



EBERLINE ANALYTICAL CORPORATION
601 SCARBORO ROAD
OAK RIDGE, TENNESSEE 37830
PHONE (865) 481-0683
FAX (865) 483-4621

EBS-OR-43348

February 13, 2018

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

CASE NARRATIVE
Work Order # 18-02001-OR

SAMPLE RECEIPT

This work order contains three solid samples received 02/01/2018. Samples were analyzed for Total Strontium, Tritium, Nickel-63 and by Gamma Spectroscopy.

<u>CLIENT ID</u>	<u>LAB ID</u>
B102110IFIFC005CV	18-02001-04
B102110IFIFC006CV	18-02001-05
B102110IFIFC008CV	18-02001-06

ANALYTICAL METHODS

Total Strontium was analyzed using EIChroM Method SRW01 Modified. Tritium was performed using Method LANL ER-210 Modified. Nickel-63 was performed using Method ASTM 3500-Ni 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.

TOTAL STRONTIUM

Samples were prepared by aliquoting as appropriate and leaching in HNO₃. Samples were diluted appropriately. Strontium recovery carriers were added to each sample. Chemical separations were conducted using selective extractions. Strontium precipitated was mounted on tared filter media. Chemical recovery was determined by Strontium carrier mass determinations. Sample was counted by gas flow proportional counting and corrected for Yttrium-90 ingrowth.

ANALYTICAL RESULTS CONTINUED

TOTAL STRONTIUM CONTINUED

Samples demonstrated acceptable results for all Total Strontium analyses. Strontium-90 results are 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.

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.

NICKEL-63

A representative aliquot of each sample was leached in HNO_3 . Leachates were placed in 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. All results except the laboratory control sample demonstrated slightly high method detection limits. The Nickel-63 method blank demonstrated an acceptable result. Results for the Nickel-63 duplicate demonstrated an acceptable relative percent difference and normalized difference. Results for the Nickel-63 laboratory control sample demonstrated an acceptable percent recovery.

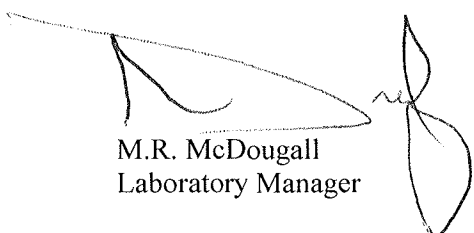
GAMMA SPECTROSCOPY

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 results demonstrated slightly high method detection limits. Some sample results are greater than the method detection limits. 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 Europium-152 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: 2/13/2018

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:	18-02001					
			Zion Solutions, LLC					Purchase Order:	677118					
			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
18-02001-01	LCS	KNOWN	02/01/18 00:00	2/1/2018	2/2/2018	18-02001	Tritium	LANL ER-210 Modified	2.46E+02	8.86E+00				pCi/g
18-02001-01	LCS	SPIKE	02/01/18 00:00	2/1/2018	2/2/2018	18-02001	Tritium	LANL ER-210 Modified	2.42E+02	5.76E+00	1.47E+01	3.63E+00		pCi/g
18-02001-02	MBL	BLANK	02/01/18 00:00	2/1/2018	2/2/2018	18-02001	Tritium	LANL ER-210 Modified	-3.75E-01	2.12E+00	2.12E+00	3.67E+00	U	pCi/g
18-02001-03	DUP	B102110IFIFC005CV	01/31/18 09:00	2/1/2018	2/2/2018	18-02001	Tritium	LANL ER-210 Modified	9.25E+01	6.29E+00	8.15E+00	7.24E+00		pCi/g
18-02001-04	DO	B102110IFIFC005CV	01/31/18 09:00	2/1/2018	2/2/2018	18-02001	Tritium	LANL ER-210 Modified	9.30E+01	6.31E+00	8.18E+00	7.25E+00		pCi/g
18-02001-05	TRG	B102110IFIFC006CV	01/31/18 09:35	2/1/2018	2/2/2018	18-02001	Tritium	LANL ER-210 Modified	2.04E+02	1.21E+01	1.67E+01	1.32E+01		pCi/g
18-02001-06	TRG	B102110IFIFC008CV	01/31/18 10:12	2/1/2018	2/2/2018	18-02001	Tritium	LANL ER-210 Modified	2.64E+01	9.04E+00	9.16E+00	1.43E+01		pCi/g
18-02001-01	LCS	KNOWN	02/01/18 00:00	2/1/2018	2/1/2018	18-02001	Nickel-63	ASTM 3500-Ni Modified	1.50E+03	4.51E+01				pCi/g
18-02001-01	LCS	SPIKE	02/01/18 00:00	2/1/2018	2/1/2018	18-02001	Nickel-63	ASTM 3500-Ni Modified	1.46E+03	8.86E+00	8.63E+01	2.00E+00		pCi/g
18-02001-02	MBL	BLANK	02/01/18 00:00	2/1/2018	2/1/2018	18-02001	Nickel-63	ASTM 3500-Ni Modified	0.00E+00	1.18E+00	1.18E+00	2.03E+00	U	pCi/g
18-02001-03	DUP	B102110IFIFC005CV	01/31/18 09:00	2/1/2018	2/1/2018	18-02001	Nickel-63	ASTM 3500-Ni Modified	4.19E+00	4.65E+00	4.65E+00	7.80E+00	U	pCi/g
18-02001-04	DO	B102110IFIFC005CV	01/31/18 09:00	2/1/2018	2/1/2018	18-02001	Nickel-63	ASTM 3500-Ni Modified	4.36E+00	4.49E+00	4.50E+00	7.53E+00	U	pCi/g
18-02001-05	TRG	B102110IFIFC006CV	01/31/18 09:35	2/1/2018	2/1/2018	18-02001	Nickel-63	ASTM 3500-Ni Modified	4.94E+00	4.47E+00	4.48E+00	7.47E+00	U	pCi/g
18-02001-06	TRG	B102110IFIFC008CV	01/31/18 10:12	2/1/2018	2/1/2018	18-02001	Nickel-63	ASTM 3500-Ni Modified	5.99E+00	4.59E+00	4.60E+00	7.63E+00	U	pCi/g
18-02001-01	LCS	KNOWN	02/01/18 00:00	2/1/2018	2/5/2018	18-02001	Strontium-90	EiChroM SRW01 Modified	5.22E+01	2.93E-01				pCi/g
18-02001-01	LCS	SPIKE	02/01/18 00:00	2/1/2018	2/5/2018	18-02001	Strontium-90	EiChroM SRW01 Modified	5.94E+01	2.41E+00	2.08E+01	9.77E-01		pCi/g
18-02001-02	MBL	BLANK	02/01/18 00:00	2/1/2018	2/5/2018	18-02001	Strontium-90	EiChroM SRW01 Modified	6.74E-01	4.72E-01	5.27E-01	7.51E-01	U	pCi/g
18-02001-03	DUP	B102110IFIFC005CV	01/31/18 09:00	2/1/2018	2/5/2018	18-02001	Strontium-90	EiChroM SRW01 Modified	8.68E-01	3.79E-01	4.84E-01	5.47E-01		pCi/g
18-02001-04	DO	B102110IFIFC005CV	01/31/18 09:00	2/1/2018	2/5/2018	18-02001	Strontium-90	EiChroM SRW01 Modified	8.51E-01	4.07E-01	5.03E-01	6.10E-01		pCi/g
18-02001-05	TRG	B102110IFIFC006CV	01/31/18 09:35	2/1/2018	2/5/2018	18-02001	Strontium-90	EiChroM SRW01 Modified	5.76E-01	4.50E-01	4.93E-01	7.32E-01	U	pCi/g
18-02001-06	TRG	B102110IFIFC008CV	01/31/18 10:12	2/1/2018	2/5/2018	18-02001	Strontium-90	EiChroM SRW01 Modified	8.11E-01	4.91E-01	5.66E-01	7.80E-01		pCi/g
18-02001-01	LCS	KNOWN	02/01/18 00:00	2/1/2018	2/1/2018	18-02001	Cobalt-60	EPA 901.1 Modified	2.71E+02	1.06E+01				pCi/g
18-02001-01	LCS	KNOWN	02/01/18 00:00	2/1/2018	2/1/2018	18-02001	Cesium-137	EPA 901.1 Modified	1.69E+02	6.75E+00				pCi/g
18-02001-01	LCS	SPIKE	02/01/18 00:00	2/1/2018	2/1/2018	18-02001	Cobalt-60	EPA 901.1 Modified	2.85E+02	1.76E+01	2.29E+01	2.08E+00		pCi/g
18-02001-01	LCS	SPIKE	02/01/18 00:00	2/1/2018	2/1/2018	18-02001	Cesium-137	EPA 901.1 Modified	1.94E+02	3.21E+01	3.36E+01	2.34E+00		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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			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
18-02001-02	MBL	BLANK	02/01/18 00:00	2/1/2018	2/1/2018	18-02001	Actinium-228	EPA 901.1 Modified	-2.63E-01	3.12E-01	3.12E-01	3.26E-01	U	pCi/g
18-02001-02	MBL	BLANK	02/01/18 00:00	2/1/2018	2/1/2018	18-02001	Silver-108m	EPA 901.1 Modified	3.85E-02	5.03E-02	5.03E-02	5.78E-02	U	pCi/g
18-02001-02	MBL	BLANK	02/01/18 00:00	2/1/2018	2/1/2018	18-02001	Americium-241	EPA 901.1 Modified	-1.46E-02	6.91E-02	6.91E-02	9.75E-02	U	pCi/g
18-02001-02	MBL	BLANK	02/01/18 00:00	2/1/2018	2/1/2018	18-02001	Barium-133	EPA 901.1 Modified	1.32E-02	6.10E-02	6.10E-02	9.33E-02	U	pCi/g
18-02001-02	MBL	BLANK	02/01/18 00:00	2/1/2018	2/1/2018	18-02001	Bismuth-214	EPA 901.1 Modified	1.72E-02	1.03E-01	1.03E-01	1.76E-01	U	pCi/g
18-02001-02	MBL	BLANK	02/01/18 00:00	2/1/2018	2/1/2018	18-02001	Cobalt-60	EPA 901.1 Modified	3.95E-02	4.87E-02	4.88E-02	1.15E-01	U	pCi/g
18-02001-02	MBL	BLANK	02/01/18 00:00	2/1/2018	2/1/2018	18-02001	Cesium-134	EPA 901.1 Modified	1.28E-03	6.45E-02	6.45E-02	9.29E-02	U	pCi/g
18-02001-02	MBL	BLANK	02/01/18 00:00	2/1/2018	2/1/2018	18-02001	Cesium-137	EPA 901.1 Modified	4.53E-02	6.31E-02	6.31E-02	1.20E-01	U	pCi/g
18-02001-02	MBL	BLANK	02/01/18 00:00	2/1/2018	2/1/2018	18-02001	Europium-152	EPA 901.1 Modified	-5.14E-02	1.91E-01	1.91E-01	1.44E-01	U	pCi/g
18-02001-02	MBL	BLANK	02/01/18 00:00	2/1/2018	2/1/2018	18-02001	Europium-154	EPA 901.1 Modified	2.16E-02	1.14E-01	1.14E-01	7.04E-02	U	pCi/g
18-02001-02	MBL	BLANK	02/01/18 00:00	2/1/2018	2/1/2018	18-02001	Europium-155	EPA 901.1 Modified	5.98E-03	5.00E-02	5.00E-02	1.00E-01	U	pCi/g
18-02001-02	MBL	BLANK	02/01/18 00:00	2/1/2018	2/1/2018	18-02001	Holmium-166m	EPA 901.1 Modified	2.53E-02	1.06E-01	1.06E-01	6.81E-02	U	pCi/g
18-02001-02	MBL	BLANK	02/01/18 00:00	2/1/2018	2/1/2018	18-02001	Iodine-129	EPA 901.1 Modified	6.95E-02	1.02E-01	1.03E-01	1.67E-01	U	pCi/g
18-02001-02	MBL	BLANK	02/01/18 00:00	2/1/2018	2/1/2018	18-02001	Potassium-40	EPA 901.1 Modified	9.69E-02	1.90E-01	1.90E-01	7.13E-01	U	pCi/g
18-02001-02	MBL	BLANK	02/01/18 00:00	2/1/2018	2/1/2018	18-02001	Manganese-54	EPA 901.1 Modified	0.00E+00	6.80E-02	6.80E-02	1.06E-01	U	pCi/g
18-02001-02	MBL	BLANK	02/01/18 00:00	2/1/2018	2/1/2018	18-02001	Niobium-94	EPA 901.1 Modified	-3.07E-02	7.76E-02	7.76E-02	8.11E-02	U	pCi/g
18-02001-02	MBL	BLANK	02/01/18 00:00	2/1/2018	2/1/2018	18-02001	Lead-210	EPA 901.1 Modified	7.35E-01	7.13E-01	7.14E-01	1.22E+00	U	pCi/g
18-02001-02	MBL	BLANK	02/01/18 00:00	2/1/2018	2/1/2018	18-02001	Lead-212	EPA 901.1 Modified	-1.68E-02	6.19E-02	6.20E-02	9.02E-02	U	pCi/g
18-02001-02	MBL	BLANK	02/01/18 00:00	2/1/2018	2/1/2018	18-02001	Lead-214	EPA 901.1 Modified	9.50E-02	8.23E-02	8.24E-02	1.68E-01	U	pCi/g
18-02001-02	MBL	BLANK	02/01/18 00:00	2/1/2018	2/1/2018	18-02001	Promethium-145	EPA 901.1 Modified	-8.51E-02	9.21E-02	9.22E-02	1.22E-01	U	pCi/g
18-02001-02	MBL	BLANK	02/01/18 00:00	2/1/2018	2/1/2018	18-02001	Radium-226	EPA 901.1 Modified	1.72E-02	1.03E-01	1.03E-01	1.76E-01	U	pCi/g
18-02001-02	MBL	BLANK	02/01/18 00:00	2/1/2018	2/1/2018	18-02001	Antimony-125	EPA 901.1 Modified	3.30E-02	1.07E-01	1.07E-01	1.91E-01	U	pCi/g
18-02001-02	MBL	BLANK	02/01/18 00:00	2/1/2018	2/1/2018	18-02001	Thorium-234	EPA 901.1 Modified	3.97E-01	6.07E-01	6.07E-01	1.00E+00	U	pCi/g
18-02001-02	MBL	BLANK	02/01/18 00:00	2/1/2018	2/1/2018	18-02001	Thallium-208	EPA 901.1 Modified	2.72E-02	1.67E-01	1.67E-01	2.79E-01	U	pCi/g
18-02001-02	MBL	BLANK	02/01/18 00:00	2/1/2018	2/1/2018	18-02001	Uranium-235	EPA 901.1 Modified	4.56E-01	5.82E-01	5.82E-01	3.46E-01	U	pCi/g

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18-02001-03	DUP	B102110IFIC005CV	01/31/18 09:00	2/1/2018	2/1/2018	18-02001	Actinium-228	EPA 901.1 Modified	-4.81E-01	2.41E+00	2.41E+00	3.52E+00	U	pCi/g
18-02001-03	DUP	B102110IFIC005CV	01/31/18 09:00	2/1/2018	2/1/2018	18-02001	Silver-108m	EPA 901.1 Modified	1.35E+00	7.68E-01	7.72E-01	5.69E-01	U	pCi/g
18-02001-03	DUP	B102110IFIC005CV	01/31/18 09:00	2/1/2018	2/1/2018	18-02001	Americium-241	EPA 901.1 Modified	4.48E-01	5.57E-01	5.57E-01	8.59E-01	U	pCi/g
18-02001-03	DUP	B102110IFIC005CV	01/31/18 09:00	2/1/2018	2/1/2018	18-02001	Barium-133	EPA 901.1 Modified	-1.10E-02	6.57E-01	6.57E-01	8.51E-01	U	pCi/g
18-02001-03	DUP	B102110IFIC005CV	01/31/18 09:00	2/1/2018	2/1/2018	18-02001	Bismuth-214	EPA 901.1 Modified	8.63E-01	1.07E+00	1.07E+00	1.78E+00	U	pCi/g
18-02001-03	DUP	B102110IFIC005CV	01/31/18 09:00	2/1/2018	2/1/2018	18-02001	Cobalt-60	EPA 901.1 Modified	7.89E+00	8.15E-01	9.10E-01	6.71E-01		pCi/g
18-02001-03	DUP	B102110IFIC005CV	01/31/18 09:00	2/1/2018	2/1/2018	18-02001	Cesium-134	EPA 901.1 Modified	2.13E-01	4.30E-01	4.30E-01	8.41E-01	U	pCi/g
18-02001-03	DUP	B102110IFIC005CV	01/31/18 09:00	2/1/2018	2/1/2018	18-02001	Cesium-137	EPA 901.1 Modified	4.22E+00	1.12E+00	1.14E+00	1.34E+00		pCi/g
18-02001-03	DUP	B102110IFIC005CV	01/31/18 09:00	2/1/2018	2/1/2018	18-02001	Europium-152	EPA 901.1 Modified	1.61E+02	8.83E+00	1.21E+01	3.53E+00		pCi/g
18-02001-03	DUP	B102110IFIC005CV	01/31/18 09:00	2/1/2018	2/1/2018	18-02001	Europium-154	EPA 901.1 Modified	4.32E+00	1.41E+00	1.42E+00	2.71E+00	U	pCi/g
18-02001-03	DUP	B102110IFIC005CV	01/31/18 09:00	2/1/2018	2/1/2018	18-02001	Europium-155	EPA 901.1 Modified	3.23E-01	9.48E-01	9.48E-01	1.42E+00	U	pCi/g
18-02001-03	DUP	B102110IFIC005CV	01/31/18 09:00	2/1/2018	2/1/2018	18-02001	Holmium-166m	EPA 901.1 Modified	1.01E+00	1.16E+00	1.17E+00	6.81E-01	U	pCi/g
18-02001-03	DUP	B102110IFIC005CV	01/31/18 09:00	2/1/2018	2/1/2018	18-02001	Iodine-129	EPA 901.1 Modified	9.24E-01	2.56E-01	2.60E-01	4.23E-01	U	pCi/g
18-02001-03	DUP	B102110IFIC005CV	01/31/18 09:00	2/1/2018	2/1/2018	18-02001	Potassium-40	EPA 901.1 Modified	1.13E+01	4.24E+00	4.28E+00	8.19E+00	U	pCi/g
18-02001-03	DUP	B102110IFIC005CV	01/31/18 09:00	2/1/2018	2/1/2018	18-02001	Manganese-54	EPA 901.1 Modified	-6.28E-01	6.83E-01	6.84E-01	9.41E-01	U	pCi/g
18-02001-03	DUP	B102110IFIC005CV	01/31/18 09:00	2/1/2018	2/1/2018	18-02001	Niobium-94	EPA 901.1 Modified	-2.24E+00	1.21E+00	1.22E+00	9.03E-01	U	pCi/g
18-02001-03	DUP	B102110IFIC005CV	01/31/18 09:00	2/1/2018	2/1/2018	18-02001	Lead-210	EPA 901.1 Modified	1.83E+02	1.69E+01	1.93E+01	1.49E+01		pCi/g
18-02001-03	DUP	B102110IFIC005CV	01/31/18 09:00	2/1/2018	2/1/2018	18-02001	Lead-212	EPA 901.1 Modified	6.28E-01	9.17E-01	9.18E-01	1.11E+00	U	pCi/g
18-02001-03	DUP	B102110IFIC005CV	01/31/18 09:00	2/1/2018	2/1/2018	18-02001	Lead-214	EPA 901.1 Modified	6.42E-01	1.19E+00	1.19E+00	1.46E+00	U	pCi/g
18-02001-03	DUP	B102110IFIC005CV	01/31/18 09:00	2/1/2018	2/1/2018	18-02001	Promethium-145	EPA 901.1 Modified	-5.65E+01	4.56E+00	5.40E+00	1.55E+00	U	pCi/g
18-02001-03	DUP	B102110IFIC005CV	01/31/18 09:00	2/1/2018	2/1/2018	18-02001	Radium-226	EPA 901.1 Modified	8.63E-01	1.07E+00	1.07E+00	1.78E+00	U	pCi/g
18-02001-03	DUP	B102110IFIC005CV	01/31/18 09:00	2/1/2018	2/1/2018	18-02001	Antimony-125	EPA 901.1 Modified	-9.10E-01	1.44E+00	1.44E+00	1.76E+00	U	pCi/g
18-02001-03	DUP	B102110IFIC005CV	01/31/18 09:00	2/1/2018	2/1/2018	18-02001	Thorium-234	EPA 901.1 Modified	7.34E+00	5.44E+00	5.46E+00	8.58E+00	U	pCi/g
18-02001-03	DUP	B102110IFIC005CV	01/31/18 09:00	2/1/2018	2/1/2018	18-02001	Thallium-208	EPA 901.1 Modified	-4.02E-01	1.61E+00	1.61E+00	1.34E+00	U	pCi/g
18-02001-03	DUP	B102110IFIC005CV	01/31/18 09:00	2/1/2018	2/1/2018	18-02001	Uranium-235	EPA 901.1 Modified	9.22E-01	7.75E+00	7.75E+00	3.91E+00	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

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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: **18-02001**Purchase Order: **677118**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
18-02001-04	DO	B102110IFIFC005CV	01/31/18 09:00	2/1/2018	2/1/2018	18-02001	Actinium-228	EPA 901.1 Modified	1.78E+00	2.38E+00	2.38E+00	3.69E+00	U	pCi/g
18-02001-04	DO	B102110IFIFC005CV	01/31/18 09:00	2/1/2018	2/1/2018	18-02001	Silver-108m	EPA 901.1 Modified	1.06E+00	7.49E-01	7.51E-01	6.26E-01	U	pCi/g
18-02001-04	DO	B102110IFIFC005CV	01/31/18 09:00	2/1/2018	2/1/2018	18-02001	Americium-241	EPA 901.1 Modified	-3.25E-01	5.48E-01	5.48E-01	7.88E-01	U	pCi/g
18-02001-04	DO	B102110IFIFC005CV	01/31/18 09:00	2/1/2018	2/1/2018	18-02001	Barium-133	EPA 901.1 Modified	5.13E-01	7.15E-01	7.15E-01	8.30E-01	U	pCi/g
18-02001-04	DO	B102110IFIFC005CV	01/31/18 09:00	2/1/2018	2/1/2018	18-02001	Bismuth-214	EPA 901.1 Modified	1.30E+00	7.34E-01	7.37E-01	9.76E-01		pCi/g
18-02001-04	DO	B102110IFIFC005CV	01/31/18 09:00	2/1/2018	2/1/2018	18-02001	Cobalt-60	EPA 901.1 Modified	7.40E+00	7.64E-01	8.53E-01	4.07E-01		pCi/g
18-02001-04	DO	B102110IFIFC005CV	01/31/18 09:00	2/1/2018	2/1/2018	18-02001	Cesium-134	EPA 901.1 Modified	-1.50E-02	4.49E-01	4.49E-01	8.63E-01	U	pCi/g
18-02001-04	DO	B102110IFIFC005CV	01/31/18 09:00	2/1/2018	2/1/2018	18-02001	Cesium-137	EPA 901.1 Modified	4.02E+00	1.02E+00	1.04E+00	1.17E+00		pCi/g
18-02001-04	DO	B102110IFIFC005CV	01/31/18 09:00	2/1/2018	2/1/2018	18-02001	Europium-152	EPA 901.1 Modified	1.54E+02	8.50E+00	1.16E+01	2.83E+00		pCi/g
18-02001-04	DO	B102110IFIFC005CV	01/31/18 09:00	2/1/2018	2/1/2018	18-02001	Europium-154	EPA 901.1 Modified	5.56E+00	1.63E+00	1.66E+00	3.10E+00	U	pCi/g
18-02001-04	DO	B102110IFIFC005CV	01/31/18 09:00	2/1/2018	2/1/2018	18-02001	Europium-155	EPA 901.1 Modified	1.56E-01	9.51E-01	9.51E-01	1.42E+00	U	pCi/g
18-02001-04	DO	B102110IFIFC005CV	01/31/18 09:00	2/1/2018	2/1/2018	18-02001	Holmium-166m	EPA 901.1 Modified	-1.33E-01	4.34E-01	4.34E-01	6.77E-01	U	pCi/g
18-02001-04	DO	B102110IFIFC005CV	01/31/18 09:00	2/1/2018	2/1/2018	18-02001	Iodine-129	EPA 901.1 Modified	7.46E-01	2.64E-01	2.67E-01	4.20E-01	U	pCi/g
18-02001-04	DO	B102110IFIFC005CV	01/31/18 09:00	2/1/2018	2/1/2018	18-02001	Potassium-40	EPA 901.1 Modified	5.82E+00	3.82E+00	3.84E+00	6.75E+00	U	pCi/g
18-02001-04	DO	B102110IFIFC005CV	01/31/18 09:00	2/1/2018	2/1/2018	18-02001	Manganese-54	EPA 901.1 Modified	9.83E-02	6.56E-01	6.56E-01	9.71E-01	U	pCi/g
18-02001-04	DO	B102110IFIFC005CV	01/31/18 09:00	2/1/2018	2/1/2018	18-02001	Niobium-94	EPA 901.1 Modified	-2.43E+00	1.15E+00	1.16E+00	9.32E-01	U	pCi/g
18-02001-04	DO	B102110IFIFC005CV	01/31/18 09:00	2/1/2018	2/1/2018	18-02001	Lead-210	EPA 901.1 Modified	1.93E+02	1.73E+01	1.99E+01	1.43E+01		pCi/g
18-02001-04	DO	B102110IFIFC005CV	01/31/18 09:00	2/1/2018	2/1/2018	18-02001	Lead-212	EPA 901.1 Modified	7.08E-01	8.79E-01	8.80E-01	1.16E+00	U	pCi/g
18-02001-04	DO	B102110IFIFC005CV	01/31/18 09:00	2/1/2018	2/1/2018	18-02001	Lead-214	EPA 901.1 Modified	1.09E+00	1.09E+00	1.09E+00	1.33E+00	U	pCi/g
18-02001-04	DO	B102110IFIFC005CV	01/31/18 09:00	2/1/2018	2/1/2018	18-02001	Promethium-145	EPA 901.1 Modified	-5.65E+01	4.57E+00	5.41E+00	1.52E+00	U	pCi/g
18-02001-04	DO	B102110IFIFC005CV	01/31/18 09:00	2/1/2018	2/1/2018	18-02001	Radium-226	EPA 901.1 Modified	1.30E+00	7.34E-01	7.37E-01	9.76E-01		pCi/g
18-02001-04	DO	B102110IFIFC005CV	01/31/18 09:00	2/1/2018	2/1/2018	18-02001	Antimony-125	EPA 901.1 Modified	-9.96E-01	1.59E+00	1.59E+00	1.91E+00	U	pCi/g
18-02001-04	DO	B102110IFIFC005CV	01/31/18 09:00	2/1/2018	2/1/2018	18-02001	Thorium-234	EPA 901.1 Modified	-1.60E+00	5.51E+00	5.52E+00	8.09E+00	U	pCi/g
18-02001-04	DO	B102110IFIFC005CV	01/31/18 09:00	2/1/2018	2/1/2018	18-02001	Thallium-208	EPA 901.1 Modified	-2.49E-01	1.53E+00	1.53E+00	1.42E+00	U	pCi/g
18-02001-04	DO	B102110IFIFC005CV	01/31/18 09:00	2/1/2018	2/1/2018	18-02001	Uranium-235	EPA 901.1 Modified	2.60E+00	7.96E+00	7.96E+00	4.02E+00	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



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Eberline Analytical Final Report of Analysis			Report To:						Work Order Details:						
			J Alex Bohacheff						SDG:	18-02001					
			Zion Solutions, LLC						Purchase Order:	677118					
			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	
18-02001-05	TRG	B102110IFIFC006CV	01/31/18 09:35	2/1/2018	2/1/2018	18-02001	Actinium-228	EPA 901.1 Modified	1.73E+00	2.90E+00	2.90E+00	4.35E+00	U	pCi/g	
18-02001-05	TRG	B102110IFIFC006CV	01/31/18 09:35	2/1/2018	2/1/2018	18-02001	Silver-108m	EPA 901.1 Modified	1.25E+00	9.53E-01	9.55E-01	8.18E-01	U	pCi/g	
18-02001-05	TRG	B102110IFIFC006CV	01/31/18 09:35	2/1/2018	2/1/2018	18-02001	Americium-241	EPA 901.1 Modified	-5.49E-01	8.49E-01	8.49E-01	1.05E+00	U	pCi/g	
18-02001-05	TRG	B102110IFIFC006CV	01/31/18 09:35	2/1/2018	2/1/2018	18-02001	Barium-133	EPA 901.1 Modified	4.71E-01	7.36E-01	7.36E-01	1.09E+00	U	pCi/g	
18-02001-05	TRG	B102110IFIFC006CV	01/31/18 09:35	2/1/2018	2/1/2018	18-02001	Bismuth-214	EPA 901.1 Modified	7.70E-01	1.48E+00	1.48E+00	1.79E+00	U	pCi/g	
18-02001-05	TRG	B102110IFIFC006CV	01/31/18 09:35	2/1/2018	2/1/2018	18-02001	Cobalt-60	EPA 901.1 Modified	1.74E+01	1.30E+00	1.58E+00	8.79E-01		pCi/g	
18-02001-05	TRG	B102110IFIFC006CV	01/31/18 09:35	2/1/2018	2/1/2018	18-02001	Cesium-134	EPA 901.1 Modified	-3.18E-01	7.02E-01	7.02E-01	1.00E+00	U	pCi/g	
18-02001-05	TRG	B102110IFIFC006CV	01/31/18 09:35	2/1/2018	2/1/2018	18-02001	Cesium-137	EPA 901.1 Modified	-2.16E-02	8.65E-01	8.65E-01	1.26E+00	U	pCi/g	
18-02001-05	TRG	B102110IFIFC006CV	01/31/18 09:35	2/1/2018	2/1/2018	18-02001	Europium-152	EPA 901.1 Modified	2.36E+02	8.46E+00	1.48E+01	4.41E+00		pCi/g	
18-02001-05	TRG	B102110IFIFC006CV	01/31/18 09:35	2/1/2018	2/1/2018	18-02001	Europium-154	EPA 901.1 Modified	8.68E+00	1.82E+00	1.87E+00	3.37E+00	U	pCi/g	
18-02001-05	TRG	B102110IFIFC006CV	01/31/18 09:35	2/1/2018	2/1/2018	18-02001	Europium-155	EPA 901.1 Modified	3.29E+00	1.09E+00	1.11E+00	1.74E+00	U	pCi/g	
18-02001-05	TRG	B102110IFIFC006CV	01/31/18 09:35	2/1/2018	2/1/2018	18-02001	Holmium-166m	EPA 901.1 Modified	-9.62E-01	1.46E+00	1.46E+00	6.61E-01	U	pCi/g	
18-02001-05	TRG	B102110IFIFC006CV	01/31/18 09:35	2/1/2018	2/1/2018	18-02001	Iodine-129	EPA 901.1 Modified	9.46E-01	8.19E-01	8.21E-01	1.05E+00	U	pCi/g	
18-02001-05	TRG	B102110IFIFC006CV	01/31/18 09:35	2/1/2018	2/1/2018	18-02001	Potassium-40	EPA 901.1 Modified	6.74E+00	3.90E+00	3.91E+00	6.58E+00		pCi/g	
18-02001-05	TRG	B102110IFIFC006CV	01/31/18 09:35	2/1/2018	2/1/2018	18-02001	Manganese-54	EPA 901.1 Modified	-3.61E-01	8.32E-01	8.32E-01	1.18E+00	U	pCi/g	
18-02001-05	TRG	B102110IFIFC006CV	01/31/18 09:35	2/1/2018	2/1/2018	18-02001	Niobium-94	EPA 901.1 Modified	-8.49E-01	1.16E+00	1.16E+00	1.06E+00	U	pCi/g	
18-02001-05	TRG	B102110IFIFC006CV	01/31/18 09:35	2/1/2018	2/1/2018	18-02001	Lead-210	EPA 901.1 Modified	3.39E+02	3.00E+01	3.47E+01	2.36E+01	U	pCi/g	
18-02001-05	TRG	B102110IFIFC006CV	01/31/18 09:35	2/1/2018	2/1/2018	18-02001	Lead-212	EPA 901.1 Modified	4.96E-01	6.12E-01	6.13E-01	1.37E+00	U	pCi/g	
18-02001-05	TRG	B102110IFIFC006CV	01/31/18 09:35	2/1/2018	2/1/2018	18-02001	Lead-214	EPA 901.1 Modified	4.97E-01	1.06E+00	1.06E+00	1.72E+00	U	pCi/g	
18-02001-05	TRG	B102110IFIFC006CV	01/31/18 09:35	2/1/2018	2/1/2018	18-02001	Promethium-145	EPA 901.1 Modified	2.48E+01	3.68E+00	3.90E+00	4.14E+00	U	pCi/g	
18-02001-05	TRG	B102110IFIFC006CV	01/31/18 09:35	2/1/2018	2/1/2018	18-02001	Radium-226	EPA 901.1 Modified	7.70E-01	1.48E+00	1.48E+00	1.79E+00	U	pCi/g	
18-02001-05	TRG	B102110IFIFC006CV	01/31/18 09:35	2/1/2018	2/1/2018	18-02001	Antimony-125	EPA 901.1 Modified	-9.13E-01	1.74E+00	1.74E+00	2.46E+00	U	pCi/g	
18-02001-05	TRG	B102110IFIFC006CV	01/31/18 09:35	2/1/2018	2/1/2018	18-02001	Thorium-234	EPA 901.1 Modified	2.30E+00	8.06E+00	8.06E+00	1.03E+01	U	pCi/g	
18-02001-05	TRG	B102110IFIFC006CV	01/31/18 09:35	2/1/2018	2/1/2018	18-02001	Thallium-208	EPA 901.1 Modified	3.56E-01	1.19E+00	1.19E+00	9.28E-01	U	pCi/g	
18-02001-05	TRG	B102110IFIFC006CV	01/31/18 09:35	2/1/2018	2/1/2018	18-02001	Uranium-235	EPA 901.1 Modified	4.10E+00	8.37E+00	8.37E+00	3.87E+00	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

[199]

Eberline Analytical Final Report of Analysis			Report To:					Work Order Details:						
			J Alex Bohacheff					SDG:		18-02001				
			Zion Solutions, LLC					Purchase Order:		677118				
			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
18-02001-06	TRG	B102110IFIFC008CV	01/31/18 10:12	2/1/2018	2/1/2018	18-02001	Actinium-228	EPA 901.1 Modified	5.34E-01	1.66E+00	1.66E+00	2.60E+00	U	pCi/g
18-02001-06	TRG	B102110IFIFC008CV	01/31/18 10:12	2/1/2018	2/1/2018	18-02001	Silver-108m	EPA 901.1 Modified	5.48E-02	4.55E-01	4.55E-01	4.66E-01	U	pCi/g
18-02001-06	TRG	B102110IFIFC008CV	01/31/18 10:12	2/1/2018	2/1/2018	18-02001	Americium-241	EPA 901.1 Modified	-4.12E-01	6.17E-01	6.17E-01	7.23E-01	U	pCi/g
18-02001-06	TRG	B102110IFIFC008CV	01/31/18 10:12	2/1/2018	2/1/2018	18-02001	Barium-133	EPA 901.1 Modified	-3.09E-02	2.31E-01	2.31E-01	7.31E-01	U	pCi/g
18-02001-06	TRG	B102110IFIFC008CV	01/31/18 10:12	2/1/2018	2/1/2018	18-02001	Bismuth-214	EPA 901.1 Modified	1.03E+00	8.51E-01	8.52E-01	1.42E+00	U	pCi/g
18-02001-06	TRG	B102110IFIFC008CV	01/31/18 10:12	2/1/2018	2/1/2018	18-02001	Cobalt-60	EPA 901.1 Modified	2.32E+00	4.53E-01	4.68E-01	3.77E-01		pCi/g
18-02001-06	TRG	B102110IFIFC008CV	01/31/18 10:12	2/1/2018	2/1/2018	18-02001	Cesium-134	EPA 901.1 Modified	1.27E-01	2.15E-01	2.15E-01	5.26E-01	U	pCi/g
18-02001-06	TRG	B102110IFIFC008CV	01/31/18 10:12	2/1/2018	2/1/2018	18-02001	Cesium-137	EPA 901.1 Modified	-6.01E-01	5.17E-01	5.18E-01	6.30E-01	U	pCi/g
18-02001-06	TRG	B102110IFIFC008CV	01/31/18 10:12	2/1/2018	2/1/2018	18-02001	Europium-152	EPA 901.1 Modified	4.80E+01	2.42E+00	3.45E+00	2.48E+00		pCi/g
18-02001-06	TRG	B102110IFIFC008CV	01/31/18 10:12	2/1/2018	2/1/2018	18-02001	Europium-154	EPA 901.1 Modified	8.13E-01	8.90E-01	8.91E-01	1.65E+00	U	pCi/g
18-02001-06	TRG	B102110IFIFC008CV	01/31/18 10:12	2/1/2018	2/1/2018	18-02001	Europium-155	EPA 901.1 Modified	2.32E-02	7.58E-01	7.58E-01	1.22E+00	U	pCi/g
18-02001-06	TRG	B102110IFIFC008CV	01/31/18 10:12	2/1/2018	2/1/2018	18-02001	Holmium-166m	EPA 901.1 Modified	5.45E-01	7.19E-01	7.20E-01	4.62E-01	U	pCi/g
18-02001-06	TRG	B102110IFIFC008CV	01/31/18 10:12	2/1/2018	2/1/2018	18-02001	Iodine-129	EPA 901.1 Modified	7.56E-02	2.62E-01	2.62E-01	3.42E-01	U	pCi/g
18-02001-06	TRG	B102110IFIFC008CV	01/31/18 10:12	2/1/2018	2/1/2018	18-02001	Potassium-40	EPA 901.1 Modified	8.65E+00	5.35E+00	5.37E+00	8.28E+00		pCi/g
18-02001-06	TRG	B102110IFIFC008CV	01/31/18 10:12	2/1/2018	2/1/2018	18-02001	Manganese-54	EPA 901.1 Modified	4.72E-02	4.13E-01	4.13E-01	6.38E-01	U	pCi/g
18-02001-06	TRG	B102110IFIFC008CV	01/31/18 10:12	2/1/2018	2/1/2018	18-02001	Niobium-94	EPA 901.1 Modified	-4.73E-01	7.49E-01	7.49E-01	6.18E-01	U	pCi/g
18-02001-06	TRG	B102110IFIFC008CV	01/31/18 10:12	2/1/2018	2/1/2018	18-02001	Lead-210	EPA 901.1 Modified	6.98E+01	9.62E+00	1.03E+01	1.10E+01		pCi/g
18-02001-06	TRG	B102110IFIFC008CV	01/31/18 10:12	2/1/2018	2/1/2018	18-02001	Lead-212	EPA 901.1 Modified	1.99E-01	3.92E-01	3.92E-01	7.70E-01	U	pCi/g
18-02001-06	TRG	B102110IFIFC008CV	01/31/18 10:12	2/1/2018	2/1/2018	18-02001	Lead-214	EPA 901.1 Modified	2.06E+00	7.72E-01	7.79E-01	2.74E+00	U	pCi/g
18-02001-06	TRG	B102110IFIFC008CV	01/31/18 10:12	2/1/2018	2/1/2018	18-02001	Promethium-145	EPA 901.1 Modified	2.54E+00	1.39E+00	1.40E+00	1.85E+00	U	pCi/g
18-02001-06	TRG	B102110IFIFC008CV	01/31/18 10:12	2/1/2018	2/1/2018	18-02001	Radium-226	EPA 901.1 Modified	1.03E+00	8.51E-01	8.52E-01	1.42E+00	U	pCi/g
18-02001-06	TRG	B102110IFIFC008CV	01/31/18 10:12	2/1/2018	2/1/2018	18-02001	Antimony-125	EPA 901.1 Modified	9.33E-01	9.98E-01	1.00E+00	1.62E+00	U	pCi/g
18-02001-06	TRG	B102110IFIFC008CV	01/31/18 10:12	2/1/2018	2/1/2018	18-02001	Thorium-234	EPA 901.1 Modified	7.40E+00	5.74E+00	5.76E+00	8.09E+00	U	pCi/g
18-02001-06	TRG	B102110IFIFC008CV	01/31/18 10:12	2/1/2018	2/1/2018	18-02001	Thallium-208	EPA 901.1 Modified	7.91E-02	1.33E+00	1.33E+00	1.68E+00	U	pCi/g
18-02001-06	TRG	B102110IFIFC008CV	01/31/18 10:12	2/1/2018	2/1/2018	18-02001	Uranium-235	EPA 901.1 Modified	-5.02E-02	4.07E+00	4.07E+00	2.67E+00	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



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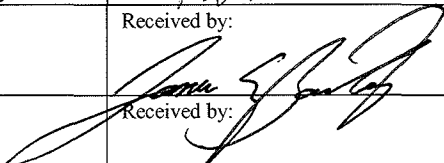
601 SCARBORO ROAD OAK RIDGE, TN 37830 865/481-0683 FAX 865/483-4621

[200]

REC'D FEB 01 2018

Attachment 1 – Chain-of-Custody Form

18-02001

Sample ID	Sample Log	Matrix	Sample Type	Sample Container				Sample Date	Sample Time	Analysis Type	Preservative	Remarks
				Vol	Unit	Type	Qty					
4 B102110IFIFC005CV	N/A	Concrete	Concrete	57.94	cm ³	Puck	1	1/31/2018	0900	HTD	None	0.0"-0.5"
6 B102110IFIFC006CV	N/A	Concrete	Concrete	57.94	cm ³	Puck	1	1/31/2018	0935	HTD	None	0.0"-0.5"
6 B102110IFIFC008CV	N/A	Concrete	Concrete	57.94	cm ³	Puck	1	1/31/2018	1012	HTD	None	0.0"-0.5"
Laboratory:				Date Submitted To Lab:				Ship Container No.:		Cooler Temperature:		Airbill Number:
Eberline Labs								N/A		N/A		
Relinquished by:				Date (mm/dd/yyyy):		Time:		Received by:		Date: (mm/dd/yyyy):		Time:
J. ALEX BOHACHEFF				1-31-18		14:31		Richard E. Rickett		01/31/2018		14:31
Relinquished by:				Date (mm/dd/yyyy):		Time:		Received by:		Date: (mm/dd/yyyy):		Time:
Richard E. Rickett				01-31-2018		16:00		Fed EX		01/31/2018		16:00
Relinquished by:				Date (mm/dd/yyyy):		Time:		Received by:		Date: (mm/dd/yyyy):		Time:
										2-1-18		0810
Relinquished by:				Date (mm/dd/yyyy):		Time:		Received by:		Date: (mm/dd/yyyy):		Time:
Comments												
ANALYSIS 5 ROC-HTD RE: Email to Mike McDougall PRIORITY 24 hour turnaround PO# 677118												



EBERLINE ANALYTICAL CORPORATION
601 SCARBORO ROAD
OAK RIDGE, TENNESSEE 37830
PHONE (865) 481-0683
FAX (865) 483-4621

EBS-OR-43352

February 13, 2018

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

CASE NARRATIVE
Work Order # 18-02009-OR

SAMPLE RECEIPT

This work order contains thirteen solid samples received 02/02/2018. Samples were analyzed for Total Strontium, Tritium, Nickel-63 and by Gamma Spectroscopy.

<u>CLIENT ID</u>	<u>LAB ID</u>	<u>CLIENT ID</u>	<u>LAB ID</u>
B102110FIWC001CV	18-02009-04	B102110FIWC019CV	18-02009-11
B102110FIWC003CV	18-02009-05	B102110FIWC020CV	18-02009-12
B102110FIWC004CV	18-02009-06	B102110FIWC014CV	18-02009-13
B102110FIFC003CV	18-02009-07	B102110FIWC018CV	18-02009-14
B102110FIFC021CV	18-02009-08	B102110FIWC016CV	18-02009-15
B102110FIWC015CV	18-02009-09	B102110FIWC019CV	18-02009-16
B102110FIWC017CV	18-02009-10		

ANALYTICAL METHODS

Total Strontium was analyzed using EICHrom Method SRW01 Modified. Tritium was performed using Method LANL ER-210 Modified. Nickel-63 was performed using Method ASTM 3500-Ni 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

TOTAL STRONTIUM

Samples were prepared by aliquoting as appropriate and leaching in HNO_3 . Samples were diluted appropriately. 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 are 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 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.

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.

NICKEL-63

A representative aliquot of each sample was leached in HNO_3 . Leachates were placed in 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. All results demonstrated slightly high method detection limits. The Nickel-63 method blank demonstrated an acceptable result. Results for the Nickel-63 duplicate demonstrated a high relative percent difference and normalized difference. Results for the duplicate sample were biased positive because of chemical interferences. Due to this condition only results from the duplicate original sample should be used for all intents and purposes. Results for the Nickel-63 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.

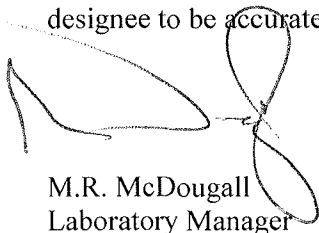
ANALYTICAL RESULTS CONTINUED

GAMMA SPECTROSCOPY CONTINUED

Samples demonstrated acceptable results for all gamma-emitting radionuclides as reported. Some results demonstrated slightly high method detection limits. Some sample results are greater than the method detection limits. 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 Europium-152 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: 2/13/2018

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 Zion Solutions, LLC 101 Shiloh Blvd Zion, IL 60099						SDG:		18-02009				
									Purchase Order:		677118				
									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	
18-02009-01	LCS	KNOWN	02/02/18 00:00	2/2/2018	2/5/2018	18-02009	Tritium	LANL ER-210 Modified	2.26E+02	8.14E+00				pCi/g	
18-02009-01	LCS	SPIKE	02/02/18 00:00	2/2/2018	2/5/2018	18-02009	Tritium	LANL ER-210 Modified	2.17E+02	7.97E+00	1.45E+01	5.53E+00		pCi/g	
18-02009-02	MBL	BLANK	02/02/18 00:00	2/2/2018	2/5/2018	18-02009	Tritium	LANL ER-210 Modified	-1.12E+00	3.04E+00	3.04E+00	5.36E+00	U	pCi/g	
18-02009-03	DUP	B102110FIWC001CV	01/31/18 13:20	2/2/2018	2/5/2018	18-02009	Tritium	LANL ER-210 Modified	8.78E+01	1.61E+01	1.69E+01	2.27E+01		pCi/g	
18-02009-04	DO	B102110FIWC001CV	01/31/18 13:20	2/2/2018	2/5/2018	18-02009	Tritium	LANL ER-210 Modified	8.33E+01	1.63E+01	1.70E+01	2.33E+01		pCi/g	
18-02009-05	TRG	B102110FIWC003CV	01/31/18 13:55	2/2/2018	2/5/2018	18-02009	Tritium	LANL ER-210 Modified	1.13E+02	1.48E+01	1.61E+01	1.92E+01		pCi/g	
18-02009-06	TRG	B102110FIWC004CV	01/31/18 14:20	2/2/2018	2/5/2018	18-02009	Tritium	LANL ER-210 Modified	1.20E+02	1.77E+01	1.89E+01	2.37E+01		pCi/g	
18-02009-07	TRG	B102110FIFC003CV	01/31/18 12:37	2/2/2018	2/5/2018	18-02009	Tritium	LANL ER-210 Modified	1.69E+02	2.04E+01	2.25E+01	2.59E+01		pCi/g	
18-02009-08	TRG	B102110FIFC021CV	01/31/18 13:00	2/2/2018	2/5/2018	18-02009	Tritium	LANL ER-210 Modified	1.29E+02	1.88E+01	2.01E+01	2.52E+01		pCi/g	
18-02009-09	TRG	B102110FIWC015CV	01/31/18 14:43	2/2/2018	2/5/2018	18-02009	Tritium	LANL ER-210 Modified	1.22E+02	1.62E+01	1.75E+01	2.11E+01		pCi/g	
18-02009-10	TRG	B102110FIWC017CV	01/31/18 15:07	2/2/2018	2/5/2018	18-02009	Tritium	LANL ER-210 Modified	1.21E+02	1.52E+01	1.67E+01	1.95E+01		pCi/g	
18-02009-11	TRG	B102110FIWC019CV	01/31/18 15:30	2/2/2018	2/5/2018	18-02009	Tritium	LANL ER-210 Modified	3.86E+02	2.19E+01	3.08E+01	2.02E+01		pCi/g	
18-02009-12	TRG	B102110FIWC020CV	02/01/18 08:12	2/2/2018	2/5/2018	18-02009	Tritium	LANL ER-210 Modified	2.28E+02	2.33E+01	2.66E+01	2.80E+01		pCi/g	
18-02009-13	TRG	B102110FIWC014CV	02/01/18 08:56	2/2/2018	2/5/2018	18-02009	Tritium	LANL ER-210 Modified	1.52E+02	1.94E+01	2.12E+01	2.50E+01		pCi/g	
18-02009-14	TRG	B102110FIWC018CV	02/01/18 09:38	2/2/2018	2/5/2018	18-02009	Tritium	LANL ER-210 Modified	1.52E+02	1.82E+01	2.01E+01	2.31E+01		pCi/g	
18-02009-15	TRG	B102110FIWC016CV	02/01/18 10:00	2/2/2018	2/5/2018	18-02009	Tritium	LANL ER-210 Modified	1.06E+02	1.53E+01	1.64E+01	2.05E+01		pCi/g	
18-02009-16	TRG	B102110FIWC019CV	02/01/18 10:38	2/2/2018	2/5/2018	18-02009	Tritium	LANL ER-210 Modified	2.46E+02	2.14E+01	2.55E+01	2.42E+01		pCi/g	
18-02009-01	LCS	KNOWN	02/02/18 00:00	2/2/2018	2/5/2018	18-02009	Nickel-63	ASTM 3500-Ni Modified	1.49E+03	4.46E+01				pCi/g	
18-02009-01	LCS	SPIKE	02/02/18 00:00	2/2/2018	2/5/2018	18-02009	Nickel-63	ASTM 3500-Ni Modified	1.45E+03	9.42E+00	8.55E+01	2.26E+00		pCi/g	
18-02009-02	MBL	BLANK	02/02/18 00:00	2/2/2018	2/5/2018	18-02009	Nickel-63	ASTM 3500-Ni Modified	-4.88E-01	1.36E+00	1.36E+00	2.35E+00	U	pCi/g	
18-02009-03	DUP	B102110FIWC001CV	01/31/18 13:20	2/2/2018	2/5/2018	18-02009	Nickel-63	ASTM 3500-Ni Modified	3.36E+00	5.32E+00	5.32E+00	8.98E+00	U	pCi/g	
18-02009-04	DO	B102110FIWC001CV	01/31/18 13:20	2/2/2018	2/5/2018	18-02009	Nickel-63	ASTM 3500-Ni Modified	3.36E+00	5.32E+00	5.32E+00	8.98E+00	U	pCi/g	
18-02009-05	TRG	B102110FIWC003CV	01/31/18 13:55	2/2/2018	2/5/2018	18-02009	Nickel-63	ASTM 3500-Ni Modified	2.83E+01	5.29E+00	5.55E+00	8.02E+00		pCi/g	
18-02009-06	TRG	B102110FIWC004CV	01/31/18 14:20	2/2/2018	2/5/2018	18-02009	Nickel-63	ASTM 3500-Ni Modified	1.62E+01	4.90E+00	4.99E+00	7.78E+00		pCi/g	
18-02009-07	TRG	B102110FIFC003CV	01/31/18 12:37	2/2/2018	2/5/2018	18-02009	Nickel-63	ASTM 3500-Ni Modified	3.11E+00	5.53E+00	5.54E+00	9.36E+00	U	pCi/g	
18-02009-08	TRG	B102110FIFC021CV	01/31/18 13:00	2/2/2018	2/6/2018	18-02009	Nickel-63	ASTM 3500-Ni Modified	4.27E+00	5.09E+00	5.10E+00	8.56E+00	U	pCi/g	
18-02009-09	TRG	B102110FIWC015CV	01/31/18 14:43	2/2/2018	2/6/2018	18-02009	Nickel-63	ASTM 3500-Ni Modified	6.91E+00	5.00E+00	5.02E+00	8.31E+00	U	pCi/g	
18-02009-10	TRG	B102110FIWC017CV	01/31/18 15:07	2/2/2018	2/6/2018	18-02009	Nickel-63	ASTM 3500-Ni Modified	-8.12E-01	5.68E+00	5.68E+00	9.76E+00	U	pCi/g	
18-02009-11	TRG	B102110FIWC019CV	01/31/18 15:30	2/2/2018	2/6/2018	18-02009	Nickel-63	ASTM 3500-Ni Modified	9.28E+00	5.64E+00	5.66E+00	9.30E+00	U	pCi/g	
18-02009-12	TRG	B102110FIWC020CV	02/01/18 08:12	2/2/2018	2/6/2018	18-02009	Nickel-63	ASTM 3500-Ni Modified	1.51E+01	5.52E+00	5.59E+00	8.88E+00		pCi/g	
18-02009-13	TRG	B102110FIWC014CV	02/01/18 08:56	2/2/2018	2/6/2018	18-02009	Nickel-63	ASTM 3500-Ni Modified	5.61E+00	4.76E+00	4.77E+00	7.94E+00	U	pCi/g	
18-02009-14	TRG	B102110FIWC018CV	02/01/18 09:38	2/2/2018	2/6/2018	18-02009	Nickel-63	ASTM 3500-Ni Modified	3.75E+00	5.94E+00	5.94E+00	1.00E+01	U	pCi/g	
18-02009-15	TRG	B102110FIWC016CV	02/01/18 10:00	2/2/2018	2/6/2018	18-02009	Nickel-63	ASTM 3500-Ni Modified	0.00E+00	5.57E+00	5.57E+00	9.54E+00	U	pCi/g	
18-02009-16	TRG	B102110FIWC019CV	02/01/18 10:38	2/2/2018	2/6/2018	18-02009	Nickel-63	ASTM 3500-Ni Modified	3.69E+00	5.27E+00	5.27E+00	8.88E+00	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



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[205]

Eberline Analytical Final Report of Analysis			Report To:						Work Order Details:						
			J Alex Bohacheff						SDG:	18-02009					
			Zion Solutions, LLC						Purchase Order:	677118					
			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	
18-02009-01	LCS	KNOWN	02/02/18 00:00	2/2/2018	2/6/2018	18-02009	Strontium-90	EiChroM SRW01 Modified	5.36E+01	3.00E-01				pCi/g	
18-02009-01	LCS	SPIKE	02/02/18 00:00	2/2/2018	2/6/2018	18-02009	Strontium-90	EiChroM SRW01 Modified	5.75E+01	2.36E+00	2.02E+01	1.08E+00		pCi/g	
18-02009-02	MBL	BLANK	02/02/18 00:00	2/2/2018	2/6/2018	18-02009	Strontium-90	EiChroM SRW01 Modified	5.75E-01	5.38E-01	5.74E-01	8.90E-01	U	pCi/g	
18-02009-03	DUP	B102110FIWC001CV	01/31/18 13:20	2/2/2018	2/6/2018	18-02009	Strontium-90	EiChroM SRW01 Modified	-6.26E-02	4.09E-01	4.10E-01	7.42E-01	U	pCi/g	
18-02009-04	DO	B102110FIWC001CV	01/31/18 13:20	2/2/2018	2/6/2018	18-02009	Strontium-90	EiChroM SRW01 Modified	4.72E-01	3.75E-01	4.09E-01	6.09E-01	U	pCi/g	
18-02009-05	TRG	B102110FIWC003CV	01/31/18 13:55	2/2/2018	2/6/2018	18-02009	Strontium-90	EiChroM SRW01 Modified	5.50E-01	4.14E-01	4.57E-01	6.72E-01	U	pCi/g	
18-02009-06	TRG	B102110FIWC004CV	01/31/18 14:20	2/2/2018	2/6/2018	18-02009	Strontium-90	EiChroM SRW01 Modified	6.88E-01	5.02E-01	5.56E-01	8.15E-01	U	pCi/g	
18-02009-07	TRG	B102110FIFC003CV	01/31/18 12:37	2/2/2018	2/6/2018	18-02009	Strontium-90	EiChroM SRW01 Modified	2.09E-01	5.09E-01	5.14E-01	8.86E-01	U	pCi/g	
18-02009-08	TRG	B102110FIFC021CV	01/31/18 13:00	2/2/2018	2/6/2018	18-02009	Strontium-90	EiChroM SRW01 Modified	6.83E-01	4.51E-01	5.10E-01	7.18E-01	U	pCi/g	
18-02009-09	TRG	B102110FIWC015CV	01/31/18 14:43	2/2/2018	2/6/2018	18-02009	Strontium-90	EiChroM SRW01 Modified	4.50E-01	4.42E-01	4.69E-01	7.35E-01	U	pCi/g	
18-02009-10	TRG	B102110FIWC017CV	01/31/18 15:07	2/2/2018	2/6/2018	18-02009	Strontium-90	EiChroM SRW01 Modified	5.13E-01	4.98E-01	5.29E-01	8.27E-01	U	pCi/g	
18-02009-11	TRG	B102110FIWC019CV	01/31/18 15:30	2/2/2018	2/6/2018	18-02009	Strontium-90	EiChroM SRW01 Modified	9.00E-01	4.96E-01	5.87E-01	7.74E-01		pCi/g	
18-02009-12	TRG	B102110FIWC020CV	02/01/18 08:12	2/2/2018	2/6/2018	18-02009	Strontium-90	EiChroM SRW01 Modified	5.64E-01	4.16E-01	4.60E-01	6.72E-01	U	pCi/g	
18-02009-13	TRG	B102110FIWC014CV	02/01/18 08:56	2/2/2018	2/6/2018	18-02009	Strontium-90	EiChroM SRW01 Modified	3.55E-01	4.39E-01	4.56E-01	7.41E-01	U	pCi/g	
18-02009-14	TRG	B102110FIWC018CV	02/01/18 09:38	2/2/2018	2/6/2018	18-02009	Strontium-90	EiChroM SRW01 Modified	4.56E-01	4.55E-01	4.81E-01	7.57E-01	U	pCi/g	
18-02009-15	TRG	B102110FIWC016CV	02/01/18 10:00	2/2/2018	2/6/2018	18-02009	Strontium-90	EiChroM SRW01 Modified	5.59E-01	5.06E-01	5.42E-01	8.35E-01	U	pCi/g	
18-02009-16	TRG	B102110FIWC019CV	02/01/18 10:38	2/2/2018	2/6/2018	18-02009	Strontium-90	EiChroM SRW01 Modified	1.77E-01	4.90E-01	4.93E-01	8.54E-01	U	pCi/g	
18-02009-01	LCS	KNOWN	02/02/18 00:00	2/2/2018	2/2/2018	18-02009	Cobalt-60	EPA 901.1 Modified	2.71E+02	1.06E+01				pCi/g	
18-02009-01	LCS	KNOWN	02/02/18 00:00	2/2/2018	2/2/2018	18-02009	Cesium-137	EPA 901.1 Modified	1.69E+02	6.75E+00				pCi/g	
18-02009-01	LCS	SPIKE	02/02/18 00:00	2/2/2018	2/2/2018	18-02009	Cobalt-60	EPA 901.1 Modified	2.89E+02	1.78E+01	2.32E+01	2.27E+00		pCi/g	
18-02009-01	LCS	SPIKE	02/02/18 00:00	2/2/2018	2/2/2018	18-02009	Cesium-137	EPA 901.1 Modified	1.91E+02	3.15E+01	3.30E+01	2.33E+00		pCi/g	

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EBERLINE ANALYTICAL CORPORATION

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

[206]

Eberline Analytical Final Report of Analysis			Report To:					Work Order Details:						
			J Alex Bohacheff					SDG:	18-02009					
			Zion Solutions, LLC					Purchase Order:	677118					
			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
18-02009-02	MBL	BLANK	02/02/18 00:00	2/2/2018	2/2/2018	18-02009	Actinium-228	EPA 901.1 Modified	5.40E-02	1.40E-01	1.40E-01	2.42E-01	U	pCi/g
18-02009-02	MBL	BLANK	02/02/18 00:00	2/2/2018	2/2/2018	18-02009	Silver-108m	EPA 901.1 Modified	-3.46E-02	5.42E-02	5.42E-02	4.97E-02	U	pCi/g
18-02009-02	MBL	BLANK	02/02/18 00:00	2/2/2018	2/2/2018	18-02009	Americium-241	EPA 901.1 Modified	-3.42E-03	1.56E-02	1.56E-02	6.45E-02	U	pCi/g
18-02009-02	MBL	BLANK	02/02/18 00:00	2/2/2018	2/2/2018	18-02009	Barium-133	EPA 901.1 Modified	-1.49E-02	4.28E-02	4.28E-02	6.27E-02	U	pCi/g
18-02009-02	MBL	BLANK	02/02/18 00:00	2/2/2018	2/2/2018	18-02009	Bismuth-214	EPA 901.1 Modified	4.35E-02	8.41E-02	8.41E-02	1.45E-01	U	pCi/g
18-02009-02	MBL	BLANK	02/02/18 00:00	2/2/2018	2/2/2018	18-02009	Cobalt-60	EPA 901.1 Modified	-1.88E-02	4.67E-02	4.67E-02	5.14E-02	U	pCi/g
18-02009-02	MBL	BLANK	02/02/18 00:00	2/2/2018	2/2/2018	18-02009	Cesium-134	EPA 901.1 Modified	-1.08E-02	4.30E-02	4.30E-02	6.30E-02	U	pCi/g
18-02009-02	MBL	BLANK	02/02/18 00:00	2/2/2018	2/2/2018	18-02009	Cesium-137	EPA 901.1 Modified	4.44E-02	3.81E-02	3.82E-02	7.48E-02	U	pCi/g
18-02009-02	MBL	BLANK	02/02/18 00:00	2/2/2018	2/2/2018	18-02009	Europium-152	EPA 901.1 Modified	4.66E-02	1.25E-01	1.25E-01	1.12E-01	U	pCi/g
18-02009-02	MBL	BLANK	02/02/18 00:00	2/2/2018	2/2/2018	18-02009	Europium-154	EPA 901.1 Modified	-9.79E-02	1.13E-01	1.13E-01	5.91E-02	U	pCi/g
18-02009-02	MBL	BLANK	02/02/18 00:00	2/2/2018	2/2/2018	18-02009	Europium-155	EPA 901.1 Modified	-2.76E-02	3.47E-02	3.47E-02	6.43E-02	U	pCi/g
18-02009-02	MBL	BLANK	02/02/18 00:00	2/2/2018	2/2/2018	18-02009	Holmium-166m	EPA 901.1 Modified	-3.89E-02	9.36E-02	9.37E-02	4.28E-02	U	pCi/g
18-02009-02	MBL	BLANK	02/02/18 00:00	2/2/2018	2/2/2018	18-02009	Iodine-129	EPA 901.1 Modified	1.60E-02	6.74E-02	6.74E-02	1.04E-01	U	pCi/g
18-02009-02	MBL	BLANK	02/02/18 00:00	2/2/2018	2/2/2018	18-02009	Potassium-40	EPA 901.1 Modified	-4.04E-03	3.14E-01	3.14E-01	5.82E-01	U	pCi/g
18-02009-02	MBL	BLANK	02/02/18 00:00	2/2/2018	2/2/2018	18-02009	Manganese-54	EPA 901.1 Modified	1.43E-02	3.96E-02	3.96E-02	6.59E-02	U	pCi/g
18-02009-02	MBL	BLANK	02/02/18 00:00	2/2/2018	2/2/2018	18-02009	Niobium-94	EPA 901.1 Modified	6.20E-03	1.54E-02	1.54E-02	6.22E-02	U	pCi/g
18-02009-02	MBL	BLANK	02/02/18 00:00	2/2/2018	2/2/2018	18-02009	Lead-210	EPA 901.1 Modified	2.46E-01	4.79E-01	4.79E-01	7.48E-01	U	pCi/g
18-02009-02	MBL	BLANK	02/02/18 00:00	2/2/2018	2/2/2018	18-02009	Lead-212	EPA 901.1 Modified	4.56E-02	4.61E-02	4.61E-02	7.93E-02	U	pCi/g
18-02009-02	MBL	BLANK	02/02/18 00:00	2/2/2018	2/2/2018	18-02009	Lead-214	EPA 901.1 Modified	1.65E-03	6.78E-02	6.78E-02	1.06E-01	U	pCi/g
18-02009-02	MBL	BLANK	02/02/18 00:00	2/2/2018	2/2/2018	18-02009	Promethium-145	EPA 901.1 Modified	5.17E-03	6.62E-02	6.62E-02	1.01E-01	U	pCi/g
18-02009-02	MBL	BLANK	02/02/18 00:00	2/2/2018	2/2/2018	18-02009	Radium-226	EPA 901.1 Modified	4.35E-02	8.41E-02	8.41E-02	1.45E-01	U	pCi/g
18-02009-02	MBL	BLANK	02/02/18 00:00	2/2/2018	2/2/2018	18-02009	Antimony-125	EPA 901.1 Modified	7.14E-03	4.55E-02	4.55E-02	1.50E-01	U	pCi/g
18-02009-02	MBL	BLANK	02/02/18 00:00	2/2/2018	2/2/2018	18-02009	Thorium-234	EPA 901.1 Modified	4.65E-01	4.45E-01	4.46E-01	7.29E-01	U	pCi/g
18-02009-02	MBL	BLANK	02/02/18 00:00	2/2/2018	2/2/2018	18-02009	Thallium-208	EPA 901.1 Modified	6.76E-02	1.07E-01	1.07E-01	1.93E-01	U	pCi/g
18-02009-02	MBL	BLANK	02/02/18 00:00	2/2/2018	2/2/2018	18-02009	Uranium-235	EPA 901.1 Modified	1.06E-01	3.41E-01	3.41E-01	2.33E-01	U	pCi/g

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EBERLINE ANALYTICAL CORPORATION

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

[207]

Eberline Analytical Final Report of Analysis			Report To:						Work Order Details:					
			J Alex Bohacheff						SDG: 18-02009					
			Zion Solutions, LLC						Purchase Order: 677118					
			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
18-02009-03	DUP	B102110FIWC001CV	01/31/18 13:20	2/2/2018	2/2/2018	18-02009	Actinium-228	EPA 901.1 Modified	7.76E-01	1.91E+00	1.91E+00	3.18E+00	U	pCi/g
18-02009-03	DUP	B102110FIWC001CV	01/31/18 13:20	2/2/2018	2/2/2018	18-02009	Silver-108m	EPA 901.1 Modified	7.85E-01	6.43E-01	6.45E-01	6.01E-01	U	pCi/g
18-02009-03	DUP	B102110FIWC001CV	01/31/18 13:20	2/2/2018	2/2/2018	18-02009	Americium-241	EPA 901.1 Modified	-1.23E+00	6.92E-01	6.95E-01	8.02E-01	U	pCi/g
18-02009-03	DUP	B102110FIWC001CV	01/31/18 13:20	2/2/2018	2/2/2018	18-02009	Barium-133	EPA 901.1 Modified	-2.32E+00	7.14E-01	7.24E-01	8.14E-01	U	pCi/g
18-02009-03	DUP	B102110FIWC001CV	01/31/18 13:20	2/2/2018	2/2/2018	18-02009	Bismuth-214	EPA 901.1 Modified	6.42E-01	1.06E+00	1.06E+00	1.58E+00	U	pCi/g
18-02009-03	DUP	B102110FIWC001CV	01/31/18 13:20	2/2/2018	2/2/2018	18-02009	Cobalt-60	EPA 901.1 Modified	1.74E+01	1.22E+00	1.51E+00	8.80E-01		pCi/g
18-02009-03	DUP	B102110FIWC001CV	01/31/18 13:20	2/2/2018	2/2/2018	18-02009	Cesium-134	EPA 901.1 Modified	-8.82E-02	5.04E-01	5.04E-01	7.26E-01	U	pCi/g
18-02009-03	DUP	B102110FIWC001CV	01/31/18 13:20	2/2/2018	2/2/2018	18-02009	Cesium-137	EPA 901.1 Modified	2.21E+00	8.16E-01	8.24E-01	1.19E+00		pCi/g
18-02009-03	DUP	B102110FIWC001CV	01/31/18 13:20	2/2/2018	2/2/2018	18-02009	Europium-152	EPA 901.1 Modified	1.60E+02	7.25E+00	1.10E+01	3.27E+00		pCi/g
18-02009-03	DUP	B102110FIWC001CV	01/31/18 13:20	2/2/2018	2/2/2018	18-02009	Europium-154	EPA 901.1 Modified	6.57E+00	1.46E+00	1.50E+00	2.58E+00	U	pCi/g
18-02009-03	DUP	B102110FIWC001CV	01/31/18 13:20	2/2/2018	2/2/2018	18-02009	Europium-155	EPA 901.1 Modified	1.33E+00	9.25E-01	9.27E-01	1.47E+00	U	pCi/g
18-02009-03	DUP	B102110FIWC001CV	01/31/18 13:20	2/2/2018	2/2/2018	18-02009	Holmium-166m	EPA 901.1 Modified	5.04E-01	9.40E-01	9.40E-01	5.18E-01	U	pCi/g
18-02009-03	DUP	B102110FIWC001CV	01/31/18 13:20	2/2/2018	2/2/2018	18-02009	Iodine-129	EPA 901.1 Modified	1.47E+00	3.80E-01	3.87E-01	1.49E+00	U	pCi/g
18-02009-03	DUP	B102110FIWC001CV	01/31/18 13:20	2/2/2018	2/2/2018	18-02009	Potassium-40	EPA 901.1 Modified	5.06E+00	3.50E+00	3.51E+00	6.82E+00	U	pCi/g
18-02009-03	DUP	B102110FIWC001CV	01/31/18 13:20	2/2/2018	2/2/2018	18-02009	Manganese-54	EPA 901.1 Modified	-5.95E-02	5.53E-01	5.53E-01	8.00E-01	U	pCi/g
18-02009-03	DUP	B102110FIWC001CV	01/31/18 13:20	2/2/2018	2/2/2018	18-02009	Niobium-94	EPA 901.1 Modified	-1.52E+00	8.68E-01	8.71E-01	7.53E-01	U	pCi/g
18-02009-03	DUP	B102110FIWC001CV	01/31/18 13:20	2/2/2018	2/2/2018	18-02009	Lead-210	EPA 901.1 Modified	2.79E+02	2.37E+01	2.77E+01	1.88E+01	U	pCi/g
18-02009-03	DUP	B102110FIWC001CV	01/31/18 13:20	2/2/2018	2/2/2018	18-02009	Lead-212	EPA 901.1 Modified	4.21E-01	5.84E-01	5.85E-01	9.39E-01	U	pCi/g
18-02009-03	DUP	B102110FIWC001CV	01/31/18 13:20	2/2/2018	2/2/2018	18-02009	Lead-214	EPA 901.1 Modified	2.75E+00	1.06E+00	1.07E+00	1.61E+00	U	pCi/g
18-02009-03	DUP	B102110FIWC001CV	01/31/18 13:20	2/2/2018	2/2/2018	18-02009	Promethium-145	EPA 901.1 Modified	5.25E+00	1.90E+00	1.92E+00	2.44E+00	U	pCi/g
18-02009-03	DUP	B102110FIWC001CV	01/31/18 13:20	2/2/2018	2/2/2018	18-02009	Radium-226	EPA 901.1 Modified	6.42E-01	1.06E+00	1.06E+00	1.58E+00	U	pCi/g
18-02009-03	DUP	B102110FIWC001CV	01/31/18 13:20	2/2/2018	2/2/2018	18-02009	Antimony-125	EPA 901.1 Modified	-4.83E-01	1.25E+00	1.25E+00	1.79E+00	U	pCi/g
18-02009-03	DUP	B102110FIWC001CV	01/31/18 13:20	2/2/2018	2/2/2018	18-02009	Thorium-234	EPA 901.1 Modified	4.65E+00	6.75E+00	6.75E+00	8.73E+00	U	pCi/g
18-02009-03	DUP	B102110FIWC001CV	01/31/18 13:20	2/2/2018	2/2/2018	18-02009	Thallium-208	EPA 901.1 Modified	1.67E+00	1.65E+00	1.65E+00	1.45E+00	U	pCi/g
18-02009-03	DUP	B102110FIWC001CV	01/31/18 13:20	2/2/2018	2/2/2018	18-02009	Uranium-235	EPA 901.1 Modified	-3.06E-01	4.98E+00	4.98E+00	3.22E+00	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

[208]

Eberline Analytical Final Report of Analysis			Report To:					Work Order Details:						
			J Alex Bohacheff					SDG:	18-02009					
			Zion Solutions, LLC					Purchase Order:	677118					
			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
18-02009-04	DO	B102110FIWC001CV	01/31/18 13:20	2/2/2018	2/2/2018	18-02009	Actinium-228	EPA 901.1 Modified	1.75E+00	2.03E+00	2.04E+00	3.09E+00	U	pCi/g
18-02009-04	DO	B102110FIWC001CV	01/31/18 13:20	2/2/2018	2/2/2018	18-02009	Silver-108m	EPA 901.1 Modified	7.08E-01	6.13E-01	6.14E-01	5.67E-01	U	pCi/g
18-02009-04	DO	B102110FIWC001CV	01/31/18 13:20	2/2/2018	2/2/2018	18-02009	Americium-241	EPA 901.1 Modified	-3.90E-01	6.47E-01	6.47E-01	7.99E-01	U	pCi/g
18-02009-04	DO	B102110FIWC001CV	01/31/18 13:20	2/2/2018	2/2/2018	18-02009	Barium-133	EPA 901.1 Modified	-9.45E-02	2.72E-01	2.72E-01	8.08E-01	U	pCi/g
18-02009-04	DO	B102110FIWC001CV	01/31/18 13:20	2/2/2018	2/2/2018	18-02009	Bismuth-214	EPA 901.1 Modified	2.03E-01	1.01E+00	1.01E+00	1.48E+00	U	pCi/g
18-02009-04	DO	B102110FIWC001CV	01/31/18 13:20	2/2/2018	2/2/2018	18-02009	Cobalt-60	EPA 901.1 Modified	1.51E+01	1.09E+00	1.34E+00	8.04E-01		pCi/g
18-02009-04	DO	B102110FIWC001CV	01/31/18 13:20	2/2/2018	2/2/2018	18-02009	Cesium-134	EPA 901.1 Modified	-4.15E-01	4.87E-01	4.87E-01	6.74E-01	U	pCi/g
18-02009-04	DO	B102110FIWC001CV	01/31/18 13:20	2/2/2018	2/2/2018	18-02009	Cesium-137	EPA 901.1 Modified	2.48E+00	9.07E-01	9.16E-01	1.32E+00		pCi/g
18-02009-04	DO	B102110FIWC001CV	01/31/18 13:20	2/2/2018	2/2/2018	18-02009	Europium-152	EPA 901.1 Modified	1.55E+02	6.36E+00	1.02E+01	3.34E+00		pCi/g
18-02009-04	DO	B102110FIWC001CV	01/31/18 13:20	2/2/2018	2/2/2018	18-02009	Europium-154	EPA 901.1 Modified	6.87E+00	1.44E+00	1.48E+00	2.55E+00	U	pCi/g
18-02009-04	DO	B102110FIWC001CV	01/31/18 13:20	2/2/2018	2/2/2018	18-02009	Europium-155	EPA 901.1 Modified	9.86E-01	8.77E-01	8.78E-01	1.40E+00	U	pCi/g
18-02009-04	DO	B102110FIWC001CV	01/31/18 13:20	2/2/2018	2/2/2018	18-02009	Holmium-166m	EPA 901.1 Modified	7.86E-01	8.94E-01	8.95E-01	5.13E-01	U	pCi/g
18-02009-04	DO	B102110FIWC001CV	01/31/18 13:20	2/2/2018	2/2/2018	18-02009	Iodine-129	EPA 901.1 Modified	1.26E+00	3.39E-01	3.45E-01	1.51E+00	U	pCi/g
18-02009-04	DO	B102110FIWC001CV	01/31/18 13:20	2/2/2018	2/2/2018	18-02009	Potassium-40	EPA 901.1 Modified	6.78E+00	2.89E+00	2.91E+00	9.53E+00	U	pCi/g
18-02009-04	DO	B102110FIWC001CV	01/31/18 13:20	2/2/2018	2/2/2018	18-02009	Manganese-54	EPA 901.1 Modified	-5.69E-02	5.27E-01	5.27E-01	7.66E-01	U	pCi/g
18-02009-04	DO	B102110FIWC001CV	01/31/18 13:20	2/2/2018	2/2/2018	18-02009	Niobium-94	EPA 901.1 Modified	-1.81E+00	8.53E-01	8.59E-01	7.18E-01	U	pCi/g
18-02009-04	DO	B102110FIWC001CV	01/31/18 13:20	2/2/2018	2/2/2018	18-02009	Lead-210	EPA 901.1 Modified	2.40E+02	2.09E+01	2.43E+01	1.77E+01	U	pCi/g
18-02009-04	DO	B102110FIWC001CV	01/31/18 13:20	2/2/2018	2/2/2018	18-02009	Lead-212	EPA 901.1 Modified	3.59E-01	5.58E-01	5.58E-01	8.95E-01	U	pCi/g
18-02009-04	DO	B102110FIWC001CV	01/31/18 13:20	2/2/2018	2/2/2018	18-02009	Lead-214	EPA 901.1 Modified	2.00E+00	8.77E-01	8.83E-01	1.64E+00		pCi/g
18-02009-04	DO	B102110FIWC001CV	01/31/18 13:20	2/2/2018	2/2/2018	18-02009	Promethium-145	EPA 901.1 Modified	4.33E+00	1.79E+00	1.80E+00	2.29E+00	U	pCi/g
18-02009-04	DO	B102110FIWC001CV	01/31/18 13:20	2/2/2018	2/2/2018	18-02009	Radium-226	EPA 901.1 Modified	2.03E-01	1.01E+00	1.01E+00	1.48E+00	U	pCi/g
18-02009-04	DO	B102110FIWC001CV	01/31/18 13:20	2/2/2018	2/2/2018	18-02009	Antimony-125	EPA 901.1 Modified	-1.20E-01	1.19E+00	1.19E+00	1.72E+00	U	pCi/g
18-02009-04	DO	B102110FIWC001CV	01/31/18 13:20	2/2/2018	2/2/2018	18-02009	Thorium-234	EPA 901.1 Modified	7.78E+00	6.28E+00	6.30E+00	8.33E+00	U	pCi/g
18-02009-04	DO	B102110FIWC001CV	01/31/18 13:20	2/2/2018	2/2/2018	18-02009	Thallium-208	EPA 901.1 Modified	-1.99E-01	8.20E-01	8.20E-01	1.32E+00	U	pCi/g
18-02009-04	DO	B102110FIWC001CV	01/31/18 13:20	2/2/2018	2/2/2018	18-02009	Uranium-235	EPA 901.1 Modified	-2.50E-01	4.85E+00	4.85E+00	3.16E+00	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

[209]

Eberline Analytical Final Report of Analysis			Report To:					Work Order Details:						
			J Alex Bohacheff					SDG:	18-02009					
			Zion Solutions, LLC					Purchase Order:	677118					
			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
18-02009-05	TRG	B102110IFIWC003CV	01/31/18 13:55	2/2/2018	2/2/2018	18-02009	Actinium-228	EPA 901.1 Modified	2.89E-01	1.33E+00	1.33E+00	1.98E+00	U	pCi/g
18-02009-05	TRG	B102110IFIWC003CV	01/31/18 13:55	2/2/2018	2/2/2018	18-02009	Silver-108m	EPA 901.1 Modified	6.49E-01	4.28E-01	4.29E-01	4.35E-01	U	pCi/g
18-02009-05	TRG	B102110IFIWC003CV	01/31/18 13:55	2/2/2018	2/2/2018	18-02009	Americium-241	EPA 901.1 Modified	-6.91E-02	3.21E-01	3.21E-01	4.68E-01	U	pCi/g
18-02009-05	TRG	B102110IFIWC003CV	01/31/18 13:55	2/2/2018	2/2/2018	18-02009	Barium-133	EPA 901.1 Modified	-1.64E-02	4.21E-01	4.21E-01	5.37E-01	U	pCi/g
18-02009-05	TRG	B102110IFIWC003CV	01/31/18 13:55	2/2/2018	2/2/2018	18-02009	Bismuth-214	EPA 901.1 Modified	5.85E-01	7.19E-01	7.19E-01	1.20E+00	U	pCi/g
18-02009-05	TRG	B102110IFIWC003CV	01/31/18 13:55	2/2/2018	2/2/2018	18-02009	Cobalt-60	EPA 901.1 Modified	4.85E+00	4.77E-01	5.38E-01	4.42E-01		pCi/g
18-02009-05	TRG	B102110IFIWC003CV	01/31/18 13:55	2/2/2018	2/2/2018	18-02009	Cesium-134	EPA 901.1 Modified	-1.91E-02	2.59E-01	2.59E-01	4.88E-01	U	pCi/g
18-02009-05	TRG	B102110IFIWC003CV	01/31/18 13:55	2/2/2018	2/2/2018	18-02009	Cesium-137	EPA 901.1 Modified	3.74E+01	5.90E+00	6.20E+00	8.62E-01		pCi/g
18-02009-05	TRG	B102110IFIWC003CV	01/31/18 13:55	2/2/2018	2/2/2018	18-02009	Europium-152	EPA 901.1 Modified	1.05E+02	5.49E+00	7.70E+00	2.06E+00		pCi/g
18-02009-05	TRG	B102110IFIWC003CV	01/31/18 13:55	2/2/2018	2/2/2018	18-02009	Europium-154	EPA 901.1 Modified	3.88E+00	9.23E-01	9.44E-01	1.68E+00	U	pCi/g
18-02009-05	TRG	B102110IFIWC003CV	01/31/18 13:55	2/2/2018	2/2/2018	18-02009	Europium-155	EPA 901.1 Modified	1.22E+00	8.83E-01	8.85E-01	1.42E+00	U	pCi/g
18-02009-05	TRG	B102110IFIWC003CV	01/31/18 13:55	2/2/2018	2/2/2018	18-02009	Holmium-166m	EPA 901.1 Modified	6.60E-02	6.38E-01	6.39E-01	3.94E-01	U	pCi/g
18-02009-05	TRG	B102110IFIWC003CV	01/31/18 13:55	2/2/2018	2/2/2018	18-02009	Iodine-129	EPA 901.1 Modified	1.07E-01	1.83E-01	1.83E-01	2.46E-01	U	pCi/g
18-02009-05	TRG	B102110IFIWC003CV	01/31/18 13:55	2/2/2018	2/2/2018	18-02009	Potassium-40	EPA 901.1 Modified	6.76E+00	1.97E+00	2.00E+00	5.06E+00		pCi/g
18-02009-05	TRG	B102110IFIWC003CV	01/31/18 13:55	2/2/2018	2/2/2018	18-02009	Manganese-54	EPA 901.1 Modified	2.47E-01	3.45E-01	3.45E-01	5.25E-01	U	pCi/g
18-02009-05	TRG	B102110IFIWC003CV	01/31/18 13:55	2/2/2018	2/2/2018	18-02009	Niobium-94	EPA 901.1 Modified	-2.07E+00	6.89E-01	6.97E-01	5.00E-01	U	pCi/g
18-02009-05	TRG	B102110IFIWC003CV	01/31/18 13:55	2/2/2018	2/2/2018	18-02009	Lead-210	EPA 901.1 Modified	1.26E+02	1.06E+01	1.25E+01	8.17E+00		pCi/g
18-02009-05	TRG	B102110IFIWC003CV	01/31/18 13:55	2/2/2018	2/2/2018	18-02009	Lead-212	EPA 901.1 Modified	4.36E-02	5.35E-01	5.35E-01	6.82E-01	U	pCi/g
18-02009-05	TRG	B102110IFIWC003CV	01/31/18 13:55	2/2/2018	2/2/2018	18-02009	Lead-214	EPA 901.1 Modified	1.29E-01	7.13E-01	7.13E-01	9.02E-01	U	pCi/g
18-02009-05	TRG	B102110IFIWC003CV	01/31/18 13:55	2/2/2018	2/2/2018	18-02009	Promethium-145	EPA 901.1 Modified	-3.87E+01	2.86E+00	3.49E+00	8.47E-01	U	pCi/g
18-02009-05	TRG	B102110IFIWC003CV	01/31/18 13:55	2/2/2018	2/2/2018	18-02009	Radium-226	EPA 901.1 Modified	5.85E-01	7.19E-01	7.19E-01	1.20E+00	U	pCi/g
18-02009-05	TRG	B102110IFIWC003CV	01/31/18 13:55	2/2/2018	2/2/2018	18-02009	Antimony-125	EPA 901.1 Modified	-8.12E-02	1.01E+00	1.01E+00	1.28E+00	U	pCi/g
18-02009-05	TRG	B102110IFIWC003CV	01/31/18 13:55	2/2/2018	2/2/2018	18-02009	Thorium-234	EPA 901.1 Modified	1.49E+00	3.17E+00	3.17E+00	4.74E+00	U	pCi/g
18-02009-05	TRG	B102110IFIWC003CV	01/31/18 13:55	2/2/2018	2/2/2018	18-02009	Thallium-208	EPA 901.1 Modified	4.48E-01	8.78E-01	8.78E-01	6.96E-01	U	pCi/g
18-02009-05	TRG	B102110IFIWC003CV	01/31/18 13:55	2/2/2018	2/2/2018	18-02009	Uranium-235	EPA 901.1 Modified	3.50E-01	4.67E+00	4.67E+00	2.40E+00	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



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

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Eberline Analytical Final Report of Analysis			Report To:						Work Order Details:						
			J Alex Bohacheff						SDG:	18-02009					
			Zion Solutions, LLC						Purchase Order:	677118					
			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	
18-02009-06	TRG	B102110IFIWC004CV	01/31/18 14:20	2/2/2018	2/2/2018	18-02009	Actinium-228	EPA 901.1 Modified	9.67E-01	2.24E+00	2.24E+00	3.31E+00	U	pCi/g	
18-02009-06	TRG	B102110IFIWC004CV	01/31/18 14:20	2/2/2018	2/2/2018	18-02009	Silver-108m	EPA 901.1 Modified	7.87E-01	7.08E-01	7.09E-01	6.11E-01	U	pCi/g	
18-02009-06	TRG	B102110IFIWC004CV	01/31/18 14:20	2/2/2018	2/2/2018	18-02009	Americium-241	EPA 901.1 Modified	-1.29E-01	6.24E-01	6.24E-01	7.82E-01	U	pCi/g	
18-02009-06	TRG	B102110IFIWC004CV	01/31/18 14:20	2/2/2018	2/2/2018	18-02009	Barium-133	EPA 901.1 Modified	-1.23E-01	2.22E-01	2.22E-01	8.00E-01	U	pCi/g	
18-02009-06	TRG	B102110IFIWC004CV	01/31/18 14:20	2/2/2018	2/2/2018	18-02009	Bismuth-214	EPA 901.1 Modified	1.61E+00	1.08E+00	1.08E+00	1.98E+00	U	pCi/g	
18-02009-06	TRG	B102110IFIWC004CV	01/31/18 14:20	2/2/2018	2/2/2018	18-02009	Cobalt-60	EPA 901.1 Modified	1.13E+01	9.06E-01	1.08E+00	7.32E-01		pCi/g	
18-02009-06	TRG	B102110IFIWC004CV	01/31/18 14:20	2/2/2018	2/2/2018	18-02009	Cesium-134	EPA 901.1 Modified	2.02E-01	3.35E-01	3.35E-01	7.52E-01	U	pCi/g	
18-02009-06	TRG	B102110IFIWC004CV	01/31/18 14:20	2/2/2018	2/2/2018	18-02009	Cesium-137	EPA 901.1 Modified	1.58E-01	6.44E-01	6.44E-01	9.48E-01	U	pCi/g	
18-02009-06	TRG	B102110IFIWC004CV	01/31/18 14:20	2/2/2018	2/2/2018	18-02009	Europium-152	EPA 901.1 Modified	1.69E+02	7.04E+00	1.12E+01	3.25E+00		pCi/g	
18-02009-06	TRG	B102110IFIWC004CV	01/31/18 14:20	2/2/2018	2/2/2018	18-02009	Europium-154	EPA 901.1 Modified	5.51E+00	1.38E+00	1.41E+00	2.52E+00	U	pCi/g	
18-02009-06	TRG	B102110IFIWC004CV	01/31/18 14:20	2/2/2018	2/2/2018	18-02009	Europium-155	EPA 901.1 Modified	1.61E+00	7.94E-01	7.98E-01	1.27E+00	U	pCi/g	
18-02009-06	TRG	B102110IFIWC004CV	01/31/18 14:20	2/2/2018	2/2/2018	18-02009	Holmium-166m	EPA 901.1 Modified	-6.20E-01	1.08E+00	1.08E+00	4.93E-01	U	pCi/g	
18-02009-06	TRG	B102110IFIWC004CV	01/31/18 14:20	2/2/2018	2/2/2018	18-02009	Iodine-129	EPA 901.1 Modified	9.30E-01	6.37E-01	6.39E-01	8.20E-01	U	pCi/g	
18-02009-06	TRG	B102110IFIWC004CV	01/31/18 14:20	2/2/2018	2/2/2018	18-02009	Potassium-40	EPA 901.1 Modified	5.65E+00	3.48E+00	3.49E+00	5.57E+00	U	pCi/g	
18-02009-06	TRG	B102110IFIWC004CV	01/31/18 14:20	2/2/2018	2/2/2018	18-02009	Manganese-54	EPA 901.1 Modified	2.13E-02	5.98E-01	5.98E-01	8.77E-01	U	pCi/g	
18-02009-06	TRG	B102110IFIWC004CV	01/31/18 14:20	2/2/2018	2/2/2018	18-02009	Niobium-94	EPA 901.1 Modified	-1.16E+00	9.22E-01	9.24E-01	8.14E-01	U	pCi/g	
18-02009-06	TRG	B102110IFIWC004CV	01/31/18 14:20	2/2/2018	2/2/2018	18-02009	Lead-210	EPA 901.1 Modified	2.70E+02	2.39E+01	2.76E+01	1.87E+01	U	pCi/g	
18-02009-06	TRG	B102110IFIWC004CV	01/31/18 14:20	2/2/2018	2/2/2018	18-02009	Lead-212	EPA 901.1 Modified	2.16E-01	5.35E-01	5.35E-01	1.01E+00	U	pCi/g	
18-02009-06	TRG	B102110IFIWC004CV	01/31/18 14:20	2/2/2018	2/2/2018	18-02009	Lead-214	EPA 901.1 Modified	-1.37E+00	9.72E-01	9.75E-01	1.31E+00	U	pCi/g	
18-02009-06	TRG	B102110IFIWC004CV	01/31/18 14:20	2/2/2018	2/2/2018	18-02009	Promethium-145	EPA 901.1 Modified	1.57E+01	2.75E+00	2.86E+00	3.23E+00	U	pCi/g	
18-02009-06	TRG	B102110IFIWC004CV	01/31/18 14:20	2/2/2018	2/2/2018	18-02009	Radium-226	EPA 901.1 Modified	1.61E+00	1.08E+00	1.08E+00	1.98E+00	U	pCi/g	
18-02009-06	TRG	B102110IFIWC004CV	01/31/18 14:20	2/2/2018	2/2/2018	18-02009	Antimony-125	EPA 901.1 Modified	6.12E-01	1.26E+00	1.26E+00	1.85E+00	U	pCi/g	
18-02009-06	TRG	B102110IFIWC004CV	01/31/18 14:20	2/2/2018	2/2/2018	18-02009	Thorium-234	EPA 901.1 Modified	4.47E+00	6.05E+00	6.06E+00	7.84E+00	U	pCi/g	
18-02009-06	TRG	B102110IFIWC004CV	01/31/18 14:20	2/2/2018	2/2/2018	18-02009	Thallium-208	EPA 901.1 Modified	-1.09E-01	9.07E-01	9.07E-01	9.51E-01	U	pCi/g	
18-02009-06	TRG	B102110IFIWC004CV	01/31/18 14:20	2/2/2018	2/2/2018	18-02009	Uranium-235	EPA 901.1 Modified	-1.90E+00	6.16E+00	6.16E+00	2.92E+00	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

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Eberline Analytical Final Report of Analysis								Report To:		Work Order Details:					
								J Alex Bohacheff		SDG:		18-02009			
								Zion Solutions, LLC		Purchase Order:		677118			
								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	
18-02009-07	TRG	B102110FIFC003CV	01/31/18 12:37	2/2/2018	2/2/2018	18-02009	Actinium-228	EPA 901.1 Modified	2.36E+00	2.11E+00	2.12E+00	3.06E+00	U	pCi/g	
18-02009-07	TRG	B102110FIFC003CV	01/31/18 12:37	2/2/2018	2/2/2018	18-02009	Silver-108m	EPA 901.1 Modified	1.15E+00	6.25E-01	6.28E-01	4.77E-01	U	pCi/g	
18-02009-07	TRG	B102110FIFC003CV	01/31/18 12:37	2/2/2018	2/2/2018	18-02009	Americium-241	EPA 901.1 Modified	-2.22E-01	4.82E-01	4.82E-01	6.84E-01	U	pCi/g	
18-02009-07	TRG	B102110FIFC003CV	01/31/18 12:37	2/2/2018	2/2/2018	18-02009	Barium-133	EPA 901.1 Modified	-8.85E-02	4.36E-01	4.36E-01	6.28E-01	U	pCi/g	
18-02009-07	TRG	B102110FIFC003CV	01/31/18 12:37	2/2/2018	2/2/2018	18-02009	Bismuth-214	EPA 901.1 Modified	1.21E+00	6.15E-01	6.18E-01	6.54E-01		pCi/g	
18-02009-07	TRG	B102110FIFC003CV	01/31/18 12:37	2/2/2018	2/2/2018	18-02009	Cobalt-60	EPA 901.1 Modified	5.47E+00	5.99E-01	6.62E-01	5.99E-01		pCi/g	
18-02009-07	TRG	B102110FIFC003CV	01/31/18 12:37	2/2/2018	2/2/2018	18-02009	Cesium-134	EPA 901.1 Modified	3.86E-03	2.12E-01	2.12E-01	5.84E-01	U	pCi/g	
18-02009-07	TRG	B102110FIFC003CV	01/31/18 12:37	2/2/2018	2/2/2018	18-02009	Cesium-137	EPA 901.1 Modified	2.95E-02	5.64E-01	5.64E-01	7.66E-01	U	pCi/g	
18-02009-07	TRG	B102110FIFC003CV	01/31/18 12:37	2/2/2018	2/2/2018	18-02009	Europium-152	EPA 901.1 Modified	9.32E+01	3.89E+00	6.16E+00	2.30E+00		pCi/g	
18-02009-07	TRG	B102110FIFC003CV	01/31/18 12:37	2/2/2018	2/2/2018	18-02009	Europium-154	EPA 901.1 Modified	3.39E+00	1.03E+00	1.05E+00	1.17E+00		pCi/g	
18-02009-07	TRG	B102110FIFC003CV	01/31/18 12:37	2/2/2018	2/2/2018	18-02009	Europium-155	EPA 901.1 Modified	1.81E+00	7.24E-01	7.30E-01	1.04E+00	U	pCi/g	
18-02009-07	TRG	B102110FIFC003CV	01/31/18 12:37	2/2/2018	2/2/2018	18-02009	Holmium-166m	EPA 901.1 Modified	4.44E-01	7.11E-01	7.11E-01	4.26E-01	U	pCi/g	
18-02009-07	TRG	B102110FIFC003CV	01/31/18 12:37	2/2/2018	2/2/2018	18-02009	Iodine-129	EPA 901.1 Modified	-2.89E+00	1.15E+00	1.16E+00	1.34E+00	U	pCi/g	
18-02009-07	TRG	B102110FIFC003CV	01/31/18 12:37	2/2/2018	2/2/2018	18-02009	Potassium-40	EPA 901.1 Modified	8.06E+00	3.00E+00	3.03E+00	6.09E+00	U	pCi/g	
18-02009-07	TRG	B102110FIFC003CV	01/31/18 12:37	2/2/2018	2/2/2018	18-02009	Manganese-54	EPA 901.1 Modified	3.38E-01	5.84E-01	5.84E-01	8.14E-01	U	pCi/g	
18-02009-07	TRG	B102110FIFC003CV	01/31/18 12:37	2/2/2018	2/2/2018	18-02009	Niobium-94	EPA 901.1 Modified	2.23E+00	7.62E-01	7.71E-01	7.13E-01	U	pCi/g	
18-02009-07	TRG	B102110FIFC003CV	01/31/18 12:37	2/2/2018	2/2/2018	18-02009	Lead-210	EPA 901.1 Modified	2.49E+02	2.55E+01	2.85E+01	2.75E+01		pCi/g	
18-02009-07	TRG	B102110FIFC003CV	01/31/18 12:37	2/2/2018	2/2/2018	18-02009	Lead-212	EPA 901.1 Modified	9.94E-02	3.55E-01	3.55E-01	7.92E-01	U	pCi/g	
18-02009-07	TRG	B102110FIFC003CV	01/31/18 12:37	2/2/2018	2/2/2018	18-02009	Lead-214	EPA 901.1 Modified	5.38E-01	6.15E-01	6.15E-01	1.02E+00	U	pCi/g	
18-02009-07	TRG	B102110FIFC003CV	01/31/18 12:37	2/2/2018	2/2/2018	18-02009	Promethium-145	EPA 901.1 Modified	4.45E+01	5.63E+00	6.08E+00	3.42E+00	U	pCi/g	
18-02009-07	TRG	B102110FIFC003CV	01/31/18 12:37	2/2/2018	2/2/2018	18-02009	Radium-226	EPA 901.1 Modified	1.21E+00	6.15E-01	6.18E-01	6.54E-01		pCi/g	
18-02009-07	TRG	B102110FIFC003CV	01/31/18 12:37	2/2/2018	2/2/2018	18-02009	Antimony-125	EPA 901.1 Modified	4.34E-01	9.49E-01	9.50E-01	1.43E+00	U	pCi/g	
18-02009-07	TRG	B102110FIFC003CV	01/31/18 12:37	2/2/2018	2/2/2018	18-02009	Thorium-234	EPA 901.1 Modified	7.58E-01	4.47E+00	4.47E+00	6.46E+00	U	pCi/g	
18-02009-07	TRG	B102110FIFC003CV	01/31/18 12:37	2/2/2018	2/2/2018	18-02009	Thallium-208	EPA 901.1 Modified	-1.08E-02	1.33E+00	1.33E+00	1.02E+00	U	pCi/g	
18-02009-07	TRG	B102110FIFC003CV	01/31/18 12:37	2/2/2018	2/2/2018	18-02009	Uranium-235	EPA 901.1 Modified	-2.49E+00	4.70E+00	4.70E+00	2.60E+00	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:		18-02009				
									Purchase Order:		677118				
									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	
18-02009-08	TRG	B102110FIFC021CV	01/31/18 13:00	2/2/2018	2/2/2018	18-02009	Actinium-228	EPA 901.1 Modified	1.44E+00	1.43E+00	1.43E+00	2.23E+00	U	pCi/g	
18-02009-08	TRG	B102110FIFC021CV	01/31/18 13:00	2/2/2018	2/2/2018	18-02009	Silver-108m	EPA 901.1 Modified	7.44E-01	4.80E-01	4.82E-01	3.70E-01	U	pCi/g	
18-02009-08	TRG	B102110FIFC021CV	01/31/18 13:00	2/2/2018	2/2/2018	18-02009	Americium-241	EPA 901.1 Modified	-9.63E-02	3.29E-01	3.29E-01	4.86E-01	U	pCi/g	
18-02009-08	TRG	B102110FIFC021CV	01/31/18 13:00	2/2/2018	2/2/2018	18-02009	Barium-133	EPA 901.1 Modified	1.23E-01	4.21E-01	4.21E-01	5.42E-01	U	pCi/g	
18-02009-08	TRG	B102110FIFC021CV	01/31/18 13:00	2/2/2018	2/2/2018	18-02009	Bismuth-214	EPA 901.1 Modified	5.92E-01	8.09E-01	8.10E-01	1.23E+00	U	pCi/g	
18-02009-08	TRG	B102110FIFC021CV	01/31/18 13:00	2/2/2018	2/2/2018	18-02009	Cobalt-60	EPA 901.1 Modified	4.49E+00	5.00E-01	5.51E-01	5.34E-01		pCi/g	
18-02009-08	TRG	B102110FIFC021CV	01/31/18 13:00	2/2/2018	2/2/2018	18-02009	Cesium-134	EPA 901.1 Modified	-7.35E-01	4.42E-01	4.44E-01	5.46E-01	U	pCi/g	
18-02009-08	TRG	B102110FIFC021CV	01/31/18 13:00	2/2/2018	2/2/2018	18-02009	Cesium-137	EPA 901.1 Modified	-3.20E-01	4.36E-01	4.36E-01	6.07E-01	U	pCi/g	
18-02009-08	TRG	B102110FIFC021CV	01/31/18 13:00	2/2/2018	2/2/2018	18-02009	Europium-152	EPA 901.1 Modified	1.02E+02	5.51E+00	7.58E+00	2.09E+00		pCi/g	
18-02009-08	TRG	B102110FIFC021CV	01/31/18 13:00	2/2/2018	2/2/2018	18-02009	Europium-154	EPA 901.1 Modified	2.95E+00	9.60E-01	9.72E-01	1.80E+00	U	pCi/g	
18-02009-08	TRG	B102110FIFC021CV	01/31/18 13:00	2/2/2018	2/2/2018	18-02009	Europium-155	EPA 901.1 Modified	2.18E-01	5.61E-01	5.61E-01	8.40E-01	U	pCi/g	
18-02009-08	TRG	B102110FIFC021CV	01/31/18 13:00	2/2/2018	2/2/2018	18-02009	Holmium-166m	EPA 901.1 Modified	2.76E-01	7.18E-01	7.18E-01	4.18E-01	U	pCi/g	
18-02009-08	TRG	B102110FIFC021CV	01/31/18 13:00	2/2/2018	2/2/2018	18-02009	Iodine-129	EPA 901.1 Modified	6.95E-01	1.64E-01	1.68E-01	2.72E-01	U	pCi/g	
18-02009-08	TRG	B102110FIFC021CV	01/31/18 13:00	2/2/2018	2/2/2018	18-02009	Potassium-40	EPA 901.1 Modified	4.97E+00	2.41E+00	2.42E+00	7.04E+00	U	pCi/g	
18-02009-08	TRG	B102110FIFC021CV	01/31/18 13:00	2/2/2018	2/2/2018	18-02009	Manganese-54	EPA 901.1 Modified	-1.28E-01	4.23E-01	4.23E-01	6.08E-01	U	pCi/g	
18-02009-08	TRG	B102110FIFC021CV	01/31/18 13:00	2/2/2018	2/2/2018	18-02009	Niobium-94	EPA 901.1 Modified	-1.46E+00	7.41E-01	7.45E-01	5.72E-01	U	pCi/g	
18-02009-08	TRG	B102110FIFC021CV	01/31/18 13:00	2/2/2018	2/2/2018	18-02009	Lead-210	EPA 901.1 Modified	1.35E+02	1.17E+01	1.36E+01	9.13E+00		pCi/g	
18-02009-08	TRG	B102110FIFC021CV	01/31/18 13:00	2/2/2018	2/2/2018	18-02009	Lead-212	EPA 901.1 Modified	2.05E-01	5.73E-01	5.73E-01	7.01E-01	U	pCi/g	
18-02009-08	TRG	B102110FIFC021CV	01/31/18 13:00	2/2/2018	2/2/2018	18-02009	Lead-214	EPA 901.1 Modified	2.36E-01	7.16E-01	7.16E-01	9.05E-01	U	pCi/g	
18-02009-08	TRG	B102110FIFC021CV	01/31/18 13:00	2/2/2018	2/2/2018	18-02009	Promethium-145	EPA 901.1 Modified	-4.14E+01	3.25E+00	3.88E+00	9.65E-01	U	pCi/g	
18-02009-08	TRG	B102110FIFC021CV	01/31/18 13:00	2/2/2018	2/2/2018	18-02009	Radium-226	EPA 901.1 Modified	5.92E-01	8.09E-01	8.10E-01	1.23E+00	U	pCi/g	
18-02009-08	TRG	B102110FIFC021CV	01/31/18 13:00	2/2/2018	2/2/2018	18-02009	Antimony-125	EPA 901.1 Modified	-2.44E-01	9.12E-01	9.12E-01	1.15E+00	U	pCi/g	
18-02009-08	TRG	B102110FIFC021CV	01/31/18 13:00	2/2/2018	2/2/2018	18-02009	Thorium-234	EPA 901.1 Modified	4.09E+00	3.13E+00	3.13E+00	4.94E+00	U	pCi/g	
18-02009-08	TRG	B102110FIFC021CV	01/31/18 13:00	2/2/2018	2/2/2018	18-02009	Thallium-208	EPA 901.1 Modified	6.95E-02	9.75E-01	9.75E-01	1.15E+00	U	pCi/g	
18-02009-08	TRG	B102110FIFC021CV	01/31/18 13:00	2/2/2018	2/2/2018	18-02009	Uranium-235	EPA 901.1 Modified	-1.46E+00	4.95E+00	4.95E+00	2.38E+00	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

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Eberline Analytical Final Report of Analysis			Report To:					Work Order Details:						
			J Alex Bohacheff					SDG:	18-02009					
			Zion Solutions, LLC					Purchase Order:	677118					
			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
18-02009-09	TRG	B102110FIWC015CV	01/31/18 14:43	2/2/2018	2/2/2018	18-02009	Actinium-228	EPA 901.1 Modified	-3.28E-01	1.55E+00	1.55E+00	2.24E+00	U	pCi/g
18-02009-09	TRG	B102110FIWC015CV	01/31/18 14:43	2/2/2018	2/2/2018	18-02009	Silver-108m	EPA 901.1 Modified	9.73E-01	4.97E-01	5.00E-01	4.50E-01	U	pCi/g
18-02009-09	TRG	B102110FIWC015CV	01/31/18 14:43	2/2/2018	2/2/2018	18-02009	Americium-241	EPA 901.1 Modified	-5.06E-01	5.26E-01	5.27E-01	6.40E-01	U	pCi/g
18-02009-09	TRG	B102110FIWC015CV	01/31/18 14:43	2/2/2018	2/2/2018	18-02009	Barium-133	EPA 901.1 Modified	-1.30E-01	3.39E-01	3.39E-01	6.51E-01	U	pCi/g
18-02009-09	TRG	B102110FIWC015CV	01/31/18 14:43	2/2/2018	2/2/2018	18-02009	Bismuth-214	EPA 901.1 Modified	4.77E-01	7.91E-01	7.92E-01	1.17E+00	U	pCi/g
18-02009-09	TRG	B102110FIWC015CV	01/31/18 14:43	2/2/2018	2/2/2018	18-02009	Cobalt-60	EPA 901.1 Modified	1.15E+01	8.09E-01	1.00E+00	6.84E-01		pCi/g
18-02009-09	TRG	B102110FIWC015CV	01/31/18 14:43	2/2/2018	2/2/2018	18-02009	Cesium-134	EPA 901.1 Modified	-1.50E-01	3.73E-01	3.73E-01	5.31E-01	U	pCi/g
18-02009-09	TRG	B102110FIWC015CV	01/31/18 14:43	2/2/2018	2/2/2018	18-02009	Cesium-137	EPA 901.1 Modified	1.11E+00	4.67E-01	4.70E-01	1.10E+00		pCi/g
18-02009-09	TRG	B102110FIWC015CV	01/31/18 14:43	2/2/2018	2/2/2018	18-02009	Europium-152	EPA 901.1 Modified	1.31E+02	5.86E+00	8.92E+00	2.33E+00		pCi/g
18-02009-09	TRG	B102110FIWC015CV	01/31/18 14:43	2/2/2018	2/2/2018	18-02009	Europium-154	EPA 901.1 Modified	6.82E+00	1.12E+00	1.17E+00	2.02E+00	U	pCi/g
18-02009-09	TRG	B102110FIWC015CV	01/31/18 14:43	2/2/2018	2/2/2018	18-02009	Europium-155	EPA 901.1 Modified	2.15E+00	7.23E-01	7.31E-01	1.15E+00	U	pCi/g
18-02009-09	TRG	B102110FIWC015CV	01/31/18 14:43	2/2/2018	2/2/2018	18-02009	Holmium-166m	EPA 901.1 Modified	-2.37E-01	7.26E-01	7.27E-01	4.10E-01	U	pCi/g
18-02009-09	TRG	B102110FIWC015CV	01/31/18 14:43	2/2/2018	2/2/2018	18-02009	Iodine-129	EPA 901.1 Modified	1.16E+00	2.73E-01	2.80E-01	1.17E+00	U	pCi/g
18-02009-09	TRG	B102110FIWC015CV	01/31/18 14:43	2/2/2018	2/2/2018	18-02009	Potassium-40	EPA 901.1 Modified	6.37E+00	2.55E+00	2.57E+00	4.23E+00		pCi/g
18-02009-09	TRG	B102110FIWC015CV	01/31/18 14:43	2/2/2018	2/2/2018	18-02009	Manganese-54	EPA 901.1 Modified	3.27E-01	4.13E-01	4.14E-01	6.21E-01	U	pCi/g
18-02009-09	TRG	B102110FIWC015CV	01/31/18 14:43	2/2/2018	2/2/2018	18-02009	Niobium-94	EPA 901.1 Modified	-1.40E+00	6.94E-01	6.98E-01	5.56E-01	U	pCi/g
18-02009-09	TRG	B102110FIWC015CV	01/31/18 14:43	2/2/2018	2/2/2018	18-02009	Lead-210	EPA 901.1 Modified	2.05E+02	1.76E+01	2.05E+01	1.40E+01	U	pCi/g
18-02009-09	TRG	B102110FIWC015CV	01/31/18 14:43	2/2/2018	2/2/2018	18-02009	Lead-212	EPA 901.1 Modified	2.93E-01	3.76E-01	3.76E-01	7.11E-01	U	pCi/g
18-02009-09	TRG	B102110FIWC015CV	01/31/18 14:43	2/2/2018	2/2/2018	18-02009	Lead-214	EPA 901.1 Modified	2.34E+00	5.83E-01	5.96E-01	9.57E-01		pCi/g
18-02009-09	TRG	B102110FIWC015CV	01/31/18 14:43	2/2/2018	2/2/2018	18-02009	Promethium-145	EPA 901.1 Modified	3.07E+00	1.41E+00	1.42E+00	1.80E+00	U	pCi/g
18-02009-09	TRG	B102110FIWC015CV	01/31/18 14:43	2/2/2018	2/2/2018	18-02009	Radium-226	EPA 901.1 Modified	4.77E-01	7.91E-01	7.92E-01	1.17E+00	U	pCi/g
18-02009-09	TRG	B102110FIWC015CV	01/31/18 14:43	2/2/2018	2/2/2018	18-02009	Antimony-125	EPA 901.1 Modified	-3.46E-02	9.29E-01	9.29E-01	1.35E+00	U	pCi/g
18-02009-09	TRG	B102110FIWC015CV	01/31/18 14:43	2/2/2018	2/2/2018	18-02009	Thorium-234	EPA 901.1 Modified	7.52E-01	5.20E+00	5.20E+00	6.56E+00	U	pCi/g
18-02009-09	TRG	B102110FIWC015CV	01/31/18 14:43	2/2/2018	2/2/2018	18-02009	Thallium-208	EPA 901.1 Modified	3.93E-01	7.70E-01	7.71E-01	1.03E+00	U	pCi/g
18-02009-09	TRG	B102110FIWC015CV	01/31/18 14:43	2/2/2018	2/2/2018	18-02009	Uranium-235	EPA 901.1 Modified	-1.84E+00	3.83E+00	3.83E+00	2.43E+00	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

[214]

Eberline Analytical Final Report of Analysis			Report To:						Work Order Details:						
			J Alex Bohacheff						SDG:		18-02009				
			Zion Solutions, LLC						Purchase Order:		677118				
			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	
18-02009-10	TRG	B102110FIWC017CV	01/31/18 15:07	2/2/2018	2/2/2018	18-02009	Actinium-228	EPA 901.1 Modified	6.62E-01	1.89E+00	1.89E+00	2.79E+00	U	pCi/g	
18-02009-10	TRG	B102110FIWC017CV	01/31/18 15:07	2/2/2018	2/2/2018	18-02009	Silver-108m	EPA 901.1 Modified	6.93E-01	6.13E-01	6.14E-01	5.30E-01	U	pCi/g	
18-02009-10	TRG	B102110FIWC017CV	01/31/18 15:07	2/2/2018	2/2/2018	18-02009	Americium-241	EPA 901.1 Modified	-4.49E-01	5.74E-01	5.75E-01	7.08E-01	U	pCi/g	
18-02009-10	TRG	B102110FIWC017CV	01/31/18 15:07	2/2/2018	2/2/2018	18-02009	Barium-133	EPA 901.1 Modified	2.48E-01	3.74E-01	3.74E-01	7.25E-01	U	pCi/g	
18-02009-10	TRG	B102110FIWC017CV	01/31/18 15:07	2/2/2018	2/2/2018	18-02009	Bismuth-214	EPA 901.1 Modified	1.43E+00	1.16E+00	1.16E+00	1.68E+00	U	pCi/g	
18-02009-10	TRG	B102110FIWC017CV	01/31/18 15:07	2/2/2018	2/2/2018	18-02009	Cobalt-60	EPA 901.1 Modified	7.60E+00	6.76E-01	7.80E-01	6.62E-01		pCi/g	
18-02009-10	TRG	B102110FIWC017CV	01/31/18 15:07	2/2/2018	2/2/2018	18-02009	Cesium-134	EPA 901.1 Modified	7.41E-02	2.31E-01	2.31E-01	6.40E-01	U	pCi/g	
18-02009-10	TRG	B102110FIWC017CV	01/31/18 15:07	2/2/2018	2/2/2018	18-02009	Cesium-137	EPA 901.1 Modified	2.17E+00	8.04E-01	8.11E-01	1.14E+00		pCi/g	
18-02009-10	TRG	B102110FIWC017CV	01/31/18 15:07	2/2/2018	2/2/2018	18-02009	Europium-152	EPA 901.1 Modified	1.58E+02	5.56E+00	9.84E+00	3.06E+00		pCi/g	
18-02009-10	TRG	B102110FIWC017CV	01/31/18 15:07	2/2/2018	2/2/2018	18-02009	Europium-154	EPA 901.1 Modified	5.91E+00	1.24E+00	1.28E+00	2.26E+00	U	pCi/g	
18-02009-10	TRG	B102110FIWC017CV	01/31/18 15:07	2/2/2018	2/2/2018	18-02009	Europium-155	EPA 901.1 Modified	1.47E+00	7.05E-01	7.09E-01	1.12E+00	U	pCi/g	
18-02009-10	TRG	B102110FIWC017CV	01/31/18 15:07	2/2/2018	2/2/2018	18-02009	Holmium-166m	EPA 901.1 Modified	-1.01E+00	9.50E-01	9.51E-01	4.36E-01	U	pCi/g	
18-02009-10	TRG	B102110FIWC017CV	01/31/18 15:07	2/2/2018	2/2/2018	18-02009	Iodine-129	EPA 901.1 Modified	8.32E-01	5.67E-01	5.69E-01	7.27E-01	U	pCi/g	
18-02009-10	TRG	B102110FIWC017CV	01/31/18 15:07	2/2/2018	2/2/2018	18-02009	Potassium-40	EPA 901.1 Modified	7.10E+00	2.61E+00	2.63E+00	5.74E+00		pCi/g	
18-02009-10	TRG	B102110FIWC017CV	01/31/18 15:07	2/2/2018	2/2/2018	18-02009	Manganese-54	EPA 901.1 Modified	-1.16E-01	4.12E-01	4.12E-01	7.73E-01	U	pCi/g	
18-02009-10	TRG	B102110FIWC017CV	01/31/18 15:07	2/2/2018	2/2/2018	18-02009	Niobium-94	EPA 901.1 Modified	-8.36E-01	7.84E-01	7.85E-01	7.10E-01	U	pCi/g	
18-02009-10	TRG	B102110FIWC017CV	01/31/18 15:07	2/2/2018	2/2/2018	18-02009	Lead-210	EPA 901.1 Modified	2.33E+02	2.05E+01	2.37E+01	1.56E+01	U	pCi/g	
18-02009-10	TRG	B102110FIWC017CV	01/31/18 15:07	2/2/2018	2/2/2018	18-02009	Lead-212	EPA 901.1 Modified	-4.41E-01	5.86E-01	5.87E-01	9.20E-01	U	pCi/g	
18-02009-10	TRG	B102110FIWC017CV	01/31/18 15:07	2/2/2018	2/2/2018	18-02009	Lead-214	EPA 901.1 Modified	7.88E-01	6.15E-01	6.17E-01	1.01E+00	U	pCi/g	
18-02009-10	TRG	B102110FIWC017CV	01/31/18 15:07	2/2/2018	2/2/2018	18-02009	Promethium-145	EPA 901.1 Modified	1.59E+01	2.45E+00	2.58E+00	2.76E+00	U	pCi/g	
18-02009-10	TRG	B102110FIWC017CV	01/31/18 15:07	2/2/2018	2/2/2018	18-02009	Radium-226	EPA 901.1 Modified	1.43E+00	1.16E+00	1.16E+00	1.68E+00	U	pCi/g	
18-02009-10	TRG	B102110FIWC017CV	01/31/18 15:07	2/2/2018	2/2/2018	18-02009	Antimony-125	EPA 901.1 Modified	-6.38E-01	1.16E+00	1.16E+00	1.65E+00	U	pCi/g	
18-02009-10	TRG	B102110FIWC017CV	01/31/18 15:07	2/2/2018	2/2/2018	18-02009	Thorium-234	EPA 901.1 Modified	7.20E-01	5.41E+00	5.41E+00	6.88E+00	U	pCi/g	
18-02009-10	TRG	B102110FIWC017CV	01/31/18 15:07	2/2/2018	2/2/2018	18-02009	Thallium-208	EPA 901.1 Modified	5.40E-01	9.98E-01	9.98E-01	1.02E+00	U	pCi/g	
18-02009-10	TRG	B102110FIWC017CV	01/31/18 15:07	2/2/2018	2/2/2018	18-02009	Uranium-235	EPA 901.1 Modified	-3.44E+00	5.50E+00	5.50E+00	2.55E+00	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

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Eberline Analytical Final Report of Analysis			Report To:						Work Order Details:						
			J Alex Bohacheff						SDG:	18-02009					
			Zion Solutions, LLC						Purchase Order:	677118					
			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	
18-02009-11	TRG	B102110FIWC019CV	01/31/18 15:30	2/2/2018	2/2/2018	18-02009	Actinium-228	EPA 901.1 Modified	2.31E+00	1.71E+00	1.72E+00	2.65E+00	U	pCi/g	
18-02009-11	TRG	B102110FIWC019CV	01/31/18 15:30	2/2/2018	2/2/2018	18-02009	Silver-108m	EPA 901.1 Modified	8.70E-01	5.73E-01	5.75E-01	4.42E-01	U	pCi/g	
18-02009-11	TRG	B102110FIWC019CV	01/31/18 15:30	2/2/2018	2/2/2018	18-02009	Americium-241	EPA 901.1 Modified	1.36E-01	3.79E-01	3.79E-01	5.67E-01	U	pCi/g	
18-02009-11	TRG	B102110FIWC019CV	01/31/18 15:30	2/2/2018	2/2/2018	18-02009	Barium-133	EPA 901.1 Modified	2.46E-01	5.06E-01	5.06E-01	6.24E-01	U	pCi/g	
18-02009-11	TRG	B102110FIWC019CV	01/31/18 15:30	2/2/2018	2/2/2018	18-02009	Bismuth-214	EPA 901.1 Modified	1.68E+00	7.70E-01	7.75E-01	1.53E+00		pCi/g	
18-02009-11	TRG	B102110FIWC019CV	01/31/18 15:30	2/2/2018	2/2/2018	18-02009	Cobalt-60	EPA 901.1 Modified	8.89E+00	7.44E-01	8.73E-01	6.22E-01		pCi/g	
18-02009-11	TRG	B102110FIWC019CV	01/31/18 15:30	2/2/2018	2/2/2018	18-02009	Cesium-134	EPA 901.1 Modified	1.04E-02	1.63E-01	1.63E-01	6.10E-01	U	pCi/g	
18-02009-11	TRG	B102110FIWC019CV	01/31/18 15:30	2/2/2018	2/2/2018	18-02009	Cesium-137	EPA 901.1 Modified	6.75E+00	1.35E+00	1.39E+00	1.25E+00		pCi/g	
18-02009-11	TRG	B102110FIWC019CV	01/31/18 15:30	2/2/2018	2/2/2018	18-02009	Europium-152	EPA 901.1 Modified	1.53E+02	7.84E+00	1.11E+01	2.24E+00		pCi/g	
18-02009-11	TRG	B102110FIWC019CV	01/31/18 15:30	2/2/2018	2/2/2018	18-02009	Europium-154	EPA 901.1 Modified	7.05E+00	1.32E+00	1.37E+00	2.39E+00	U	pCi/g	
18-02009-11	TRG	B102110FIWC019CV	01/31/18 15:30	2/2/2018	2/2/2018	18-02009	Europium-155	EPA 901.1 Modified	4.31E-01	6.52E-01	6.52E-01	9.73E-01	U	pCi/g	
18-02009-11	TRG	B102110FIWC019CV	01/31/18 15:30	2/2/2018	2/2/2018	18-02009	Holmium-166m	EPA 901.1 Modified	2.56E-01	8.04E-01	8.04E-01	4.76E-01	U	pCi/g	
18-02009-11	TRG	B102110FIWC019CV	01/31/18 15:30	2/2/2018	2/2/2018	18-02009	Iodine-129	EPA 901.1 Modified	7.33E-01	2.07E-01	2.10E-01	3.15E-01	U	pCi/g	
18-02009-11	TRG	B102110FIWC019CV	01/31/18 15:30	2/2/2018	2/2/2018	18-02009	Potassium-40	EPA 901.1 Modified	9.49E+00	2.99E+00	3.03E+00	7.58E+00		pCi/g	
18-02009-11	TRG	B102110FIWC019CV	01/31/18 15:30	2/2/2018	2/2/2018	18-02009	Manganese-54	EPA 901.1 Modified	-1.42E-01	4.75E-01	4.75E-01	6.84E-01	U	pCi/g	
18-02009-11	TRG	B102110FIWC019CV	01/31/18 15:30	2/2/2018	2/2/2018	18-02009	Niobium-94	EPA 901.1 Modified	-2.70E+00	9.11E-01	9.22E-01	6.37E-01	U	pCi/g	
18-02009-11	TRG	B102110FIWC019CV	01/31/18 15:30	2/2/2018	2/2/2018	18-02009	Lead-210	EPA 901.1 Modified	2.09E+02	1.66E+01	1.97E+01	1.06E+01		pCi/g	
18-02009-11	TRG	B102110FIWC019CV	01/31/18 15:30	2/2/2018	2/2/2018	18-02009	Lead-212	EPA 901.1 Modified	3.58E-01	6.16E-01	6.17E-01	8.04E-01	U	pCi/g	
18-02009-11	TRG	B102110FIWC019CV	01/31/18 15:30	2/2/2018	2/2/2018	18-02009	Lead-214	EPA 901.1 Modified	-1.35E-01	8.14E-01	8.14E-01	1.01E+00	U	pCi/g	
18-02009-11	TRG	B102110FIWC019CV	01/31/18 15:30	2/2/2018	2/2/2018	18-02009	Promethium-145	EPA 901.1 Modified	-6.21E+01	4.42E+00	5.45E+00	1.16E+00	U	pCi/g	
18-02009-11	TRG	B102110FIWC019CV	01/31/18 15:30	2/2/2018	2/2/2018	18-02009	Radium-226	EPA 901.1 Modified	1.68E+00	7.70E-01	7.75E-01	1.53E+00		pCi/g	
18-02009-11	TRG	B102110FIWC019CV	01/31/18 15:30	2/2/2018	2/2/2018	18-02009	Antimony-125	EPA 901.1 Modified	-1.78E-01	1.05E+00	1.05E+00	1.35E+00	U	pCi/g	
18-02009-11	TRG	B102110FIWC019CV	01/31/18 15:30	2/2/2018	2/2/2018	18-02009	Thorium-234	EPA 901.1 Modified	8.43E-01	3.84E+00	3.84E+00	5.67E+00	U	pCi/g	
18-02009-11	TRG	B102110FIWC019CV	01/31/18 15:30	2/2/2018	2/2/2018	18-02009	Thallium-208	EPA 901.1 Modified	-4.75E-01	1.16E+00	1.16E+00	9.27E-01	U	pCi/g	
18-02009-11	TRG	B102110FIWC019CV	01/31/18 15:30	2/2/2018	2/2/2018	18-02009	Uranium-235	EPA 901.1 Modified	5.28E+00	6.08E+00	6.08E+00	2.81E+00	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

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Eberline Analytical Final Report of Analysis			Report To:						Work Order Details:						
			J Alex Bohacheff						SDG: 18-02009						
			Zion Solutions, LLC						Purchase Order: 677118						
			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	
18-02009-12	TRG	B102110FIWC020CV	02/01/18 08:12	2/2/2018	2/2/2018	18-02009	Actinium-228	EPA 901.1 Modified	1.28E+00	1.38E+00	1.39E+00	2.10E+00	U	pCi/g	
18-02009-12	TRG	B102110FIWC020CV	02/01/18 08:12	2/2/2018	2/2/2018	18-02009	Silver-108m	EPA 901.1 Modified	5.36E-01	4.34E-01	4.34E-01	3.74E-01	U	pCi/g	
18-02009-12	TRG	B102110FIWC020CV	02/01/18 08:12	2/2/2018	2/2/2018	18-02009	Americium-241	EPA 901.1 Modified	-1.97E-01	4.14E-01	4.14E-01	5.15E-01	U	pCi/g	
18-02009-12	TRG	B102110FIWC020CV	02/01/18 08:12	2/2/2018	2/2/2018	18-02009	Barium-133	EPA 901.1 Modified	-6.59E-02	3.60E-01	3.60E-01	5.18E-01	U	pCi/g	
18-02009-12	TRG	B102110FIWC020CV	02/01/18 08:12	2/2/2018	2/2/2018	18-02009	Bismuth-214	EPA 901.1 Modified	3.55E-01	6.75E-01	6.75E-01	1.00E+00	U	pCi/g	
18-02009-12	TRG	B102110FIWC020CV	02/01/18 08:12	2/2/2018	2/2/2018	18-02009	Cobalt-60	EPA 901.1 Modified	7.92E+00	5.99E-01	7.24E-01	3.68E-01		pCi/g	
18-02009-12	TRG	B102110FIWC020CV	02/01/18 08:12	2/2/2018	2/2/2018	18-02009	Cesium-134	EPA 901.1 Modified	-4.01E-02	3.21E-01	3.21E-01	4.64E-01	U	pCi/g	
18-02009-12	TRG	B102110FIWC020CV	02/01/18 08:12	2/2/2018	2/2/2018	18-02009	Cesium-137	EPA 901.1 Modified	4.31E-01	4.08E-01	4.09E-01	6.08E-01	U	pCi/g	
18-02009-12	TRG	B102110FIWC020CV	02/01/18 08:12	2/2/2018	2/2/2018	18-02009	Europium-152	EPA 901.1 Modified	1.06E+02	3.83E+00	6.66E+00	2.11E+00		pCi/g	
18-02009-12	TRG	B102110FIWC020CV	02/01/18 08:12	2/2/2018	2/2/2018	18-02009	Europium-154	EPA 901.1 Modified	2.91E+00	8.12E-01	8.26E-01	1.47E+00	U	pCi/g	
18-02009-12	TRG	B102110FIWC020CV	02/01/18 08:12	2/2/2018	2/2/2018	18-02009	Europium-155	EPA 901.1 Modified	8.56E-01	5.17E-01	5.19E-01	8.23E-01	U	pCi/g	
18-02009-12	TRG	B102110FIWC020CV	02/01/18 08:12	2/2/2018	2/2/2018	18-02009	Holmium-166m	EPA 901.1 Modified	-5.06E-01	6.59E-01	6.60E-01	3.15E-01	U	pCi/g	
18-02009-12	TRG	B102110FIWC020CV	02/01/18 08:12	2/2/2018	2/2/2018	18-02009	Iodine-129	EPA 901.1 Modified	7.35E-01	3.83E-01	3.84E-01	4.98E-01	U	pCi/g	
18-02009-12	TRG	B102110FIWC020CV	02/01/18 08:12	2/2/2018	2/2/2018	18-02009	Potassium-40	EPA 901.1 Modified	6.27E+00	2.26E+00	2.28E+00	4.01E+00	U	pCi/g	
18-02009-12	TRG	B102110FIWC020CV	02/01/18 08:12	2/2/2018	2/2/2018	18-02009	Manganese-54	EPA 901.1 Modified	-1.85E-01	3.69E-01	3.69E-01	5.20E-01	U	pCi/g	
18-02009-12	TRG	B102110FIWC020CV	02/01/18 08:12	2/2/2018	2/2/2018	18-02009	Niobium-94	EPA 901.1 Modified	-2.75E-01	5.53E-01	5.53E-01	4.91E-01	U	pCi/g	
18-02009-12	TRG	B102110FIWC020CV	02/01/18 08:12	2/2/2018	2/2/2018	18-02009	Lead-210	EPA 901.1 Modified	1.53E+02	1.37E+01	1.58E+01	1.10E+01	U	pCi/g	
18-02009-12	TRG	B102110FIWC020CV	02/01/18 08:12	2/2/2018	2/2/2018	18-02009	Lead-212	EPA 901.1 Modified	1.39E-01	3.45E-01	3.45E-01	6.52E-01	U	pCi/g	
18-02009-12	TRG	B102110FIWC020CV	02/01/18 08:12	2/2/2018	2/2/2018	18-02009	Lead-214	EPA 901.1 Modified	-7.62E-01	6.27E-01	6.28E-01	8.58E-01	U	pCi/g	
18-02009-12	TRG	B102110FIWC020CV	02/01/18 08:12	2/2/2018	2/2/2018	18-02009	Promethium-145	EPA 901.1 Modified	7.86E+00	1.56E+00	1.61E+00	1.88E+00	U	pCi/g	
18-02009-12	TRG	B102110FIWC020CV	02/01/18 08:12	2/2/2018	2/2/2018	18-02009	Radium-226	EPA 901.1 Modified	3.55E-01	6.75E-01	6.75E-01	1.00E+00	U	pCi/g	
18-02009-12	TRG	B102110FIWC020CV	02/01/18 08:12	2/2/2018	2/2/2018	18-02009	Antimony-125	EPA 901.1 Modified	4.33E-01	8.16E-01	8.16E-01	1.20E+00	U	pCi/g	
18-02009-12	TRG	B102110FIWC020CV	02/01/18 08:12	2/2/2018	2/2/2018	18-02009	Thorium-234	EPA 901.1 Modified	-2.47E-03	3.99E+00	3.99E+00	5.03E+00	U	pCi/g	
18-02009-12	TRG	B102110FIWC020CV	02/01/18 08:12	2/2/2018	2/2/2018	18-02009	Thallium-208	EPA 901.1 Modified	7.36E-01	1.09E+00	1.09E+00	6.06E-01	U	pCi/g	
18-02009-12	TRG	B102110FIWC020CV	02/01/18 08:12	2/2/2018	2/2/2018	18-02009	Uranium-235	EPA 901.1 Modified	1.12E+00	3.95E+00	3.95E+00	1.83E+00	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

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Eberline Analytical Final Report of Analysis								Report To:		Work Order Details:					
								J Alex Bohacheff		SDG:		18-02009			
								Zion Solutions, LLC		Purchase Order:		677118			
								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	
18-02009-13	TRG	B102110FIWC014CV	02/01/18 08:56	2/2/2018	2/2/2018	18-02009	Actinium-228	EPA 901.1 Modified	-8.70E-01	1.75E+00	1.75E+00	2.50E+00	U	pCi/g	
18-02009-13	TRG	B102110FIWC014CV	02/01/18 08:56	2/2/2018	2/2/2018	18-02009	Silver-108m	EPA 901.1 Modified	2.42E-01	5.38E-01	5.38E-01	4.96E-01	U	pCi/g	
18-02009-13	TRG	B102110FIWC014CV	02/01/18 08:56	2/2/2018	2/2/2018	18-02009	Americium-241	EPA 901.1 Modified	-9.73E-01	6.00E-01	6.03E-01	7.04E-01	U	pCi/g	
18-02009-13	TRG	B102110FIWC014CV	02/01/18 08:56	2/2/2018	2/2/2018	18-02009	Barium-133	EPA 901.1 Modified	-1.44E-01	2.44E-01	2.45E-01	7.17E-01	U	pCi/g	
18-02009-13	TRG	B102110FIWC014CV	02/01/18 08:56	2/2/2018	2/2/2018	18-02009	Bismuth-214	EPA 901.1 Modified	7.53E-01	8.61E-01	8.62E-01	1.30E+00	U	pCi/g	
18-02009-13	TRG	B102110FIWC014CV	02/01/18 08:56	2/2/2018	2/2/2018	18-02009	Cobalt-60	EPA 901.1 Modified	8.07E+00	6.91E-01	8.06E-01	7.22E-01		pCi/g	
18-02009-13	TRG	B102110FIWC014CV	02/01/18 08:56	2/2/2018	2/2/2018	18-02009	Cesium-134	EPA 901.1 Modified	-2.36E-01	4.21E-01	4.21E-01	5.93E-01	U	pCi/g	
18-02009-13	TRG	B102110FIWC014CV	02/01/18 08:56	2/2/2018	2/2/2018	18-02009	Cesium-137	EPA 901.1 Modified	5.93E-01	4.66E-01	4.67E-01	7.55E-01	U	pCi/g	
18-02009-13	TRG	B102110FIWC014CV	02/01/18 08:56	2/2/2018	2/2/2018	18-02009	Europium-152	EPA 901.1 Modified	1.29E+02	5.40E+00	8.54E+00	3.03E+00		pCi/g	
18-02009-13	TRG	B102110FIWC014CV	02/01/18 08:56	2/2/2018	2/2/2018	18-02009	Europium-154	EPA 901.1 Modified	3.62E+00	1.03E+00	1.05E+00	1.89E+00	U	pCi/g	
18-02009-13	TRG	B102110FIWC014CV	02/01/18 08:56	2/2/2018	2/2/2018	18-02009	Europium-155	EPA 901.1 Modified	1.93E+00	7.85E-01	7.91E-01	1.27E+00	U	pCi/g	
18-02009-13	TRG	B102110FIWC014CV	02/01/18 08:56	2/2/2018	2/2/2018	18-02009	Holmium-166m	EPA 901.1 Modified	1.67E-01	7.99E-01	7.99E-01	4.51E-01	U	pCi/g	
18-02009-13	TRG	B102110FIWC014CV	02/01/18 08:56	2/2/2018	2/2/2018	18-02009	Iodine-129	EPA 901.1 Modified	1.25E+00	3.42E-01	3.48E-01	1.34E+00	U	pCi/g	
18-02009-13	TRG	B102110FIWC014CV	02/01/18 08:56	2/2/2018	2/2/2018	18-02009	Potassium-40	EPA 901.1 Modified	3.87E+00	2.80E+00	2.81E+00	5.30E+00	U	pCi/g	
18-02009-13	TRG	B102110FIWC014CV	02/01/18 08:56	2/2/2018	2/2/2018	18-02009	Manganese-54	EPA 901.1 Modified	-1.59E-01	4.50E-01	4.50E-01	6.46E-01	U	pCi/g	
18-02009-13	TRG	B102110FIWC014CV	02/01/18 08:56	2/2/2018	2/2/2018	18-02009	Niobium-94	EPA 901.1 Modified	-1.22E+00	7.14E-01	7.17E-01	5.95E-01	U	pCi/g	
18-02009-13	TRG	B102110FIWC014CV	02/01/18 08:56	2/2/2018	2/2/2018	18-02009	Lead-210	EPA 901.1 Modified	2.19E+02	1.90E+01	2.21E+01	1.62E+01	U	pCi/g	
18-02009-13	TRG	B102110FIWC014CV	02/01/18 08:56	2/2/2018	2/2/2018	18-02009	Lead-212	EPA 901.1 Modified	-3.57E-02	3.36E-01	3.36E-01	7.80E-01	U	pCi/g	
18-02009-13	TRG	B102110FIWC014CV	02/01/18 08:56	2/2/2018	2/2/2018	18-02009	Lead-214	EPA 901.1 Modified	2.02E+00	7.36E-01	7.43E-01	1.45E+00		pCi/g	
18-02009-13	TRG	B102110FIWC014CV	02/01/18 08:56	2/2/2018	2/2/2018	18-02009	Promethium-145	EPA 901.1 Modified	3.43E+00	1.62E+00	1.63E+00	2.08E+00	U	pCi/g	
18-02009-13	TRG	B102110FIWC014CV	02/01/18 08:56	2/2/2018	2/2/2018	18-02009	Radium-226	EPA 901.1 Modified	7.53E-01	8.61E-01	8.62E-01	1.30E+00	U	pCi/g	
18-02009-13	TRG	B102110FIWC014CV	02/01/18 08:56	2/2/2018	2/2/2018	18-02009	Antimony-125	EPA 901.1 Modified	1.88E-01	1.06E+00	1.06E+00	1.55E+00	U	pCi/g	
18-02009-13	TRG	B102110FIWC014CV	02/01/18 08:56	2/2/2018	2/2/2018	18-02009	Thorium-234	EPA 901.1 Modified	2.85E+00	5.86E+00	5.87E+00	7.52E+00	U	pCi/g	
18-02009-13	TRG	B102110FIWC014CV	02/01/18 08:56	2/2/2018	2/2/2018	18-02009	Thallium-208	EPA 901.1 Modified	5.28E-02	5.69E-01	5.69E-01	1.18E+00	U	pCi/g	
18-02009-13	TRG	B102110FIWC014CV	02/01/18 08:56	2/2/2018	2/2/2018	18-02009	Uranium-235	EPA 901.1 Modified	1.90E-01	4.27E+00	4.27E+00	2.71E+00	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

[218]

Eberline Analytical Final Report of Analysis			Report To:						Work Order Details:						
			J Alex Bohacheff Zion Solutions, LLC 101 Shiloh Blvd Zion, IL 60099						SDG:		18-02009				
									Purchase Order:		677118				
									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	
18-02009-14	TRG	B102110FIWC018CV	02/01/18 09:38	2/2/2018	2/2/2018	18-02009	Actinium-228	EPA 901.1 Modified	-8.63E-01	2.44E+00	2.44E+00	3.22E+00	U	pCi/g	
18-02009-14	TRG	B102110FIWC018CV	02/01/18 09:38	2/2/2018	2/2/2018	18-02009	Silver-108m	EPA 901.1 Modified	1.26E+00	6.99E-01	7.02E-01	5.22E-01	U	pCi/g	
18-02009-14	TRG	B102110FIWC018CV	02/01/18 09:38	2/2/2018	2/2/2018	18-02009	Americium-241	EPA 901.1 Modified	-4.21E-01	5.22E-01	5.22E-01	7.37E-01	U	pCi/g	
18-02009-14	TRG	B102110FIWC018CV	02/01/18 09:38	2/2/2018	2/2/2018	18-02009	Barium-133	EPA 901.1 Modified	3.94E-01	4.64E-01	4.64E-01	6.97E-01	U	pCi/g	
18-02009-14	TRG	B102110FIWC018CV	02/01/18 09:38	2/2/2018	2/2/2018	18-02009	Bismuth-214	EPA 901.1 Modified	4.64E-01	8.80E-01	8.80E-01	1.32E+00	U	pCi/g	
18-02009-14	TRG	B102110FIWC018CV	02/01/18 09:38	2/2/2018	2/2/2018	18-02009	Cobalt-60	EPA 901.1 Modified	7.87E+00	7.54E-01	8.55E-01	6.54E-01		pCi/g	
18-02009-14	TRG	B102110FIWC018CV	02/01/18 09:38	2/2/2018	2/2/2018	18-02009	Cesium-134	EPA 901.1 Modified	-2.17E-01	4.41E-01	4.42E-01	6.24E-01	U	pCi/g	
18-02009-14	TRG	B102110FIWC018CV	02/01/18 09:38	2/2/2018	2/2/2018	18-02009	Cesium-137	EPA 901.1 Modified	1.17E-01	6.66E-01	6.66E-01	9.04E-01	U	pCi/g	
18-02009-14	TRG	B102110FIWC018CV	02/01/18 09:38	2/2/2018	2/2/2018	18-02009	Europium-152	EPA 901.1 Modified	1.10E+02	4.36E+00	7.13E+00	3.38E+00		pCi/g	
18-02009-14	TRG	B102110FIWC018CV	02/01/18 09:38	2/2/2018	2/2/2018	18-02009	Europium-154	EPA 901.1 Modified	2.89E+00	1.26E+00	1.27E+00	2.18E+00	U	pCi/g	
18-02009-14	TRG	B102110FIWC018CV	02/01/18 09:38	2/2/2018	2/2/2018	18-02009	Europium-155	EPA 901.1 Modified	1.29E+00	7.69E-01	7.72E-01	1.11E+00	U	pCi/g	
18-02009-14	TRG	B102110FIWC018CV	02/01/18 09:38	2/2/2018	2/2/2018	18-02009	Holmium-166m	EPA 901.1 Modified	5.71E-01	1.04E+00	1.04E+00	4.72E-01	U	pCi/g	
18-02009-14	TRG	B102110FIWC018CV	02/01/18 09:38	2/2/2018	2/2/2018	18-02009	Iodine-129	EPA 901.1 Modified	-3.55E+00	1.29E+00	1.30E+00	1.45E+00	U	pCi/g	
18-02009-14	TRG	B102110FIWC018CV	02/01/18 09:38	2/2/2018	2/2/2018	18-02009	Potassium-40	EPA 901.1 Modified	4.52E+00	3.01E+00	3.02E+00	7.77E+00	U	pCi/g	
18-02009-14	TRG	B102110FIWC018CV	02/01/18 09:38	2/2/2018	2/2/2018	18-02009	Manganese-54	EPA 901.1 Modified	1.63E-01	6.35E-01	6.36E-01	8.64E-01	U	pCi/g	
18-02009-14	TRG	B102110FIWC018CV	02/01/18 09:38	2/2/2018	2/2/2018	18-02009	Niobium-94	EPA 901.1 Modified	5.19E-02	2.31E-01	2.31E-01	7.75E-01	U	pCi/g	
18-02009-14	TRG	B102110FIWC018CV	02/01/18 09:38	2/2/2018	2/2/2018	18-02009	Lead-210	EPA 901.1 Modified	2.55E+02	2.54E+01	2.86E+01	2.81E+01		pCi/g	
18-02009-14	TRG	B102110FIWC018CV	02/01/18 09:38	2/2/2018	2/2/2018	18-02009	Lead-212	EPA 901.1 Modified	7.16E-01	5.49E-01	5.50E-01	1.80E+00	U	pCi/g	
18-02009-14	TRG	B102110FIWC018CV	02/01/18 09:38	2/2/2018	2/2/2018	18-02009	Lead-214	EPA 901.1 Modified	-8.42E-02	7.90E-01	7.90E-01	1.14E+00	U	pCi/g	
18-02009-14	TRG	B102110FIWC018CV	02/01/18 09:38	2/2/2018	2/2/2018	18-02009	Promethium-145	EPA 901.1 Modified	6.11E+01	7.55E+00	8.18E+00	3.81E+00	U	pCi/g	
18-02009-14	TRG	B102110FIWC018CV	02/01/18 09:38	2/2/2018	2/2/2018	18-02009	Radium-226	EPA 901.1 Modified	4.64E-01	8.80E-01	8.80E-01	1.32E+00	U	pCi/g	
18-02009-14	TRG	B102110FIWC018CV	02/01/18 09:38	2/2/2018	2/2/2018	18-02009	Antimony-125	EPA 901.1 Modified	1.14E+00	1.07E+00	1.08E+00	1.63E+00	U	pCi/g	
18-02009-14	TRG	B102110FIWC018CV	02/01/18 09:38	2/2/2018	2/2/2018	18-02009	Thorium-234	EPA 901.1 Modified	-3.33E+00	4.91E+00	4.92E+00	6.93E+00	U	pCi/g	
18-02009-14	TRG	B102110FIWC018CV	02/01/18 09:38	2/2/2018	2/2/2018	18-02009	Thallium-208	EPA 901.1 Modified	2.99E-01	1.49E+00	1.49E+00	1.37E+00	U	pCi/g	
18-02009-14	TRG	B102110FIWC018CV	02/01/18 09:38	2/2/2018	2/2/2018	18-02009	Uranium-235	EPA 901.1 Modified	-1.45E+00	3.89E+00	3.89E+00	2.70E+00	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

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Eberline Analytical Final Report of Analysis			Report To:					Work Order Details:						
			J Alex Bohacheff					SDG: 18-02009						
			Zion Solutions, LLC					Purchase Order: 677118						
			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
18-02009-15	TRG	B102110FIWC016CV	02/01/18 10:00	2/2/2018	2/2/2018	18-02009	Actinium-228	EPA 901.1 Modified	-1.56E-01	1.55E+00	1.55E+00	2.27E+00	U	pCi/g
18-02009-15	TRG	B102110FIWC016CV	02/01/18 10:00	2/2/2018	2/2/2018	18-02009	Silver-108m	EPA 901.1 Modified	8.37E-01	4.77E-01	4.78E-01	4.44E-01	U	pCi/g
18-02009-15	TRG	B102110FIWC016CV	02/01/18 10:00	2/2/2018	2/2/2018	18-02009	Americium-241	EPA 901.1 Modified	-2.42E-02	3.75E-01	3.75E-01	5.76E-01	U	pCi/g
18-02009-15	TRG	B102110FIWC016CV	02/01/18 10:00	2/2/2018	2/2/2018	18-02009	Barium-133	EPA 901.1 Modified	2.19E-02	4.06E-01	4.06E-01	5.95E-01	U	pCi/g
18-02009-15	TRG	B102110FIWC016CV	02/01/18 10:00	2/2/2018	2/2/2018	18-02009	Bismuth-214	EPA 901.1 Modified	9.47E-01	8.01E-01	8.02E-01	1.30E+00	U	pCi/g
18-02009-15	TRG	B102110FIWC016CV	02/01/18 10:00	2/2/2018	2/2/2018	18-02009	Cobalt-60	EPA 901.1 Modified	3.95E+00	4.32E-01	4.77E-01	2.63E-01		pCi/g
18-02009-15	TRG	B102110FIWC016CV	02/01/18 10:00	2/2/2018	2/2/2018	18-02009	Cesium-134	EPA 901.1 Modified	1.04E-01	2.63E-01	2.63E-01	5.06E-01	U	pCi/g
18-02009-15	TRG	B102110FIWC016CV	02/01/18 10:00	2/2/2018	2/2/2018	18-02009	Cesium-137	EPA 901.1 Modified	4.06E-01	4.60E-01	4.60E-01	6.95E-01	U	pCi/g
18-02009-15	TRG	B102110FIWC016CV	02/01/18 10:00	2/2/2018	2/2/2018	18-02009	Europium-152	EPA 901.1 Modified	8.22E+01	3.27E+00	5.33E+00	2.28E+00		pCi/g
18-02009-15	TRG	B102110FIWC016CV	02/01/18 10:00	2/2/2018	2/2/2018	18-02009	Europium-154	EPA 901.1 Modified	2.28E+00	8.68E-01	8.76E-01	1.66E+00	U	pCi/g
18-02009-15	TRG	B102110FIWC016CV	02/01/18 10:00	2/2/2018	2/2/2018	18-02009	Europium-155	EPA 901.1 Modified	1.03E+00	8.71E-01	8.73E-01	1.23E+00	U	pCi/g
18-02009-15	TRG	B102110FIWC016CV	02/01/18 10:00	2/2/2018	2/2/2018	18-02009	Holmium-166m	EPA 901.1 Modified	-2.61E-01	7.31E-01	7.31E-01	3.45E-01	U	pCi/g
18-02009-15	TRG	B102110FIWC016CV	02/01/18 10:00	2/2/2018	2/2/2018	18-02009	Iodine-129	EPA 901.1 Modified	1.43E+00	4.83E-01	4.88E-01	1.96E+00	U	pCi/g
18-02009-15	TRG	B102110FIWC016CV	02/01/18 10:00	2/2/2018	2/2/2018	18-02009	Potassium-40	EPA 901.1 Modified	5.97E+00	2.84E+00	2.86E+00	4.13E+00		pCi/g
18-02009-15	TRG	B102110FIWC016CV	02/01/18 10:00	2/2/2018	2/2/2018	18-02009	Manganese-54	EPA 901.1 Modified	-6.45E-02	4.17E-01	4.17E-01	6.04E-01	U	pCi/g
18-02009-15	TRG	B102110FIWC016CV	02/01/18 10:00	2/2/2018	2/2/2018	18-02009	Niobium-94	EPA 901.1 Modified	9.50E-02	1.91E-01	1.91E-01	5.98E-01	U	pCi/g
18-02009-15	TRG	B102110FIWC016CV	02/01/18 10:00	2/2/2018	2/2/2018	18-02009	Lead-210	EPA 901.1 Modified	1.31E+02	1.28E+01	1.45E+01	1.31E+01	U	pCi/g
18-02009-15	TRG	B102110FIWC016CV	02/01/18 10:00	2/2/2018	2/2/2018	18-02009	Lead-212	EPA 901.1 Modified	1.59E-01	3.76E-01	3.76E-01	7.19E-01	U	pCi/g
18-02009-15	TRG	B102110FIWC016CV	02/01/18 10:00	2/2/2018	2/2/2018	18-02009	Lead-214	EPA 901.1 Modified	-1.12E+00	7.14E-01	7.16E-01	9.43E-01	U	pCi/g
18-02009-15	TRG	B102110FIWC016CV	02/01/18 10:00	2/2/2018	2/2/2018	18-02009	Promethium-145	EPA 901.1 Modified	7.28E+00	1.82E+00	1.85E+00	2.28E+00	U	pCi/g
18-02009-15	TRG	B102110FIWC016CV	02/01/18 10:00	2/2/2018	2/2/2018	18-02009	Radium-226	EPA 901.1 Modified	9.47E-01	8.01E-01	8.02E-01	1.30E+00	U	pCi/g
18-02009-15	TRG	B102110FIWC016CV	02/01/18 10:00	2/2/2018	2/2/2018	18-02009	Antimony-125	EPA 901.1 Modified	2.20E-01	9.11E-01	9.11E-01	1.34E+00	U	pCi/g
18-02009-15	TRG	B102110FIWC016CV	02/01/18 10:00	2/2/2018	2/2/2018	18-02009	Thorium-234	EPA 901.1 Modified	6.18E-01	4.52E+00	4.52E+00	5.80E+00	U	pCi/g
18-02009-15	TRG	B102110FIWC016CV	02/01/18 10:00	2/2/2018	2/2/2018	18-02009	Thallium-208	EPA 901.1 Modified	5.94E-02	8.09E-01	8.09E-01	9.42E-01	U	pCi/g
18-02009-15	TRG	B102110FIWC016CV	02/01/18 10:00	2/2/2018	2/2/2018	18-02009	Uranium-235	EPA 901.1 Modified	-7.76E-01	4.19E+00	4.19E+00	2.08E+00	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

[220]

Eberline Analytical Final Report of Analysis			Report To:					Work Order Details:						
			J Alex Bohacheff					SDG:	18-02009					
			Zion Solutions, LLC					Purchase Order:	677118					
			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
18-02009-16	TRG	B102110IFIWC019CV	02/01/18 10:38	2/2/2018	2/2/2018	18-02009	Actinium-228	EPA 901.1 Modified	1.34E-01	1.95E+00	1.95E+00	2.88E+00	U	pCi/g
18-02009-16	TRG	B102110IFIWC019CV	02/01/18 10:38	2/2/2018	2/2/2018	18-02009	Silver-108m	EPA 901.1 Modified	8.34E-01	5.92E-01	5.94E-01	4.44E-01	U	pCi/g
18-02009-16	TRG	B102110IFIWC019CV	02/01/18 10:38	2/2/2018	2/2/2018	18-02009	Americium-241	EPA 901.1 Modified	-1.33E-01	3.86E-01	3.86E-01	5.69E-01	U	pCi/g
18-02009-16	TRG	B102110IFIWC019CV	02/01/18 10:38	2/2/2018	2/2/2018	18-02009	Barium-133	EPA 901.1 Modified	-2.37E-01	5.38E-01	5.38E-01	6.43E-01	U	pCi/g
18-02009-16	TRG	B102110IFIWC019CV	02/01/18 10:38	2/2/2018	2/2/2018	18-02009	Bismuth-214	EPA 901.1 Modified	-1.40E-01	9.59E-01	9.59E-01	1.39E+00	U	pCi/g
18-02009-16	TRG	B102110IFIWC019CV	02/01/18 10:38	2/2/2018	2/2/2018	18-02009	Cobalt-60	EPA 901.1 Modified	8.42E+00	7.26E-01	8.45E-01	4.79E-01		pCi/g
18-02009-16	TRG	B102110IFIWC019CV	02/01/18 10:38	2/2/2018	2/2/2018	18-02009	Cesium-134	EPA 901.1 Modified	-4.16E-01	4.66E-01	4.66E-01	6.38E-01	U	pCi/g
18-02009-16	TRG	B102110IFIWC019CV	02/01/18 10:38	2/2/2018	2/2/2018	18-02009	Cesium-137	EPA 901.1 Modified	6.83E-01	6.30E-01	6.31E-01	1.03E+00	U	pCi/g
18-02009-16	TRG	B102110IFIWC019CV	02/01/18 10:38	2/2/2018	2/2/2018	18-02009	Europium-152	EPA 901.1 Modified	1.45E+02	7.66E+00	1.07E+01	2.57E+00		pCi/g
18-02009-16	TRG	B102110IFIWC019CV	02/01/18 10:38	2/2/2018	2/2/2018	18-02009	Europium-154	EPA 901.1 Modified	2.96E+00	1.17E+00	1.18E+00	2.06E+00	U	pCi/g
18-02009-16	TRG	B102110IFIWC019CV	02/01/18 10:38	2/2/2018	2/2/2018	18-02009	Europium-155	EPA 901.1 Modified	3.39E-01	6.90E-01	6.90E-01	1.02E+00	U	pCi/g
18-02009-16	TRG	B102110IFIWC019CV	02/01/18 10:38	2/2/2018	2/2/2018	18-02009	Holmium-166m	EPA 901.1 Modified	3.44E-01	8.59E-01	8.59E-01	4.82E-01	U	pCi/g
18-02009-16	TRG	B102110IFIWC019CV	02/01/18 10:38	2/2/2018	2/2/2018	18-02009	Iodine-129	EPA 901.1 Modified	1.08E+00	2.05E-01	2.13E-01	3.39E-01	U	pCi/g
18-02009-16	TRG	B102110IFIWC019CV	02/01/18 10:38	2/2/2018	2/2/2018	18-02009	Potassium-40	EPA 901.1 Modified	6.81E+00	3.43E+00	3.45E+00	6.02E+00		pCi/g
18-02009-16	TRG	B102110IFIWC019CV	02/01/18 10:38	2/2/2018	2/2/2018	18-02009	Manganese-54	EPA 901.1 Modified	1.15E-01	5.13E-01	5.13E-01	7.61E-01	U	pCi/g
18-02009-16	TRG	B102110IFIWC019CV	02/01/18 10:38	2/2/2018	2/2/2018	18-02009	Niobium-94	EPA 901.1 Modified	2.40E-01	3.07E-01	3.08E-01	7.09E-01	U	pCi/g
18-02009-16	TRG	B102110IFIWC019CV	02/01/18 10:38	2/2/2018	2/2/2018	18-02009	Lead-210	EPA 901.1 Modified	2.05E+02	1.67E+01	1.98E+01	1.14E+01		pCi/g
18-02009-16	TRG	B102110IFIWC019CV	02/01/18 10:38	2/2/2018	2/2/2018	18-02009	Lead-212	EPA 901.1 Modified	2.00E-01	4.62E-01	4.62E-01	8.20E-01	U	pCi/g
18-02009-16	TRG	B102110IFIWC019CV	02/01/18 10:38	2/2/2018	2/2/2018	18-02009	Lead-214	EPA 901.1 Modified	5.20E-01	8.68E-01	8.69E-01	1.03E+00	U	pCi/g
18-02009-16	TRG	B102110IFIWC019CV	02/01/18 10:38	2/2/2018	2/2/2018	18-02009	Promethium-145	EPA 901.1 Modified	-6.21E+01	4.57E+00	5.57E+00	1.27E+00	U	pCi/g
18-02009-16	TRG	B102110IFIWC019CV	02/01/18 10:38	2/2/2018	2/2/2018	18-02009	Radium-226	EPA 901.1 Modified	-1.40E-01	9.59E-01	9.59E-01	1.39E+00	U	pCi/g
18-02009-16	TRG	B102110IFIWC019CV	02/01/18 10:38	2/2/2018	2/2/2018	18-02009	Antimony-125	EPA 901.1 Modified	-7.37E-01	1.12E+00	1.12E+00	1.38E+00	U	pCi/g
18-02009-16	TRG	B102110IFIWC019CV	02/01/18 10:38	2/2/2018	2/2/2018	18-02009	Thorium-234	EPA 901.1 Modified	2.96E+00	4.02E+00	4.03E+00	6.03E+00	U	pCi/g
18-02009-16	TRG	B102110IFIWC019CV	02/01/18 10:38	2/2/2018	2/2/2018	18-02009	Thallium-208	EPA 901.1 Modified	4.64E-01	8.21E-01	8.21E-01	1.22E+00	U	pCi/g
18-02009-16	TRG	B102110IFIWC019CV	02/01/18 10:38	2/2/2018	2/2/2018	18-02009	Uranium-235	EPA 901.1 Modified	4.83E-01	5.91E+00	5.91E+00	2.88E+00	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



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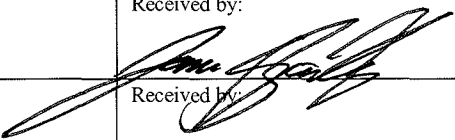
18-02009
Attachment 1 – Chain-of-Custody Form

REC'D FEB 02 2018

	Sample ID	Sample Log	Matrix	Sample Type	Sample Container				Sample Date	Sample Time	Analysis Type	Preservative	Remarks
					Vol	Unit	Type	Qty					
4	B102110FIWC001CV	N/A	Concrete	Concrete	57.94	cm ³	Puck	1	1/31/2018	1320	HTD	None	0.0"-0.5"
5	B102110FIWC003CV	N/A	Concrete	Concrete	57.94	cm ³	Puck	1	1/31/2018	1355	HTD	None	0.0"-0.5"
6	B102110FIWC004CV	N/A	Concrete	Concrete	57.94	cm ³	Puck	1	1/31/2018	1420	HTD	None	0.0"-0.5"
7	B102110FIFC003CV	N/A	Concrete	Concrete	57.94	cm ³	Puck	1	1/31/2018	1237	HTD	None	0.0"-0.5"
8	B102110FIFC021CV	N/A	Concrete	Concrete	57.94	cm ³	Puck	1	1/31/2018	1300	HTD	None	0.0"-0.5"
9	B102110FIWC015CV	N/A	Concrete	Concrete	57.94	cm ³	Puck	1	1/31/2018	1443	HTD	None	0.0"-0.5"
10	B102110FIWC017CV	N/A	Concrete	Concrete	57.94	cm ³	Puck	1	1/31/2018	1507	HTD	None	0.0"-0.5"
11	B102110FIWC019CV	N/A	Concrete	Concrete	57.94	cm ³	Puck	1	1/31/2018	1530	HTD	None	0.0"-0.5"
12	B102110FIWC020CV	N/A	Concrete	Concrete	57.94	cm ³	Puck	1	2/1/2018	0812	HTD	None	0.0"-0.5"
13	B102110FIWC014CV	N/A	Concrete	Concrete	57.94	cm ³	Puck	1	2/1/2018	0856	HTD	None	0.0"-0.5"
14	B102110FIWC018CV	N/A	Concrete	Concrete	57.94	cm ³	Puck	1	2/1/2018	0938	HTD	None	0.0"-0.5"
15	B102110FIWC016CV	N/A	Concrete	Concrete	57.94	cm ³	Puck	1	2/1/2018	1000	HTD	None	0.0"-0.5"
16	B102110FIWC019CV	N/A	Concrete	Concrete	57.94	cm ³	Puck	1	2/1/2018	1038	HTD	None	0.0"-0.5"

18-02009

REC'D FEB 02 2018

Laboratory: <u>Eberline Labs</u>		Date Submitted To Lab:		Ship Container No.: <u>N/A</u>		Cooler Temperature: <u>N/A</u>		Airbill Number: 8107 0645 6770	
Relinquished by: J. ALEX BOHACHEFF		Date (mm/dd/yyyy): 02/01/2018	Time: 1345	Received by: Rick Rickett		Date (mm/dd/yyyy): 02/01/2018	Time: 1345		
Relinquished by: Richard F. Rickett		Date (mm/dd/yyyy): 02/01/2018	Time: 16:00	Received by: FedEx		Date (mm/dd/yyyy): 02/01/2018	Time: 16:00		
Relinquished by:		Date (mm/dd/yyyy):	Time:	Received by: 		Date (mm/dd/yyyy): 2-2-18	Time: 0815		
Relinquished by:		Date (mm/dd/yyyy):	Time:	Received by:		Date (mm/dd/yyyy):	Time:		
Comments ANALYSIS 5 ROC-HTD REFERENCE: Email to Mike McDougall PRIORITY 24 hour turnaround PO# 677118									



EBERLINE ANALYTICAL CORPORATION
601 SCARBORO ROAD
OAK RIDGE, TENNESSEE 37830
PHONE (865) 481-0683
FAX (865) 483-4621

EBS-OR-43353

February 13, 2018

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

CASE NARRATIVE
Work Order # 18-02018-OR

SAMPLE RECEIPT

This work order contains three solid samples received 02/03/2018. Samples were analyzed for Total Strontium, Tritium, Nickel-63 and by Gamma Spectroscopy.

<u>CLIENT ID</u>	<u>LAB ID</u>
B102110IFIWC010CV	18-02018-04
B102110IFIWC011CV	18-02018-05
B102110IFIWC018CV	18-02018-06

ANALYTICAL METHODS

Total Strontium was analyzed using EICHroM Method SRW01 Modified. Tritium was performed using Method LANL ER-210 Modified. Nickel-63 was performed using Method ASTM 3500-Ni 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.

TOTAL STRONTIUM

Samples were prepared by aliquoting as appropriate and leaching in HNO₃. Samples were diluted appropriately. 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.

ANALYTICAL RESULTS CONTINUED

TOTAL STRONTIUM CONTINUED

Samples demonstrated acceptable results for all Total Strontium analyses. Strontium-90 results are 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 a slightly 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.

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. Results for laboratory fraction -05 (Client ID: B102110IFIWC011CV) demonstrated a slightly high method detection limit. 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.

NICKEL-63

A representative aliquot of each sample was leached in HNO₃. Leachates were placed in 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. All results demonstrated slightly high method detection limits. The Nickel-63 method blank demonstrated an acceptable result. Results for the Nickel-63 duplicate demonstrated a high relative percent difference and normalized difference. In this case duplicate variations were caused by the heterogeneous sample nature. Results for the Nickel-63 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 results demonstrated slightly high method detection limits. Some sample results are greater than the method detection limits. 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 Cesium-137 and Potassium-40 replicate

ANALYTICAL RESULTS CONTINUED

GAMMA SPECTROSCOPY CONTINUED

demonstrated a slightly high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Europium-152 replicate demonstrated a high relative percent difference and normalized difference. In this case duplicate variations were caused by the heterogeneous sample nature. 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: 2/13/2018

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:		18-02018				
			Zion Solutions, LLC					Purchase Order:		677118				
			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
18-02018-01	LCS	KNOWN	02/03/18 00:00	2/3/2018	2/6/2018	18-02018	Tritium	LANL ER-210 Modified	2.25E+02	8.11E+00				pCi/g
18-02018-01	LCS	SPIKE	02/03/18 00:00	2/3/2018	2/6/2018	18-02018	Tritium	LANL ER-210 Modified	2.13E+02	5.47E+00	1.31E+01	3.72E+00		pCi/g
18-02018-02	MBL	BLANK	02/03/18 00:00	2/3/2018	2/7/2018	18-02018	Tritium	LANL ER-210 Modified	-1.30E+00	2.13E+00	2.13E+00	3.72E+00	U	pCi/g
18-02018-03	DUP	B102110IFIWC010CV	02/01/18 13:10	2/3/2018	2/7/2018	18-02018	Tritium	LANL ER-210 Modified	5.14E+01	9.74E+00	1.02E+01	1.45E+01		pCi/g
18-02018-04	DO	B102110IFIWC010CV	02/01/18 13:10	2/3/2018	2/7/2018	18-02018	Tritium	LANL ER-210 Modified	5.01E+01	9.74E+00	1.01E+01	1.46E+01		pCi/g
18-02018-05	TRG	B102110IFIWC011CV	02/01/18 14:30	2/3/2018	2/7/2018	18-02018	Tritium	LANL ER-210 Modified	3.16E+00	7.44E+00	7.45E+00	1.27E+01	U	pCi/g
18-02018-06	TRG	B102110IFIWC018CV	02/01/18 13:50	2/3/2018	2/7/2018	18-02018	Tritium	LANL ER-210 Modified	1.65E+02	1.26E+01	1.56E+01	1.52E+01		pCi/g
18-02018-01	LCS	KNOWN	02/03/18 00:00	2/3/2018	2/6/2018	18-02018	Nickel-63	ASTM 3500-Ni Modified	1.51E+03	4.54E+01				pCi/g
18-02018-01	LCS	SPIKE	02/03/18 00:00	2/3/2018	2/6/2018	18-02018	Nickel-63	ASTM 3500-Ni Modified	1.18E+03	8.76E+00	7.00E+01	2.30E+00		pCi/g
18-02018-02	MBL	BLANK	02/03/18 00:00	2/3/2018	2/6/2018	18-02018	Nickel-63	ASTM 3500-Ni Modified	1.04E+00	1.31E+00	1.31E+00	2.20E+00	U	pCi/g
18-02018-03	DUP	B102110IFIWC010CV	02/01/18 13:10	2/3/2018	2/6/2018	18-02018	Nickel-63	ASTM 3500-Ni Modified	1.15E+01	5.28E+00	5.33E+00	8.60E+00		pCi/g
18-02018-04	DO	B102110IFIWC010CV	02/01/18 13:10	2/3/2018	2/6/2018	18-02018	Nickel-63	ASTM 3500-Ni Modified	4.94E+01	6.24E+00	6.89E+00	8.89E+00		pCi/g
18-02018-05	TRG	B102110IFIWC011CV	02/01/18 14:30	2/3/2018	2/6/2018	18-02018	Nickel-63	ASTM 3500-Ni Modified	1.01E+01	5.12E+00	5.16E+00	8.38E+00		pCi/g
18-02018-06	TRG	B102110IFIWC018CV	02/01/18 13:50	2/3/2018	2/6/2018	18-02018	Nickel-63	ASTM 3500-Ni Modified	1.32E+01	5.71E+00	5.77E+00	9.28E+00		pCi/g
18-02018-01	LCS	KNOWN	02/03/18 00:00	2/3/2018	2/6/2018	18-02018	Strontium-90	EiChroM SRW01 Modified	5.25E+01	2.94E-01				pCi/g
18-02018-01	LCS	SPIKE	02/03/18 00:00	2/3/2018	2/6/2018	18-02018	Strontium-90	EiChroM SRW01 Modified	4.11E+01	1.84E+00	1.44E+01	9.12E-01		pCi/g
18-02018-02	MBL	BLANK	02/03/18 00:00	2/3/2018	2/6/2018	18-02018	Strontium-90	EiChroM SRW01 Modified	4.20E-01	5.30E-01	5.50E-01	8.98E-01	U	pCi/g
18-02018-03	DUP	B102110IFIWC010CV	02/01/18 13:10	2/3/2018	2/6/2018	18-02018	Strontium-90	EiChroM SRW01 Modified	4.29E-01	5.02E-01	5.24E-01	8.45E-01	U	pCi/g
18-02018-04	DO	B102110IFIWC010CV	02/01/18 13:10	2/3/2018	2/6/2018	18-02018	Strontium-90	EiChroM SRW01 Modified	3.23E-01	5.36E-01	5.48E-01	9.20E-01	U	pCi/g
18-02018-05	TRG	B102110IFIWC011CV	02/01/18 14:30	2/3/2018	2/6/2018	18-02018	Strontium-90	EiChroM SRW01 Modified	4.96E-01	6.11E-01	6.35E-01	1.03E+00	U	pCi/g
18-02018-06	TRG	B102110IFIWC018CV	02/01/18 13:50	2/3/2018	2/6/2018	18-02018	Strontium-90	EiChroM SRW01 Modified	1.61E+00	6.17E-01	8.33E-01	9.09E-01		pCi/g
18-02018-01	LCS	KNOWN	02/03/18 00:00	2/3/2018	2/5/2018	18-02018	Cobalt-60	EPA 901.1 Modified	2.71E+02	1.06E+01				pCi/g
18-02018-01	LCS	KNOWN	02/03/18 00:00	2/3/2018	2/5/2018	18-02018	Cesium-137	EPA 901.1 Modified	1.69E+02	6.75E+00				pCi/g
18-02018-01	LCS	SPIKE	02/03/18 00:00	2/3/2018	2/5/2018	18-02018	Cobalt-60	EPA 901.1 Modified	2.88E+02	1.77E+01	2.31E+01	2.16E+00		pCi/g
18-02018-01	LCS	SPIKE	02/03/18 00:00	2/3/2018	2/5/2018	18-02018	Cesium-137	EPA 901.1 Modified	1.91E+02	3.16E+01	3.31E+01	2.83E+00		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					SDG:	18-02018					
			Zion Solutions, LLC					Purchase Order:	677118					
			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
18-02018-02	MBL	BLANK	02/03/18 00:00	2/3/2018	2/5/2018	18-02018	Actinium-228	EPA 901.1 Modified	3.97E-02	1.52E-01	1.52E-01	4.33E-01	U	pCi/g
18-02018-02	MBL	BLANK	02/03/18 00:00	2/3/2018	2/5/2018	18-02018	Silver-108m	EPA 901.1 Modified	3.57E-02	5.73E-02	5.74E-02	7.09E-02	U	pCi/g
18-02018-02	MBL	BLANK	02/03/18 00:00	2/3/2018	2/5/2018	18-02018	Americium-241	EPA 901.1 Modified	2.01E-02	3.22E-02	3.22E-02	1.11E-01	U	pCi/g
18-02018-02	MBL	BLANK	02/03/18 00:00	2/3/2018	2/5/2018	18-02018	Barium-133	EPA 901.1 Modified	8.22E-03	5.55E-02	5.55E-02	9.35E-02	U	pCi/g
18-02018-02	MBL	BLANK	02/03/18 00:00	2/3/2018	2/5/2018	18-02018	Bismuth-214	EPA 901.1 Modified	1.83E-02	1.44E-01	1.44E-01	2.10E-01	U	pCi/g
18-02018-02	MBL	BLANK	02/03/18 00:00	2/3/2018	2/5/2018	18-02018	Cobalt-60	EPA 901.1 Modified	2.86E-02	4.80E-02	4.80E-02	1.12E-01	U	pCi/g
18-02018-02	MBL	BLANK	02/03/18 00:00	2/3/2018	2/5/2018	18-02018	Cesium-134	EPA 901.1 Modified	-6.15E-02	9.22E-02	9.22E-02	9.34E-02	U	pCi/g
18-02018-02	MBL	BLANK	02/03/18 00:00	2/3/2018	2/5/2018	18-02018	Cesium-137	EPA 901.1 Modified	-6.98E-03	8.06E-02	8.06E-02	1.13E-01	U	pCi/g
18-02018-02	MBL	BLANK	02/03/18 00:00	2/3/2018	2/5/2018	18-02018	Europium-152	EPA 901.1 Modified	2.49E-02	6.25E-02	6.26E-02	1.44E-01	U	pCi/g
18-02018-02	MBL	BLANK	02/03/18 00:00	2/3/2018	2/5/2018	18-02018	Europium-154	EPA 901.1 Modified	-1.04E-01	2.01E-01	2.01E-01	7.75E-02	U	pCi/g
18-02018-02	MBL	BLANK	02/03/18 00:00	2/3/2018	2/5/2018	18-02018	Europium-155	EPA 901.1 Modified	-6.67E-03	6.56E-02	6.56E-02	9.50E-02	U	pCi/g
18-02018-02	MBL	BLANK	02/03/18 00:00	2/3/2018	2/5/2018	18-02018	Holmium-166m	EPA 901.1 Modified	2.47E-02	9.99E-02	9.99E-02	5.93E-02	U	pCi/g
18-02018-02	MBL	BLANK	02/03/18 00:00	2/3/2018	2/5/2018	18-02018	Iodine-129	EPA 901.1 Modified	-4.49E-02	7.97E-02	7.97E-02	1.55E-01	U	pCi/g
18-02018-02	MBL	BLANK	02/03/18 00:00	2/3/2018	2/5/2018	18-02018	Potassium-40	EPA 901.1 Modified	9.69E-02	5.49E-01	5.49E-01	1.04E+00	U	pCi/g
18-02018-02	MBL	BLANK	02/03/18 00:00	2/3/2018	2/5/2018	18-02018	Manganese-54	EPA 901.1 Modified	-3.18E-03	4.68E-02	4.68E-02	7.64E-02	U	pCi/g
18-02018-02	MBL	BLANK	02/03/18 00:00	2/3/2018	2/5/2018	18-02018	Niobium-94	EPA 901.1 Modified	1.45E-02	5.29E-02	5.29E-02	8.66E-02	U	pCi/g
18-02018-02	MBL	BLANK	02/03/18 00:00	2/3/2018	2/5/2018	18-02018	Lead-210	EPA 901.1 Modified	5.29E-01	6.04E-01	6.05E-01	1.04E+00	U	pCi/g
18-02018-02	MBL	BLANK	02/03/18 00:00	2/3/2018	2/5/2018	18-02018	Lead-212	EPA 901.1 Modified	3.45E-03	6.80E-02	6.80E-02	1.08E-01	U	pCi/g
18-02018-02	MBL	BLANK	02/03/18 00:00	2/3/2018	2/5/2018	18-02018	Lead-214	EPA 901.1 Modified	6.64E-02	6.95E-02	6.96E-02	1.45E-01	U	pCi/g
18-02018-02	MBL	BLANK	02/03/18 00:00	2/3/2018	2/5/2018	18-02018	Promethium-145	EPA 901.1 Modified	6.50E-02	8.77E-02	8.78E-02	1.49E-01	U	pCi/g
18-02018-02	MBL	BLANK	02/03/18 00:00	2/3/2018	2/5/2018	18-02018	Radium-226	EPA 901.1 Modified	1.83E-02	1.44E-01	1.44E-01	2.10E-01	U	pCi/g
18-02018-02	MBL	BLANK	02/03/18 00:00	2/3/2018	2/5/2018	18-02018	Antimony-125	EPA 901.1 Modified	-4.08E-02	1.64E-01	1.64E-01	2.21E-01	U	pCi/g
18-02018-02	MBL	BLANK	02/03/18 00:00	2/3/2018	2/5/2018	18-02018	Thorium-234	EPA 901.1 Modified	7.08E-01	6.47E-01	6.48E-01	1.12E+00	U	pCi/g
18-02018-02	MBL	BLANK	02/03/18 00:00	2/3/2018	2/5/2018	18-02018	Thallium-208	EPA 901.1 Modified	1.68E-01	1.60E-01	1.60E-01	3.25E-01	U	pCi/g
18-02018-02	MBL	BLANK	02/03/18 00:00	2/3/2018	2/5/2018	18-02018	Uranium-235	EPA 901.1 Modified	-4.37E-01	6.11E-01	6.12E-01	3.22E-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

[228]

Eberline Analytical Final Report of Analysis			Report To:						Work Order Details:						
			J Alex Bohacheff						SDG:		18-02018				
			Zion Solutions, LLC						Purchase Order:		677118				
			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	
18-02018-03	DUP	B102110IFIWC010CV	02/08/18 13:10	2/3/2018	2/5/2018	18-02018	Actinium-228	EPA 901.1 Modified	4.01E-01	1.88E+00	1.88E+00	2.82E+00	U	pCi/g	
18-02018-03	DUP	B102110IFIWC010CV	02/08/18 13:10	2/3/2018	2/5/2018	18-02018	Silver-108m	EPA 901.1 Modified	4.08E-01	5.86E-01	5.86E-01	4.55E-01	U	pCi/g	
18-02018-03	DUP	B102110IFIWC010CV	02/08/18 13:10	2/3/2018	2/5/2018	18-02018	Americium-241	EPA 901.1 Modified	-4.02E-01	4.19E-01	4.19E-01	5.77E-01	U	pCi/g	
18-02018-03	DUP	B102110IFIWC010CV	02/08/18 13:10	2/3/2018	2/5/2018	18-02018	Barium-133	EPA 901.1 Modified	-5.93E-02	4.98E-01	4.98E-01	6.29E-01	U	pCi/g	
18-02018-03	DUP	B102110IFIWC010CV	02/08/18 13:10	2/3/2018	2/5/2018	18-02018	Bismuth-214	EPA 901.1 Modified	3.00E-01	9.87E-01	9.87E-01	1.48E+00	U	pCi/g	
18-02018-03	DUP	B102110IFIWC010CV	02/08/18 13:10	2/3/2018	2/5/2018	18-02018	Cobalt-60	EPA 901.1 Modified	6.05E+00	6.75E-01	7.43E-01	6.96E-01		pCi/g	
18-02018-03	DUP	B102110IFIWC010CV	02/08/18 13:10	2/3/2018	2/5/2018	18-02018	Cesium-134	EPA 901.1 Modified	-5.13E-01	4.92E-01	4.93E-01	6.61E-01	U	pCi/g	
18-02018-03	DUP	B102110IFIWC010CV	02/08/18 13:10	2/3/2018	2/5/2018	18-02018	Cesium-137	EPA 901.1 Modified	1.11E+00	6.57E-01	6.59E-01	1.03E+00		pCi/g	
18-02018-03	DUP	B102110IFIWC010CV	02/08/18 13:10	2/3/2018	2/5/2018	18-02018	Europium-152	EPA 901.1 Modified	1.10E+02	6.25E+00	8.41E+00	2.58E+00		pCi/g	
18-02018-03	DUP	B102110IFIWC010CV	02/08/18 13:10	2/3/2018	2/5/2018	18-02018	Europium-154	EPA 901.1 Modified	3.39E+00	1.21E+00	1.22E+00	2.28E+00	U	pCi/g	
18-02018-03	DUP	B102110IFIWC010CV	02/08/18 13:10	2/3/2018	2/5/2018	18-02018	Europium-155	EPA 901.1 Modified	2.39E+00	1.33E+00	1.33E+00	1.47E+00		pCi/g	
18-02018-03	DUP	B102110IFIWC010CV	02/08/18 13:10	2/3/2018	2/5/2018	18-02018	Holmium-166m	EPA 901.1 Modified	2.06E-01	8.78E-01	8.78E-01	5.18E-01	U	pCi/g	
18-02018-03	DUP	B102110IFIWC010CV	02/08/18 13:10	2/3/2018	2/5/2018	18-02018	Iodine-129	EPA 901.1 Modified	2.91E-01	2.15E-01	2.15E-01	3.18E-01	U	pCi/g	
18-02018-03	DUP	B102110IFIWC010CV	02/08/18 13:10	2/3/2018	2/5/2018	18-02018	Potassium-40	EPA 901.1 Modified	4.85E+00	2.41E+00	2.42E+00	1.43E+00		pCi/g	
18-02018-03	DUP	B102110IFIWC010CV	02/08/18 13:10	2/3/2018	2/5/2018	18-02018	Manganese-54	EPA 901.1 Modified	-1.84E-01	2.05E-01	2.05E-01	7.57E-01	U	pCi/g	
18-02018-03	DUP	B102110IFIWC010CV	02/08/18 13:10	2/3/2018	2/5/2018	18-02018	Niobium-94	EPA 901.1 Modified	-2.02E+00	9.56E-01	9.61E-01	6.97E-01	U	pCi/g	
18-02018-03	DUP	B102110IFIWC010CV	02/08/18 13:10	2/3/2018	2/5/2018	18-02018	Lead-210	EPA 901.1 Modified	1.25E+02	1.18E+01	1.35E+01	1.07E+01		pCi/g	
18-02018-03	DUP	B102110IFIWC010CV	02/08/18 13:10	2/3/2018	2/5/2018	18-02018	Lead-212	EPA 901.1 Modified	4.05E-02	6.70E-01	6.70E-01	8.57E-01	U	pCi/g	
18-02018-03	DUP	B102110IFIWC010CV	02/08/18 13:10	2/3/2018	2/5/2018	18-02018	Lead-214	EPA 901.1 Modified	7.28E-01	9.57E-01	9.58E-01	1.08E+00	U	pCi/g	
18-02018-03	DUP	B102110IFIWC010CV	02/08/18 13:10	2/3/2018	2/5/2018	18-02018	Promethium-145	EPA 901.1 Modified	-3.87E+01	3.27E+00	3.83E+00	1.16E+00	U	pCi/g	
18-02018-03	DUP	B102110IFIWC010CV	02/08/18 13:10	2/3/2018	2/5/2018	18-02018	Radium-226	EPA 901.1 Modified	3.00E-01	9.87E-01	9.87E-01	1.48E+00	U	pCi/g	
18-02018-03	DUP	B102110IFIWC010CV	02/08/18 13:10	2/3/2018	2/5/2018	18-02018	Antimony-125	EPA 901.1 Modified	1.94E-01	1.03E+00	1.03E+00	1.37E+00	U	pCi/g	
18-02018-03	DUP	B102110IFIWC010CV	02/08/18 13:10	2/3/2018	2/5/2018	18-02018	Thorium-234	EPA 901.1 Modified	1.66E+00	4.19E+00	4.19E+00	6.34E+00	U	pCi/g	
18-02018-03	DUP	B102110IFIWC010CV	02/08/18 13:10	2/3/2018	2/5/2018	18-02018	Thallium-208	EPA 901.1 Modified	-8.42E-01	1.19E+00	1.19E+00	1.04E+00	U	pCi/g	
18-02018-03	DUP	B102110IFIWC010CV	02/08/18 13:10	2/3/2018	2/5/2018	18-02018	Uranium-235	EPA 901.1 Modified	-3.20E+00	6.19E+00	6.19E+00	3.17E+00	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

[229]

Eberline Analytical Final Report of Analysis			Report To:					Work Order Details:						
			J Alex Bohacheff					SDG:	18-02018					
			Zion Solutions, LLC					Purchase Order:	677118					
			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
18-02018-04	DO	B102110IFIWC010CV	02/08/18 13:10	2/3/2018	2/5/2018	18-02018	Actinium-228	EPA 901.1 Modified	-5.66E-01	2.74E+00	2.74E+00	3.99E+00	U	pCi/g
18-02018-04	DO	B102110IFIWC010CV	02/08/18 13:10	2/3/2018	2/5/2018	18-02018	Silver-108m	EPA 901.1 Modified	3.08E-01	8.50E-01	8.50E-01	6.82E-01	U	pCi/g
18-02018-04	DO	B102110IFIWC010CV	02/08/18 13:10	2/3/2018	2/5/2018	18-02018	Americium-241	EPA 901.1 Modified	5.59E-01	7.05E-01	7.05E-01	1.11E+00	U	pCi/g
18-02018-04	DO	B102110IFIWC010CV	02/08/18 13:10	2/3/2018	2/5/2018	18-02018	Barium-133	EPA 901.1 Modified	8.79E-01	5.42E-01	5.44E-01	9.26E-01	U	pCi/g
18-02018-04	DO	B102110IFIWC010CV	02/08/18 13:10	2/3/2018	2/5/2018	18-02018	Bismuth-214	EPA 901.1 Modified	1.02E+00	1.36E+00	1.36E+00	2.07E+00	U	pCi/g
18-02018-04	DO	B102110IFIWC010CV	02/08/18 13:10	2/3/2018	2/5/2018	18-02018	Cobalt-60	EPA 901.1 Modified	9.17E+00	9.70E-01	1.08E+00	6.78E-01		pCi/g
18-02018-04	DO	B102110IFIWC010CV	02/08/18 13:10	2/3/2018	2/5/2018	18-02018	Cesium-134	EPA 901.1 Modified	1.04E-01	3.24E-01	3.24E-01	9.28E-01	U	pCi/g
18-02018-04	DO	B102110IFIWC010CV	02/08/18 13:10	2/3/2018	2/5/2018	18-02018	Cesium-137	EPA 901.1 Modified	8.54E-01	8.59E-01	8.60E-01	1.43E+00	U	pCi/g
18-02018-04	DO	B102110IFIWC010CV	02/08/18 13:10	2/3/2018	2/5/2018	18-02018	Europium-152	EPA 901.1 Modified	1.64E+02	6.91E+00	1.09E+01	3.96E+00		pCi/g
18-02018-04	DO	B102110IFIWC010CV	02/08/18 13:10	2/3/2018	2/5/2018	18-02018	Europium-154	EPA 901.1 Modified	4.92E+00	1.64E+00	1.66E+00	3.21E+00	U	pCi/g
18-02018-04	DO	B102110IFIWC010CV	02/08/18 13:10	2/3/2018	2/5/2018	18-02018	Europium-155	EPA 901.1 Modified	1.49E+00	1.70E+00	1.70E+00	2.85E+00	U	pCi/g
18-02018-04	DO	B102110IFIWC010CV	02/08/18 13:10	2/3/2018	2/5/2018	18-02018	Holmium-166m	EPA 901.1 Modified	-7.12E-01	1.22E+00	1.22E+00	8.19E-01	U	pCi/g
18-02018-04	DO	B102110IFIWC010CV	02/08/18 13:10	2/3/2018	2/5/2018	18-02018	Iodine-129	EPA 901.1 Modified	3.87E+00	3.92E+00	3.93E+00	5.34E+00	U	pCi/g
18-02018-04	DO	B102110IFIWC010CV	02/08/18 13:10	2/3/2018	2/5/2018	18-02018	Potassium-40	EPA 901.1 Modified	7.15E+00	4.48E+00	4.49E+00	8.45E+00	U	pCi/g
18-02018-04	DO	B102110IFIWC010CV	02/08/18 13:10	2/3/2018	2/5/2018	18-02018	Manganese-54	EPA 901.1 Modified	-4.26E-01	6.75E-01	6.76E-01	9.57E-01	U	pCi/g
18-02018-04	DO	B102110IFIWC010CV	02/08/18 13:10	2/3/2018	2/5/2018	18-02018	Niobium-94	EPA 901.1 Modified	4.65E-01	5.08E-01	5.09E-01	9.96E-01	U	pCi/g
18-02018-04	DO	B102110IFIWC010CV	02/08/18 13:10	2/3/2018	2/5/2018	18-02018	Lead-210	EPA 901.1 Modified	3.78E+02	4.69E+01	5.07E+01	3.00E+01		pCi/g
18-02018-04	DO	B102110IFIWC010CV	02/08/18 13:10	2/3/2018	2/5/2018	18-02018	Lead-212	EPA 901.1 Modified	-3.82E-02	8.55E-01	8.55E-01	1.33E+00	U	pCi/g
18-02018-04	DO	B102110IFIWC010CV	02/08/18 13:10	2/3/2018	2/5/2018	18-02018	Lead-214	EPA 901.1 Modified	1.16E+00	1.07E+00	1.07E+00	1.77E+00	U	pCi/g
18-02018-04	DO	B102110IFIWC010CV	02/08/18 13:10	2/3/2018	2/5/2018	18-02018	Promethium-145	EPA 901.1 Modified	-2.09E+02	3.93E+01	4.07E+01	6.12E+00	U	pCi/g
18-02018-04	DO	B102110IFIWC010CV	02/08/18 13:10	2/3/2018	2/5/2018	18-02018	Radium-226	EPA 901.1 Modified	1.02E+00	1.36E+00	1.36E+00	2.07E+00	U	pCi/g
18-02018-04	DO	B102110IFIWC010CV	02/08/18 13:10	2/3/2018	2/5/2018	18-02018	Antimony-125	EPA 901.1 Modified	-8.46E-01	1.66E+00	1.66E+00	2.03E+00	U	pCi/g
18-02018-04	DO	B102110IFIWC010CV	02/08/18 13:10	2/3/2018	2/5/2018	18-02018	Thorium-234	EPA 901.1 Modified	7.74E-01	7.02E+00	7.02E+00	1.04E+01	U	pCi/g
18-02018-04	DO	B102110IFIWC010CV	02/08/18 13:10	2/3/2018	2/5/2018	18-02018	Thallium-208	EPA 901.1 Modified	-1.95E+00	1.70E+00	1.71E+00	1.69E+00	U	pCi/g
18-02018-04	DO	B102110IFIWC010CV	02/08/18 13:10	2/3/2018	2/5/2018	18-02018	Uranium-235	EPA 901.1 Modified	3.67E+00	9.37E+00	9.37E+00	4.76E+00	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

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Eberline Analytical Final Report of Analysis			Report To:					Work Order Details:						
			J Alex Bohacheff					SDG:		18-02018				
			Zion Solutions, LLC					Purchase Order:		677118				
			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
18-02018-05	TRG	B102110IFIWC011CV	02/08/18 14:30	2/3/2018	2/5/2018	18-02018	Actinium-228	EPA 901.1 Modified	6.25E-01	6.01E-01	6.01E-01	1.10E+00	U	pCi/g
18-02018-05	TRG	B102110IFIWC011CV	02/08/18 14:30	2/3/2018	2/5/2018	18-02018	Silver-108m	EPA 901.1 Modified	2.49E-02	1.34E-01	1.34E-01	1.67E-01	U	pCi/g
18-02018-05	TRG	B102110IFIWC011CV	02/08/18 14:30	2/3/2018	2/5/2018	18-02018	Americium-241	EPA 901.1 Modified	-2.66E-01	2.88E-01	2.88E-01	3.17E-01	U	pCi/g
18-02018-05	TRG	B102110IFIWC011CV	02/08/18 14:30	2/3/2018	2/5/2018	18-02018	Barium-133	EPA 901.1 Modified	7.34E-03	1.18E-01	1.18E-01	3.17E-01	U	pCi/g
18-02018-05	TRG	B102110IFIWC011CV	02/08/18 14:30	2/3/2018	2/5/2018	18-02018	Bismuth-214	EPA 901.1 Modified	8.45E-01	3.05E-01	3.09E-01	5.92E-01		pCi/g
18-02018-05	TRG	B102110IFIWC011CV	02/08/18 14:30	2/3/2018	2/5/2018	18-02018	Cobalt-60	EPA 901.1 Modified	6.31E-02	1.96E-01	1.96E-01	3.08E-01	U	pCi/g
18-02018-05	TRG	B102110IFIWC011CV	02/08/18 14:30	2/3/2018	2/5/2018	18-02018	Cesium-134	EPA 901.1 Modified	-4.12E-03	6.81E-02	6.81E-02	2.79E-01	U	pCi/g
18-02018-05	TRG	B102110IFIWC011CV	02/08/18 14:30	2/3/2018	2/5/2018	18-02018	Cesium-137	EPA 901.1 Modified	-3.59E-02	1.56E-01	1.56E-01	2.32E-01	U	pCi/g
18-02018-05	TRG	B102110IFIWC011CV	02/08/18 14:30	2/3/2018	2/5/2018	18-02018	Europium-152	EPA 901.1 Modified	3.64E+00	4.34E-01	4.72E-01	8.63E-01		pCi/g
18-02018-05	TRG	B102110IFIWC011CV	02/08/18 14:30	2/3/2018	2/5/2018	18-02018	Europium-154	EPA 901.1 Modified	-3.80E-02	2.11E-01	2.11E-01	5.58E-01	U	pCi/g
18-02018-05	TRG	B102110IFIWC011CV	02/08/18 14:30	2/3/2018	2/5/2018	18-02018	Europium-155	EPA 901.1 Modified	1.22E-01	2.82E-01	2.82E-01	4.77E-01	U	pCi/g
18-02018-05	TRG	B102110IFIWC011CV	02/08/18 14:30	2/3/2018	2/5/2018	18-02018	Holmium-166m	EPA 901.1 Modified	-1.18E-02	2.19E-01	2.19E-01	2.02E-01	U	pCi/g
18-02018-05	TRG	B102110IFIWC011CV	02/08/18 14:30	2/3/2018	2/5/2018	18-02018	Iodine-129	EPA 901.1 Modified	-6.36E-03	8.45E-02	8.45E-02	1.10E-01	U	pCi/g
18-02018-05	TRG	B102110IFIWC011CV	02/08/18 14:30	2/3/2018	2/5/2018	18-02018	Potassium-40	EPA 901.1 Modified	8.79E+00	2.33E+00	2.37E+00	1.18E+00		pCi/g
18-02018-05	TRG	B102110IFIWC011CV	02/08/18 14:30	2/3/2018	2/5/2018	18-02018	Manganese-54	EPA 901.1 Modified	-8.25E-03	7.65E-02	7.65E-02	1.94E-01	U	pCi/g
18-02018-05	TRG	B102110IFIWC011CV	02/08/18 14:30	2/3/2018	2/5/2018	18-02018	Niobium-94	EPA 901.1 Modified	-3.16E-02	1.53E-01	1.53E-01	2.07E-01	U	pCi/g
18-02018-05	TRG	B102110IFIWC011CV	02/08/18 14:30	2/3/2018	2/5/2018	18-02018	Lead-210	EPA 901.1 Modified	3.81E+00	2.30E+00	2.31E+00	3.67E+00		pCi/g
18-02018-05	TRG	B102110IFIWC011CV	02/08/18 14:30	2/3/2018	2/5/2018	18-02018	Lead-212	EPA 901.1 Modified	2.41E-01	2.74E-01	2.75E-01	4.58E-01	U	pCi/g
18-02018-05	TRG	B102110IFIWC011CV	02/08/18 14:30	2/3/2018	2/5/2018	18-02018	Lead-214	EPA 901.1 Modified	9.06E-01	3.03E-01	3.07E-01	1.06E+00	U	pCi/g
18-02018-05	TRG	B102110IFIWC011CV	02/08/18 14:30	2/3/2018	2/5/2018	18-02018	Promethium-145	EPA 901.1 Modified	-2.41E-01	3.56E-01	3.56E-01	4.27E-01	U	pCi/g
18-02018-05	TRG	B102110IFIWC011CV	02/08/18 14:30	2/3/2018	2/5/2018	18-02018	Radium-226	EPA 901.1 Modified	8.45E-01	3.05E-01	3.09E-01	5.92E-01		pCi/g
18-02018-05	TRG	B102110IFIWC011CV	02/08/18 14:30	2/3/2018	2/5/2018	18-02018	Antimony-125	EPA 901.1 Modified	-1.10E-01	3.66E-01	3.66E-01	5.36E-01	U	pCi/g
18-02018-05	TRG	B102110IFIWC011CV	02/08/18 14:30	2/3/2018	2/5/2018	18-02018	Thorium-234	EPA 901.1 Modified	4.67E+00	3.76E+00	3.76E+00	6.18E+00	U	pCi/g
18-02018-05	TRG	B102110IFIWC011CV	02/08/18 14:30	2/3/2018	2/5/2018	18-02018	Thallium-208	EPA 901.1 Modified	1.06E+00	6.53E-01	6.55E-01	9.86E-01		pCi/g
18-02018-05	TRG	B102110IFIWC011CV	02/08/18 14:30	2/3/2018	2/5/2018	18-02018	Uranium-235	EPA 901.1 Modified	-6.70E-01	1.67E+00	1.67E+00	1.11E+00	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



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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: 18-02018
Purchase Order: 677118
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
18-02018-06	TRG	B102110IFIWC018CV	02/08/18 13:50	2/3/2018	2/5/2018	18-02018	Actinium-228	EPA 901.1 Modified	-4.18E-01	2.23E+00	2.23E+00	3.22E+00	U	pCi/g
18-02018-06	TRG	B102110IFIWC018CV	02/08/18 13:50	2/3/2018	2/5/2018	18-02018	Silver-108m	EPA 901.1 Modified	1.27E+00	7.20E-01	7.23E-01	6.68E-01	U	pCi/g
18-02018-06	TRG	B102110IFIWC018CV	02/08/18 13:50	2/3/2018	2/5/2018	18-02018	Americium-241	EPA 901.1 Modified	1.80E-01	7.93E-01	7.93E-01	1.01E+00	U	pCi/g
18-02018-06	TRG	B102110IFIWC018CV	02/08/18 13:50	2/3/2018	2/5/2018	18-02018	Barium-133	EPA 901.1 Modified	-7.91E-02	3.27E-01	3.27E-01	9.71E-01	U	pCi/g
18-02018-06	TRG	B102110IFIWC018CV	02/08/18 13:50	2/3/2018	2/5/2018	18-02018	Bismuth-214	EPA 901.1 Modified	1.28E+00	1.24E+00	1.24E+00	1.42E+00	U	pCi/g
18-02018-06	TRG	B102110IFIWC018CV	02/08/18 13:50	2/3/2018	2/5/2018	18-02018	Cobalt-60	EPA 901.1 Modified	1.34E+01	9.82E-01	1.20E+00	1.02E+00		pCi/g
18-02018-06	TRG	B102110IFIWC018CV	02/08/18 13:50	2/3/2018	2/5/2018	18-02018	Cesium-134	EPA 901.1 Modified	-1.39E-02	3.37E-01	3.37E-01	7.68E-01	U	pCi/g
18-02018-06	TRG	B102110IFIWC018CV	02/08/18 13:50	2/3/2018	2/5/2018	18-02018	Cesium-137	EPA 901.1 Modified	4.94E-02	6.40E-01	6.40E-01	9.34E-01	U	pCi/g
18-02018-06	TRG	B102110IFIWC018CV	02/08/18 13:50	2/3/2018	2/5/2018	18-02018	Europium-152	EPA 901.1 Modified	2.23E+02	7.75E+00	1.38E+01	4.54E+00		pCi/g
18-02018-06	TRG	B102110IFIWC018CV	02/08/18 13:50	2/3/2018	2/5/2018	18-02018	Europium-154	EPA 901.1 Modified	7.20E+00	1.47E+00	1.52E+00	2.62E+00	U	pCi/g
18-02018-06	TRG	B102110IFIWC018CV	02/08/18 13:50	2/3/2018	2/5/2018	18-02018	Europium-155	EPA 901.1 Modified	2.83E+00	1.11E+00	1.12E+00	1.77E+00	U	pCi/g
18-02018-06	TRG	B102110IFIWC018CV	02/08/18 13:50	2/3/2018	2/5/2018	18-02018	Holmium-166m	EPA 901.1 Modified	-3.13E-01	1.06E+00	1.06E+00	6.27E-01	U	pCi/g
18-02018-06	TRG	B102110IFIWC018CV	02/08/18 13:50	2/3/2018	2/5/2018	18-02018	Iodine-129	EPA 901.1 Modified	1.19E+00	3.37E-01	3.42E-01	1.59E+00	U	pCi/g
18-02018-06	TRG	B102110IFIWC018CV	02/08/18 13:50	2/3/2018	2/5/2018	18-02018	Potassium-40	EPA 901.1 Modified	5.18E+00	3.56E+00	3.57E+00	5.24E+00	U	pCi/g
18-02018-06	TRG	B102110IFIWC018CV	02/08/18 13:50	2/3/2018	2/5/2018	18-02018	Manganese-54	EPA 901.1 Modified	8.46E-02	6.07E-01	6.07E-01	8.91E-01	U	pCi/g
18-02018-06	TRG	B102110IFIWC018CV	02/08/18 13:50	2/3/2018	2/5/2018	18-02018	Niobium-94	EPA 901.1 Modified	-2.90E+00	1.04E+00	1.05E+00	7.84E-01	U	pCi/g
18-02018-06	TRG	B102110IFIWC018CV	02/08/18 13:50	2/3/2018	2/5/2018	18-02018	Lead-210	EPA 901.1 Modified	2.85E+02	2.44E+01	2.85E+01	1.95E+01	U	pCi/g
18-02018-06	TRG	B102110IFIWC018CV	02/08/18 13:50	2/3/2018	2/5/2018	18-02018	Lead-212	EPA 901.1 Modified	-8.63E-01	6.84E-01	6.85E-01	1.04E+00	U	pCi/g
18-02018-06	TRG	B102110IFIWC018CV	02/08/18 13:50	2/3/2018	2/5/2018	18-02018	Lead-214	EPA 901.1 Modified	4.36E+00	1.20E+00	1.22E+00	3.37E+00		pCi/g
18-02018-06	TRG	B102110IFIWC018CV	02/08/18 13:50	2/3/2018	2/5/2018	18-02018	Promethium-145	EPA 901.1 Modified	6.90E+00	1.96E+00	1.99E+00	2.50E+00	U	pCi/g
18-02018-06	TRG	B102110IFIWC018CV	02/08/18 13:50	2/3/2018	2/5/2018	18-02018	Radium-226	EPA 901.1 Modified	1.28E+00	1.24E+00	1.24E+00	1.42E+00	U	pCi/g
18-02018-06	TRG	B102110IFIWC018CV	02/08/18 13:50	2/3/2018	2/5/2018	18-02018	Antimony-125	EPA 901.1 Modified	-6.13E-03	1.40E+00	1.40E+00	2.02E+00	U	pCi/g
18-02018-06	TRG	B102110IFIWC018CV	02/08/18 13:50	2/3/2018	2/5/2018	18-02018	Thorium-234	EPA 901.1 Modified	9.50E-01	7.89E+00	7.89E+00	1.01E+01	U	pCi/g
18-02018-06	TRG	B102110IFIWC018CV	02/08/18 13:50	2/3/2018	2/5/2018	18-02018	Thallium-208	EPA 901.1 Modified	1.13E+00	1.79E+00	1.79E+00	1.28E+00	U	pCi/g
18-02018-06	TRG	B102110IFIWC018CV	02/08/18 13:50	2/3/2018	2/5/2018	18-02018	Uranium-235	EPA 901.1 Modified	-4.75E+00	5.96E+00	5.97E+00	3.87E+00	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

[232]

18-02018
REC'D FEB 03 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					
B102110IFIWC010CV	N/A	Concrete	Concrete	57.94	cm ³	Puck	1	2/1/2018	1310	5 ROC HTD	None	0.0"-0.5"
B102110IFIWC011CV	N/A	Concrete	Concrete	57.94	cm ³	Puck	1	2/1/2018	1430	5 ROC HTD	None	0.0"-0.5"
B102110IFIWC018CV	N/A	Concrete	Concrete	57.94	cm ³	Puck	1	2/1/2018	1350	5 ROC HTD	None	0.0"-0.5"
Laboratory: Eberline Labs			Date Submitted To Lab:			Ship Container No.: N/A			Cooler Temperature: N/A		Airbill Number: <i>FedEx</i> <i>8107 0645 6769</i>	
Relinquished by: J. ALEX BOHACHEFF			Date (mm/dd/yyyy): <i>02/01/2018</i>	Time: <i>1550</i>		Received by: <i>Rick Rickert</i>			Date: (mm/dd/yyyy): <i>02/01/2018</i>		Time: <i>1548</i>	
Relinquished by: <i>Richard F. Rickert</i>			Date (mm/dd/yyyy): <i>02/02/2018</i>	Time: <i>0700</i>		Received by: <i>Fed Ex</i>			Date: (mm/dd/yyyy): <i>02/02/2018</i>		Time: <i>0700</i>	
Relinquished by:			Date (mm/dd/yyyy):	Time:		Received by: <i>[Signature]</i>			Date: (mm/dd/yyyy): <i>2-3-18</i>		Time: <i>0850</i>	
Relinquished by:			Date (mm/dd/yyyy):	Time:		Received by:			Date: (mm/dd/yyyy):		Time:	
Comments ANALYSIS 5 ROC-HTD RE: Email to Mike McDougall PRIORITY 24 hour turnaround PO# 677118												