2/15/2018	2/16/2018	18-02067	Potassium-40	EPA 901.1 Modified	6.63E+00	2.95E+00	2.97E+00	4.03E+00		pCi/g	
18-02067-05	TRG	B105105CJFC006CV	12/12/17 19:15	2/15/2018	2/16/2018	18-02067	Molybdenum-93	EPA 901.1 Modified	4.20E-02	1.56E-01	1.56E-01	2.24E-01	U	pCi/g	
18-02067-05	TRG	B105105CJFC006CV	12/12/17 19:15	2/15/2018	2/16/2018	18-02067	Niobium-94	EPA 901.1 Modified	-1.24E-01	2.16E-01	2.17E-01	2.66E-01	U	pCi/g	
18-02067-05	TRG	B105105CJFC006CV	12/12/17 19:15	2/15/2018	2/16/2018	18-02067	Antimony-125	EPA 901.1 Modified	-1.44E-01	1.14E+00	1.14E+00	1.48E+00	U	pCi/g	

CU=Counting Uncertainty;CSU=Combined Standard Uncertainty (1-sigma);MDA=Minimal Detected Activity;LCS=Laboratory Control Sample;MBL=Blank;DUP=Duplicate;TRG=Normal Sample;DO=Duplicate Original;U=Non-detect



EBERLINE ANALYTICAL CORPORATION

601 SCARBORO ROAD OAK RIDGE, TN 37830 865/481-0683 FAX 865/483-4621

Eberline Analytical Final Report of Analysis			Report To:						Work Order Details:						
			J Alex Bohacheff						SDG:	18-02067					
			Zion Solutions, LLC						Purchase Order:	677116					
			101 Shiloh Blvd						Analysis Category:	ENVIRONMENTAL					
			Zion, IL 60099						Sample Matrix:	SO					
Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Qualifier	Report Units	
18-02067-06	TRG	B105106CJFC003CV	12/13/17 01:00	2/15/2018	2/16/2018	18-02067	Silver-108m	EPA 901.1 Modified	-5.39E-02	3.09E-01	3.09E-01	4.66E-01	U	pCi/g	
18-02067-06	TRG	B105106CJFC003CV	12/13/17 01:00	2/15/2018	2/16/2018	18-02067	Cobalt-60	EPA 901.1 Modified	3.43E-01	3.47E-01	3.47E-01	6.24E-01	U	pCi/g	
18-02067-06	TRG	B105106CJFC003CV	12/13/17 01:00	2/15/2018	2/16/2018	18-02067	Cesium-134	EPA 901.1 Modified	5.23E-02	2.23E-01	2.23E-01	4.31E-01	U	pCi/g	
18-02067-06	TRG	B105106CJFC003CV	12/13/17 01:00	2/15/2018	2/16/2018	18-02067	Cesium-137	EPA 901.1 Modified	2.05E+01	3.83E+00	3.97E+00	6.93E-01		pCi/g	
18-02067-06	TRG	B105106CJFC003CV	12/13/17 01:00	2/15/2018	2/16/2018	18-02067	Europium-152	EPA 901.1 Modified	1.55E+00	1.32E+00	1.32E+00	8.80E-01	U	pCi/g	
18-02067-06	TRG	B105106CJFC003CV	12/13/17 01:00	2/15/2018	2/16/2018	18-02067	Europium-154	EPA 901.1 Modified	5.42E-02	6.37E-01	6.37E-01	4.68E-01	U	pCi/g	
18-02067-06	TRG	B105106CJFC003CV	12/13/17 01:00	2/15/2018	2/16/2018	18-02067	Europium-155	EPA 901.1 Modified	-5.77E-04	4.37E-01	4.37E-01	7.09E-01	U	pCi/g	
18-02067-06	TRG	B105106CJFC003CV	12/13/17 01:00	2/15/2018	2/16/2018	18-02067	Potassium-40	EPA 901.1 Modified	1.31E+01	4.30E+00	4.35E+00	3.50E+00		pCi/g	
18-02067-06	TRG	B105106CJFC003CV	12/13/17 01:00	2/15/2018	2/16/2018	18-02067	Molybdenum-93	EPA 901.1 Modified	-1.46E-01	3.02E-01	3.02E-01	3.78E-01	U	pCi/g	
18-02067-06	TRG	B105106CJFC003CV	12/13/17 01:00	2/15/2018	2/16/2018	18-02067	Niobium-94	EPA 901.1 Modified	1.87E-02	1.97E-01	1.97E-01	3.40E-01	U	pCi/g	
18-02067-06	TRG	B105106CJFC003CV	12/13/17 01:00	2/15/2018	2/16/2018	18-02067	Antimony-125	EPA 901.1 Modified	-1.79E-02	1.23E+00	1.23E+00	1.86E+00	U	pCi/g	
18-02067-07	TRG	B105106CJFC004CV	12/13/17 00:25	2/15/2018	2/16/2018	18-02067	Silver-108m	EPA 901.1 Modified	-1.95E-01	4.34E-01	4.34E-01	6.14E-01	U	pCi/g	
18-02067-07	TRG	B105106CJFC004CV	12/13/17 00:25	2/15/2018	2/16/2018	18-02067	Cobalt-60	EPA 901.1 Modified	2.67E+01	1.91E+00	2.35E+00	6.81E-01		pCi/g	
18-02067-07	TRG	B105106CJFC004CV	12/13/17 00:25	2/15/2018	2/16/2018	18-02067	Cesium-134	EPA 901.1 Modified	-1.14E+00	8.37E-01	8.39E-01	8.08E-01	U	pCi/g	
18-02067-07	TRG	B105106CJFC004CV	12/13/17 00:25	2/15/2018	2/16/2018	18-02067	Cesium-137	EPA 901.1 Modified	1.00E+03	1.56E+02	1.64E+02	1.77E+00		pCi/g	
18-02067-07	TRG	B105106CJFC004CV	12/13/17 00:25	2/15/2018	2/16/2018	18-02067	Europium-152	EPA 901.1 Modified	2.71E-01	5.06E+00	5.06E+00	2.22E+00	U	pCi/g	
18-02067-07	TRG	B105106CJFC004CV	12/13/17 00:25	2/15/2018	2/16/2018	18-02067	Europium-154	EPA 901.1 Modified	4.35E-01	6.28E-01	6.28E-01	1.13E+00	U	pCi/g	
18-02067-07	TRG	B105106CJFC004CV	12/13/17 00:25	2/15/2018	2/16/2018	18-02067	Europium-155	EPA 901.1 Modified	2.41E-01	1.04E+00	1.04E+00	1.55E+00	U	pCi/g	
18-02067-07	TRG	B105106CJFC004CV	12/13/17 00:25	2/15/2018	2/16/2018	18-02067	Potassium-40	EPA 901.1 Modified	8.60E+00	3.33E+00	3.36E+00	4.41E+00		pCi/g	
18-02067-07	TRG	B105106CJFC004CV	12/13/17 00:25	2/15/2018	2/16/2018	18-02067	Molybdenum-93	EPA 901.1 Modified	9.53E-02	2.31E-01	2.31E-01	3.36E-01	U	pCi/g	
18-02067-07	TRG	B105106CJFC004CV	12/13/17 00:25	2/15/2018	2/16/2018	18-02067	Niobium-94	EPA 901.1 Modified	1.71E-01	4.35E-01	4.35E-01	5.29E-01	U	pCi/g	
18-02067-07	TRG	B105106CJFC004CV	12/13/17 00:25	2/15/2018	2/16/2018	18-02067	Antimony-125	EPA 901.1 Modified	-5.25E+00	4.96E+00	4.97E+00	6.02E+00	U	pCi/g	
18-02067-08	TRG	B105107CWFC008CV	12/18/17 18:25	2/15/2018	2/16/2018	18-02067	Silver-108m	EPA 901.1 Modified	-1.85E-01	7.57E-01	7.57E-01	1.11E+00	U	pCi/g	
18-02067-08	TRG	B105107CWFC008CV	12/18/17 18:25	2/15/2018	2/16/2018	18-02067	Cobalt-60	EPA 901.1 Modified	3.37E+00	5.54E-01	5.80E-01	7.27E-01		pCi/g	
18-02067-08	TRG	B105107CWFC008CV	12/18/17 18:25	2/15/2018	2/16/2018	18-02067	Cesium-134	EPA 901.1 Modified	2.72E+00	4.04E+00	4.04E+00	8.36E-01	U	pCi/g	
18-02067-08	TRG	B105107CWFC008CV	12/18/17 18:25	2/15/2018	2/16/2018	18-02067	Cesium-137	EPA 901.1 Modified	1.56E+04	1.55E+03	1.75E+03	1.99E+01		pCi/g	
18-02067-08	TRG	B105107CWFC008CV	12/18/17 18:25	2/15/2018	2/16/2018	18-02067	Europium-152	EPA 901.1 Modified	5.87E+00	2.59E+01	2.59E+01	4.27E+00	U	pCi/g	
18-02067-08	TRG	B105107CWFC008CV	12/18/17 18:25	2/15/2018	2/16/2018	18-02067	Europium-154	EPA 901.1 Modified	8.03E-01	8.40E-01	8.41E-01	1.74E+00	U	pCi/g	
18-02067-08	TRG	B105107CWFC008CV	12/18/17 18:25	2/15/2018	2/16/2018	18-02067	Europium-155	EPA 901.1 Modified	2.23E+00	4.31E+00	4.32E+00	6.78E+00	U	pCi/g	
18-02067-08	TRG	B105107CWFC008CV	12/18/17 18:25	2/15/2018	2/16/2018	18-02067	Potassium-40	EPA 901.1 Modified	5.21E+00	3.90E+00	3.91E+00	5.81E+00	U	pCi/g	
18-02067-08	TRG	B105107CWFC008CV	12/18/17 18:25	2/15/2018	2/16/2018	18-02067	Molybdenum-93	EPA 901.1 Modified	5.55E-01	9.78E-01	9.79E-01	5.50E-01	U	pCi/g	
18-02067-08	TRG	B105107CWFC008CV	12/18/17 18:25	2/15/2018	2/16/2018	18-02067	Niobium-94	EPA 901.1 Modified	-6.22E-02	4.61E-01	4.62E-01	6.88E-01	U	pCi/g	
18-02067-08	TRG	B105107CWFC008CV	12/18/17 18:25	2/15/2018	2/16/2018	18-02067	Antimony-125	EPA 901.1 Modified	-5.38E+00	2.49E+01	2.49E+01	3.13E+01	U	pCi/g	

CU=Counting Uncertainty;CSU=Combined Standard Uncertainty (1-sigma);MDA=Minimal Detected Activity;LCS=Laboratory Control Sample;MBL=Blank;DUP=Duplicate;TRG=Normal Sample;DO=Duplicate Original;U=Non-detect



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SERVICES

EBERLINE ANALYTICAL CORPORATION

601 SCARBORO ROAD OAK RIDGE, TN 37830 865/481-0683 FAX 865/483-4621

Eberline Analytical Final Report of Analysis			Report To:						Work Order Details:						
			J Alex Bohacheff						SDG:	18-02067					
			Zion Solutions, LLC						Purchase Order:	677116					
			101 Shiloh Blvd						Analysis Category:	ENVIRONMENTAL					
			Zion, IL 60099						Sample Matrix:	SO					
Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Qualifier	Report Units	
18-02067-09	TRG	B105107CJWC006CV	12/18/17 19:00	2/15/2018	2/16/2018	18-02067	Silver-108m	EPA 901.1 Modified	1.65E+00	3.51E+00	3.51E+00	5.13E+00	U	pCi/g	
18-02067-09	TRG	B105107CJWC006CV	12/18/17 19:00	2/15/2018	2/16/2018	18-02067	Cobalt-60	EPA 901.1 Modified	5.53E+01	4.44E+00	5.27E+00	2.98E+00		pCi/g	
18-02067-09	TRG	B105107CJWC006CV	12/18/17 19:00	2/15/2018	2/16/2018	18-02067	Cesium-134	EPA 901.1 Modified	3.72E+00	6.79E+00	6.79E+00	4.94E+00	U	pCi/g	
18-02067-09	TRG	B105107CJWC006CV	12/18/17 19:00	2/15/2018	2/16/2018	18-02067	Cesium-137	EPA 901.1 Modified	3.32E+04	3.23E+03	3.65E+03	3.59E+01		pCi/g	
18-02067-09	TRG	B105107CJWC006CV	12/18/17 19:00	2/15/2018	2/16/2018	18-02067	Europium-152	EPA 901.1 Modified	-1.42E+01	4.75E+01	4.75E+01	9.63E+00	U	pCi/g	
18-02067-09	TRG	B105107CJWC006CV	12/18/17 19:00	2/15/2018	2/16/2018	18-02067	Europium-154	EPA 901.1 Modified	8.60E-01	5.21E+00	5.21E+00	7.90E+00	U	pCi/g	
18-02067-09	TRG	B105107CJWC006CV	12/18/17 19:00	2/15/2018	2/16/2018	18-02067	Europium-155	EPA 901.1 Modified	-3.93E+00	9.50E+00	9.50E+00	1.49E+01	U	pCi/g	
18-02067-09	TRG	B105107CJWC006CV	12/18/17 19:00	2/15/2018	2/16/2018	18-02067	Potassium-40	EPA 901.1 Modified	4.33E+00	9.26E+00	9.26E+00	1.56E+01	U	pCi/g	
18-02067-09	TRG	B105107CJWC006CV	12/18/17 19:00	2/15/2018	2/16/2018	18-02067	Molybdenum-93	EPA 901.1 Modified	9.61E-01	4.33E+00	4.33E+00	1.23E+00	U	pCi/g	
18-02067-09	TRG	B105107CJWC006CV	12/18/17 19:00	2/15/2018	2/16/2018	18-02067	Niobium-94	EPA 901.1 Modified	2.32E+00	2.65E+00	2.65E+00	3.99E+00	U	pCi/g	
18-02067-09	TRG	B105107CJWC006CV	12/18/17 19:00	2/15/2018	2/16/2018	18-02067	Antimony-125	EPA 901.1 Modified	1.25E+01	4.37E+01	4.37E+01	5.27E+01	U	pCi/g	
18-02067-10	TRG	B105100CJFC003CV	12/12/17 23:07	2/15/2018	2/16/2018	18-02067	Silver-108m	EPA 901.1 Modified	-5.35E-02	2.12E-01	2.12E-01	3.14E-01	U	pCi/g	
18-02067-10	TRG	B105100CJFC003CV	12/12/17 23:07	2/15/2018	2/16/2018	18-02067	Cobalt-60	EPA 901.1 Modified	1.57E+00	2.77E-01	2.88E-01	1.79E-01		pCi/g	
18-02067-10	TRG	B105100CJFC003CV	12/12/17 23:07	2/15/2018	2/16/2018	18-02067	Cesium-134	EPA 901.1 Modified	-6.34E-01	4.56E-01	4.57E-01	3.97E-01	U	pCi/g	
18-02067-10	TRG	B105100CJFC003CV	12/12/17 23:07	2/15/2018	2/16/2018	18-02067	Cesium-137	EPA 901.1 Modified	2.78E+02	4.33E+01	4.56E+01	8.54E-01		pCi/g	
18-02067-10	TRG	B105100CJFC003CV	12/12/17 23:07	2/15/2018	2/16/2018	18-02067	Europium-152	EPA 901.1 Modified	-1.62E-01	2.79E+00	2.79E+00	1.37E+00	U	pCi/g	
18-02067-10	TRG	B105100CJFC003CV	12/12/17 23:07	2/15/2018	2/16/2018	18-02067	Europium-154	EPA 901.1 Modified	5.32E-02	3.16E-01	3.16E-01	6.39E-01	U	pCi/g	
18-02067-10	TRG	B105100CJFC003CV	12/12/17 23:07	2/15/2018	2/16/2018	18-02067	Europium-155	EPA 901.1 Modified	-3.52E-01	5.98E-01	5.99E-01	8.70E-01	U	pCi/g	
18-02067-10	TRG	B105100CJFC003CV	12/12/17 23:07	2/15/2018	2/16/2018	18-02067	Potassium-40	EPA 901.1 Modified	8.45E+00	2.67E+00	2.71E+00	2.61E+00		pCi/g	
18-02067-10	TRG	B105100CJFC003CV	12/12/17 23:07	2/15/2018	2/16/2018	18-02067	Molybdenum-93	EPA 901.1 Modified	1.85E-01	1.40E-01	1.40E-01	2.35E-01	U	pCi/g	
18-02067-10	TRG	B105100CJFC003CV	12/12/17 23:07	2/15/2018	2/16/2018	18-02067	Niobium-94	EPA 901.1 Modified	1.25E-01	1.67E-01	1.67E-01	2.69E-01	U	pCi/g	
18-02067-10	TRG	B105100CJFC003CV	12/12/17 23:07	2/15/2018	2/16/2018	18-02067	Antimony-125	EPA 901.1 Modified	-1.27E+00	2.64E+00	2.65E+00	3.29E+00	U	pCi/g	
18-02067-11	TRG	B105100CJFC005CV	12/12/17 23:07	2/15/2018	2/16/2018	18-02067	Silver-108m	EPA 901.1 Modified	-2.03E-01	2.83E-01	2.83E-01	3.65E-01	U	pCi/g	
18-02067-11	TRG	B105100CJFC005CV	12/12/17 23:07	2/15/2018	2/16/2018	18-02067	Cobalt-60	EPA 901.1 Modified	4.63E+00	5.22E-01	5.73E-01	5.71E-01		pCi/g	
18-02067-11	TRG	B105100CJFC005CV	12/12/17 23:07	2/15/2018	2/16/2018	18-02067	Cesium-134	EPA 901.1 Modified	2.84E-02	9.77E-02	9.77E-02	3.66E-01	U	pCi/g	
18-02067-11	TRG	B105100CJFC005CV	12/12/17 23:07	2/15/2018	2/16/2018	18-02067	Cesium-137	EPA 901.1 Modified	1.22E+01	2.27E+00	2.36E+00	6.53E-01		pCi/g	
18-02067-11	TRG	B105100CJFC005CV	12/12/17 23:07	2/15/2018	2/16/2018	18-02067	Europium-152	EPA 901.1 Modified	-5.43E-01	9.71E-01	9.71E-01	5.73E-01	U	pCi/g	
18-02067-11	TRG	B105100CJFC005CV	12/12/17 23:07	2/15/2018	2/16/2018	18-02067	Europium-154	EPA 901.1 Modified	3.43E-01	4.24E-01	4.24E-01	2.99E-01	U	pCi/g	
18-02067-11	TRG	B105100CJFC005CV	12/12/17 23:07	2/15/2018	2/16/2018	18-02067	Europium-155	EPA 901.1 Modified	5.81E-02	2.08E-01	2.08E-01	4.94E-01	U	pCi/g	
18-02067-11	TRG	B105100CJFC005CV	12/12/17 23:07	2/15/2018	2/16/2018	18-02067	Potassium-40	EPA 901.1 Modified	5.44E+00	3.65E+00	3.66E+00	5.64E+00	U	pCi/g	
18-02067-11	TRG	B105100CJFC005CV	12/12/17 23:07	2/15/2018	2/16/2018	18-02067	Molybdenum-93	EPA 901.1 Modified	3.74E-02	1.99E-01	1.99E-01	2.28E-01	U	pCi/g	
18-02067-11	TRG	B105100CJFC005CV	12/12/17 23:07	2/15/2018	2/16/2018	18-02067	Niobium-94	EPA 901.1 Modified	-1.02E-01	2.49E-01	2.49E-01	3.62E-01	U	pCi/g	
18-02067-11	TRG	B105100CJFC005CV	12/12/17 23:07	2/15/2018	2/16/2018	18-02067	Antimony-125	EPA 901.1 Modified	4.76E-02	7.79E-01	7.79E-01	1.18E+00	U	pCi/g	

CU=Counting Uncertainty;CSU=Combined Standard Uncertainty (1-sigma);MDA=Minimal Detected Activity;LCS=Laboratory Control Sample;MBL=Blank;DUP=Duplicate;TRG=Normal Sample;DO=Duplicate Original;U=Non-detect



EBERLINE ANALYTICAL CORPORATION

601 SCARBORO ROAD OAK RIDGE, TN 37830 865/481-0683 FAX 865/483-4621

REC'D FEB 15 2018

ZS-WM-131
Revision 0
Information Use

1-8-02067

Attachment 1 – EXAMPLE – Chain-of-Custody Form

Sample ID	Sample Log	Matrix	Sample Type	Sample Container				Sample Date	Sample Time	Analysis Type	Preservative	Remarks
				Vol	Unit	Type	Qty					
4 B105105CJFC005CV	N/A	CONCRETE	CONCRETE	57.94	Cm ³	puck	1	12/12/17	1840	FULL SUITE	NONE	0.0"-0.5" 98.00g
5 B105105CJFC006CV	N/A	CONCRETE	CONCRETE	57.94	Cm ³	puck	1	12/12/17	1915	FULL SUITE	NONE	0.0"-0.5" 100.32g
6 B105106CJFC003CV	N/A	CONCRETE	CONCRETE	57.94	Cm ³	puck	1	12/13/17	0100	FULL SUITE	NONE	0.0"-0.5" 109.09g
7 B105106CJFC004CV	N/A	CONCRETE	CONCRETE	57.94	Cm ³	puck	1	12/13/17	0025	FULL SUITE	NONE	0.0"-0.5" 96.29g
8 B105107CWFC008CV	N/A	CONCRETE	CONCRETE	57.94	Cm ³	puck	1	12/18/17	1825	FULL SUITE	NONE	0.0"-0.5" 115.16g
9 B105107CJWC006CV	N/A	CONCRETE	CONCRETE	57.94	Cm ³	puck	1	12/18/17	1900	FULL SUITE	NONE	0.0"-0.5" 101.21g
10 B105100CJFC003CV	N/A	CONCRETE	CONCRETE	57.94	Cm ³	puck	1	12/12/17	2307	FULL SUITE	NONE	1.5"-2.0" 68.46g
11 B105100CJFC005CV	N/A	CONCRETE	CONCRETE	57.94	Cm ³	puck	1	12/12/17	2307	FULL SUITE	NONE	0.0"-0.5" 99.88g
Laboratory: EBERLINE LABS				Date Submitted To Lab:				Ship Container No.: N/A		Cooler Temperature: N/A		Airbill Number: <i>Fed Ex</i> 8107 0645 6758
Relinquished by: J. ALEX BOHACHEFF				Date (mm/dd/yyyy): 02/13/2018		Time: 0900		Received by: <i>Rick Ricker</i>		Date (mm/dd/yyyy): 02/13/2018		Time: 0900
Relinquished by: <i>Richard E. Ricker</i>				Date (mm/dd/yyyy): 02/13/2018		Time: 16:00		Received by: <i>Fed Ex</i>		Date (mm/dd/yyyy): 02/13/2018		Time: 16:00
Relinquished by:				Date (mm/dd/yyyy):		Time:		Received by: <i>[Signature]</i>		Date (mm/dd/yyyy): 2-15-18		Time: 1445
Comments ANALYSIS: FULL SUITE 14 DAY TURN AROUND PO# 677116												



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EBS-OR-43669

May 4, 2018

Patricia Giza
Zion Solutions, LLC
101 Shiloh Blvd
Zion, IL 60099

CASE NARRATIVE
Work Order # 18-04086-OR

SAMPLE RECEIPT

This work order contains eight solid samples received 04/18/2018. Samples were analyzed for Isotopic Plutonium, Plutonium-241, Neptunium-237, Americium-241/243, Curium-243/244, Total Strontium, Technetium-99, Tritium, Carbon-14, Promethium-147, Nickel-59/63, Iron-55 and by Gamma Spectroscopy.

<u>CLIENT ID</u>	<u>LAB ID</u>	<u>CLIENT ID</u>	<u>LAB ID</u>
B103202ACJFC004CV	18-04086-04	B103202ACJFC008CV	18-04086-08
B103202ACJFC005CV	18-04086-05	B103202ACJFC009CV	18-04086-09
B103202ACJWC006CV	18-04086-06	B103202ACJFC010CV	18-04086-10
B103202ACJFC007CV	18-04086-07	B103202ACJFC011CV	18-04086-11

ANALYTICAL METHODS

Isotopic Plutonium and Plutonium-241 were analyzed using Method EML Pu-02 Modified. Neptunium-237 was analyzed using EIChrOM Method ACW08 Modified. Americium and Curium were analyzed using Method EML Am-01 Modified. Total Strontium was analyzed using EIChrOM Method SRW01 Modified. Technetium-99 was analyzed using EIChrOM Method TCS01 Modified. Tritium was performed using Method LANL ER-210 Modified. Carbon-14 was performed using EPA Method 520.0 Modified. Promethium-147 was performed using Method EML Pm-01 Modified. Nickel-59/63 was performed using Method ASTM 3500-Ni Modified. Iron-55 was performed using EML Method Fe-01-01 Modified. Gamma Spectroscopy was performed using EPA Method 901.1 Modified.

Laboratory qualifiers are as follows:

U - Result is less than the MDA.

ANALYTICAL RESULTS

Combined Standard Uncertainty is reported at 1-sigma value.

ANALYTICAL RESULTS CONTINUED

Minimum Detectable Activity (MDA) values for data represented in this report are sample-specific. MDA measurements are determined based on factors and conditions including instrument settings, aliquot size and matrix type.

ISOTOPIC PLUTONIUM

Samples were prepared by removing representative aliquots followed by mixed acid digestions as appropriate. Plutonium was selectively extracted by ion exchange. Plutonium was eluted, micro-precipitated and mounted on micro-porous filter media. Sample activities were then determined by alpha spectroscopy using energy specific regions of interest for Plutonium-238 and Plutonium-239. Chemical recovery was determined by the use of a Plutonium-242 tracer. Activity of the Plutonium-242 tracer was determined by alpha spectroscopy using an energy specific region of interest.

Samples demonstrated acceptable results for all Plutonium analyses. Chemical recovery was acceptable for all samples. The Plutonium-238 and Plutonium-239/240 method blank demonstrated acceptable results. Results for the Plutonium-238 and Plutonium-239/240 duplicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Plutonium-238 and Plutonium-239 laboratory control sample demonstrated an acceptable percent recovery.

PLUTONIUM-241

Following sample analysis for Isotopic Plutonium, filter media used was dissolved. Dissolved samples were placed into scintillation vials, scintillation cocktail was added and Plutonium-241 was determined by liquid scintillation counting. Analytical tracer recovery was determined by yields from the Isotopic Plutonium tracer.

Samples demonstrated acceptable results for all Plutonium-241 analyses. Chemical recovery was acceptable for all samples. The Plutonium-241 method blank demonstrated an acceptable result. Results for the Plutonium-241 duplicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Plutonium-241 laboratory control sample demonstrated an acceptable percent recovery.

NEPTUNIUM-237

Samples were prepared by removing representative aliquots followed by mixed acid digestions and dilutions as appropriate. Aliquots from these dilutions were taken to dryness. Sample residues were dissolved in dilute acid and Neptunium was selectively separated using Eichrom stabilized selective resins. Neptunium was eluted, micro-precipitated and mounted on micro-porous filter media. Sample activities were then determined by alpha spectroscopy using an energy specific region of interest for Neptunium-237 activity. A Neptunium-239 tracer was used to determine chemical yields by beta proportional counting.

Samples demonstrated acceptable results for all Neptunium-237 analyses. Chemical recovery was acceptable for all samples. The Neptunium-237 method blank demonstrated an acceptable result. Results for the Neptunium-237 duplicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Neptunium-237 laboratory control sample demonstrated an acceptable percent recovery.

ANALYTICAL RESULTS CONTINUED

AMERICIUM-241

Samples were prepared by removing representative aliquots followed by mixed acid digestions and dilutions as appropriate. Aliquots from these dilutions were taken and were co-precipitated with Calcium Phosphate. Precipitates were nitrate converted using Nitric acid and Aluminum Nitrate. The Americium fractions were separated from other elements using the Eichrom, TRU and UTEVA resins. The separated Americium fractions were then mounted on a membrane filter by micro-precipitation and counted on the alpha spectroscopy system. Analytical tracer recovery was determined by the use of an Americium-243 standard and subsequent activity determination by alpha spectroscopy.

Samples demonstrated acceptable results for all Americium-241 analyses. Chemical recovery was acceptable for all samples. The Americium-241 method blank demonstrated an acceptable result. Results for the Americium-241 duplicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Americium-241 laboratory control sample demonstrated an acceptable percent recovery.

AMERICIUM-243

Samples were prepared by removing representative aliquots followed by mixed acid digestions and dilutions as appropriate. Aliquots from these dilutions were taken and were co-precipitated with Calcium Phosphate. Precipitates were nitrate converted using Nitric acid and Aluminum Nitrate. The Americium fractions were separated from other elements using the Eichrom, TRU and UTEVA resins. The separated Americium fractions were then mounted on a membrane filter by micro-precipitation and counted on the alpha spectroscopy system. Analytical tracer recovery was determined by the use of a Curium-244 standard and subsequent activity determination by alpha spectroscopy.

Samples demonstrated acceptable results for all Americium-243 analyses. Chemical recovery was acceptable for all samples. The Americium-243 method blank demonstrated an acceptable result. Results for the Americium-243 duplicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Americium-243 laboratory control sample demonstrated an acceptable percent recovery.

CURIUM-243/244

Samples were prepared by removing representative aliquots followed by mixed acid digestions and dilutions as appropriate. Aliquots from these dilutions were taken and were co-precipitated with Calcium Phosphate. Precipitates were nitrate converted using Nitric acid and Aluminum Nitrate. The Curium fractions were separated from other elements using the Eichrom, TRU and UTEVA resins. The separated Curium fractions were then mounted on a membrane filter by micro-precipitation and counted on the alpha spectroscopy system. Analytical tracer recovery was determined by the use of an Americium-243 standard and subsequent activity determination by alpha spectroscopy.

Samples demonstrated acceptable results for all Curium-243/244 analyses. Chemical recovery was acceptable for all samples. The Curium-243/244 method blank demonstrated an acceptable result. Results for the Curium-243/244 duplicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Curium-244 laboratory control sample demonstrated an acceptable percent recovery.

ANALYTICAL RESULTS CONTINUED

TOTAL STRONTIUM

Samples were prepared by removing representative aliquots followed by mixed acid digestions and dilutions as appropriate. Aliquots from these dilutions were taken and Strontium recovery carriers were added to the samples. Chemical separations were conducted using selective extractions. Strontium precipitate was mounted on tared filter media. Chemical recovery was determined by Strontium carrier mass determinations. Samples were counted by gas flow proportional counting and corrected for Yttrium-90 ingrowth.

Samples demonstrated acceptable results for all Total Strontium analyses. Strontium-90 results are reported from Total Strontium assuming secular equilibrium. Chemical recovery was acceptable for all samples. The Total Strontium method blank demonstrated an acceptable result. Results for the Total Strontium duplicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Total Strontium laboratory control sample demonstrated an acceptable percent recovery.

TECHNETIUM-99

Samples were prepared by removing representative aliquots followed by mixed acid digestions and dilutions as appropriate. Aliquots from these dilutions were taken and were prepared by oxidative reactions with Nitric acid and Hydrogen Peroxide. After complete oxidization, Technetium was selectively extracted by the use of EIChroM stabilized resins. Special cleanup chemistry was conducted for complete removal of interferences associated with Uranium. Processed resins were then transferred to liquid scintillation vials, scintillation cocktail was added and samples were counted by beta liquid scintillation.

Samples demonstrated acceptable results for all Technetium-99 analyses. The Technetium-99 method blank demonstrated an acceptable result. Results for the Technetium-99 duplicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Technetium-99 laboratory control sample demonstrated an acceptable percent recovery.

TRITIUM

A representative aliquot of each sample was equilibrated with tritium free water. Equilibrates were transferred into a round-bottomed distillation flask and attached to a single stage still. A portion of each middle distillation fraction was transferred to a liquid scintillation vial and cocktail was added. Samples were then counted by beta liquid scintillation.

Samples demonstrated acceptable results for all Tritium analyses. The Tritium method blank demonstrated an acceptable result. Results for the Tritium duplicate demonstrated an acceptable relative percent difference and normalized difference. Results for the Tritium laboratory control sample demonstrated an acceptable percent recovery.

ANALYTICAL RESULTS CONTINUED

CARBON-14

A representative aliquot of each sample was placed into a 1-liter reaction vessel. A carbonate solution was added. Samples were oxidized using Potassium Permanganate. Carbon Dioxide was evolved and Carbon-14 was captured into Harvey brand, Carb-Sorb cocktail. Carbon-14 beta emissions were then determined by beta liquid scintillation using an energy selective region.

Samples demonstrated acceptable results for all Carbon-14 analyses. The Carbon-14 method blank demonstrated an acceptable result. Results for the Carbon-14 duplicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Carbon-14 laboratory control sample demonstrated an acceptable percent recovery.

PROMETHIUM-147

Samples were prepared by removing representative aliquots followed by mixed acid digestions and dilutions as appropriate. Aliquots from these dilutions were taken to near dryness. Sample residues were dissolved in deionized water. The pH of each sample was adjusted with HNO₃. Samples were extracted with scintillation Extractant. Organic phase of each sample was transferred to scintillation vials. Promethium-147 was determined by liquid scintillation counting.

Samples demonstrated acceptable results for all Promethium-147 analyses. The Promethium-147 method blank demonstrated an acceptable result. Results for the Promethium-147 duplicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Promethium-147 laboratory control sample demonstrated an acceptable percent recovery.

NICKEL-63

Samples were prepared by removing representative aliquots followed by mixed acid digestions and dilutions as appropriate. Aliquots from these dilutions were taken and were placed into an appropriately sized beaker. Stable elemental Nickel carrier was added to each sample prior to digestion. Samples were digested in concentrated Nitric acid. After digestion, sample pH was adjusted and Nickel-63 was precipitated selectively with Dimethylglyoxime. Precipitates were selectively separated, redissolved, and residual acid was effectively neutralized. Sample residuals were placed into scintillation vials, scintillation cocktail was added and Nickel-63 activity was determined by beta liquid scintillation.

Samples demonstrated acceptable results for all Nickel-63 analyses. The Nickel-63 method blank demonstrated an acceptable result. Results for the Nickel-63 duplicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Nickel-63 laboratory control sample demonstrated an acceptable percent recovery.

NICKEL-59

Following Nickel-63 determination by liquid scintillation, sample extractions were then counted by low energy photon spectroscopy for determination of Nickel-59 activity.

ANALYTICAL RESULTS CONTINUED

NICKEL-59

Samples demonstrated acceptable results for all Nickel-59 analyses. The Nickel-59 method blank demonstrated an acceptable result. Results for the Nickel-59 duplicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Iron-55 laboratory control sample demonstrated an acceptable percent recovery.

IRON-55

Representative aliquots were removed from samples and placed into Petri geometry containers. Samples were then counted by low-energy photon spectroscopy.

Samples demonstrated acceptable results for all Iron-55 analyses. The Iron-55 method blank demonstrated an acceptable result. Results for the Iron-55 replicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Iron-55 laboratory control sample demonstrated an acceptable percent recovery.

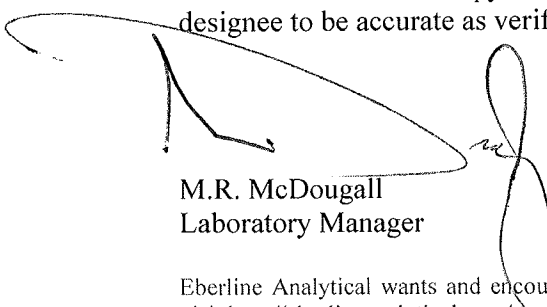
GAMMA SPECTROSCOPY

Samples for Gamma Spectroscopy analysis were prepared by transferring a known mass/aliquot of each homogenized sample to a standard geometry container. Samples were counted on High Purity Germanium (HPGe) gamma ray detectors.

Samples demonstrated acceptable results for all gamma-emitting radionuclides as reported. Some samples demonstrated results that are greater than the method detection limit. These results are reported from the Canberra Gamma Apex "Nuclide MDA Report" and are not positive. These results are qualified as non-detect (U). The method blank demonstrated acceptable results for all radionuclides as reported. Results for the Cobalt-60 replicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Cesium-137 and Potassium-40 replicate demonstrated an acceptable relative percent difference and normalized difference. Results for the Cobalt-60 and Cesium-137 laboratory control sample demonstrated an acceptable percent recovery.

CERTIFICATION OF ACCURACY

I certify that this data report is in compliance with the terms and conditions of the Purchase Order, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hard copy data package has been authorized by the cognizant project manager or his/her designee to be accurate as verified by the following signature.



M.R. McDougall
Laboratory Manager

Date: 5/4/2018

Eberline Analytical wants and encourages your feedback regarding our performance providing radioanalytical services. Please visit <http://eberlineanalytical.com/> to provide us with feedback on our services.

Eberline Analytical Final Report of Analysis			Report To:					Work Order Details:						
			Patricia Giza					SDG:	18-04086					
			Zion Solutions, LLC					Purchase Order:	677116					
			101 Shiloh Blvd					Analysis Category:	ENVIRONMENTAL					
			Zion, IL 60099					Sample Matrix:	SO					
Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Qualifier	Report Units
18-04086-01	LCS	KNOWN	04/18/18 00:00	4/18/2018	4/24/2018	18-04086	Americium-241	EML Am-01 Modified	5.49E+00	1.65E-01				pCi/g
18-04086-01	LCS	SPIKE	04/18/18 00:00	4/18/2018	4/24/2018	18-04086	Americium-241	EML Am-01 Modified	5.22E+00	9.45E-01	1.03E+00	1.25E-01		pCi/g
18-04086-02	MBL	BLANK	04/18/18 00:00	4/18/2018	4/24/2018	18-04086	Americium-241	EML Am-01 Modified	-3.94E-02	3.31E-02	3.32E-02	1.26E-01	U	pCi/g
18-04086-03	DUP	B103202ACJFC004CV	04/10/18 15:42	4/18/2018	4/24/2018	18-04086	Americium-241	EML Am-01 Modified	6.81E-02	6.50E-02	6.52E-02	7.91E-02	U	pCi/g
18-04086-04	DO	B103202ACJFC004CV	04/10/18 15:42	4/18/2018	4/24/2018	18-04086	Americium-241	EML Am-01 Modified	2.53E-02	6.09E-02	6.09E-02	1.22E-01	U	pCi/g
18-04086-05	TRG	B103202ACJFC005CV	04/09/18 09:40	4/18/2018	4/24/2018	18-04086	Americium-241	EML Am-01 Modified	2.13E-02	3.62E-02	3.62E-02	6.13E-02	U	pCi/g
18-04086-06	TRG	B103202ACJWC006CV	04/06/18 15:30	4/18/2018	4/24/2018	18-04086	Americium-241	EML Am-01 Modified	3.05E-02	4.12E-02	4.13E-02	6.45E-02	U	pCi/g
18-04086-07	TRG	B103202ACJFC007CV	04/10/18 13:02	4/18/2018	4/24/2018	18-04086	Americium-241	EML Am-01 Modified	2.26E-02	3.47E-02	3.47E-02	5.16E-02	U	pCi/g
18-04086-08	TRG	B103202ACJFC008CV	04/07/18 13:55	4/18/2018	4/24/2018	18-04086	Americium-241	EML Am-01 Modified	3.29E-02	5.59E-02	5.60E-02	9.46E-02	U	pCi/g
18-04086-09	TRG	B103202ACJFC009CV	04/07/18 10:05	4/18/2018	4/24/2018	18-04086	Americium-241	EML Am-01 Modified	1.93E-02	3.28E-02	3.28E-02	5.55E-02	U	pCi/g
18-04086-10	TRG	B103202ACJFC010CV	04/10/18 08:00	4/18/2018	4/24/2018	18-04086	Americium-241	EML Am-01 Modified	3.81E-02	4.50E-02	4.51E-02	6.59E-02	U	pCi/g
18-04086-11	TRG	B103202ACJFC011CV	04/09/18 13:35	4/18/2018	4/24/2018	18-04086	Americium-241	EML Am-01 Modified	-1.88E-03	2.13E-02	2.13E-02	6.51E-02	U	pCi/g
18-04086-01	LCS	KNOWN	04/18/18 00:00	4/18/2018	4/24/2018	18-04086	Americium-243	EML Am-01 Modified	6.94E+00	2.08E-01				pCi/g
18-04086-01	LCS	SPIKE	04/18/18 00:00	4/18/2018	4/24/2018	18-04086	Americium-243	EML Am-01 Modified	6.59E+00	8.70E-01	1.31E+00	9.19E-02		pCi/g
18-04086-02	MBL	BLANK	04/18/18 00:00	4/18/2018	4/24/2018	18-04086	Americium-243	EML Am-01 Modified	6.87E-02	7.45E-02	7.52E-02	8.97E-02	U	pCi/g
18-04086-03	DUP	B103202ACJFC004CV	04/10/18 15:42	4/18/2018	4/24/2018	18-04086	Americium-243	EML Am-01 Modified	3.44E-02	5.57E-02	5.59E-02	9.58E-02	U	pCi/g
18-04086-04	DO	B103202ACJFC004CV	04/10/18 15:42	4/18/2018	4/24/2018	18-04086	Americium-243	EML Am-01 Modified	-8.45E-03	3.51E-02	3.51E-02	1.13E-01	U	pCi/g
18-04086-05	TRG	B103202ACJWC005CV	04/09/18 09:40	4/18/2018	4/24/2018	18-04086	Americium-243	EML Am-01 Modified	5.20E-02	5.60E-02	5.65E-02	7.51E-02	U	pCi/g
18-04086-06	TRG	B103202ACJWC006CV	04/06/18 15:30	4/18/2018	4/24/2018	18-04086	Americium-243	EML Am-01 Modified	5.15E-02	6.45E-02	6.49E-02	1.01E-01	U	pCi/g
18-04086-07	TRG	B103202ACJFC007CV	04/10/18 13:02	4/18/2018	4/24/2018	18-04086	Americium-243	EML Am-01 Modified	3.17E-02	4.10E-02	4.12E-02	5.70E-02	U	pCi/g
18-04086-08	TRG	B103202ACJFC008CV	04/07/18 13:55	4/18/2018	4/24/2018	18-04086	Americium-243	EML Am-01 Modified	2.04E-02	4.38E-02	4.39E-02	8.52E-02	U	pCi/g
18-04086-09	TRG	B103202ACJFC009CV	04/07/18 10:05	4/18/2018	4/24/2018	18-04086	Americium-243	EML Am-01 Modified	2.09E-02	3.54E-02	3.56E-02	6.02E-02	U	pCi/g
18-04086-10	TRG	B103202ACJFC010CV	04/10/18 08:00	4/18/2018	4/24/2018	18-04086	Americium-243	EML Am-01 Modified	1.30E-02	4.12E-02	4.12E-02	8.73E-02	U	pCi/g
18-04086-11	TRG	B103202ACJFC011CV	04/09/18 13:35	4/18/2018	4/24/2018	18-04086	Americium-243	EML Am-01 Modified	1.98E-02	4.95E-02	4.96E-02	1.03E-01	U	pCi/g

CU=Counting Uncertainty;CSU=Combined Standard Uncertainty (1-sigma);MDA=Minimal Detected Activity;LCS=Laboratory Control Sample;MBL=Blank;DUP=Duplicate;TRG=Normal Sample;DO=Duplicate Original;U=Non-detect



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Eberline Analytical Final Report of Analysis			Report To:					Work Order Details:						
			Patricia Giza Zion Solutions, LLC 101 Shiloh Blvd Zion, IL 60099					SDG:	18-04086					
								Purchase Order:	677116					
								Analysis Category:	ENVIRONMENTAL					
								Sample Matrix:	SO					
Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Qualifier	Report Units
18-04086-01	LCS	KNOWN	04/18/18 00:00	4/18/2018	4/24/2018	18-04086	Curium-243/244	EML Am-01 Modified	6.55E+00	1.18E-01				pCi/g
18-04086-01	LCS	SPIKE	04/18/18 00:00	4/18/2018	4/24/2018	18-04086	Curium-243/244	EML Am-01 Modified	5.91E+00	1.05E+00	1.27E+00	1.05E-01		pCi/g
18-04086-02	MBL	BLANK	04/18/18 00:00	4/18/2018	4/24/2018	18-04086	Curium-243/244	EML Am-01 Modified	-1.95E-02	2.82E-02	2.83E-02	9.08E-02	U	pCi/g
18-04086-03	DUP	B103202ACJFC004CV	04/10/18 15:42	4/18/2018	4/24/2018	18-04086	Curium-243/244	EML Am-01 Modified	1.75E-02	3.78E-02	3.78E-02	7.46E-02	U	pCi/g
18-04086-04	DO	B103202ACJFC004CV	04/10/18 15:42	4/18/2018	4/24/2018	18-04086	Curium-243/244	EML Am-01 Modified	8.42E-03	3.52E-02	3.52E-02	9.02E-02	U	pCi/g
18-04086-05	TRG	B103202ACJFC005CV	04/09/18 09:40	4/18/2018	4/24/2018	18-04086	Curium-243/244	EML Am-01 Modified	2.13E-02	3.62E-02	3.63E-02	6.13E-02	U	pCi/g
18-04086-06	TRG	B103202ACJWC006CV	04/06/18 15:30	4/18/2018	4/24/2018	18-04086	Curium-243/244	EML Am-01 Modified	1.70E-02	2.89E-02	2.90E-02	4.90E-02	U	pCi/g
18-04086-07	TRG	B103202ACJFC007CV	04/10/18 13:02	4/18/2018	4/24/2018	18-04086	Curium-243/244	EML Am-01 Modified	0.00E+00	3.43E-02	3.43E-02	7.42E-02	U	pCi/g
18-04086-08	TRG	B103202ACJFC008CV	04/07/18 13:55	4/18/2018	4/24/2018	18-04086	Curium-243/244	EML Am-01 Modified	3.96E-02	6.76E-02	6.78E-02	1.19E-01	U	pCi/g
18-04086-09	TRG	B103202ACJFC009CV	04/07/18 10:05	4/18/2018	4/24/2018	18-04086	Curium-243/244	EML Am-01 Modified	1.93E-02	3.28E-02	3.29E-02	5.56E-02	U	pCi/g
18-04086-10	TRG	B103202ACJFC010CV	04/10/18 08:00	4/18/2018	4/24/2018	18-04086	Curium-243/244	EML Am-01 Modified	8.11E-03	2.91E-02	2.92E-02	6.59E-02	U	pCi/g
18-04086-11	TRG	B103202ACJFC011CV	04/09/18 13:35	4/18/2018	4/24/2018	18-04086	Curium-243/244	EML Am-01 Modified	3.17E-03	2.05E-02	2.05E-02	5.58E-02	U	pCi/g
18-04086-01	LCS	KNOWN	04/18/18 00:00	4/18/2018	4/20/2018	18-04086	Carbon-14	EPA 520.0 Modified	1.39E+03	3.89E+01				pCi/g
18-04086-01	LCS	SPIKE	04/18/18 00:00	4/18/2018	4/20/2018	18-04086	Carbon-14	EPA 520.0 Modified	1.39E+03	1.41E+01	1.95E+02	5.53E+00		pCi/g
18-04086-02	MBL	BLANK	04/18/18 00:00	4/18/2018	4/20/2018	18-04086	Carbon-14	EPA 520.0 Modified	-9.50E-01	1.59E+00	1.60E+00	2.75E+00	U	pCi/g
18-04086-03	DUP	B103202ACJFC004CV	04/10/18 15:42	4/18/2018	4/20/2018	18-04086	Carbon-14	EPA 520.0 Modified	-6.31E-01	1.59E+00	1.59E+00	2.74E+00	U	pCi/g
18-04086-04	DO	B103202ACJFC004CV	04/10/18 15:42	4/18/2018	4/20/2018	18-04086	Carbon-14	EPA 520.0 Modified	2.15E-01	1.65E+00	1.65E+00	2.81E+00	U	pCi/g
18-04086-05	TRG	B103202ACJFC005CV	04/09/18 09:40	4/18/2018	4/20/2018	18-04086	Carbon-14	EPA 520.0 Modified	6.88E-01	1.18E+00	1.19E+00	2.00E+00	U	pCi/g
18-04086-06	TRG	B103202ACJWC006CV	04/06/18 15:30	4/18/2018	4/20/2018	18-04086	Carbon-14	EPA 520.0 Modified	1.07E+00	1.51E+00	1.52E+00	2.55E+00	U	pCi/g
18-04086-07	TRG	B103202ACJFC007CV	04/10/18 13:02	4/18/2018	4/20/2018	18-04086	Carbon-14	EPA 520.0 Modified	2.09E-01	1.60E+00	1.60E+00	2.73E+00	U	pCi/g
18-04086-08	TRG	B103202ACJFC008CV	04/07/18 13:55	4/18/2018	4/20/2018	18-04086	Carbon-14	EPA 520.0 Modified	-8.16E-02	1.24E+00	1.24E+00	2.13E+00	U	pCi/g
18-04086-09	TRG	B103202ACJFC009CV	04/07/18 10:05	4/18/2018	4/20/2018	18-04086	Carbon-14	EPA 520.0 Modified	-6.03E-01	1.30E+00	1.31E+00	2.25E+00	U	pCi/g
18-04086-10	TRG	B103202ACJFC010CV	04/10/18 08:00	4/18/2018	4/20/2018	18-04086	Carbon-14	EPA 520.0 Modified	4.71E-01	1.45E+00	1.45E+00	2.46E+00	U	pCi/g
18-04086-11	TRG	B103202ACJFC011CV	04/09/18 13:35	4/18/2018	4/20/2018	18-04086	Carbon-14	EPA 520.0 Modified	6.84E-01	1.32E+00	1.32E+00	2.23E+00	U	pCi/g

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Eberline Analytical Final Report of Analysis			Report To:					Work Order Details:						
			Patricia Giza					SDG:	18-04086					
			Zion Solutions, LLC					Purchase Order:	677116					
			101 Shiloh Blvd					Analysis Category:	ENVIRONMENTAL					
			Zion, IL 60099					Sample Matrix:	SO					
Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Qualifier	Report Units
18-04086-01	LCS	KNOWN	04/18/18 00:00	4/18/2018	4/19/2018	18-04086	Iron-55	EML Fe-01-01 Modified	7.74E+03	3.25E+02				pCi/g
18-04086-01	LCS	SPIKE	04/18/18 00:00	4/18/2018	4/19/2018	18-04086	Iron-55	EML Fe-01-01 Modified	6.64E+03	7.86E+02	1.39E+03	2.84E+02		pCi/g
18-04086-02	MBL	BLANK	04/18/18 00:00	4/18/2018	4/19/2018	18-04086	Iron-55	EML Fe-01-01 Modified	-5.94E-01	1.86E+00	1.86E+00	2.80E+00	U	pCi/g
18-04086-03	DUP	B103202ACJFC004CV	04/10/18 15:42	4/18/2018	4/19/2018	18-04086	Iron-55	EML Fe-01-01 Modified	1.22E-01	5.02E-01	5.02E-01	7.75E-01	U	pCi/g
18-04086-04	DO	B103202ACJFC004CV	04/10/18 15:42	4/18/2018	4/19/2018	18-04086	Iron-55	EML Fe-01-01 Modified	-3.33E-01	5.01E-01	5.04E-01	7.27E-01	U	pCi/g
18-04086-05	TRG	B103202ACJFC005CV	04/09/18 09:40	4/18/2018	4/19/2018	18-04086	Iron-55	EML Fe-01-01 Modified	1.94E-01	5.48E-01	5.49E-01	8.76E-01	U	pCi/g
18-04086-06	TRG	B103202ACJWC006CV	04/06/18 15:30	4/18/2018	4/19/2018	18-04086	Iron-55	EML Fe-01-01 Modified	-6.52E-02	2.01E-01	2.02E-01	3.06E-01	U	pCi/g
18-04086-07	TRG	B103202ACJFC007CV	04/10/18 13:02	4/18/2018	4/20/2018	18-04086	Iron-55	EML Fe-01-01 Modified	4.31E-03	1.22E-01	1.22E-01	1.88E-01	U	pCi/g
18-04086-08	TRG	B103202ACJFC008CV	04/07/18 13:55	4/18/2018	4/20/2018	18-04086	Iron-55	EML Fe-01-01 Modified	1.03E-01	4.07E-01	4.08E-01	6.45E-01	U	pCi/g
18-04086-09	TRG	B103202ACJFC009CV	04/07/18 10:05	4/18/2018	4/20/2018	18-04086	Iron-55	EML Fe-01-01 Modified	1.55E-01	2.99E-01	3.00E-01	4.66E-01	U	pCi/g
18-04086-10	TRG	B103202ACJFC010CV	04/10/18 08:00	4/18/2018	4/20/2018	18-04086	Iron-55	EML Fe-01-01 Modified	-1.09E-01	2.35E-01	2.36E-01	3.52E-01	U	pCi/g
18-04086-11	TRG	B103202ACJFC011CV	04/09/18 13:35	4/18/2018	4/20/2018	18-04086	Iron-55	EML Fe-01-01 Modified	-1.28E-01	4.25E-01	4.26E-01	6.43E-01	U	pCi/g
18-04086-01	LCS	KNOWN	04/18/18 00:00	4/18/2018	4/19/2018	18-04086	Tritium	LANL ER-210 Modified	2.45E+02	8.82E+00				pCi/g
18-04086-01	LCS	SPIKE	04/18/18 00:00	4/18/2018	4/19/2018	18-04086	Tritium	LANL ER-210 Modified	2.16E+02	5.58E+00	1.33E+01	3.76E+00		pCi/g
18-04086-02	MBL	BLANK	04/18/18 00:00	4/18/2018	4/19/2018	18-04086	Tritium	LANL ER-210 Modified	5.21E+00	2.28E+00	2.30E+00	3.68E+00		pCi/g
18-04086-03	DUP	B103202ACJFC004CV	04/10/18 15:42	4/18/2018	4/19/2018	18-04086	Tritium	LANL ER-210 Modified	-1.40E+00	3.17E+00	3.18E+00	5.53E+00	U	pCi/g
18-04086-04	DO	B103202ACJFC004CV	04/10/18 15:42	4/18/2018	4/19/2018	18-04086	Tritium	LANL ER-210 Modified	-1.66E+00	3.13E+00	3.14E+00	5.47E+00	U	pCi/g
18-04086-05	TRG	B103202ACJFC005CV	04/09/18 09:40	4/18/2018	4/19/2018	18-04086	Tritium	LANL ER-210 Modified	3.03E+00	4.43E+00	4.44E+00	7.49E+00	U	pCi/g
18-04086-06	TRG	B103202ACJWC006CV	04/06/18 15:30	4/18/2018	4/19/2018	18-04086	Tritium	LANL ER-210 Modified	3.04E+00	4.45E+00	4.45E+00	7.51E+00	U	pCi/g
18-04086-07	TRG	B103202ACJFC007CV	04/10/18 13:02	4/18/2018	4/19/2018	18-04086	Tritium	LANL ER-210 Modified	6.05E+00	4.25E+00	4.27E+00	7.04E+00	U	pCi/g
18-04086-08	TRG	B103202ACJFC008CV	04/07/18 13:55	4/18/2018	4/19/2018	18-04086	Tritium	LANL ER-210 Modified	-2.77E+00	3.90E+00	3.90E+00	6.84E+00	U	pCi/g
18-04086-09	TRG	B103202ACJFC009CV	04/07/18 10:05	4/18/2018	4/19/2018	18-04086	Tritium	LANL ER-210 Modified	-3.00E+00	4.22E+00	4.22E+00	7.40E+00	U	pCi/g
18-04086-10	TRG	B103202ACJFC010CV	04/10/18 08:00	4/18/2018	4/20/2018	18-04086	Tritium	LANL ER-210 Modified	-2.75E+00	3.87E+00	3.87E+00	6.80E+00	U	pCi/g
18-04086-11	TRG	B103202ACJFC011CV	04/09/18 13:35	4/18/2018	4/20/2018	18-04086	Tritium	LANL ER-210 Modified	1.44E+00	4.17E+00	4.17E+00	7.11E+00	U	pCi/g

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			Patricia Giza					SDG:	18-04086					
			Zion Solutions, LLC					Purchase Order:	677116					
			101 Shiloh Blvd					Analysis Category:	ENVIRONMENTAL					
			Zion, IL 60099					Sample Matrix:	SO					
Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Qualifier	Report Units
18-04086-01	LCS	KNOWN	04/18/18 00:00	4/18/2018	4/19/2018	18-04086	Iron-55	ASTM 3500-Ni Modified	7.74E+03	3.25E+02				pCi/g
18-04086-01	LCS	SPIKE	04/18/18 00:00	4/18/2018	4/19/2018	18-04086	Iron-55	ASTM 3500-Ni Modified	6.38E+03	7.59E+02	8.76E+02	2.85E+02		pCi/g
18-04086-02	MBL	BLANK	04/18/18 00:00	4/18/2018	4/19/2018	18-04086	Nickel-59	ASTM 3500-Ni Modified	-1.81E-01	1.36E+00	1.36E+00	2.10E+00	U	pCi/g
18-04086-03	DUP	B103202ACJFC004CV	04/10/18 15:42	4/18/2018	4/19/2018	18-04086	Nickel-59	ASTM 3500-Ni Modified	-3.26E-01	3.57E-01	3.58E-01	5.15E-01	U	pCi/g
18-04086-04	DO	B103202ACJFC004CV	04/10/18 15:42	4/18/2018	4/19/2018	18-04086	Nickel-59	ASTM 3500-Ni Modified	-9.88E-02	3.35E-01	3.35E-01	5.15E-01	U	pCi/g
18-04086-05	TRG	B103202ACJFC005CV	04/09/18 09:40	4/18/2018	4/19/2018	18-04086	Nickel-59	ASTM 3500-Ni Modified	1.25E-02	4.03E-01	4.03E-01	6.30E-01	U	pCi/g
18-04086-06	TRG	B103202ACJWC006CV	04/06/18 15:30	4/18/2018	4/19/2018	18-04086	Nickel-59	ASTM 3500-Ni Modified	1.09E-01	1.47E-01	1.47E-01	2.39E-01	U	pCi/g
18-04086-07	TRG	B103202ACJFC007CV	04/10/18 13:02	4/18/2018	4/20/2018	18-04086	Nickel-59	ASTM 3500-Ni Modified	-1.26E-02	8.86E-02	8.86E-02	1.37E-01	U	pCi/g
18-04086-08	TRG	B103202ACJFC008CV	04/07/18 13:55	4/18/2018	4/20/2018	18-04086	Nickel-59	ASTM 3500-Ni Modified	-9.22E-02	3.05E-01	3.05E-01	4.66E-01	U	pCi/g
18-04086-09	TRG	B103202ACJFC009CV	04/07/18 10:05	4/18/2018	4/20/2018	18-04086	Nickel-59	ASTM 3500-Ni Modified	-4.09E-01	2.29E-01	2.31E-01	2.96E-01	U	pCi/g
18-04086-10	TRG	B103202ACJFC010CV	04/10/18 08:00	4/18/2018	4/20/2018	18-04086	Nickel-59	ASTM 3500-Ni Modified	7.61E-02	1.75E-01	1.75E-01	2.79E-01	U	pCi/g
18-04086-11	TRG	B103202ACJFC011CV	04/09/18 13:35	4/18/2018	4/20/2018	18-04086	Nickel-59	ASTM 3500-Ni Modified	-2.50E-01	3.16E-01	3.17E-01	4.63E-01	U	pCi/g
18-04086-01	LCS	KNOWN	04/18/18 00:00	4/18/2018	4/21/2018	18-04086	Nickel-63	ASTM 3500-Ni Modified	1.52E+03	4.57E+01				pCi/g
18-04086-01	LCS	SPIKE	04/18/18 00:00	4/18/2018	4/21/2018	18-04086	Nickel-63	ASTM 3500-Ni Modified	1.44E+03	8.73E+00	8.53E+01	1.95E+00		pCi/g
18-04086-02	MBL	BLANK	04/18/18 00:00	4/18/2018	4/21/2018	18-04086	Nickel-63	ASTM 3500-Ni Modified	1.60E-01	1.13E+00	1.13E+00	1.93E+00	U	pCi/g
18-04086-03	DUP	B103202ACJFC004CV	04/10/18 15:42	4/18/2018	4/21/2018	18-04086	Nickel-63	ASTM 3500-Ni Modified	5.68E-01	1.01E+00	1.01E+00	1.71E+00	U	pCi/g
18-04086-04	DO	B103202ACJFC004CV	04/10/18 15:42	4/18/2018	4/21/2018	18-04086	Nickel-63	ASTM 3500-Ni Modified	7.97E-01	1.03E+00	1.04E+00	1.74E+00	U	pCi/g
18-04086-05	TRG	B103202ACJFC005CV	04/09/18 09:40	4/18/2018	4/21/2018	18-04086	Nickel-63	ASTM 3500-Ni Modified	7.11E-01	1.01E+00	1.02E+00	1.71E+00	U	pCi/g
18-04086-06	TRG	B103202ACJWC006CV	04/06/18 15:30	4/18/2018	4/21/2018	18-04086	Nickel-63	ASTM 3500-Ni Modified	1.30E+01	1.20E+00	1.42E+00	1.61E+00		pCi/g
18-04086-07	TRG	B103202ACJFC007CV	04/10/18 13:02	4/18/2018	4/21/2018	18-04086	Nickel-63	ASTM 3500-Ni Modified	9.79E+00	1.12E+00	1.26E+00	1.57E+00		pCi/g
18-04086-08	TRG	B103202ACJFC008CV	04/07/18 13:55	4/18/2018	4/22/2018	18-04086	Nickel-63	ASTM 3500-Ni Modified	9.30E+01	2.32E+00	5.94E+00	1.75E+00		pCi/g
18-04086-09	TRG	B103202ACJFC009CV	04/07/18 10:05	4/18/2018	4/22/2018	18-04086	Nickel-63	ASTM 3500-Ni Modified	3.53E-01	1.00E+00	1.00E+00	1.70E+00	U	pCi/g
18-04086-10	TRG	B103202ACJFC010CV	04/10/18 08:00	4/18/2018	4/22/2018	18-04086	Nickel-63	ASTM 3500-Ni Modified	1.49E+01	1.20E+00	1.48E+00	1.56E+00		pCi/g
18-04086-11	TRG	B103202ACJFC011CV	04/09/18 13:35	4/18/2018	4/22/2018	18-04086	Nickel-63	ASTM 3500-Ni Modified	3.14E+00	1.12E+00	1.13E+00	1.80E+00		pCi/g

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Eberline Analytical Final Report of Analysis			Report To:						Work Order Details:						
			Patricia Giza Zion Solutions, LLC 101 Shiloh Blvd Zion, IL 60099						SDG:		18-04086				
									Purchase Order:		677116				
									Analysis Category:		ENVIRONMENTAL				
			Zion, IL 60099						Sample Matrix:		SO				
Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Qualifier	Report Units	
18-04086-01	LCS	KNOWN	04/18/18 00:00	4/18/2018	4/23/2018	18-04086	Neptunium-237	EiChroM ACW08 Mod	9.51E+00	3.42E-01				pCi/g	
18-04086-01	LCS	SPIKE	04/18/18 00:00	4/18/2018	4/23/2018	18-04086	Neptunium-237	EiChroM ACW08 Mod	1.13E+01	1.25E+00	1.81E+00	1.94E-01		pCi/g	
18-04086-02	MBL	BLANK	04/18/18 00:00	4/18/2018	4/23/2018	18-04086	Neptunium-237	EiChroM ACW08 Mod	-8.91E-03	5.28E-02	5.29E-02	1.25E-01	U	pCi/g	
18-04086-03	DUP	B103202ACJFC004CV	04/10/18 15:42	4/18/2018	4/23/2018	18-04086	Neptunium-237	EiChroM ACW08 Mod	1.78E-02	8.10E-02	8.10E-02	1.80E-01	U	pCi/g	
18-04086-04	DO	B103202ACJFC004CV	04/10/18 15:42	4/18/2018	4/23/2018	18-04086	Neptunium-237	EiChroM ACW08 Mod	-2.59E-02	5.40E-02	5.41E-02	1.60E-01	U	pCi/g	
18-04086-05	TRG	B103202ACJFC005CV	04/09/18 09:40	4/18/2018	4/23/2018	18-04086	Neptunium-237	EiChroM ACW08 Mod	6.46E-03	4.18E-02	4.18E-02	1.14E-01	U	pCi/g	
18-04086-06	TRG	B103202ACJWC006CV	04/06/18 15:30	4/18/2018	4/23/2018	18-04086	Neptunium-237	EiChroM ACW08 Mod	-1.79E-02	3.73E-02	3.74E-02	1.11E-01	U	pCi/g	
18-04086-07	TRG	B103202ACJFC007CV	04/10/18 13:02	4/18/2018	4/23/2018	18-04086	Neptunium-237	EiChroM ACW08 Mod	1.36E-02	3.25E-02	3.25E-02	6.82E-02	U	pCi/g	
18-04086-08	TRG	B103202ACJFC008CV	04/07/18 13:55	4/18/2018	4/23/2018	18-04086	Neptunium-237	EiChroM ACW08 Mod	9.28E-03	3.87E-02	3.87E-02	9.94E-02	U	pCi/g	
18-04086-09	TRG	B103202ACJFC009CV	04/07/18 10:05	4/18/2018	4/23/2018	18-04086	Neptunium-237	EiChroM ACW08 Mod	-8.95E-03	3.59E-02	3.59E-02	9.21E-02	U	pCi/g	
18-04086-10	TRG	B103202ACJFC010CV	04/10/18 08:00	4/18/2018	4/23/2018	18-04086	Neptunium-237	EiChroM ACW08 Mod	2.78E-02	6.01E-02	6.02E-02	1.19E-01	U	pCi/g	
18-04086-11	TRG	B103202ACJFC011CV	04/09/18 13:35	4/18/2018	4/23/2018	18-04086	Neptunium-237	EiChroM ACW08 Mod	2.24E-03	5.15E-02	5.15E-02	1.31E-01	U	pCi/g	
18-04086-01	LCS	KNOWN	04/18/18 00:00	4/18/2018	4/20/2018	18-04086	Promethium-147	EML Pm-01 Modified	4.34E+01	1.17E+00				pCi/g	
18-04086-01	LCS	SPIKE	04/18/18 00:00	4/18/2018	4/20/2018	18-04086	Promethium-147	EML Pm-01 Modified	5.14E+01	1.72E+00	7.89E+00	1.55E+00		pCi/g	
18-04086-02	MBL	BLANK	04/18/18 00:00	4/18/2018	4/20/2018	18-04086	Promethium-147	EML Pm-01 Modified	-3.20E-01	8.89E-01	8.90E-01	1.54E+00	U	pCi/g	
18-04086-03	DUP	B103202ACJFC004CV	04/10/18 15:42	4/18/2018	4/20/2018	18-04086	Promethium-147	EML Pm-01 Modified	1.01E+00	8.10E-01	8.24E-01	1.35E+00	U	pCi/g	
18-04086-04	DO	B103202ACJFC004CV	04/10/18 15:42	4/18/2018	4/20/2018	18-04086	Promethium-147	EML Pm-01 Modified	1.12E-01	7.84E-01	7.84E-01	1.34E+00	U	pCi/g	
18-04086-05	TRG	B103202ACJFC005CV	04/09/18 09:40	4/18/2018	4/20/2018	18-04086	Promethium-147	EML Pm-01 Modified	4.78E-01	7.54E-01	7.57E-01	1.27E+00	U	pCi/g	
18-04086-06	TRG	B103202ACJWC006CV	04/06/18 15:30	4/18/2018	4/20/2018	18-04086	Promethium-147	EML Pm-01 Modified	1.12E+00	7.38E-01	7.57E-01	1.22E+00	U	pCi/g	
18-04086-07	TRG	B103202ACJFC007CV	04/10/18 13:02	4/18/2018	4/20/2018	18-04086	Promethium-147	EML Pm-01 Modified	1.20E+00	7.28E-01	7.49E-01	1.20E+00	U	pCi/g	
18-04086-08	TRG	B103202ACJFC008CV	04/07/18 13:55	4/18/2018	4/20/2018	18-04086	Promethium-147	EML Pm-01 Modified	1.19E+00	7.51E-01	7.72E-01	1.24E+00	U	pCi/g	
18-04086-09	TRG	B103202ACJFC009CV	04/07/18 10:05	4/18/2018	4/20/2018	18-04086	Promethium-147	EML Pm-01 Modified	5.38E-01	7.65E-01	7.69E-01	1.29E+00	U	pCi/g	
18-04086-10	TRG	B103202ACJFC010CV	04/10/18 08:00	4/18/2018	4/20/2018	18-04086	Promethium-147	EML Pm-01 Modified	9.15E-01	7.74E-01	7.86E-01	1.29E+00	U	pCi/g	
18-04086-11	TRG	B103202ACJFC011CV	04/09/18 13:35	4/18/2018	4/20/2018	18-04086	Promethium-147	EML Pm-01 Modified	1.57E+00	7.92E-01	8.26E-01	1.30E+00		pCi/g	

CU=Counting Uncertainty;CSU=Combined Standard Uncertainty (1-sigma);MDA=Minimal Detected Activity;LCS=Laboratory Control Sample;MBL=Blank;DUP=Duplicate;TRG=Normal Sample;DO=Duplicate Original;U=Non-detect



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Eberline Analytical Final Report of Analysis			Report To:					Work Order Details:						
			Patricia Giza					SDG:	18-04086					
			Zion Solutions, LLC					Purchase Order:	677116					
			101 Shiloh Blvd					Analysis Category:	ENVIRONMENTAL					
			Zion, IL 60099					Sample Matrix:	SO					
Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Qualifier	Report Units
18-04086-01	LCS	KNOWN	04/18/18 00:00	4/18/2018	4/23/2018	18-04086	Plutonium-238	EML Pu-02 Modified	5.22E+00	1.10E-01				pCi/g
18-04086-01	LCS	SPIKE	04/18/18 00:00	4/18/2018	4/23/2018	18-04086	Plutonium-238	EML Pu-02 Modified	4.48E+00	7.67E-01	8.79E-01	1.38E-01		pCi/g
18-04086-02	MBL	BLANK	04/18/18 00:00	4/18/2018	4/23/2018	18-04086	Plutonium-238	EML Pu-02 Modified	-2.08E-02	4.34E-02	4.35E-02	1.29E-01	U	pCi/g
18-04086-03	DUP	B103202ACJFC004CV	04/10/18 15:42	4/18/2018	4/23/2018	18-04086	Plutonium-238	EML Pu-02 Modified	-1.22E-02	4.88E-02	4.88E-02	1.25E-01	U	pCi/g
18-04086-04	DO	B103202ACJFC004CV	04/10/18 15:42	4/18/2018	4/23/2018	18-04086	Plutonium-238	EML Pu-02 Modified	4.04E-02	6.88E-02	6.89E-02	1.16E-01	U	pCi/g
18-04086-05	TRG	B103202ACJFC005CV	04/09/18 09:40	4/18/2018	4/23/2018	18-04086	Plutonium-238	EML Pu-02 Modified	-4.85E-02	5.47E-02	5.49E-02	1.85E-01	U	pCi/g
18-04086-06	TRG	B103202ACJWC006CV	04/06/18 15:30	4/18/2018	4/23/2018	18-04086	Plutonium-238	EML Pu-02 Modified	-2.65E-02	6.55E-02	6.55E-02	1.86E-01	U	pCi/g
18-04086-07	TRG	B103202ACJFC007CV	04/10/18 13:02	4/18/2018	4/23/2018	18-04086	Plutonium-238	EML Pu-02 Modified	1.23E-01	1.32E-01	1.32E-01	1.82E-01	U	pCi/g
18-04086-08	TRG	B103202ACJFC008CV	04/07/18 13:55	4/18/2018	4/23/2018	18-04086	Plutonium-238	EML Pu-02 Modified	3.73E-02	8.09E-02	8.10E-02	1.60E-01	U	pCi/g
18-04086-09	TRG	B103202ACJFC009CV	04/07/18 10:05	4/18/2018	4/23/2018	18-04086	Plutonium-238	EML Pu-02 Modified	2.17E-02	9.92E-02	9.92E-02	2.32E-01	U	pCi/g
18-04086-10	TRG	B103202ACJFC010CV	04/10/18 08:00	4/18/2018	4/23/2018	18-04086	Plutonium-238	EML Pu-02 Modified	-2.86E-02	5.98E-02	5.99E-02	1.77E-01	U	pCi/g
18-04086-11	TRG	B103202ACJFC011CV	04/09/18 13:35	4/18/2018	4/23/2018	18-04086	Plutonium-238	EML Pu-02 Modified	1.66E-02	7.58E-02	7.58E-02	1.77E-01	U	pCi/g
18-04086-01	LCS	KNOWN	04/18/18 00:00	4/18/2018	4/23/2018	18-04086	Plutonium-239/240	EML Pu-02 Modified	7.04E+00	2.25E-01				pCi/g
18-04086-01	LCS	SPIKE	04/18/18 00:00	4/18/2018	4/23/2018	18-04086	Plutonium-239/240	EML Pu-02 Modified	7.50E+00	1.16E+00	1.36E+00	6.58E-02		pCi/g
18-04086-02	MBL	BLANK	04/18/18 00:00	4/18/2018	4/23/2018	18-04086	Plutonium-239/240	EML Pu-02 Modified	4.39E-02	7.12E-02	7.13E-02	1.22E-01	U	pCi/g
18-04086-03	DUP	B103202ACJFC004CV	04/10/18 15:42	4/18/2018	4/23/2018	18-04086	Plutonium-239/240	EML Pu-02 Modified	-1.22E-02	4.88E-02	4.88E-02	1.25E-01	U	pCi/g
18-04086-04	DO	B103202ACJFC004CV	04/10/18 15:42	4/18/2018	4/23/2018	18-04086	Plutonium-239/240	EML Pu-02 Modified	-3.72E-02	5.39E-02	5.40E-02	1.73E-01	U	pCi/g
18-04086-05	TRG	B103202ACJFC005CV	04/09/18 09:40	4/18/2018	4/23/2018	18-04086	Plutonium-239/240	EML Pu-02 Modified	-3.64E-02	5.26E-02	5.28E-02	1.69E-01	U	pCi/g
18-04086-06	TRG	B103202ACJWC006CV	04/06/18 15:30	4/18/2018	4/23/2018	18-04086	Plutonium-239/240	EML Pu-02 Modified	-2.12E-02	6.45E-02	6.46E-02	1.76E-01	U	pCi/g
18-04086-07	TRG	B103202ACJFC007CV	04/10/18 13:02	4/18/2018	4/23/2018	18-04086	Plutonium-239/240	EML Pu-02 Modified	1.70E-02	7.78E-02	7.78E-02	1.82E-01	U	pCi/g
18-04086-08	TRG	B103202ACJFC008CV	04/07/18 13:55	4/18/2018	4/23/2018	18-04086	Plutonium-239/240	EML Pu-02 Modified	6.56E-02	9.86E-02	9.88E-02	1.59E-01	U	pCi/g
18-04086-09	TRG	B103202ACJFC009CV	04/07/18 10:05	4/18/2018	4/23/2018	18-04086	Plutonium-239/240	EML Pu-02 Modified	3.32E-02	9.80E-02	9.80E-02	2.13E-01	U	pCi/g
18-04086-10	TRG	B103202ACJFC010CV	04/10/18 08:00	4/18/2018	4/23/2018	18-04086	Plutonium-239/240	EML Pu-02 Modified	-1.91E-02	5.82E-02	5.82E-02	1.58E-01	U	pCi/g
18-04086-11	TRG	B103202ACJFC011CV	04/09/18 13:35	4/18/2018	4/23/2018	18-04086	Plutonium-239/240	EML Pu-02 Modified	-1.37E-02	5.70E-02	5.70E-02	1.84E-01	U	pCi/g

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			Patricia Giza					SDG:	18-04086					
			Zion Solutions, LLC					Purchase Order:	677116					
			101 Shiloh Blvd					Analysis Category:	ENVIRONMENTAL					
			Zion, IL 60099					Sample Matrix:	SO					
Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Qualifier	Report Units
18-04086-01	LCS	KNOWN	04/18/18 00:00	4/18/2018	4/23/2018	18-04086	Plutonium-241	EML Pu-02 Modified	2.78E+02	1.28E+01				pCi/g
18-04086-01	LCS	SPIKE	04/18/18 00:00	4/18/2018	4/23/2018	18-04086	Plutonium-241	EML Pu-02 Modified	2.30E+02	7.47E+00	2.01E+01	6.91E+00		pCi/g
18-04086-02	MBL	BLANK	04/18/18 00:00	4/18/2018	4/23/2018	18-04086	Plutonium-241	EML Pu-02 Modified	2.36E+00	5.99E+00	5.99E+00	1.02E+01	U	pCi/g
18-04086-03	DUP	B103202ACJFC004CV	04/10/18 15:42	4/18/2018	4/23/2018	18-04086	Plutonium-241	EML Pu-02 Modified	-1.68E+00	6.31E+00	6.31E+00	1.08E+01	U	pCi/g
18-04086-04	DO	B103202ACJFC004CV	04/10/18 15:42	4/18/2018	4/23/2018	18-04086	Plutonium-241	EML Pu-02 Modified	2.61E+00	5.69E+00	5.69E+00	9.63E+00	U	pCi/g
18-04086-05	TRG	B103202ACJFC005CV	04/09/18 09:40	4/18/2018	4/23/2018	18-04086	Plutonium-241	EML Pu-02 Modified	-1.29E+00	6.44E+00	6.44E+00	1.11E+01	U	pCi/g
18-04086-06	TRG	B103202ACJWC006CV	04/06/18 15:30	4/18/2018	4/23/2018	18-04086	Plutonium-241	EML Pu-02 Modified	3.34E+00	7.28E+00	7.28E+00	1.23E+01	U	pCi/g
18-04086-07	TRG	B103202ACJFC007CV	04/10/18 13:02	4/18/2018	4/23/2018	18-04086	Plutonium-241	EML Pu-02 Modified	0.00E+00	7.34E+00	7.34E+00	1.26E+01	U	pCi/g
18-04086-08	TRG	B103202ACJFC008CV	04/07/18 13:55	4/18/2018	4/23/2018	18-04086	Plutonium-241	EML Pu-02 Modified	-1.11E+00	8.35E+00	8.35E+00	1.43E+01	U	pCi/g
18-04086-09	TRG	B103202ACJFC009CV	04/07/18 10:05	4/18/2018	4/24/2018	18-04086	Plutonium-241	EML Pu-02 Modified	4.24E+00	9.24E+00	9.24E+00	1.56E+01	U	pCi/g
18-04086-10	TRG	B103202ACJFC010CV	04/10/18 08:00	4/18/2018	4/24/2018	18-04086	Plutonium-241	EML Pu-02 Modified	-2.65E+00	7.94E+00	7.94E+00	1.37E+01	U	pCi/g
18-04086-11	TRG	B103202ACJFC011CV	04/09/18 13:35	4/18/2018	4/24/2018	18-04086	Plutonium-241	EML Pu-02 Modified	-4.74E+00	7.06E+00	7.07E+00	1.23E+01	U	pCi/g
18-04086-01	LCS	KNOWN	04/18/18 00:00	4/18/2018	4/24/2018	18-04086	Technetium-99	EiChroM TCW01 Modified	9.97E+02	2.19E+01				pCi/g
18-04086-01	LCS	SPIKE	04/18/18 00:00	4/18/2018	4/24/2018	18-04086	Technetium-99	EiChroM TCW01 Modified	1.08E+03	5.90E+00	1.08E+02	1.39E+00		pCi/g
18-04086-02	MBL	BLANK	04/18/18 00:00	4/18/2018	4/24/2018	18-04086	Technetium-99	EiChroM TCW01 Modified	5.15E-02	8.46E-01	8.46E-01	1.44E+00	U	pCi/g
18-04086-03	DUP	B103202ACJFC004CV	04/10/18 15:42	4/18/2018	4/24/2018	18-04086	Technetium-99	EiChroM TCW01 Modified	3.34E-01	6.90E-01	6.91E-01	1.17E+00	U	pCi/g
18-04086-04	DO	B103202ACJFC004CV	04/10/18 15:42	4/18/2018	4/24/2018	18-04086	Technetium-99	EiChroM TCW01 Modified	5.77E-01	6.87E-01	6.90E-01	1.15E+00	U	pCi/g
18-04086-05	TRG	B103202ACJFC005CV	04/09/18 09:40	4/18/2018	4/24/2018	18-04086	Technetium-99	EiChroM TCW01 Modified	1.05E+00	6.58E-01	6.66E-01	1.09E+00	U	pCi/g
18-04086-06	TRG	B103202ACJWC006CV	04/06/18 15:30	4/18/2018	4/24/2018	18-04086	Technetium-99	EiChroM TCW01 Modified	8.38E-01	6.41E-01	6.46E-01	1.07E+00	U	pCi/g
18-04086-07	TRG	B103202ACJFC007CV	04/10/18 13:02	4/18/2018	4/24/2018	18-04086	Technetium-99	EiChroM TCW01 Modified	7.68E-01	6.15E-01	6.20E-01	1.02E+00	U	pCi/g
18-04086-08	TRG	B103202ACJFC008CV	04/07/18 13:55	4/18/2018	4/24/2018	18-04086	Technetium-99	EiChroM TCW01 Modified	1.01E+00	6.59E-01	6.67E-01	1.09E+00	U	pCi/g
18-04086-09	TRG	B103202ACJFC009CV	04/07/18 10:05	4/18/2018	4/24/2018	18-04086	Technetium-99	EiChroM TCW01 Modified	6.56E-01	6.45E-01	6.48E-01	1.08E+00	U	pCi/g
18-04086-10	TRG	B103202ACJFC010CV	04/10/18 08:00	4/18/2018	4/24/2018	18-04086	Technetium-99	EiChroM TCW01 Modified	8.03E-01	6.43E-01	6.48E-01	1.07E+00	U	pCi/g
18-04086-11	TRG	B103202ACJFC011CV	04/09/18 13:35	4/18/2018	4/24/2018	18-04086	Technetium-99	EiChroM TCW01 Modified	8.56E-01	6.55E-01	6.60E-01	1.09E+00	U	pCi/g

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			Patricia Giza Zion Solutions, LLC 101 Shiloh Blvd Zion, IL 60099						SDG:	18-04086					
									Purchase Order:	677116					
									Analysis Category:	ENVIRONMENTAL					
									Sample Matrix:	SO					
Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Qualifier	Report Units	
18-04086-01	LCS	KNOWN	04/18/18 00:00	4/18/2018	4/24/2018	18-04086	Strontium-90	EiChroM SRW01 Modified	5.14E+01	2.88E-01				pCi/g	
18-04086-01	LCS	SPIKE	04/18/18 00:00	4/18/2018	4/24/2018	18-04086	Strontium-90	EiChroM SRW01 Modified	4.01E+01	2.29E+00	1.41E+01	9.62E-01		pCi/g	
18-04086-02	MBL	BLANK	04/18/18 00:00	4/18/2018	4/24/2018	18-04086	Strontium-90	EiChroM SRW01 Modified	-3.98E-01	3.45E-01	3.71E-01	7.74E-01	U	pCi/g	
18-04086-03	DUP	B103202ACJFC004CV	04/10/18 15:42	4/18/2018	4/24/2018	18-04086	Strontium-90	EiChroM SRW01 Modified	3.58E-01	2.85E-01	3.11E-01	5.68E-01	U	pCi/g	
18-04086-04	DO	B103202ACJFC004CV	04/10/18 15:42	4/18/2018	4/24/2018	18-04086	Strontium-90	EiChroM SRW01 Modified	-4.54E-02	2.77E-01	2.78E-01	5.98E-01	U	pCi/g	
18-04086-05	TRG	B103202ACJFC005CV	04/09/18 09:40	4/18/2018	4/24/2018	18-04086	Strontium-90	EiChroM SRW01 Modified	-3.61E-02	2.62E-01	2.62E-01	5.64E-01	U	pCi/g	
18-04086-06	TRG	B103202ACJWC006CV	04/06/18 15:30	4/18/2018	4/24/2018	18-04086	Strontium-90	EiChroM SRW01 Modified	4.82E-02	2.49E-01	2.49E-01	5.26E-01	U	pCi/g	
18-04086-07	TRG	B103202ACJFC007CV	04/10/18 13:02	4/18/2018	4/24/2018	18-04086	Strontium-90	EiChroM SRW01 Modified	2.85E-01	1.88E-01	2.13E-01	3.70E-01	U	pCi/g	
18-04086-08	TRG	B103202ACJFC008CV	04/07/18 13:55	4/18/2018	4/24/2018	18-04086	Strontium-90	EiChroM SRW01 Modified	1.50E-01	2.59E-01	2.64E-01	5.36E-01	U	pCi/g	
18-04086-09	TRG	B103202ACJFC009CV	04/07/18 10:05	4/18/2018	4/24/2018	18-04086	Strontium-90	EiChroM SRW01 Modified	2.05E-01	2.66E-01	2.75E-01	5.46E-01	U	pCi/g	
18-04086-10	TRG	B103202ACJFC010CV	04/10/18 08:00	4/18/2018	4/24/2018	18-04086	Strontium-90	EiChroM SRW01 Modified	-3.79E-01	2.64E-01	2.96E-01	6.07E-01	U	pCi/g	
18-04086-11	TRG	B103202ACJFC011CV	04/09/18 13:35	4/18/2018	4/24/2018	18-04086	Strontium-90	EiChroM SRW01 Modified	3.66E-01	2.47E-01	2.78E-01	4.87E-01	U	pCi/g	
18-04086-01	LCS	KNOWN	04/18/18 00:00	4/18/2018	4/18/2018	18-04086	Cobalt-60	EPA 901.1 Modified	2.71E+02	1.06E+01				pCi/g	
18-04086-01	LCS	KNOWN	04/18/18 00:00	4/18/2018	4/18/2018	18-04086	Cesium-137	EPA 901.1 Modified	1.69E+02	6.75E+00				pCi/g	
18-04086-01	LCS	SPIKE	04/18/18 00:00	4/18/2018	4/18/2018	18-04086	Cobalt-60	EPA 901.1 Modified	2.66E+02	1.52E+01	2.04E+01	3.10E+00		pCi/g	
18-04086-01	LCS	SPIKE	04/18/18 00:00	4/18/2018	4/18/2018	18-04086	Cesium-137	EPA 901.1 Modified	1.88E+02	2.26E+01	2.45E+01	2.67E+00		pCi/g	
18-04086-02	MBL	BLANK	04/18/18 00:00	4/18/2018	4/18/2018	18-04086	Silver-108m	EPA 901.1 Modified	1.53E-02	3.07E-02	3.07E-02	3.96E-02	U	pCi/g	
18-04086-02	MBL	BLANK	04/18/18 00:00	4/18/2018	4/18/2018	18-04086	Cobalt-60	EPA 901.1 Modified	2.03E-02	2.61E-02	2.61E-02	4.02E-02	U	pCi/g	
18-04086-02	MBL	BLANK	04/18/18 00:00	4/18/2018	4/18/2018	18-04086	Cesium-134	EPA 901.1 Modified	-3.15E-02	3.88E-02	3.89E-02	4.71E-02	U	pCi/g	
18-04086-02	MBL	BLANK	04/18/18 00:00	4/18/2018	4/18/2018	18-04086	Cesium-137	EPA 901.1 Modified	6.36E-03	3.28E-02	3.28E-02	4.89E-02	U	pCi/g	
18-04086-02	MBL	BLANK	04/18/18 00:00	4/18/2018	4/18/2018	18-04086	Europium-152	EPA 901.1 Modified	6.58E-02	8.99E-02	9.00E-02	7.05E-02	U	pCi/g	
18-04086-02	MBL	BLANK	04/18/18 00:00	4/18/2018	4/18/2018	18-04086	Europium-154	EPA 901.1 Modified	-6.24E-03	2.91E-02	2.91E-02	3.44E-02	U	pCi/g	
18-04086-02	MBL	BLANK	04/18/18 00:00	4/18/2018	4/18/2018	18-04086	Europium-155	EPA 901.1 Modified	-5.26E-02	3.68E-02	3.69E-02	4.66E-02	U	pCi/g	
18-04086-02	MBL	BLANK	04/18/18 00:00	4/18/2018	4/18/2018	18-04086	Potassium-40	EPA 901.1 Modified	-4.73E-02	2.75E-01	2.75E-01	3.95E-01	U	pCi/g	
18-04086-02	MBL	BLANK	04/18/18 00:00	4/18/2018	4/18/2018	18-04086	Molybdenum-93	EPA 901.1 Modified	1.34E-02	2.54E-02	2.55E-02	4.06E-02	U	pCi/g	
18-04086-02	MBL	BLANK	04/18/18 00:00	4/18/2018	4/18/2018	18-04086	Niobium-94	EPA 901.1 Modified	-5.46E-04	7.51E-03	7.51E-03	4.40E-02	U	pCi/g	
18-04086-02	MBL	BLANK	04/18/18 00:00	4/18/2018	4/18/2018	18-04086	Antimony-125	EPA 901.1 Modified	-1.42E-02	7.94E-02	7.94E-02	1.08E-01	U	pCi/g	

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Eberline Analytical Final Report of Analysis			Report To:					Work Order Details:						
			Patricia Giza					SDG:	18-04086					
			Zion Solutions, LLC					Purchase Order:	677116					
			101 Shiloh Blvd					Analysis Category:	ENVIRONMENTAL					
			Zion, IL 60099					Sample Matrix:	SO					
Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Qualifier	Report Units
18-04086-03	DUP	B103202ACJFC004CV	04/10/18 15:42	4/18/2018	4/18/2018	18-04086	Silver-108m	EPA 901.1 Modified	-5.45E-02	1.54E-01	1.54E-01	1.79E-01	U	pCi/g
18-04086-03	DUP	B103202ACJFC004CV	04/10/18 15:42	4/18/2018	4/18/2018	18-04086	Cobalt-60	EPA 901.1 Modified	1.60E-01	9.82E-02	9.86E-02	1.95E-01	U	pCi/g
18-04086-03	DUP	B103202ACJFC004CV	04/10/18 15:42	4/18/2018	4/18/2018	18-04086	Cesium-134	EPA 901.1 Modified	-6.56E-02	8.42E-02	8.43E-02	2.35E-01	U	pCi/g
18-04086-03	DUP	B103202ACJFC004CV	04/10/18 15:42	4/18/2018	4/18/2018	18-04086	Cesium-137	EPA 901.1 Modified	1.57E-01	1.76E-01	1.76E-01	2.92E-01	U	pCi/g
18-04086-03	DUP	B103202ACJFC004CV	04/10/18 15:42	4/18/2018	4/18/2018	18-04086	Europium-152	EPA 901.1 Modified	-1.47E-01	4.25E-01	4.25E-01	4.50E-01	U	pCi/g
18-04086-03	DUP	B103202ACJFC004CV	04/10/18 15:42	4/18/2018	4/18/2018	18-04086	Europium-154	EPA 901.1 Modified	2.75E-02	3.26E-01	3.26E-01	2.32E-01	U	pCi/g
18-04086-03	DUP	B103202ACJFC004CV	04/10/18 15:42	4/18/2018	4/18/2018	18-04086	Europium-155	EPA 901.1 Modified	-2.59E-03	2.53E-01	2.53E-01	4.03E-01	U	pCi/g
18-04086-03	DUP	B103202ACJFC004CV	04/10/18 15:42	4/18/2018	4/18/2018	18-04086	Potassium-40	EPA 901.1 Modified	7.38E+00	2.04E+00	2.08E+00	3.17E+00		pCi/g
18-04086-03	DUP	B103202ACJFC004CV	04/10/18 15:42	4/18/2018	4/18/2018	18-04086	Molybdenum-93	EPA 901.1 Modified	-8.46E-03	1.23E-01	1.23E-01	1.62E-01	U	pCi/g
18-04086-03	DUP	B103202ACJFC004CV	04/10/18 15:42	4/18/2018	4/18/2018	18-04086	Niobium-94	EPA 901.1 Modified	1.66E-03	1.14E-01	1.14E-01	1.81E-01	U	pCi/g
18-04086-03	DUP	B103202ACJFC004CV	04/10/18 15:42	4/18/2018	4/18/2018	18-04086	Antimony-125	EPA 901.1 Modified	2.73E-01	3.79E-01	3.79E-01	6.16E-01	U	pCi/g
18-04086-04	DO	B103202ACJFC004CV	04/10/18 15:42	4/18/2018	4/18/2018	18-04086	Silver-108m	EPA 901.1 Modified	-4.48E-02	1.38E-01	1.38E-01	1.81E-01	U	pCi/g
18-04086-04	DO	B103202ACJFC004CV	04/10/18 15:42	4/18/2018	4/18/2018	18-04086	Cobalt-60	EPA 901.1 Modified	4.14E-02	1.36E-01	1.36E-01	2.21E-01	U	pCi/g
18-04086-04	DO	B103202ACJFC004CV	04/10/18 15:42	4/18/2018	4/18/2018	18-04086	Cesium-134	EPA 901.1 Modified	-5.05E-01	2.49E-01	2.51E-01	2.28E-01	U	pCi/g
18-04086-04	DO	B103202ACJFC004CV	04/10/18 15:42	4/18/2018	4/18/2018	18-04086	Cesium-137	EPA 901.1 Modified	1.56E-01	1.62E-01	1.62E-01	2.68E-01	U	pCi/g
18-04086-04	DO	B103202ACJFC004CV	04/10/18 15:42	4/18/2018	4/18/2018	18-04086	Europium-152	EPA 901.1 Modified	5.13E-02	5.57E-01	5.57E-01	4.52E-01	U	pCi/g
18-04086-04	DO	B103202ACJFC004CV	04/10/18 15:42	4/18/2018	4/18/2018	18-04086	Europium-154	EPA 901.1 Modified	-1.91E-01	3.31E-01	3.31E-01	2.36E-01	U	pCi/g
18-04086-04	DO	B103202ACJFC004CV	04/10/18 15:42	4/18/2018	4/18/2018	18-04086	Europium-155	EPA 901.1 Modified	4.84E-02	2.33E-01	2.33E-01	3.82E-01	U	pCi/g
18-04086-04	DO	B103202ACJFC004CV	04/10/18 15:42	4/18/2018	4/18/2018	18-04086	Potassium-40	EPA 901.1 Modified	7.10E+00	2.06E+00	2.09E+00	3.55E+00		pCi/g
18-04086-04	DO	B103202ACJFC004CV	04/10/18 15:42	4/18/2018	4/18/2018	18-04086	Molybdenum-93	EPA 901.1 Modified	8.16E-02	1.23E-01	1.23E-01	1.62E-01	U	pCi/g
18-04086-04	DO	B103202ACJFC004CV	04/10/18 15:42	4/18/2018	4/18/2018	18-04086	Niobium-94	EPA 901.1 Modified	-1.65E-02	1.25E-01	1.25E-01	1.90E-01	U	pCi/g
18-04086-04	DO	B103202ACJFC004CV	04/10/18 15:42	4/18/2018	4/18/2018	18-04086	Antimony-125	EPA 901.1 Modified	-4.72E-01	4.03E-01	4.03E-01	5.01E-01	U	pCi/g
18-04086-05	TRG	B103202ACJFC005CV	04/09/18 09:40	4/18/2018	4/18/2018	18-04086	Silver-108m	EPA 901.1 Modified	-5.07E-02	2.56E-01	2.56E-01	3.88E-01	U	pCi/g
18-04086-05	TRG	B103202ACJFC005CV	04/09/18 09:40	4/18/2018	4/18/2018	18-04086	Cobalt-60	EPA 901.1 Modified	4.56E-01	1.84E-01	1.85E-01	4.21E-01		pCi/g
18-04086-05	TRG	B103202ACJFC005CV	04/09/18 09:40	4/18/2018	4/18/2018	18-04086	Cesium-134	EPA 901.1 Modified	-1.61E-01	1.68E-01	1.68E-01	4.00E-01	U	pCi/g
18-04086-05	TRG	B103202ACJFC005CV	04/09/18 09:40	4/18/2018	4/18/2018	18-04086	Cesium-137	EPA 901.1 Modified	1.69E-01	2.69E-01	2.69E-01	4.32E-01	U	pCi/g
18-04086-05	TRG	B103202ACJFC005CV	04/09/18 09:40	4/18/2018	4/18/2018	18-04086	Europium-152	EPA 901.1 Modified	2.90E+00	1.38E+00	1.38E+00	9.18E-01	U	pCi/g
18-04086-05	TRG	B103202ACJFC005CV	04/09/18 09:40	4/18/2018	4/18/2018	18-04086	Europium-154	EPA 901.1 Modified	2.27E-01	3.98E-01	3.98E-01	4.68E-01	U	pCi/g
18-04086-05	TRG	B103202ACJFC005CV	04/09/18 09:40	4/18/2018	4/18/2018	18-04086	Europium-155	EPA 901.1 Modified	1.09E+00	4.35E-01	4.39E-01	6.82E-01	U	pCi/g
18-04086-05	TRG	B103202ACJFC005CV	04/09/18 09:40	4/18/2018	4/18/2018	18-04086	Potassium-40	EPA 901.1 Modified	9.07E+00	2.91E+00	2.95E+00	3.22E+00		pCi/g
18-04086-05	TRG	B103202ACJFC005CV	04/09/18 09:40	4/18/2018	4/18/2018	18-04086	Molybdenum-93	EPA 901.1 Modified	-9.80E-02	1.68E-01	1.68E-01	3.24E-01	U	pCi/g
18-04086-05	TRG	B103202ACJFC005CV	04/09/18 09:40	4/18/2018	4/18/2018	18-04086	Niobium-94	EPA 901.1 Modified	-1.46E-02	2.55E-01	2.55E-01	3.73E-01	U	pCi/g
18-04086-05	TRG	B103202ACJFC005CV	04/09/18 09:40	4/18/2018	4/18/2018	18-04086	Antimony-125	EPA 901.1 Modified	3.92E-01	7.77E-01	7.77E-01	1.21E+00	U	pCi/g

CU=Counting Uncertainty;CSU=Combined Standard Uncertainty (1-sigma);MDA=Minimal Detected Activity;LCS=Laboratory Control Sample;MBL=Blank;DUP=Duplicate;TRG=Normal Sample;DO=Duplicate Original;U=Non-detect



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601 SCARBORO ROAD OAK RIDGE, TN 37830 865/481-0683 FAX 865/483-4621

Eberline Analytical Final Report of Analysis			Report To:						Work Order Details:						
			Patricia Giza						SDG:		18-04086				
			Zion Solutions, LLC						Purchase Order:		677116				
			101 Shiloh Blvd						Analysis Category:		ENVIRONMENTAL				
			Zion, IL 60099						Sample Matrix:		SO				
Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Qualifier	Report Units	
18-04086-06	TRG	B103202ACJWC006CV	04/06/18 15:30	4/18/2018	4/18/2018	18-04086	Silver-108m	EPA 901.1 Modified	5.04E-02	1.36E-01	1.36E-01	2.13E-01	U	pCi/g	
18-04086-06	TRG	B103202ACJWC006CV	04/06/18 15:30	4/18/2018	4/18/2018	18-04086	Cobalt-60	EPA 901.1 Modified	3.83E+00	3.02E-01	3.60E-01	1.48E-01		pCi/g	
18-04086-06	TRG	B103202ACJWC006CV	04/06/18 15:30	4/18/2018	4/18/2018	18-04086	Cesium-134	EPA 901.1 Modified	3.95E-03	4.42E-02	4.42E-02	2.43E-01	U	pCi/g	
18-04086-06	TRG	B103202ACJWC006CV	04/06/18 15:30	4/18/2018	4/18/2018	18-04086	Cesium-137	EPA 901.1 Modified	6.11E+00	7.13E-01	7.79E-01	3.65E-01		pCi/g	
18-04086-06	TRG	B103202ACJWC006CV	04/06/18 15:30	4/18/2018	4/18/2018	18-04086	Europium-152	EPA 901.1 Modified	7.80E-01	7.36E-01	7.37E-01	4.68E-01	U	pCi/g	
18-04086-06	TRG	B103202ACJWC006CV	04/06/18 15:30	4/18/2018	4/18/2018	18-04086	Europium-154	EPA 901.1 Modified	-1.47E-01	3.00E-01	3.00E-01	2.39E-01	U	pCi/g	
18-04086-06	TRG	B103202ACJWC006CV	04/06/18 15:30	4/18/2018	4/18/2018	18-04086	Europium-155	EPA 901.1 Modified	5.51E-01	2.14E-01	2.16E-01	3.27E-01	U	pCi/g	
18-04086-06	TRG	B103202ACJWC006CV	04/06/18 15:30	4/18/2018	4/18/2018	18-04086	Potassium-40	EPA 901.1 Modified	5.28E+00	1.44E+00	1.46E+00	1.72E+00		pCi/g	
18-04086-06	TRG	B103202ACJWC006CV	04/06/18 15:30	4/18/2018	4/18/2018	18-04086	Molybdenum-93	EPA 901.1 Modified	-4.37E-02	1.36E-01	1.36E-01	9.95E-02	U	pCi/g	
18-04086-06	TRG	B103202ACJWC006CV	04/06/18 15:30	4/18/2018	4/18/2018	18-04086	Niobium-94	EPA 901.1 Modified	-5.31E-02	1.57E-01	1.57E-01	1.97E-01	U	pCi/g	
18-04086-06	TRG	B103202ACJWC006CV	04/06/18 15:30	4/18/2018	4/18/2018	18-04086	Antimony-125	EPA 901.1 Modified	3.78E-02	5.06E-01	5.06E-01	7.50E-01	U	pCi/g	
18-04086-07	TRG	B103202ACJFC007CV	04/10/18 13:02	4/18/2018	4/18/2018	18-04086	Silver-108m	EPA 901.1 Modified	-9.03E-03	6.06E-02	6.06E-02	6.06E-02	U	pCi/g	
18-04086-07	TRG	B103202ACJFC007CV	04/10/18 13:02	4/18/2018	4/18/2018	18-04086	Cobalt-60	EPA 901.1 Modified	1.52E+00	1.28E-01	1.50E-01	1.19E-01		pCi/g	
18-04086-07	TRG	B103202ACJFC007CV	04/10/18 13:02	4/18/2018	4/18/2018	18-04086	Cesium-134	EPA 901.1 Modified	6.39E-04	2.68E-02	2.68E-02	6.17E-02	U	pCi/g	
18-04086-07	TRG	B103202ACJFC007CV	04/10/18 13:02	4/18/2018	4/18/2018	18-04086	Cesium-137	EPA 901.1 Modified	1.71E+00	2.08E-01	2.25E-01	1.15E-01		pCi/g	
18-04086-07	TRG	B103202ACJFC007CV	04/10/18 13:02	4/18/2018	4/18/2018	18-04086	Europium-152	EPA 901.1 Modified	9.44E-02	1.19E-01	1.19E-01	1.66E-01	U	pCi/g	
18-04086-07	TRG	B103202ACJFC007CV	04/10/18 13:02	4/18/2018	4/18/2018	18-04086	Europium-154	EPA 901.1 Modified	-8.61E-02	1.12E-01	1.13E-01	8.29E-02	U	pCi/g	
18-04086-07	TRG	B103202ACJFC007CV	04/10/18 13:02	4/18/2018	4/18/2018	18-04086	Europium-155	EPA 901.1 Modified	3.97E-02	4.70E-02	4.70E-02	1.32E-01	U	pCi/g	
18-04086-07	TRG	B103202ACJFC007CV	04/10/18 13:02	4/18/2018	4/18/2018	18-04086	Potassium-40	EPA 901.1 Modified	4.15E+00	7.78E-01	8.06E-01	6.04E-01		pCi/g	
18-04086-07	TRG	B103202ACJFC007CV	04/10/18 13:02	4/18/2018	4/18/2018	18-04086	Molybdenum-93	EPA 901.1 Modified	-8.57E-03	4.82E-02	4.82E-02	6.21E-02	U	pCi/g	
18-04086-07	TRG	B103202ACJFC007CV	04/10/18 13:02	4/18/2018	4/18/2018	18-04086	Niobium-94	EPA 901.1 Modified	-3.84E-02	5.91E-02	5.91E-02	8.15E-02	U	pCi/g	
18-04086-07	TRG	B103202ACJFC007CV	04/10/18 13:02	4/18/2018	4/18/2018	18-04086	Antimony-125	EPA 901.1 Modified	-9.98E-02	1.27E-01	1.27E-01	1.94E-01	U	pCi/g	
18-04086-08	TRG	B103202ACJFC008CV	04/07/18 13:55	4/18/2018	4/18/2018	18-04086	Silver-108m	EPA 901.1 Modified	-4.89E-03	1.52E-01	1.52E-01	1.80E-01	U	pCi/g	
18-04086-08	TRG	B103202ACJFC008CV	04/07/18 13:55	4/18/2018	4/18/2018	18-04086	Cobalt-60	EPA 901.1 Modified	4.59E+00	3.85E-01	4.51E-01	4.15E-01		pCi/g	
18-04086-08	TRG	B103202ACJFC008CV	04/07/18 13:55	4/18/2018	4/18/2018	18-04086	Cesium-134	EPA 901.1 Modified	-3.67E-02	5.30E-02	5.30E-02	2.00E-01	U	pCi/g	
18-04086-08	TRG	B103202ACJFC008CV	04/07/18 13:55	4/18/2018	4/18/2018	18-04086	Cesium-137	EPA 901.1 Modified	8.24E-01	2.33E-01	2.37E-01	3.08E-01		pCi/g	
18-04086-08	TRG	B103202ACJFC008CV	04/07/18 13:55	4/18/2018	4/18/2018	18-04086	Europium-152	EPA 901.1 Modified	-7.05E-02	3.36E-01	3.36E-01	4.16E-01	U	pCi/g	
18-04086-08	TRG	B103202ACJFC008CV	04/07/18 13:55	4/18/2018	4/18/2018	18-04086	Europium-154	EPA 901.1 Modified	1.42E-01	2.81E-01	2.81E-01	2.15E-01	U	pCi/g	
18-04086-08	TRG	B103202ACJFC008CV	04/07/18 13:55	4/18/2018	4/18/2018	18-04086	Europium-155	EPA 901.1 Modified	1.08E-01	1.75E-01	1.75E-01	3.37E-01	U	pCi/g	
18-04086-08	TRG	B103202ACJFC008CV	04/07/18 13:55	4/18/2018	4/18/2018	18-04086	Potassium-40	EPA 901.1 Modified	8.52E+00	2.18E+00	2.22E+00	2.43E+00		pCi/g	
18-04086-08	TRG	B103202ACJFC008CV	04/07/18 13:55	4/18/2018	4/18/2018	18-04086	Molybdenum-93	EPA 901.1 Modified	-1.45E-02	1.33E-01	1.33E-01	1.50E-01	U	pCi/g	
18-04086-08	TRG	B103202ACJFC008CV	04/07/18 13:55	4/18/2018	4/18/2018	18-04086	Niobium-94	EPA 901.1 Modified	3.20E-05	1.62E-01	1.62E-01	2.27E-01	U	pCi/g	
18-04086-08	TRG	B103202ACJFC008CV	04/07/18 13:55	4/18/2018	4/18/2018	18-04086	Antimony-125	EPA 901.1 Modified	1.37E-01	3.57E-01	3.57E-01	5.57E-01	U	pCi/g	

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Eberline Analytical Final Report of Analysis			Report To:						Work Order Details:								
			Patricia Giza						SDG:	18-04086							
			Zion Solutions, LLC						Purchase Order:	677116							
			101 Shiloh Blvd						Analysis Category:	ENVIRONMENTAL							
Zion, IL 60099						Sample Matrix:						SO					
Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Qualifier	Report Units			
18-04086-09	TRG	B103202ACJFC009CV	04/07/18 10:05	4/18/2018	4/18/2018	18-04086	Silver-108m	EPA 901.1 Modified	8.37E-02	1.47E-01	1.47E-01	2.43E-01	U	pCi/g			
18-04086-09	TRG	B103202ACJFC009CV	04/07/18 10:05	4/18/2018	4/18/2018	18-04086	Cobalt-60	EPA 901.1 Modified	2.15E-04	1.55E-01	1.55E-01	2.16E-01	U	pCi/g			
18-04086-09	TRG	B103202ACJFC009CV	04/07/18 10:05	4/18/2018	4/18/2018	18-04086	Cesium-134	EPA 901.1 Modified	1.23E-02	4.36E-02	4.36E-02	2.55E-01	U	pCi/g			
18-04086-09	TRG	B103202ACJFC009CV	04/07/18 10:05	4/18/2018	4/18/2018	18-04086	Cesium-137	EPA 901.1 Modified	1.02E-01	1.84E-01	1.84E-01	2.86E-01	U	pCi/g			
18-04086-09	TRG	B103202ACJFC009CV	04/07/18 10:05	4/18/2018	4/18/2018	18-04086	Europium-152	EPA 901.1 Modified	2.52E-01	4.51E-01	4.52E-01	5.80E-01	U	pCi/g			
18-04086-09	TRG	B103202ACJFC009CV	04/07/18 10:05	4/18/2018	4/18/2018	18-04086	Europium-154	EPA 901.1 Modified	-1.75E-01	3.46E-01	3.47E-01	2.94E-01	U	pCi/g			
18-04086-09	TRG	B103202ACJFC009CV	04/07/18 10:05	4/18/2018	4/18/2018	18-04086	Europium-155	EPA 901.1 Modified	8.90E-01	2.90E-01	2.94E-01	4.46E-01	U	pCi/g			
18-04086-09	TRG	B103202ACJFC009CV	04/07/18 10:05	4/18/2018	4/18/2018	18-04086	Potassium-40	EPA 901.1 Modified	7.51E+00	2.17E+00	2.21E+00	2.52E+00		pCi/g			
18-04086-09	TRG	B103202ACJFC009CV	04/07/18 10:05	4/18/2018	4/18/2018	18-04086	Molybdenum-93	EPA 901.1 Modified	-8.28E-03	1.46E-01	1.46E-01	1.29E-01	U	pCi/g			
18-04086-09	TRG	B103202ACJFC009CV	04/07/18 10:05	4/18/2018	4/18/2018	18-04086	Niobium-94	EPA 901.1 Modified	-4.96E-02	1.40E-01	1.40E-01	2.15E-01	U	pCi/g			
18-04086-09	TRG	B103202ACJFC009CV	04/07/18 10:05	4/18/2018	4/18/2018	18-04086	Antimony-125	EPA 901.1 Modified	2.14E-01	4.84E-01	4.84E-01	7.50E-01	U	pCi/g			
18-04086-10	TRG	B103202ACJFC010CV	04/10/18 08:00	4/18/2018	4/18/2018	18-04086	Silver-108m	EPA 901.1 Modified	-1.83E-01	1.94E-01	1.95E-01	1.76E-01	U	pCi/g			
18-04086-10	TRG	B103202ACJFC010CV	04/10/18 08:00	4/18/2018	4/18/2018	18-04086	Cobalt-60	EPA 901.1 Modified	2.55E+01	1.52E+00	2.00E+00	3.00E-01		pCi/g			
18-04086-10	TRG	B103202ACJFC010CV	04/10/18 08:00	4/18/2018	4/18/2018	18-04086	Cesium-134	EPA 901.1 Modified	2.62E-02	9.83E-02	9.83E-02	1.88E-01	U	pCi/g			
18-04086-10	TRG	B103202ACJFC010CV	04/10/18 08:00	4/18/2018	4/18/2018	18-04086	Cesium-137	EPA 901.1 Modified	1.03E+01	1.08E+00	1.21E+00	4.42E-01		pCi/g			
18-04086-10	TRG	B103202ACJFC010CV	04/10/18 08:00	4/18/2018	4/18/2018	18-04086	Europium-152	EPA 901.1 Modified	-5.54E-02	5.21E-01	5.21E-01	3.53E-01	U	pCi/g			
18-04086-10	TRG	B103202ACJFC010CV	04/10/18 08:00	4/18/2018	4/18/2018	18-04086	Europium-154	EPA 901.1 Modified	-2.15E-01	2.93E-01	2.93E-01	1.79E-01	U	pCi/g			
18-04086-10	TRG	B103202ACJFC010CV	04/10/18 08:00	4/18/2018	4/18/2018	18-04086	Europium-155	EPA 901.1 Modified	1.26E-01	1.98E-01	1.98E-01	2.63E-01	U	pCi/g			
18-04086-10	TRG	B103202ACJFC010CV	04/10/18 08:00	4/18/2018	4/18/2018	18-04086	Potassium-40	EPA 901.1 Modified	6.53E+00	1.36E+00	1.40E+00	2.01E+00		pCi/g			
18-04086-10	TRG	B103202ACJFC010CV	04/10/18 08:00	4/18/2018	4/18/2018	18-04086	Molybdenum-93	EPA 901.1 Modified	-1.98E-03	1.20E-01	1.20E-01	1.11E-01	U	pCi/g			
18-04086-10	TRG	B103202ACJFC010CV	04/10/18 08:00	4/18/2018	4/18/2018	18-04086	Niobium-94	EPA 901.1 Modified	1.15E-01	2.20E-01	2.20E-01	2.50E-01	U	pCi/g			
18-04086-10	TRG	B103202ACJFC010CV	04/10/18 08:00	4/18/2018	4/18/2018	18-04086	Antimony-125	EPA 901.1 Modified	8.39E-02	3.32E-01	3.32E-01	5.39E-01	U	pCi/g			
18-04086-11	TRG	B103202ACJFC011CV	04/09/18 13:35	4/18/2018	4/19/2018	18-04086	Silver-108m	EPA 901.1 Modified	1.27E-01	2.21E-01	2.21E-01	3.29E-01	U	pCi/g			
18-04086-11	TRG	B103202ACJFC011CV	04/09/18 13:35	4/18/2018	4/19/2018	18-04086	Cobalt-60	EPA 901.1 Modified	9.79E-01	2.32E-01	2.37E-01	4.18E-01		pCi/g			
18-04086-11	TRG	B103202ACJFC011CV	04/09/18 13:35	4/18/2018	4/19/2018	18-04086	Cesium-134	EPA 901.1 Modified	-1.21E-01	1.55E-01	1.55E-01	4.02E-01	U	pCi/g			
18-04086-11	TRG	B103202ACJFC011CV	04/09/18 13:35	4/18/2018	4/19/2018	18-04086	Cesium-137	EPA 901.1 Modified	4.30E-01	2.65E-01	2.66E-01	4.16E-01		pCi/g			
18-04086-11	TRG	B103202ACJFC011CV	04/09/18 13:35	4/18/2018	4/19/2018	18-04086	Europium-152	EPA 901.1 Modified	2.63E+00	1.21E+00	1.22E+00	7.43E-01	U	pCi/g			
18-04086-11	TRG	B103202ACJFC011CV	04/09/18 13:35	4/18/2018	4/19/2018	18-04086	Europium-154	EPA 901.1 Modified	1.62E-01	3.02E-01	3.02E-01	3.75E-01	U	pCi/g			
18-04086-11	TRG	B103202ACJFC011CV	04/09/18 13:35	4/18/2018	4/19/2018	18-04086	Europium-155	EPA 901.1 Modified	6.39E-01	2.83E-01	2.85E-01	5.64E-01	U	pCi/g			
18-04086-11	TRG	B103202ACJFC011CV	04/09/18 13:35	4/18/2018	4/19/2018	18-04086	Potassium-40	EPA 901.1 Modified	7.91E+00	2.48E+00	2.52E+00	2.84E+00		pCi/g			
18-04086-11	TRG	B103202ACJFC011CV	04/09/18 13:35	4/18/2018	4/19/2018	18-04086	Molybdenum-93	EPA 901.1 Modified	-1.48E-01	2.34E-01	2.34E-01	2.11E-01	U	pCi/g			
18-04086-11	TRG	B103202ACJFC011CV	04/09/18 13:35	4/18/2018	4/19/2018	18-04086	Niobium-94	EPA 901.1 Modified	-1.11E-01	2.04E-01	2.04E-01	2.97E-01	U	pCi/g			
18-04086-11	TRG	B103202ACJFC011CV	04/09/18 13:35	4/18/2018	4/19/2018	18-04086	Antimony-125	EPA 901.1 Modified	1.21E-01	6.58E-01	6.58E-01	1.00E+00	U	pCi/g			

CU=Counting Uncertainty;CSU=Combined Standard Uncertainty (1-sigma);MDA=Minimal Detected Activity;LCS=Laboratory Control Sample;MBL=Blank;DUP=Duplicate;TRG=Normal Sample;DO=Duplicate Original;U=Non-detect



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601 SCARBORO ROAD OAK RIDGE, TN 37830 865/481-0683 Fax 865/483-4621

REC'D APR 18 2018

Attachment 1 - Chain-of-Custody Form

Sample ID	Sample Log	Matrix	Sample Type	Sample Container				Sample Date	Sample Time	Analysis Type	Preservative	Remarks
				Vol	Unit	Type	Qty					
4 ✓ B103202ACJFC004CV	N/A	CONCRETE	CONCRETE	57.94	cm ³	Puck	1	04/10/2018	1542	FULL SUITE	N/A	0.0-0.5" 87.73g
5 ✓ B103202ACJFC005CV	N/A	CONCRETE	CONCRETE	57.94	cm ³	Puck	1	04/09/2018	0940	FULL SUITE	N/A	0.0-0.5" 63.74g
6 ✓ B103202ACJWC006CV	N/A	CONCRETE	CONCRETE	57.94	cm ³	Puck	1	04/06/2018	1530	FULL SUITE	N/A	0.0-0.5" 156.47g
7 ✓ B103202ACJFC007CV	N/A	CONCRETE	CONCRETE	57.94	cm ³	Puck	1	04/10/2018	1302	FULL SUITE	N/A	0.0-0.5" 235.30g
8 ✓ B103202ACJFC008CV	N/A	CONCRETE	CONCRETE	57.94	cm ³	Puck	1	04/07/2018	1355	FULL SUITE	N/A	0.0-0.5" 81.17g
9 ✓ B103202ACJFC009CV	N/A	CONCRETE	CONCRETE	57.94	cm ³	Puck	1	04/07/2018	1005	FULL SUITE	N/A	0.0-0.5" 97.54g
10 ✓ B103202ACJFC010CV	N/A	CONCRETE	CONCRETE	57.94	cm ³	Puck	1	04/10/2018	0800	FULL SUITE	N/A	0.0-0.5" 158.57g
11 ✓ B103202ACJFC011CV	N/A	CONCRETE	CONCRETE	57.94	cm ³	Puck	1	04/09/2018	1335	FULL SUITE	N/A	0.0-0.5" 76.27g
Laboratory: Eberline Labs				Date Submitted To Lab:				Ship Container No.: N/A		Cooler Temperature: N/A		Airbill Number: FEDEX 8107 0645 6644
Relinquished by: J. ALEX BOHACHEFF				Date: 04/17/2018	Time: 1215			Received by: Richard F. Rickett		Date: (mm/dd/yyyy): 04/17/2018		Time: 1215
Relinquished by: Richard F. Rickett				Date: 04/17/2018	Time: 1630			Received by: Fed Ex First Overnight		Date: (mm/dd/yyyy): 04/17/2018		Time: 1630
Relinquished by: Fed Ex First overnight				Date: 4/18/18	Time: 0750			Received by: Bahy Bannister		Date: (mm/dd/yyyy): 4/18/18		Time: 0750
Relinquished by:				Date: (mm/dd/yyyy):	Time:			Received by:		Date: (mm/dd/yyyy):		Time:
Comments PO# 677116 7 day turnaround Full Suite												



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EBS-OR-43302

February 2, 2018

Alex Bohacheff
Zion Solutions, LLC
101 Shiloh Blvd
Zion, IL 60099

CASE NARRATIVE

Work Order # 18-01063-OR

SAMPLE RECEIPT

This work order contains six solid samples received 01/19/2018. Samples were analyzed for Isotopic Plutonium, Plutonium-241, Neptunium-237, Americium-241/243, Curium-243/244, Strontium-90 (reported from Total Strontium), Technetium-99, Tritium, Carbon-14, Promethium-147, Nickel-59/63, Iron-55 and by Gamma Spectroscopy.

<u>CLIENT ID</u>	<u>LAB ID</u>	<u>CLIENT ID</u>	<u>LAB ID</u>
B102110CJWC001CV	18-01063-04	B101110CJWC002CV	18-01063-07
B102110CJFC005CV	18-01063-05	B101110CJFC005CV	18-01063-08
B102110CJWM013MT	18-01063-06	B101110CJFC007CV	18-01063-09

ANALYTICAL METHODS

Isotopic Plutonium and Plutonium-241 were analyzed using Method EML Pu-02 Modified. Neptunium-237 was analyzed using EIChrOM Method ACW08 Modified. Americium and Curium were analyzed using Method EML Am-01 Modified. Total Strontium was analyzed using EIChrOM Method SRW01 Modified. Technetium-99 was analyzed using EIChrOM Method TCS01 Modified. Tritium was performed using Method LANL ER-210 Modified. Carbon-14 was performed using EPA Method 520.0 Modified. Promethium-147 was performed using Method EML Pm-01 Modified. Nickel-59/63 was performed using Method ASTM 3500-Ni Modified. Iron-55 was performed using EML Method Fe-01-01 Modified. Gamma Spectroscopy was performed using EPA Method 901.1 Modified.

Laboratory qualifiers are as follows:

U - Result is less than the MDA.

ANALYTICAL RESULTS

Combined Standard Uncertainty is reported at 2-sigma value.

Minimum Detectable Activity (MDA) values for data represented in this report are sample-specific. MDA measurements are determined based on factors and conditions including instrument settings, aliquot size and matrix type.

ANALYTICAL RESULTS CONTINUED

SPECIAL CIRCUMSTANCES

Due to the sample matrix, most results demonstrated slightly high method detection limits. Client ID B102110CJWC001CV (lab fraction -04) was reanalyzed per client request under Work Order #18-01138. Some results for this sample only may have revision.

ISOTOPIC PLUTONIUM

Samples were prepared by removing representative aliquots followed by mixed acid digestions and dilutions as appropriate. Aliquots were taken from dilutions and Plutonium was selectively extracted by ion exchange. Plutonium was eluted, micro-precipitated and mounted on micro-porous filter media. Sample activities were then determined by alpha spectroscopy using energy specific regions of interest for Plutonium-238 and Plutonium-239. Chemical recovery was determined by the use of a Plutonium-242 tracer. Activity of the Plutonium-242 tracer was determined by alpha spectroscopy using an energy specific region of interest.

Samples demonstrated acceptable results for all Plutonium analyses. Chemical recovery was acceptable for all samples. The Plutonium-238 and Plutonium-239/240 method blank demonstrated acceptable results. Results for the Plutonium-238 and Plutonium-239/240 duplicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Plutonium-238 and Plutonium-239 laboratory control sample demonstrated an acceptable percent recovery.

PLUTONIUM-241

Following sample analysis for Isotopic Plutonium, filter media used was dissolved. Dissolved samples were placed into scintillation vials, scintillation cocktail was added and Plutonium-241 was determined by liquid scintillation counting. Analytical tracer recovery was determined by yields from the Isotopic Plutonium tracer.

Samples demonstrated acceptable results for all Plutonium-241 analyses. Chemical recovery was acceptable for all samples. The Plutonium-241 method blank demonstrated an acceptable result. Results for the Plutonium-241 duplicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Plutonium-241 laboratory control sample demonstrated an acceptable percent recovery.

NEPTUNIUM-237

Samples were prepared by removing representative aliquots followed by mixed acid digestions and dilutions as appropriate. Aliquots from dilutions were taken to dryness. Sample residues were dissolved in dilute acid and Neptunium was selectively separated using EichroM stabilized selective resins. Neptunium was eluted, micro-precipitated and mounted on micro-porous filter media. Sample activities were then determined by alpha spectroscopy using an energy specific region of interest for Neptunium-237 activity. A Neptunium-239 tracer was used to determine chemical yields by beta proportional counting.

ANALYTICAL RESULTS CONTINUED

NEPTUNIUM-237 CONTINUED

Samples demonstrated acceptable results for all Neptunium-237 analyses. Chemical recovery was acceptable for all samples. The Neptunium-237 method blank demonstrated an acceptable result. Results for the Neptunium-237 duplicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Neptunium-237 laboratory control sample demonstrated an acceptable percent recovery.

AMERICIUM-241

Samples were prepared by removing representative aliquots followed by mixed acid digestions and dilutions as appropriate. Aliquots from dilutions were taken and were co-precipitated with Calcium Phosphate. Precipitates were nitrate converted using Nitric acid and Aluminum Nitrate. The Americium fractions were separated from other elements using the Eichrom, TRU and UTEVA resins. The separated Americium fractions were then mounted on a membrane filter by micro-precipitation and counted on the alpha spectroscopy system. Analytical tracer recovery was determined by the use of an Americium-243 standard and subsequent activity determination by alpha spectroscopy.

Samples demonstrated acceptable results for all Americium-241 analyses. All results demonstrated slightly high method detection limits. Chemical recovery was low for laboratory fraction -06 (Client ID: B102110CJWM013MT). Reanalysis was not performed due to the non-positive sample nature. Chemical recovery was acceptable for all other samples. The Americium-241 method blank demonstrated an acceptable result. Results for the Americium-241 duplicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Americium-241 laboratory control sample demonstrated an acceptable percent recovery.

AMERICIUM-243

Samples were prepared by removing representative aliquots followed by mixed acid digestions and dilutions as appropriate. Aliquots from dilutions were taken and were co-precipitated with Calcium Phosphate. Precipitates were nitrate converted using Nitric acid and Aluminum Nitrate. The Americium fractions were separated from other elements using the Eichrom, TRU and UTEVA resins. The separated Americium fractions were then mounted on a membrane filter by micro-precipitation and counted on the alpha spectroscopy system. Analytical tracer recovery was determined by the use of a Curium-244 standard and subsequent activity determination by alpha spectroscopy.

Samples demonstrated acceptable results for all Americium-243 analyses. Chemical recovery was low for laboratory fraction -06 (Client ID: B102110CJWM013MT). Reanalysis was not performed due to the non-positive sample nature. Chemical recovery was acceptable for all other samples. The Americium-243 method blank demonstrated an acceptable result. Results for the Americium-243 duplicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Americium-243 laboratory control sample demonstrated an acceptable percent recovery.

ANALYTICAL RESULTS CONTINUED

CURIUM-243/244

Samples were prepared by removing representative aliquots followed by mixed acid digestions and dilutions as appropriate. Aliquots from dilutions were taken and were co-precipitated with Calcium Phosphate. Precipitates were nitrate converted using Nitric acid and Aluminum Nitrate. The Curium fractions were separated from other elements using the EIChrOM, TRU and UTEVA resins. The separated Curium fractions were then mounted on a membrane filter by micro-precipitation and counted on the alpha spectroscopy system. Analytical tracer recovery was determined by the use of an Americium-243 standard and subsequent activity determination by alpha spectroscopy.

Samples demonstrated acceptable results for all Curium-243/244 analyses. Chemical recovery was low for laboratory fraction -06 (Client ID: B102110CJWM013MT). Reanalysis was not performed due to the non-positive sample nature. Chemical recovery was acceptable for all other samples. The Curium-243/244 method blank demonstrated an acceptable result. Results for the Curium-243/244 duplicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Curium-244 laboratory control sample demonstrated an acceptable percent recovery.

TOTAL STRONTIUM

Samples were prepared by removing representative aliquots followed by mixed acid digestions and dilutions as appropriate. Aliquots from dilutions were taken and Strontium recovery carriers were added to each sample. Chemical separations were conducted using selective extractions. Strontium precipitate was mounted on tared filter media. Chemical recovery was determined by Strontium carrier mass determinations. Samples were counted by gas flow proportional counting and corrected for Yttrium-90 ingrowth.

Samples demonstrated acceptable results for all Total Strontium analyses. Strontium-90 results were reported from Total Strontium. Chemical recovery was acceptable for all samples. The Total Strontium method blank demonstrated an acceptable result. Results for the Total Strontium duplicate demonstrated an acceptable relative percent difference and normalized difference. Results for the Total Strontium laboratory control sample demonstrated an acceptable percent recovery.

TECHNETIUM-99

Samples were prepared by removing representative aliquots followed by mixed acid digestions and dilutions as appropriate. Aliquots from dilutions were taken and prepared by oxidative reactions with Nitric acid and Hydrogen Peroxide. After complete oxidization, Technetium was selectively extracted by the use of EIChrOM stabilized resins. Special cleanup chemistry was conducted for complete removal of interferences associated with Uranium. Processed resins were then transferred to liquid scintillation vials, scintillation cocktail was added and samples were counted by beta liquid scintillation.

Samples demonstrated acceptable results for all Technetium-99 analyses. The Technetium-99 method blank demonstrated an acceptable result. Results for the Technetium-99 duplicate demonstrated a slightly high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Technetium-99 laboratory control sample demonstrated an acceptable percent recovery.

ANALYTICAL RESULTS CONTINUED

TRITIUM

A representative aliquot of each sample was equilibrated with Tritium free water. Equilibrates were transferred into round-bottomed distillation flasks and attached to single stage stills. A portion of each middle distillation fraction was transferred to a liquid scintillation vial and cocktail was added. Samples were then counted by beta liquid scintillation.

Samples demonstrated acceptable results for all Tritium analyses. The Tritium method blank demonstrated an acceptable result. Results for the Tritium duplicate demonstrated an acceptable relative percent difference and normalized difference. Results for the Tritium laboratory control sample demonstrated an acceptable percent recovery.

CARBON-14

A representative aliquot of each sample was placed into a 1-liter reaction vessel. A carbonate solution was added. Samples were oxidized using Potassium Permanganate. Carbon Dioxide was evolved and Carbon-14 was captured into Harvey brand, Carb-Sorb cocktail. Carbon-14 beta emissions were then determined by beta liquid scintillation using an energy selective region.

Samples demonstrated acceptable results for all Carbon-14 analyses. The Carbon-14 method blank demonstrated an acceptable result. Results for the Carbon-14 duplicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Carbon-14 laboratory control sample demonstrated an acceptable percent recovery.

PROMETHIUM-147

Samples were prepared by removing representative aliquots followed by mixed acid digestions and dilutions as appropriate. Aliquots from dilutions were taken and acidified with HNO_3 and taken to dryness. A Promethium-147 extractant solution was added to each sample. A pipette was used to transfer top layer of sample to scintillation vial. Samples were counted by beta liquid scintillation using an energy selective region.

Samples demonstrated acceptable results for all Promethium-147 analyses. The Promethium-147 method blank demonstrated an acceptable result. Results for the Promethium-147 duplicate demonstrated an acceptable relative percent difference and normalized difference. Results for the Promethium-147 laboratory control sample demonstrated a slightly high percent recovery.

NICKEL-63

A representative aliquot of each sample was placed into an appropriately sized beaker. Stable elemental Nickel carrier was added to each sample prior to digestion. Samples were digested in concentrated Nitric acid. After digestion, sample pH was adjusted and Nickel-63 was precipitated selectively with Dimethylglyoxime. Precipitates were selectively separated, redissolved, and residual acid was effectively neutralized. Sample residuals were placed into scintillation vials, scintillation cocktail was added and Nickel-63 activity was determined by beta liquid scintillation.

ANALYTICAL RESULTS CONTINUED

NICKEL-63 CONTINUED

Samples demonstrated acceptable results for all Nickel-63 analyses. The Nickel-63 method blank demonstrated an acceptable result. Results for the Nickel-63 duplicate demonstrated an acceptable relative percent difference. Results for the Nickel-63 laboratory control sample demonstrated an acceptable percent recovery.

NICKEL-59

Following Nickel-63 determination by liquid scintillation, sample extractions were then counted by low energy photon spectroscopy for determination of Nickel-59 activity.

Samples demonstrated acceptable results for all Nickel-59 analyses. The Nickel-59 method blank demonstrated an acceptable result. Results for the Nickel-59 duplicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Iron-55 laboratory control sample demonstrated an acceptable percent recovery.

IRON-55

A representative aliquot from each sample was placed into a Petri geometry container. Samples were then counted on a planar, low energy photon spectroscopy (LEPS) detector.

Samples demonstrated acceptable results for all Iron-55 analyses. The Iron-55 method blank demonstrated an acceptable result. Results for the Iron-55 replicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Iron-55 laboratory control sample demonstrated an acceptable percent recovery.

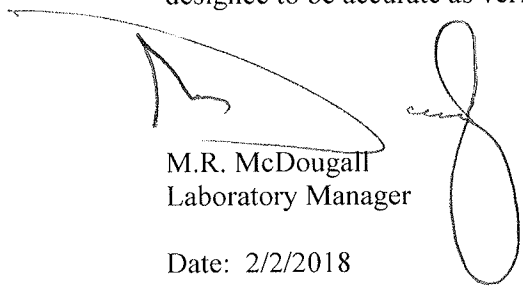
GAMMA SPECTROSCOPY

Samples for Gamma Spectroscopy analysis were prepared by transferring each sample to a standard geometry container. Samples were counted on High Purity Germanium (HPGe) gamma ray detectors.

Samples demonstrated acceptable results for all gamma-emitting radionuclides as reported. Cesium-134 for the method blank and laboratory fraction -08 (Client ID: B101110CJFC005CV), Molybdenum-93 for the method blank and laboratory fraction -07 (Client ID: B101110CJWC002CV), Europium-152 for laboratory fraction -08 (Client ID: B101110CJFC005CV) and Europium-154 for laboratory fraction -06 (Client ID: B102110CJWM013MT) demonstrated results that are greater than the method detection limit. These results are reported from the Canberra Gamma Apex "Nuclide MDA Report" and are not positive. These results are qualified as non-detect (U). The method blank demonstrated acceptable results for all radionuclides as reported. Results for the Cobalt-60 and Cesium-137 replicate demonstrated an acceptable relative percent difference and normalized difference. Results for the Cesium-134 replicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Cobalt-60 and Cesium-137 laboratory control sample demonstrated an acceptable percent recovery.

CERTIFICATION OF ACCURACY

I certify that this data report is in compliance with the terms and conditions of the Purchase Order, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hard copy data package has been authorized by the cognizant project manager or his/her designee to be accurate as verified by the following signature.



M.R. McDougall
Laboratory Manager

Date: 2/2/2018

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Eberline Analytical

Final Report of Analysis

Report To:

J Alex Bohacheff
Zion Solutions, LLC
101 Shiloh Blvd
Zion, IL 60099

Work Order Details:

SDG: **18-01063**
 Purchase Order: **677116**
 Analysis Category: **ENVIRONMENTAL**
 Sample Matrix: **SO**

Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Qualifier	Report Units
18-01063-01	LCS	KNOWN	01/19/18 00:00	1/19/2018	1/26/2018	18-01063	Americium-241	EML Am-01 Modified	5.45E+00	1.63E-01				pCi/g
18-01063-01	LCS	SPIKE	01/19/18 00:00	1/19/2018	1/26/2018	18-01063	Americium-241	EML Am-01 Modified	4.61E+00	8.17E-01	8.90E-01	9.67E-02		pCi/g
18-01063-02	MBL	BLANK	01/19/18 00:00	1/19/2018	1/26/2018	18-01063	Americium-241	EML Am-01 Modified	2.08E-02	4.50E-02	4.50E-02	8.87E-02	U	pCi/g
18-01063-03	DUP	B101110CJFC007CV	11/16/17 00:15	1/19/2018	1/26/2018	18-01063	Americium-241	EML Am-01 Modified	1.29E-01	1.09E-01	1.10E-01	1.45E-01	U	pCi/g
18-01063-04	TRG	B102110CJWC001CV	11/01/17 10:30	1/19/2018	1/26/2018	18-01063	Americium-241	EML Am-01 Modified	-1.09E-02	3.46E-02	3.46E-02	1.14E-01	U	pCi/g
18-01063-05	TRG	B102110CJFC005CV	11/01/17 12:40	1/19/2018	1/26/2018	18-01063	Americium-241	EML Am-01 Modified	4.33E-02	7.09E-02	7.10E-02	1.24E-01	U	pCi/g
18-01063-06	TRG	B102110CJWM013MT	11/07/17 20:15	1/19/2018	1/26/2018	18-01063	Americium-241	EML Am-01 Modified	-3.18E-02	3.60E-01	3.60E-01	1.10E+00	U	pCi/g
18-01063-07	TRG	B101110CJWC002CV	11/11/17 18:55	1/19/2018	1/26/2018	18-01063	Americium-241	EML Am-01 Modified	2.21E-01	1.32E-01	1.33E-01	1.01E-01		pCi/g
18-01063-08	TRG	B101110CJFC005CV	11/15/17 00:20	1/19/2018	1/26/2018	18-01063	Americium-241	EML Am-01 Modified	6.73E-02	7.33E-02	7.35E-02	8.79E-02	U	pCi/g
18-01063-09	DO	B101110CJFC007CV	11/16/17 00:15	1/19/2018	1/26/2018	18-01063	Americium-241	EML Am-01 Modified	6.95E-02	6.92E-02	6.94E-02	8.12E-02	U	pCi/g
18-01063-01	LCS	KNOWN	01/19/18 00:00	1/19/2018	1/26/2018	18-01063	Americium-243	EML Am-01 Modified	6.73E+00	2.02E-01				pCi/g
18-01063-01	LCS	SPIKE	01/19/18 00:00	1/19/2018	1/26/2018	18-01063	Americium-243	EML Am-01 Modified	7.13E+00	1.24E+00	1.64E+00	1.97E-01		pCi/g
18-01063-02	MBL	BLANK	01/19/18 00:00	1/19/2018	1/26/2018	18-01063	Americium-243	EML Am-01 Modified	7.74E-02	8.83E-02	8.91E-02	1.16E-01	U	pCi/g
18-01063-03	DUP	B101110CJFC007CV	11/16/17 00:15	1/19/2018	1/26/2018	18-01063	Americium-243	EML Am-01 Modified	8.37E-02	9.23E-02	9.32E-02	1.33E-01	U	pCi/g
18-01063-04	TRG	B102110CJWC001CV	11/01/17 10:30	1/19/2018	1/26/2018	18-01063	Americium-243	EML Am-01 Modified	8.44E-02	8.72E-02	8.81E-02	1.10E-01	U	pCi/g
18-01063-05	TRG	B102110CJFC005CV	11/01/17 12:40	1/19/2018	1/26/2018	18-01063	Americium-243	EML Am-01 Modified	3.40E-02	5.77E-02	5.80E-02	9.79E-02	U	pCi/g
18-01063-06	TRG	B102110CJWM013MT	11/07/17 20:15	1/19/2018	1/26/2018	18-01063	Americium-243	EML Am-01 Modified	-1.25E-01	7.58E-01	7.58E-01	2.38E+00	U	pCi/g
18-01063-07	TRG	B101110CJWC002CV	11/11/17 18:55	1/19/2018	1/26/2018	18-01063	Americium-243	EML Am-01 Modified	4.98E-02	8.47E-02	8.50E-02	1.49E-01	U	pCi/g
18-01063-08	TRG	B101110CJFC005CV	11/15/17 00:20	1/19/2018	1/26/2018	18-01063	Americium-243	EML Am-01 Modified	8.20E-03	3.42E-02	3.42E-02	8.78E-02	U	pCi/g
18-01063-09	DO	B101110CJFC007CV	11/16/17 00:15	1/19/2018	1/26/2018	18-01063	Americium-243	EML Am-01 Modified	2.29E-02	5.73E-02	5.74E-02	1.19E-01	U	pCi/g
18-01063-01	LCS	KNOWN	01/19/18 00:00	1/19/2018	1/26/2018	18-01063	Curium-243/244	EML Am-01 Modified	6.67E+00	1.20E-01				pCi/g
18-01063-01	LCS	SPIKE	01/19/18 00:00	1/19/2018	1/26/2018	18-01063	Curium-243/244	EML Am-01 Modified	5.05E+00	8.81E-01	1.07E+00	8.66E-02		pCi/g
18-01063-02	MBL	BLANK	01/19/18 00:00	1/19/2018	1/26/2018	18-01063	Curium-243/244	EML Am-01 Modified	3.92E-02	5.45E-02	5.47E-02	8.25E-02	U	pCi/g
18-01063-03	DUP	B101110CJFC007CV	11/16/17 00:15	1/19/2018	1/26/2018	18-01063	Curium-243/244	EML Am-01 Modified	-9.83E-04	6.00E-02	6.00E-02	1.46E-01	U	pCi/g
18-01063-04	TRG	B102110CJWC001CV	11/01/17 10:30	1/19/2018	1/26/2018	18-01063	Curium-243/244	EML Am-01 Modified	1.53E-02	4.53E-02	4.53E-02	9.86E-02	U	pCi/g
18-01063-05	TRG	B102110CJFC005CV	11/01/17 12:40	1/19/2018	1/26/2018	18-01063	Curium-243/244	EML Am-01 Modified	1.04E-01	8.30E-02	8.40E-02	7.49E-02		pCi/g
18-01063-06	TRG	B102110CJWM013MT	11/07/17 20:15	1/19/2018	1/26/2018	18-01063	Curium-243/244	EML Am-01 Modified	1.37E-01	4.93E-01	4.93E-01	1.11E+00	U	pCi/g
18-01063-07	TRG	B101110CJWC002CV	11/11/17 18:55	1/19/2018	1/26/2018	18-01063	Curium-243/244	EML Am-01 Modified	-3.07E-03	3.60E-02	3.60E-02	7.55E-02	U	pCi/g
18-01063-08	TRG	B101110CJFC005CV	11/15/17 00:20	1/19/2018	1/26/2018	18-01063	Curium-243/244	EML Am-01 Modified	4.92E-02	6.39E-02	6.42E-02	8.85E-02	U	pCi/g
18-01063-09	DO	B101110CJFC007CV	11/16/17 00:15	1/19/2018	1/26/2018	18-01063	Curium-243/244	EML Am-01 Modified	-7.94E-03	3.18E-02	3.19E-02	8.17E-02	U	pCi/g

CU=Counting Uncertainty;CSU=Combined Standard Uncertainty (2-sigma);MDA=Minimal Detected Activity;LCS=Laboratory Control Sample;MBL=Blank;DUP=Duplicate;TRG=Normal Sample;DO=Duplicate Original;U=Non-detect



EBERLINE ANALYTICAL CORPORATION

601 SCARBORO ROAD OAK RIDGE, TN 37830 865/481-0683 FAX 865/483-4621

Eberline Analytical Final Report of Analysis			Report To:						Work Order Details:						
			J Alex Bohacheff Zion Solutions, LLC 101 Shiloh Blvd Zion, IL 60099						SDG:		18-01063				
									Purchase Order:		677116				
									Analysis Category:		ENVIRONMENTAL				
									Sample Matrix:		SO				
Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Qualifier	Report Units	
18-01063-01	LCS	KNOWN	01/19/18 00:00	1/19/2018	1/23/2018	18-01063	Carbon-14	EPA 520.0 Modified	1.36E+03	3.82E+01				pCi/g	
18-01063-01	LCS	SPIKE	01/19/18 00:00	1/19/2018	1/23/2018	18-01063	Carbon-14	EPA 520.0 Modified	1.32E+03	1.37E+01	1.84E+02	5.56E+00		pCi/g	
18-01063-02	MBL	BLANK	01/19/18 00:00	1/19/2018	1/23/2018	18-01063	Carbon-14	EPA 520.0 Modified	1.03E+00	3.22E+00	3.22E+00	5.47E+00	U	pCi/g	
18-01063-03	DUP	B102110CJWC001CV	11/01/17 10:30	1/19/2018	1/23/2018	18-01063	Carbon-14	EPA 520.0 Modified	1.04E+00	1.82E+00	1.83E+00	3.08E+00	U	pCi/g	
18-01063-04	DO	B102110CJWC001CV	11/01/17 10:30	1/19/2018	1/23/2018	18-01063	Carbon-14	EPA 520.0 Modified	3.19E+00	2.68E+00	2.72E+00	4.47E+00	U	pCi/g	
18-01063-05	TRG	B102110CJFC005CV	11/01/17 12:40	1/19/2018	1/23/2018	18-01063	Carbon-14	EPA 520.0 Modified	1.01E+01	2.55E+00	2.92E+00	4.02E+00		pCi/g	
18-01063-06	TRG	B102110CJWM013MT	11/07/17 20:15	1/19/2018	1/23/2018	18-01063	Carbon-14	EPA 520.0 Modified	3.66E-01	2.86E+00	2.86E+00	4.87E+00	U	pCi/g	
18-01063-07	TRG	B101110CJWC002CV	11/11/17 18:55	1/19/2018	1/23/2018	18-01063	Carbon-14	EPA 520.0 Modified	6.14E+00	1.86E+00	2.05E+00	2.97E+00		pCi/g	
18-01063-08	TRG	B101110CJFC005CV	11/15/17 00:20	1/19/2018	1/23/2018	18-01063	Carbon-14	EPA 520.0 Modified	8.16E+00	2.43E+00	2.68E+00	3.87E+00		pCi/g	
18-01063-09	TRG	B101110CJFC007CV	11/16/17 00:15	1/19/2018	1/23/2018	18-01063	Carbon-14	EPA 520.0 Modified	4.42E+00	1.73E+00	1.83E+00	2.80E+00		pCi/g	
18-01063-01	LCS	KNOWN	01/19/18 00:00	1/19/2018	1/22/2018	18-01063	Iron-55	EML Fe-01-01 Modified	7.74E+03	3.25E+02				pCi/g	
18-01063-01	LCS	SPIKE	01/19/18 00:00	1/19/2018	1/22/2018	18-01063	Iron-55	EML Fe-01-01 Modified	6.98E+03	8.19E+02	1.46E+03	2.85E+02		pCi/g	
18-01063-02	MBL	BLANK	01/19/18 00:00	1/19/2018	1/22/2018	18-01063	Iron-55	EML Fe-01-01 Modified	-1.89E-02	3.83E+00	3.83E+00	5.97E+00	U	pCi/g	
18-01063-03	DUP	B102110CJWC001CV	11/01/17 10:30	1/19/2018	1/22/2018	18-01063	Iron-55	EML Fe-01-01 Modified	5.00E-02	2.80E+00	2.80E+00	4.28E+00	U	pCi/g	
18-01063-04	DO	B102110CJWC001CV	11/01/17 10:30	1/19/2018	1/22/2018	18-01063	Iron-55	EML Fe-01-01 Modified	4.05E+00	6.61E+00	6.64E+00	1.00E+01	U	pCi/g	
18-01063-05	TRG	B102110CJFC005CV	11/01/17 12:40	1/19/2018	1/22/2018	18-01063	Iron-55	EML Fe-01-01 Modified	2.26E+00	6.03E+00	6.04E+00	9.12E+00	U	pCi/g	
18-01063-06	TRG	B102110CJWM013MT	11/07/17 20:15	1/19/2018	1/22/2018	18-01063	Iron-55	EML Fe-01-01 Modified	2.02E+00	4.92E+00	4.94E+00	8.26E+00	U	pCi/g	
18-01063-07	TRG	B101110CJWC002CV	11/11/17 18:55	1/19/2018	1/22/2018	18-01063	Iron-55	EML Fe-01-01 Modified	2.65E+01	1.62E+01	1.68E+01	2.42E+01	U	pCi/g	
18-01063-08	TRG	B101110CJFC005CV	11/15/17 00:20	1/19/2018	1/22/2018	18-01063	Iron-55	EML Fe-01-01 Modified	1.39E-01	1.19E+01	1.19E+01	1.79E+01	U	pCi/g	
18-01063-09	TRG	B101110CJFC007CV	11/16/17 00:15	1/19/2018	1/22/2018	18-01063	Iron-55	EML Fe-01-01 Modified	-1.71E+00	8.32E+00	8.33E+00	1.25E+01	U	pCi/g	
18-01063-01	LCS	KNOWN	01/19/18 00:00	1/19/2018	1/24/2018	18-01063	Tritium	LANL ER-210 Modified	2.23E+02	8.02E+00				pCi/g	
18-01063-01	LCS	SPIKE	01/19/18 00:00	1/19/2018	1/24/2018	18-01063	Tritium	LANL ER-210 Modified	2.03E+02	5.41E+00	1.26E+01	3.73E+00		pCi/g	
18-01063-02	MBL	BLANK	01/19/18 00:00	1/19/2018	1/24/2018	18-01063	Tritium	LANL ER-210 Modified	1.48E+00	2.17E+00	2.17E+00	3.66E+00	U	pCi/g	
18-01063-03	DUP	B102110CJWC001CV	11/01/17 10:30	1/19/2018	1/24/2018	18-01063	Tritium	LANL ER-210 Modified	6.56E+01	1.25E+01	1.30E+01	1.85E+01		pCi/g	
18-01063-04	DO	B102110CJWC001CV	11/01/17 10:30	1/19/2018	1/25/2018	18-01063	Tritium	LANL ER-210 Modified	6.99E+01	1.25E+01	1.31E+01	1.84E+01		pCi/g	
18-01063-05	TRG	B102110CJFC005CV	11/01/17 12:40	1/19/2018	1/25/2018	18-01063	Tritium	LANL ER-210 Modified	5.72E+01	1.44E+01	1.47E+01	2.22E+01		pCi/g	
18-01063-06	TRG	B102110CJWM013MT	11/07/17 20:15	1/19/2018	1/25/2018	18-01063	Tritium	LANL ER-210 Modified	2.07E+01	8.74E+00	8.82E+00	1.41E+01		pCi/g	
18-01063-07	TRG	B101110CJWC002CV	11/11/17 18:55	1/19/2018	1/25/2018	18-01063	Tritium	LANL ER-210 Modified	3.24E+01	1.42E+01	1.43E+01	2.29E+01		pCi/g	
18-01063-08	TRG	B101110CJFC005CV	11/15/17 00:20	1/19/2018	1/25/2018	18-01063	Tritium	LANL ER-210 Modified	3.50E+01	1.58E+01	1.59E+01	2.56E+01		pCi/g	
18-01063-09	TRG	B101110CJFC007CV	11/16/17 00:15	1/19/2018	1/25/2018	18-01063	Tritium	LANL ER-210 Modified	5.38E+01	1.96E+01	1.98E+01	3.13E+01		pCi/g	

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601 SCARBORO ROAD OAK RIDGE, TN 37830 865/481-0683 FAX 865/483-4621

Eberline Analytical Final Report of Analysis			Report To:					Work Order Details:						
			J Alex Bohacheff					SDG:	18-01063					
			Zion Solutions, LLC					Purchase Order:	677116					
			101 Shiloh Blvd					Analysis Category:	ENVIRONMENTAL					
			Zion, IL 60099					Sample Matrix:	SO					
Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Qualifier	Report Units
18-01063-01	LCS	KNOWN	01/19/18 00:00	1/19/2018	1/25/2018	18-01063	Iron-55	ASTM 3500-Ni Modified	7.74E+03	3.25E+02				pCi/g
18-01063-01	LCS	SPIKE	01/19/18 00:00	1/19/2018	1/25/2018	18-01063	Iron-55	ASTM 3500-Ni Modified	7.06E+03	8.28E+02	9.60E+02	2.88E+02		pCi/g
18-01063-02	MBL	BLANK	01/19/18 00:00	1/19/2018	1/25/2018	18-01063	Nickel-59	ASTM 3500-Ni Modified	3.75E+00	2.42E+01	2.42E+01	3.93E+01	U	pCi/g
18-01063-03	DUP	B102110CJWC001CV	11/01/17 10:30	1/19/2018	1/25/2018	18-01063	Nickel-59	ASTM 3500-Ni Modified	-2.83E+01	7.86E+01	7.86E+01	1.42E+02	U	pCi/g
18-01063-04	DO	B102110CJWC001CV	11/01/17 10:30	1/19/2018	1/25/2018	18-01063	Nickel-59	ASTM 3500-Ni Modified	2.53E+01	8.21E+01	8.22E+01	1.34E+02	U	pCi/g
18-01063-05	TRG	B102110CJFC005CV	11/01/17 12:40	1/19/2018	1/25/2018	18-01063	Nickel-59	ASTM 3500-Ni Modified	1.53E+00	3.43E+01	3.43E+01	5.50E+01	U	pCi/g
18-01063-06	TRG	B102110CJWM013MT	11/07/17 20:15	1/19/2018	1/25/2018	18-01063	Nickel-59	ASTM 3500-Ni Modified	-4.10E+00	3.08E+01	3.08E+01	4.83E+01	U	pCi/g
18-01063-07	TRG	B101110CJWC002CV	11/11/17 18:55	1/19/2018	1/25/2018	18-01063	Nickel-59	ASTM 3500-Ni Modified	-6.18E+00	2.98E+01	2.98E+01	4.64E+01	U	pCi/g
18-01063-08	TRG	B101110CJFC005CV	11/15/17 00:20	1/19/2018	1/25/2018	18-01063	Nickel-59	ASTM 3500-Ni Modified	1.57E+02	9.68E+01	9.74E+01	1.53E+02		pCi/g
18-01063-09	TRG	B101110CJFC007CV	11/16/17 00:15	1/19/2018	1/25/2018	18-01063	Nickel-59	ASTM 3500-Ni Modified	-1.43E+01	5.52E+01	5.52E+01	8.40E+01	U	pCi/g
18-01063-01	LCS	KNOWN	01/19/18 00:00	1/19/2018	1/23/2018	18-01063	Nickel-63	ASTM 3500-Ni Modified	1.47E+03	4.42E+01				pCi/g
18-01063-01	LCS	SPIKE	01/19/18 00:00	1/19/2018	1/23/2018	18-01063	Nickel-63	ASTM 3500-Ni Modified	1.55E+03	9.76E+00	9.19E+01	2.30E+00		pCi/g
18-01063-02	MBL	BLANK	01/19/18 00:00	1/19/2018	1/23/2018	18-01063	Nickel-63	ASTM 3500-Ni Modified	-1.06E+00	1.36E+00	1.36E+00	2.37E+00	U	pCi/g
18-01063-03	DUP	B102110CJWC001CV	11/01/17 10:30	1/19/2018	1/23/2018	18-01063	Nickel-63	ASTM 3500-Ni Modified	9.57E+03	4.74E+01	5.65E+02	8.88E+00		pCi/g
18-01063-04	DO	B102110CJWC001CV	11/01/17 10:30	1/19/2018	1/23/2018	18-01063	Nickel-63	ASTM 3500-Ni Modified	1.15E+04	5.08E+01	6.79E+02	8.49E+00		pCi/g
18-01063-05	TRG	B102110CJFC005CV	11/01/17 12:40	1/19/2018	1/23/2018	18-01063	Nickel-63	ASTM 3500-Ni Modified	5.60E+02	7.38E+00	3.37E+01	3.45E+00		pCi/g
18-01063-06	TRG	B102110CJWM013MT	11/07/17 20:15	1/19/2018	1/23/2018	18-01063	Nickel-63	ASTM 3500-Ni Modified	4.89E+00	2.00E+00	2.02E+00	3.24E+00		pCi/g
18-01063-07	TRG	B101110CJWC002CV	11/11/17 18:55	1/19/2018	1/23/2018	18-01063	Nickel-63	ASTM 3500-Ni Modified	5.58E+03	2.07E+01	3.29E+02	2.91E+00		pCi/g
18-01063-08	TRG	B101110CJFC005CV	11/15/17 00:20	1/19/2018	1/23/2018	18-01063	Nickel-63	ASTM 3500-Ni Modified	9.00E+03	3.98E+01	5.31E+02	6.69E+00		pCi/g
18-01063-09	TRG	B101110CJFC007CV	11/16/17 00:15	1/19/2018	1/23/2018	18-01063	Nickel-63	ASTM 3500-Ni Modified	5.49E+02	9.30E+00	3.36E+01	5.35E+00		pCi/g
18-01063-01	LCS	KNOWN	01/19/18 00:00	1/19/2018	1/25/2018	18-01063	Neptunium-237	EiChroM ACW08 Mod	9.50E+00	3.42E-01				pCi/g
18-01063-01	LCS	SPIKE	01/19/18 00:00	1/19/2018	1/25/2018	18-01063	Neptunium-237	EiChroM ACW08 Mod	9.72E+00	7.98E-01	1.38E+00	1.40E-01		pCi/g
18-01063-02	MBL	BLANK	01/19/18 00:00	1/19/2018	1/25/2018	18-01063	Neptunium-237	EiChroM ACW08 Mod	2.46E-02	4.17E-02	4.18E-02	7.09E-02	U	pCi/g
18-01063-03	DUP	B102110CJWC001CV	11/01/17 10:30	1/19/2018	1/25/2018	18-01063	Neptunium-237	EiChroM ACW08 Mod	6.60E-02	6.50E-02	6.55E-02	7.72E-02	U	pCi/g
18-01063-04	DO	B102110CJWC001CV	11/01/17 10:30	1/19/2018	1/25/2018	18-01063	Neptunium-237	EiChroM ACW08 Mod	4.64E-03	3.00E-02	3.00E-02	8.17E-02	U	pCi/g
18-01063-05	TRG	B102110CJFC005CV	11/01/17 12:40	1/19/2018	1/25/2018	18-01063	Neptunium-237	EiChroM ACW08 Mod	4.15E-02	5.35E-02	5.37E-02	7.45E-02	U	pCi/g
18-01063-06	TRG	B102110CJWM013MT	11/07/17 20:15	1/19/2018	1/25/2018	18-01063	Neptunium-237	EiChroM ACW08 Mod	-8.07E-03	3.23E-02	3.23E-02	8.30E-02	U	pCi/g
18-01063-07	TRG	B101110CJWC002CV	11/11/17 18:55	1/19/2018	1/25/2018	18-01063	Neptunium-237	EiChroM ACW08 Mod	2.64E-03	3.68E-02	3.68E-02	1.05E-01	U	pCi/g
18-01063-08	TRG	B101110CJFC005CV	11/15/17 00:20	1/19/2018	1/25/2018	18-01063	Neptunium-237	EiChroM ACW08 Mod	8.64E-03	5.42E-02	5.42E-02	1.31E-01	U	pCi/g
18-01063-09	TRG	B101110CJFC007CV	11/16/17 00:15	1/19/2018	1/25/2018	18-01063	Neptunium-237	EiChroM ACW08 Mod	7.44E-03	3.10E-02	3.10E-02	7.97E-02	U	pCi/g

CU=Counting Uncertainty;CSU=Combined Standard Uncertainty (2-sigma);MDA=Minimal Detected Activity;LCS=Laboratory Control Sample;MBL=Blank;DUP=Duplicate;TRG=Normal Sample;DO=Duplicate Original;U=Non-detect



EBERLINE ANALYTICAL CORPORATION

601 SCARBORO ROAD OAK RIDGE, TN 37830 865/481-0683 FAX 865/483-4621

Eberline Analytical Final Report of Analysis			Report To:						Work Order Details:						
			J Alex Bohacheff						SDG:	18-01063					
			Zion Solutions, LLC						Purchase Order:	677116					
			101 Shiloh Blvd						Analysis Category:	ENVIRONMENTAL					
			Zion, IL 60099						Sample Matrix:	SO					
Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Qualifier	Report Units	
18-01063-01	LCS	KNOWN	01/19/18 00:00	1/19/2018	1/24/2018	18-01063	Promethium-147	EML Pm-01 Modified	4.50E+01	1.22E+00				pCi/g	
18-01063-01	LCS	SPIKE	01/19/18 00:00	1/19/2018	1/24/2018	18-01063	Promethium-147	EML Pm-01 Modified	5.74E+01	1.76E+00	8.79E+00	1.49E+00		pCi/g	
18-01063-02	MBL	BLANK	01/19/18 00:00	1/19/2018	1/24/2018	18-01063	Promethium-147	EML Pm-01 Modified	5.03E-01	8.72E-01	8.75E-01	1.47E+00	U	pCi/g	
18-01063-03	DUP	B102110CJWC001CV	11/01/17 10:30	1/19/2018	1/24/2018	18-01063	Promethium-147	EML Pm-01 Modified	2.06E+00	8.77E-01	9.30E-01	1.42E+00		pCi/g	
18-01063-04	DO	B102110CJWC001CV	11/01/17 10:30	1/19/2018	1/24/2018	18-01063	Promethium-147	EML Pm-01 Modified	2.32E+00	8.88E-01	9.54E-01	1.43E+00		pCi/g	
18-01063-05	TRG	B102110CJFC005CV	11/01/17 12:40	1/19/2018	1/24/2018	18-01063	Promethium-147	EML Pm-01 Modified	1.49E+01	1.26E+00	2.57E+00	1.65E+00		pCi/g	
18-01063-06	TRG	B102110CJWM013MT	11/07/17 20:15	1/19/2018	1/24/2018	18-01063	Promethium-147	EML Pm-01 Modified	2.36E+00	1.25E+00	1.30E+00	2.04E+00		pCi/g	
18-01063-07	TRG	B101110CJWC002CV	11/11/17 18:55	1/19/2018	1/24/2018	18-01063	Promethium-147	EML Pm-01 Modified	3.07E+01	1.47E+00	4.84E+00	1.57E+00		pCi/g	
18-01063-08	TRG	B101110CJFC005CV	11/15/17 00:20	1/19/2018	1/24/2018	18-01063	Promethium-147	EML Pm-01 Modified	3.27E+01	1.51E+00	5.14E+00	1.59E+00		pCi/g	
18-01063-09	TRG	B101110CJFC007CV	11/16/17 00:15	1/19/2018	1/24/2018	18-01063	Promethium-147	EML Pm-01 Modified	2.83E+00	1.01E+00	1.09E+00	1.62E+00		pCi/g	
18-01063-01	LCS	KNOWN	01/19/18 00:00	1/19/2018	1/25/2018	18-01063	Plutonium-238	EML Pu-02 Modified	5.16E+00	1.08E-01				pCi/g	
18-01063-01	LCS	SPIKE	01/19/18 00:00	1/19/2018	1/25/2018	18-01063	Plutonium-238	EML Pu-02 Modified	4.84E+00	8.57E-01	9.75E-01	1.28E-01		pCi/g	
18-01063-02	MBL	BLANK	01/19/18 00:00	1/19/2018	1/25/2018	18-01063	Plutonium-238	EML Pu-02 Modified	-1.09E-02	3.31E-02	3.31E-02	9.02E-02	U	pCi/g	
18-01063-03	DUP	B102110CJWC001CV	11/01/17 10:30	1/19/2018	1/25/2018	18-01063	Plutonium-238	EML Pu-02 Modified	3.52E-02	8.37E-02	8.37E-02	1.62E-01	U	pCi/g	
18-01063-04	DO	B102110CJWC001CV	11/01/17 10:30	1/19/2018	1/25/2018	18-01063	Plutonium-238	EML Pu-02 Modified	-1.95E-02	4.28E-02	4.28E-02	1.46E-01	U	pCi/g	
18-01063-05	TRG	B102110CJFC005CV	11/01/17 12:40	1/19/2018	1/25/2018	18-01063	Plutonium-238	EML Pu-02 Modified	3.59E-02	8.23E-02	8.24E-02	1.60E-01	U	pCi/g	
18-01063-06	TRG	B102110CJWM013MT	11/07/17 20:15	1/19/2018	1/25/2018	18-01063	Plutonium-238	EML Pu-02 Modified	5.71E-03	7.98E-02	7.98E-02	2.28E-01	U	pCi/g	
18-01063-07	TRG	B101110CJWC002CV	11/11/17 18:55	1/19/2018	1/25/2018	18-01063	Plutonium-238	EML Pu-02 Modified	3.56E-02	6.78E-02	6.79E-02	1.25E-01	U	pCi/g	
18-01063-08	TRG	B101110CJFC005CV	11/15/17 00:20	1/19/2018	1/25/2018	18-01063	Plutonium-238	EML Pu-02 Modified	-9.89E-03	5.87E-02	5.87E-02	1.39E-01	U	pCi/g	
18-01063-09	TRG	B101110CJFC007CV	11/16/17 00:15	1/19/2018	1/25/2018	18-01063	Plutonium-238	EML Pu-02 Modified	2.95E-03	4.13E-02	4.13E-02	1.18E-01	U	pCi/g	
18-01063-01	LCS	KNOWN	01/19/18 00:00	1/19/2018	1/25/2018	18-01063	Plutonium-239/240	EML Pu-02 Modified	7.01E+00	2.24E-01				pCi/g	
18-01063-01	LCS	SPIKE	01/19/18 00:00	1/19/2018	1/25/2018	18-01063	Plutonium-239/240	EML Pu-02 Modified	8.13E+00	1.30E+00	1.52E+00	9.17E-02		pCi/g	
18-01063-02	MBL	BLANK	01/19/18 00:00	1/19/2018	1/25/2018	18-01063	Plutonium-239/240	EML Pu-02 Modified	5.12E-03	3.31E-02	3.31E-02	9.02E-02	U	pCi/g	
18-01063-03	DUP	B102110CJWC001CV	11/01/17 10:30	1/19/2018	1/25/2018	18-01063	Plutonium-239/240	EML Pu-02 Modified	-1.30E-02	5.57E-02	5.57E-02	1.55E-01	U	pCi/g	
18-01063-04	DO	B102110CJWC001CV	11/01/17 10:30	1/19/2018	1/25/2018	18-01063	Plutonium-239/240	EML Pu-02 Modified	3.39E-02	6.59E-02	6.60E-02	1.23E-01	U	pCi/g	
18-01063-05	TRG	B102110CJFC005CV	11/01/17 12:40	1/19/2018	1/25/2018	18-01063	Plutonium-239/240	EML Pu-02 Modified	6.30E-02	8.03E-02	8.05E-02	1.20E-01	U	pCi/g	
18-01063-06	TRG	B102110CJWM013MT	11/07/17 20:15	1/19/2018	1/25/2018	18-01063	Plutonium-239/240	EML Pu-02 Modified	5.70E-03	7.97E-02	7.97E-02	2.27E-01	U	pCi/g	
18-01063-07	TRG	B101110CJWC002CV	11/11/17 18:55	1/19/2018	1/25/2018	18-01063	Plutonium-239/240	EML Pu-02 Modified	1.07E-01	1.07E-01	1.07E-01	1.25E-01	U	pCi/g	
18-01063-08	TRG	B101110CJFC005CV	11/15/17 00:20	1/19/2018	1/25/2018	18-01063	Plutonium-239/240	EML Pu-02 Modified	-9.88E-03	5.86E-02	5.86E-02	1.39E-01	U	pCi/g	
18-01063-09	TRG	B101110CJFC007CV	11/16/17 00:15	1/19/2018	1/25/2018	18-01063	Plutonium-239/240	EML Pu-02 Modified	9.24E-03	5.79E-02	5.79E-02	1.40E-01	U	pCi/g	

CU=Counting Uncertainty;CSU=Combined Standard Uncertainty (2-sigma);MDA=Minimal Detected Activity;LCS=Laboratory Control Sample;MBL=Blank;DUP=Duplicate;TRG=Normal Sample;DO=Duplicate Original;U=Non-detect



EBERLINE ANALYTICAL CORPORATION

601 SCARBORO ROAD OAK RIDGE, TN 37830 865/481-0683 FAX 865/483-4621

Eberline Analytical Final Report of Analysis			Report To:						Work Order Details:						
			J Alex Bohacheff Zion Solutions, LLC 101 Shiloh Blvd Zion, IL 60099						SDG: 18-01063						
									Purchase Order: 677116						
									Analysis Category: ENVIRONMENTAL						
						Sample Matrix: SO									
Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Qualifier	Report Units	
18-01063-01	LCS	KNOWN	01/19/18 00:00	1/19/2018	1/25/2018	18-01063	Plutonium-241	EML Pu-02 Modified	2.80E+02	1.29E+01				pCi/g	
18-01063-01	LCS	SPIKE	01/19/18 00:00	1/19/2018	1/25/2018	18-01063	Plutonium-241	EML Pu-02 Modified	2.44E+02	7.64E+00	2.12E+01	7.00E+00		pCi/g	
18-01063-02	MBL	BLANK	01/19/18 00:00	1/19/2018	1/25/2018	18-01063	Plutonium-241	EML Pu-02 Modified	-2.38E+00	4.51E+00	4.51E+00	7.80E+00	U	pCi/g	
18-01063-03	DUP	B102110CJWC001CV	11/01/17 10:30	1/19/2018	1/25/2018	18-01063	Plutonium-241	EML Pu-02 Modified	-1.37E+00	5.25E+00	5.25E+00	9.02E+00	U	pCi/g	
18-01063-04	DO	B102110CJWC001CV	11/01/17 10:30	1/19/2018	1/25/2018	18-01063	Plutonium-241	EML Pu-02 Modified	-2.61E+00	5.66E+00	5.66E+00	9.77E+00	U	pCi/g	
18-01063-05	TRG	B102110CJFC005CV	11/01/17 12:40	1/19/2018	1/25/2018	18-01063	Plutonium-241	EML Pu-02 Modified	-3.81E+00	5.77E+00	5.78E+00	1.00E+01	U	pCi/g	
18-01063-06	TRG	B102110CJWM013MT	11/07/17 20:15	1/19/2018	1/26/2018	18-01063	Plutonium-241	EML Pu-02 Modified	-1.64E+01	1.06E+01	1.07E+01	1.87E+01	U	pCi/g	
18-01063-07	TRG	B101110CJWC002CV	11/11/17 18:55	1/19/2018	1/26/2018	18-01063	Plutonium-241	EML Pu-02 Modified	-8.05E+00	8.07E+00	8.10E+00	1.41E+01	U	pCi/g	
18-01063-08	TRG	B101110CJFC005CV	11/15/17 00:20	1/19/2018	1/26/2018	18-01063	Plutonium-241	EML Pu-02 Modified	-1.19E+01	7.35E+00	7.41E+00	1.30E+01	U	pCi/g	
18-01063-09	TRG	B101110CJFC007CV	11/16/17 00:15	1/19/2018	1/26/2018	18-01063	Plutonium-241	EML Pu-02 Modified	-4.70E+00	4.71E+00	4.73E+00	8.23E+00	U	pCi/g	
18-01063-01	LCS	KNOWN	01/19/18 00:00	1/19/2018	1/25/2018	18-01063	Technetium-99	EiChroM TCS01 Modified	1.00E+03	2.20E+01				pCi/g	
18-01063-01	LCS	SPIKE	01/19/18 00:00	1/19/2018	1/25/2018	18-01063	Technetium-99	EiChroM TCS01 Modified	1.03E+03	5.80E+00	1.03E+02	1.34E+00		pCi/g	
18-01063-02	MBL	BLANK	01/19/18 00:00	1/19/2018	1/25/2018	18-01063	Technetium-99	EiChroM TCS01 Modified	1.23E+00	8.31E-01	8.40E-01	1.38E+00	U	pCi/g	
18-01063-03	DUP	B102110CJWC001CV	11/01/17 10:30	1/19/2018	1/25/2018	18-01063	Technetium-99	EiChroM TCS01 Modified	1.25E+00	7.50E-01	7.60E-01	1.24E+00		pCi/g	
18-01063-04	DO	B102110CJWC001CV	11/01/17 10:30	1/19/2018	1/25/2018	18-01063	Technetium-99	EiChroM TCS01 Modified	1.61E+00	7.55E-01	7.72E-01	1.24E+00		pCi/g	
18-01063-05	TRG	B102110CJFC005CV	11/01/17 12:40	1/19/2018	1/25/2018	18-01063	Technetium-99	EiChroM TCS01 Modified	1.59E+00	7.45E-01	7.62E-01	1.22E+00		pCi/g	
18-01063-06	TRG	B102110CJWM013MT	11/07/17 20:15	1/19/2018	1/25/2018	18-01063	Technetium-99	EiChroM TCS01 Modified	9.04E-01	7.64E-01	7.69E-01	1.28E+00	U	pCi/g	
18-01063-07	TRG	B101110CJWC002CV	11/11/17 18:55	1/19/2018	1/25/2018	18-01063	Technetium-99	EiChroM TCS01 Modified	2.01E+00	7.72E-01	7.97E-01	1.25E+00		pCi/g	
18-01063-08	TRG	B101110CJFC005CV	11/15/17 00:20	1/19/2018	1/25/2018	18-01063	Technetium-99	EiChroM TCS01 Modified	1.29E+00	7.49E-01	7.60E-01	1.24E+00		pCi/g	
18-01063-09	TRG	B101110CJFC007CV	11/16/17 00:15	1/19/2018	1/25/2018	18-01063	Technetium-99	EiChroM TCS01 Modified	2.29E+00	7.79E-01	8.12E-01	1.25E+00		pCi/g	
18-01063-01	LCS	KNOWN	01/19/18 00:00	1/19/2018	1/26/2018	18-01063	Strontium-90	EiChroM SRW01 Modified	5.08E+01	2.84E-01				pCi/g	
18-01063-01	LCS	SPIKE	01/19/18 00:00	1/19/2018	1/26/2018	18-01063	Strontium-90	EiChroM SRW01 Modified	4.00E+01	1.83E+00	1.41E+01	9.02E-01		pCi/g	
18-01063-02	MBL	BLANK	01/19/18 00:00	1/19/2018	1/26/2018	18-01063	Strontium-90	EiChroM SRW01 Modified	1.46E+00	6.17E-01	7.98E-01	9.28E-01		pCi/g	
18-01063-03	DUP	B102110CJWC001CV	11/01/17 10:30	1/19/2018	1/26/2018	18-01063	Strontium-90	EiChroM SRW01 Modified	1.56E+02	3.30E+00	5.42E+01	9.12E-01		pCi/g	
18-01063-04	DO	B102110CJWC001CV	11/01/17 10:30	1/19/2018	1/26/2018	18-01063	Strontium-90	EiChroM SRW01 Modified	1.74E+02	3.55E+00	6.07E+01	8.13E-01		pCi/g	
18-01063-05	TRG	B102110CJFC005CV	11/01/17 12:40	1/19/2018	1/26/2018	18-01063	Strontium-90	EiChroM SRW01 Modified	9.38E+00	9.07E-01	3.39E+00	8.03E-01		pCi/g	
18-01063-06	TRG	B102110CJWM013MT	11/07/17 20:15	1/19/2018	1/26/2018	18-01063	Strontium-90	EiChroM SRW01 Modified	4.86E-01	5.20E-01	5.47E-01	8.71E-01	U	pCi/g	
18-01063-07	TRG	B101110CJWC002CV	11/11/17 18:55	1/19/2018	1/26/2018	18-01063	Strontium-90	EiChroM SRW01 Modified	1.53E+02	3.37E+00	5.34E+01	7.92E-01		pCi/g	
18-01063-08	TRG	B101110CJFC005CV	11/15/17 00:20	1/19/2018	1/26/2018	18-01063	Strontium-90	EiChroM SRW01 Modified	2.86E+01	1.51E+00	1.01E+01	7.82E-01		pCi/g	
18-01063-09	TRG	B101110CJFC007CV	11/16/17 00:15	1/19/2018	1/26/2018	18-01063	Strontium-90	EiChroM SRW01 Modified	1.09E+01	1.04E+00	3.94E+00	8.54E-01		pCi/g	

CU=Counting Uncertainty;CSU=Combined Standard Uncertainty (2-sigma);MDA=Minimal Detected Activity;LCS=Laboratory Control Sample;MBL=Blank;DUP=Duplicate;TRG=Normal Sample;DO=Duplicate Original;U=Non-detect



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Eberline Analytical Final Report of Analysis			Report To:						Work Order Details:						
			J Alex Bohacheff Zion Solutions, LLC 101 Shiloh Blvd Zion, IL 60099						SDG:	18-01063					
									Purchase Order:	677116					
									Analysis Category:	ENVIRONMENTAL					
									Sample Matrix:	SO					
Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Qualifier	Report Units	
18-01063-01	LCS	KNOWN	01/19/18 00:00	1/19/2018	1/19/2018	18-01063	Cobalt-60	EPA 901.1 Modified	2.71E+02	1.06E+01				pCi/g	
18-01063-01	LCS	KNOWN	01/19/18 00:00	1/19/2018	1/19/2018	18-01063	Cesium-137	EPA 901.1 Modified	1.69E+02	6.75E+00				pCi/g	
18-01063-01	LCS	SPIKE	01/19/18 00:00	1/19/2018	1/19/2018	18-01063	Cobalt-60	EPA 901.1 Modified	2.87E+02	1.77E+01	2.30E+01	2.38E+00		pCi/g	
18-01063-01	LCS	SPIKE	01/19/18 00:00	1/19/2018	1/19/2018	18-01063	Cesium-137	EPA 901.1 Modified	1.92E+02	3.17E+01	3.32E+01	2.66E+00		pCi/g	
18-01063-02	MBL	BLANK	01/19/18 00:00	1/19/2018	1/19/2018	18-01063	Silver-108m	EPA 901.1 Modified	-3.37E-02	8.12E-02	8.12E-02	6.85E-02	U	pCi/g	
18-01063-02	MBL	BLANK	01/19/18 00:00	1/19/2018	1/19/2018	18-01063	Cobalt-60	EPA 901.1 Modified	3.43E-02	3.37E-02	3.38E-02	1.03E-01	U	pCi/g	
18-01063-02	MBL	BLANK	01/19/18 00:00	1/19/2018	1/19/2018	18-01063	Cesium-134	EPA 901.1 Modified	-4.05E-02	8.40E-02	8.40E-02	9.29E-02	U	pCi/g	
18-01063-02	MBL	BLANK	01/19/18 00:00	1/19/2018	1/19/2018	18-01063	Cesium-137	EPA 901.1 Modified	-7.55E-02	8.97E-02	8.98E-02	9.49E-02	U	pCi/g	
18-01063-02	MBL	BLANK	01/19/18 00:00	1/19/2018	1/19/2018	18-01063	Europium-152	EPA 901.1 Modified	-9.17E-02	1.77E-01	1.77E-01	1.46E-01	U	pCi/g	
18-01063-02	MBL	BLANK	01/19/18 00:00	1/19/2018	1/19/2018	18-01063	Europium-154	EPA 901.1 Modified	5.18E-02	1.58E-01	1.58E-01	7.55E-02	U	pCi/g	
18-01063-02	MBL	BLANK	01/19/18 00:00	1/19/2018	1/19/2018	18-01063	Europium-155	EPA 901.1 Modified	5.35E-02	5.98E-02	5.98E-02	1.26E-01	U	pCi/g	
18-01063-02	MBL	BLANK	01/19/18 00:00	1/19/2018	1/19/2018	18-01063	Molybdenum-93	EPA 901.1 Modified	-3.30E-03	5.56E-02	5.56E-02	7.75E-02	U	pCi/g	
18-01063-02	MBL	BLANK	01/19/18 00:00	1/19/2018	1/19/2018	18-01063	Niobium-94	EPA 901.1 Modified	3.47E-02	5.18E-02	5.19E-02	9.41E-02	U	pCi/g	
18-01063-02	MBL	BLANK	01/19/18 00:00	1/19/2018	1/19/2018	18-01063	Antimony-125	EPA 901.1 Modified	-1.45E-02	1.53E-01	1.53E-01	2.41E-01	U	pCi/g	
18-01063-03	DUP	B102110CJWC001CV	11/01/17 10:30	1/19/2018	1/19/2018	18-01063	Silver-108m	EPA 901.1 Modified	-1.37E-01	5.28E-01	5.28E-01	7.93E-01	U	pCi/g	
18-01063-03	DUP	B102110CJWC001CV	11/01/17 10:30	1/19/2018	1/19/2018	18-01063	Cobalt-60	EPA 901.1 Modified	2.50E+00	5.17E-01	5.33E-01	1.31E-01		pCi/g	
18-01063-03	DUP	B102110CJWC001CV	11/01/17 10:30	1/19/2018	1/19/2018	18-01063	Cesium-134	EPA 901.1 Modified	9.27E-01	2.63E+00	2.63E+00	7.25E-01	U	pCi/g	
18-01063-03	DUP	B102110CJWC001CV	11/01/17 10:30	1/19/2018	1/19/2018	18-01063	Cesium-137	EPA 901.1 Modified	1.70E+03	3.00E+02	3.12E+02	6.40E+00		pCi/g	
18-01063-03	DUP	B102110CJWC001CV	11/01/17 10:30	1/19/2018	1/19/2018	18-01063	Europium-152	EPA 901.1 Modified	2.46E+00	1.43E+01	1.43E+01	8.96E+00	U	pCi/g	
18-01063-03	DUP	B102110CJWC001CV	11/01/17 10:30	1/19/2018	1/19/2018	18-01063	Europium-154	EPA 901.1 Modified	5.20E-01	5.11E-01	5.12E-01	1.56E+00	U	pCi/g	
18-01063-03	DUP	B102110CJWC001CV	11/01/17 10:30	1/19/2018	1/19/2018	18-01063	Europium-155	EPA 901.1 Modified	-1.95E+00	5.16E+00	5.16E+00	5.40E+00	U	pCi/g	
18-01063-03	DUP	B102110CJWC001CV	11/01/17 10:30	1/19/2018	1/19/2018	18-01063	Molybdenum-93	EPA 901.1 Modified	4.00E-01	4.30E-01	4.31E-01	1.40E-01	U	pCi/g	
18-01063-03	DUP	B102110CJWC001CV	11/01/17 10:30	1/19/2018	1/19/2018	18-01063	Niobium-94	EPA 901.1 Modified	2.34E-01	5.50E-01	5.50E-01	7.79E-01	U	pCi/g	
18-01063-03	DUP	B102110CJWC001CV	11/01/17 10:30	1/19/2018	1/19/2018	18-01063	Antimony-125	EPA 901.1 Modified	-1.27E+01	1.30E+01	1.30E+01	1.81E+01	U	pCi/g	

CU=Counting Uncertainty;CSU=Combined Standard Uncertainty (2-sigma);MDA=Minimal Detected Activity;LCS=Laboratory Control Sample;MBL=Blank;DUP=Duplicate;TRG=Normal Sample;DO=Duplicate Original;U=Non-detect



EBERLINE ANALYTICAL CORPORATION

601 SCARBORO ROAD OAK RIDGE, TN 37830 865/481-0683 FAX 865/483-4621

Eberline Analytical Final Report of Analysis			Report To:					Work Order Details:							
			J Alex Bohacheff					SDG:	18-01063						
			Zion Solutions, LLC					Purchase Order:	677116						
			101 Shiloh Blvd					Analysis Category:	ENVIRONMENTAL						
			Zion, IL 60099					Sample Matrix:	SO						
Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Qualifier	Report Units	
18-01063-04	DO	B102110CJWC001CV	11/01/17 10:30	1/19/2018	1/19/2018	18-01063	Silver-108m	EPA 901.1 Modified	3.37E-01	4.36E-01	4.37E-01	8.09E-01	U	pCi/g	
18-01063-04	DO	B102110CJWC001CV	11/01/17 10:30	1/19/2018	1/19/2018	18-01063	Cobalt-60	EPA 901.1 Modified	2.65E+00	5.07E-01	5.25E-01	1.31E-01		pCi/g	
18-01063-04	DO	B102110CJWC001CV	11/01/17 10:30	1/19/2018	1/19/2018	18-01063	Cesium-134	EPA 901.1 Modified	-2.69E-01	2.60E+00	2.60E+00	8.52E-01	U	pCi/g	
18-01063-04	DO	B102110CJWC001CV	11/01/17 10:30	1/19/2018	1/19/2018	18-01063	Cesium-137	EPA 901.1 Modified	1.68E+03	2.96E+02	3.08E+02	6.66E+00		pCi/g	
18-01063-04	DO	B102110CJWC001CV	11/01/17 10:30	1/19/2018	1/19/2018	18-01063	Europium-152	EPA 901.1 Modified	9.24E+00	2.33E+00	2.38E+00	1.17E+00		pCi/g	
18-01063-04	DO	B102110CJWC001CV	11/01/17 10:30	1/19/2018	1/19/2018	18-01063	Europium-154	EPA 901.1 Modified	3.90E-01	4.42E-01	4.43E-01	1.40E+00	U	pCi/g	
18-01063-04	DO	B102110CJWC001CV	11/01/17 10:30	1/19/2018	1/19/2018	18-01063	Europium-155	EPA 901.1 Modified	-4.03E+00	5.15E+00	5.15E+00	5.32E+00	U	pCi/g	
18-01063-04	DO	B102110CJWC001CV	11/01/17 10:30	1/19/2018	1/19/2018	18-01063	Molybdenum-93	EPA 901.1 Modified	-2.83E-01	5.19E-01	5.19E-01	5.59E-01	U	pCi/g	
18-01063-04	DO	B102110CJWC001CV	11/01/17 10:30	1/19/2018	1/19/2018	18-01063	Niobium-94	EPA 901.1 Modified	-2.73E-01	5.04E-01	5.04E-01	6.65E-01	U	pCi/g	
18-01063-04	DO	B102110CJWC001CV	11/01/17 10:30	1/19/2018	1/19/2018	18-01063	Antimony-125	EPA 901.1 Modified	-8.07E+00	1.30E+01	1.31E+01	1.85E+01	U	pCi/g	
18-01063-05	TRG	B102110CJFC005CV	11/01/17 12:40	1/19/2018	1/19/2018	18-01063	Silver-108m	EPA 901.1 Modified	1.49E+00	2.50E+00	2.50E+00	3.47E+00	U	pCi/g	
18-01063-05	TRG	B102110CJFC005CV	11/01/17 12:40	1/19/2018	1/19/2018	18-01063	Cobalt-60	EPA 901.1 Modified	7.49E+01	5.47E+00	6.68E+00	2.23E+00		pCi/g	
18-01063-05	TRG	B102110CJFC005CV	11/01/17 12:40	1/19/2018	1/19/2018	18-01063	Cesium-134	EPA 901.1 Modified	-1.55E+00	4.38E+00	4.38E+00	3.18E+00	U	pCi/g	
18-01063-05	TRG	B102110CJFC005CV	11/01/17 12:40	1/19/2018	1/19/2018	18-01063	Cesium-137	EPA 901.1 Modified	1.04E+04	1.72E+03	1.80E+03	2.28E+01		pCi/g	
18-01063-05	TRG	B102110CJFC005CV	11/01/17 12:40	1/19/2018	1/19/2018	18-01063	Europium-152	EPA 901.1 Modified	8.14E+01	9.68E+00	1.05E+01	6.67E+00		pCi/g	
18-01063-05	TRG	B102110CJFC005CV	11/01/17 12:40	1/19/2018	1/19/2018	18-01063	Europium-154	EPA 901.1 Modified	2.25E+00	3.17E+00	3.17E+00	5.55E+00	U	pCi/g	
18-01063-05	TRG	B102110CJFC005CV	11/01/17 12:40	1/19/2018	1/19/2018	18-01063	Europium-155	EPA 901.1 Modified	1.09E+01	8.21E+00	8.23E+00	1.36E+01	U	pCi/g	
18-01063-05	TRG	B102110CJFC005CV	11/01/17 12:40	1/19/2018	1/19/2018	18-01063	Molybdenum-93	EPA 901.1 Modified	-8.06E-01	2.45E+00	2.45E+00	1.21E+00	U	pCi/g	
18-01063-05	TRG	B102110CJFC005CV	11/01/17 12:40	1/19/2018	1/19/2018	18-01063	Niobium-94	EPA 901.1 Modified	8.75E-01	1.23E+00	1.23E+00	3.12E+00	U	pCi/g	
18-01063-05	TRG	B102110CJFC005CV	11/01/17 12:40	1/19/2018	1/19/2018	18-01063	Antimony-125	EPA 901.1 Modified	3.89E+00	3.09E+01	3.09E+01	3.83E+01	U	pCi/g	
18-01063-06	TRG	B102110CJWM013MT	11/07/17 20:15	1/19/2018	1/19/2018	18-01063	Silver-108m	EPA 901.1 Modified	-1.25E-01	3.28E-01	3.28E-01	2.50E-01	U	pCi/g	
18-01063-06	TRG	B102110CJWM013MT	11/07/17 20:15	1/19/2018	1/19/2018	18-01063	Cobalt-60	EPA 901.1 Modified	4.12E+01	2.57E+00	3.33E+00	4.69E-01		pCi/g	
18-01063-06	TRG	B102110CJWM013MT	11/07/17 20:15	1/19/2018	1/19/2018	18-01063	Cesium-134	EPA 901.1 Modified	1.41E-01	2.18E-01	2.18E-01	3.19E-01	U	pCi/g	
18-01063-06	TRG	B102110CJWM013MT	11/07/17 20:15	1/19/2018	1/19/2018	18-01063	Cesium-137	EPA 901.1 Modified	4.64E-01	3.04E-01	3.05E-01	4.89E-01	U	pCi/g	
18-01063-06	TRG	B102110CJWM013MT	11/07/17 20:15	1/19/2018	1/19/2018	18-01063	Europium-152	EPA 901.1 Modified	5.14E-01	7.51E-01	7.52E-01	5.81E-01	U	pCi/g	
18-01063-06	TRG	B102110CJWM013MT	11/07/17 20:15	1/19/2018	1/19/2018	18-01063	Europium-154	EPA 901.1 Modified	3.40E-01	4.24E-01	4.24E-01	2.98E-01	U	pCi/g	
18-01063-06	TRG	B102110CJWM013MT	11/07/17 20:15	1/19/2018	1/19/2018	18-01063	Europium-155	EPA 901.1 Modified	-3.29E-01	3.56E-01	3.56E-01	3.08E-01	U	pCi/g	
18-01063-06	TRG	B102110CJWM013MT	11/07/17 20:15	1/19/2018	1/19/2018	18-01063	Molybdenum-93	EPA 901.1 Modified	7.43E-02	2.76E-01	2.76E-01	1.31E-01	U	pCi/g	
18-01063-06	TRG	B102110CJWM013MT	11/07/17 20:15	1/19/2018	1/19/2018	18-01063	Niobium-94	EPA 901.1 Modified	2.98E-01	3.70E-01	3.70E-01	3.68E-01	U	pCi/g	
18-01063-06	TRG	B102110CJWM013MT	11/07/17 20:15	1/19/2018	1/19/2018	18-01063	Antimony-125	EPA 901.1 Modified	-3.29E-01	5.56E-01	5.57E-01	7.87E-01	U	pCi/g	

CU=Counting Uncertainty;CSU=Combined Standard Uncertainty (2-sigma);MDA=Minimal Detected Activity;LCS=Laboratory Control Sample;MBL=Blank;DUP=Duplicate;TRG=Normal Sample;DO=Duplicate Original;U=Non-detect



EBERLINE ANALYTICAL CORPORATION

601 SCARBORO ROAD OAK RIDGE, TN 37830 865/481-0683 FAX 865/483-4621

Eberline Analytical Final Report of Analysis			Report To:						Work Order Details:						
			J Alex Bohacheff						SDG:		18-01063				
			Zion Solutions, LLC						Purchase Order:		677116				
			101 Shiloh Blvd						Analysis Category:		ENVIRONMENTAL				
			Zion, IL 60099						Sample Matrix:		SO				
Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Qualifier	Report Units	
18-01063-07	TRG	B101110CJWC002CV	11/11/17 18:55	1/19/2018	1/19/2018	18-01063	Silver-108m	EPA 901.1 Modified	1.94E+00	6.14E+00	6.14E+00	8.90E+00	U	pCi/g	
18-01063-07	TRG	B101110CJWC002CV	11/11/17 18:55	1/19/2018	1/19/2018	18-01063	Cobalt-60	EPA 901.1 Modified	1.13E+02	7.71E+00	9.65E+00	7.50E+00		pCi/g	
18-01063-07	TRG	B101110CJWC002CV	11/11/17 18:55	1/19/2018	1/19/2018	18-01063	Cesium-134	EPA 901.1 Modified	-7.85E+00	1.42E+01	1.42E+01	6.61E+00	U	pCi/g	
18-01063-07	TRG	B101110CJWC002CV	11/11/17 18:55	1/19/2018	1/19/2018	18-01063	Cesium-137	EPA 901.1 Modified	6.77E+04	1.19E+04	1.24E+04	6.27E+01		pCi/g	
18-01063-07	TRG	B101110CJWC002CV	11/11/17 18:55	1/19/2018	1/19/2018	18-01063	Europium-152	EPA 901.1 Modified	7.67E+01	1.33E+01	1.39E+01	1.18E+01		pCi/g	
18-01063-07	TRG	B101110CJWC002CV	11/11/17 18:55	1/19/2018	1/19/2018	18-01063	Europium-154	EPA 901.1 Modified	1.32E+00	5.25E+00	5.25E+00	8.15E+00	U	pCi/g	
18-01063-07	TRG	B101110CJWC002CV	11/11/17 18:55	1/19/2018	1/19/2018	18-01063	Europium-155	EPA 901.1 Modified	-1.47E+01	2.80E+01	2.80E+01	2.93E+01	U	pCi/g	
18-01063-07	TRG	B101110CJWC002CV	11/11/17 18:55	1/19/2018	1/19/2018	18-01063	Molybdenum-93	EPA 901.1 Modified	1.43E+00	1.11E+01	1.11E+01	1.37E+00	U	pCi/g	
18-01063-07	TRG	B101110CJWC002CV	11/11/17 18:55	1/19/2018	1/19/2018	18-01063	Niobium-94	EPA 901.1 Modified	4.94E-01	3.94E+00	3.94E+00	5.76E+00	U	pCi/g	
18-01063-07	TRG	B101110CJWC002CV	11/11/17 18:55	1/19/2018	1/19/2018	18-01063	Antimony-125	EPA 901.1 Modified	-1.12E+01	8.85E+01	8.85E+01	1.10E+02	U	pCi/g	
18-01063-08	TRG	B101110CJFC005CV	11/15/17 00:20	1/19/2018	1/19/2018	18-01063	Silver-108m	EPA 901.1 Modified	1.65E+01	2.81E+01	2.81E+01	3.74E+01	U	pCi/g	
18-01063-08	TRG	B101110CJFC005CV	11/15/17 00:20	1/19/2018	1/19/2018	18-01063	Cobalt-60	EPA 901.1 Modified	6.27E+02	4.24E+01	5.33E+01	3.73E+01		pCi/g	
18-01063-08	TRG	B101110CJFC005CV	11/15/17 00:20	1/19/2018	1/19/2018	18-01063	Cesium-134	EPA 901.1 Modified	3.39E+01	3.05E+01	3.06E+01	2.42E+01	U	pCi/g	
18-01063-08	TRG	B101110CJFC005CV	11/15/17 00:20	1/19/2018	1/19/2018	18-01063	Cesium-137	EPA 901.1 Modified	1.02E+05	1.68E+04	1.76E+04	2.58E+02		pCi/g	
18-01063-08	TRG	B101110CJFC005CV	11/15/17 00:20	1/19/2018	1/19/2018	18-01063	Europium-152	EPA 901.1 Modified	6.59E+01	1.84E+02	1.84E+02	5.94E+01	U	pCi/g	
18-01063-08	TRG	B101110CJFC005CV	11/15/17 00:20	1/19/2018	1/19/2018	18-01063	Europium-154	EPA 901.1 Modified	-3.11E-01	1.92E+01	1.92E+01	3.00E+01	U	pCi/g	
18-01063-08	TRG	B101110CJFC005CV	11/15/17 00:20	1/19/2018	1/19/2018	18-01063	Europium-155	EPA 901.1 Modified	-4.05E+01	6.88E+01	6.88E+01	6.53E+01	U	pCi/g	
18-01063-08	TRG	B101110CJFC005CV	11/15/17 00:20	1/19/2018	1/19/2018	18-01063	Molybdenum-93	EPA 901.1 Modified	-8.91E+01	5.36E+01	5.38E+01	7.06E+00	U	pCi/g	
18-01063-08	TRG	B101110CJFC005CV	11/15/17 00:20	1/19/2018	1/19/2018	18-01063	Niobium-94	EPA 901.1 Modified	1.23E+01	1.53E+01	1.53E+01	2.09E+01	U	pCi/g	
18-01063-08	TRG	B101110CJFC005CV	11/15/17 00:20	1/19/2018	1/19/2018	18-01063	Antimony-125	EPA 901.1 Modified	1.30E+02	1.79E+02	1.79E+02	2.36E+02	U	pCi/g	
18-01063-09	TRG	B101110CJFC007CV	11/16/17 00:15	1/19/2018	1/19/2018	18-01063	Silver-108m	EPA 901.1 Modified	3.79E-01	2.18E+00	2.18E+00	3.21E+00	U	pCi/g	
18-01063-09	TRG	B101110CJFC007CV	11/16/17 00:15	1/19/2018	1/19/2018	18-01063	Cobalt-60	EPA 901.1 Modified	1.59E+02	9.71E+00	1.27E+01	3.00E+00		pCi/g	
18-01063-09	TRG	B101110CJFC007CV	11/16/17 00:15	1/19/2018	1/19/2018	18-01063	Cesium-134	EPA 901.1 Modified	-4.10E+00	5.58E+00	5.59E+00	3.51E+00	U	pCi/g	
18-01063-09	TRG	B101110CJFC007CV	11/16/17 00:15	1/19/2018	1/19/2018	18-01063	Cesium-137	EPA 901.1 Modified	9.91E+03	1.74E+03	1.81E+03	1.64E+01		pCi/g	
18-01063-09	TRG	B101110CJFC007CV	11/16/17 00:15	1/19/2018	1/19/2018	18-01063	Europium-152	EPA 901.1 Modified	5.96E+01	7.99E+00	8.56E+00	9.39E+00		pCi/g	
18-01063-09	TRG	B101110CJFC007CV	11/16/17 00:15	1/19/2018	1/19/2018	18-01063	Europium-154	EPA 901.1 Modified	1.63E+00	3.43E+00	3.43E+00	5.58E+00	U	pCi/g	
18-01063-09	TRG	B101110CJFC007CV	11/16/17 00:15	1/19/2018	1/19/2018	18-01063	Europium-155	EPA 901.1 Modified	-1.08E+00	1.05E+01	1.05E+01	1.08E+01	U	pCi/g	
18-01063-09	TRG	B101110CJFC007CV	11/16/17 00:15	1/19/2018	1/19/2018	18-01063	Molybdenum-93	EPA 901.1 Modified	-7.18E-01	2.06E+00	2.06E+00	1.16E+00	U	pCi/g	
18-01063-09	TRG	B101110CJFC007CV	11/16/17 00:15	1/19/2018	1/19/2018	18-01063	Niobium-94	EPA 901.1 Modified	4.53E-01	2.40E+00	2.40E+00	2.91E+00	U	pCi/g	
18-01063-09	TRG	B101110CJFC007CV	11/16/17 00:15	1/19/2018	1/19/2018	18-01063	Antimony-125	EPA 901.1 Modified	1.68E+01	2.97E+01	2.97E+01	4.24E+01	U	pCi/g	

CU=Counting Uncertainty;CSU=Combined Standard Uncertainty (2-sigma);MDA=Minimal Detected Activity;LCS=Laboratory Control Sample;MBL=Blank;DUP=Duplicate;TRG=Normal Sample;DO=Duplicate Original;U=Non-detect



EBERLINE ANALYTICAL CORPORATION

601 SCARBORO ROAD OAK RIDGE, TN 37830 865/481-0683 FAX 865/483-4621

18-01063

REC'D JAN 19 2018

Attachment 1 – Chain-of-Custody Form

Sample ID	Sample Log	Matrix	Sample Type	Sample Container				Sample Date	Sample Time	Analysis Type	Preservative	Remarks	
				Vol	Unit	Type	Qty						
<u>B102110CJWC001CV</u>	<u>N/A</u>	<u>Concrete</u>	<u>Concrete</u>	<u>57.94</u>	<u>cm³</u>	<u>Puck</u>	<u>1</u>	<u>11/1/2017</u>	<u>1030 hrs</u>	<u>Full Suite</u>	<u>None</u>	<u>0.0"-0.5"</u>	
<u>B102110CJFC005CV</u>	<u>N/A</u>	<u>Concrete</u>	<u>Concrete</u>	<u>57.94</u>	<u>cm³</u>	<u>Puck</u>	<u>1</u>	<u>11/1/2017</u>	<u>1240 hrs</u>	<u>Full Suite</u>	<u>None</u>	<u>0.0"-0.5"</u>	
<u>B102110CJWM013MT</u>	<u>N/A</u>	<u>Metal</u>	<u>Metal</u>	<u>202.79</u>	<u>cm³</u>	<u>Plate</u>	<u>1</u>	<u>11/7/2017</u>	<u>2015 hrs</u>	<u>Full Suite</u>	<u>None</u>	<u>N/A</u>	
<u>B101110CJWC002CV</u>	<u>N/A</u>	<u>Concrete</u>	<u>Concrete</u>	<u>57.94</u>	<u>cm³</u>	<u>Puck</u>	<u>1</u>	<u>11/11/2017</u>	<u>1855 hrs</u>	<u>Full Suite</u>	<u>None</u>	<u>0.0"-0.5"</u>	
<u>B101110CJFC005CV</u>	<u>N/A</u>	<u>Concrete</u>	<u>Concrete</u>	<u>57.94</u>	<u>cm³</u>	<u>Puck</u>	<u>1</u>	<u>11/15/2017</u>	<u>0020 hrs</u>	<u>Full Suite</u>	<u>None</u>	<u>0.0"-0.5"</u>	
<u>B101110CJFC007CV</u>	<u>N/A</u>	<u>Concrete</u>	<u>Concrete</u>	<u>57.94</u>	<u>cm³</u>	<u>Puck</u>	<u>1</u>	<u>11/16/2017</u>	<u>0015 hrs</u>	<u>Full Suite</u>	<u>None</u>	<u>0.0"-0.5"</u>	
Laboratory: <u>Eberline Labs</u>				Date Submitted To Lab:			Ship Container No.: <u>N/A</u>		Cooler Temperature: <u>N/A</u>		Airbill Number:		
Relinquished by: J. ALEX BOHACHEFF				Date (mm/dd/yyyy): 01/18/2018		Time: 1005		Received by: Tim Harris		Date: (mm/dd/yyyy): 01/18/2018		Time: 1005	
Relinquished by: J HARRIS				Date (mm/dd/yyyy): 01/18/2018		Time: 1600		Received by: FED EX		Date: (mm/dd/yyyy): 01/19/2018		Time: 1600	
Relinquished by: Fed Ex				Date (mm/dd/yyyy): 1/19/18		Time: 0810		Received by: Bobby Bannister		Date: (mm/dd/yyyy): 1/19/18		Time: 0810	
Relinquished by:				Date (mm/dd/yyyy):		Time:		Received by:		Date: (mm/dd/yyyy):		Time:	
Comments PO# 673846 24 hour turnaround													