



EBERLINE SERVICES

EBERLINE ANALYTICAL CORPORATION
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EBS-OR-43591

April 4, 2018

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

CASE NARRATIVE Work Order # 18-03104-OR

SAMPLE RECEIPT

This work order contains ten solid samples received 03/22/2018. Samples were analyzed for Strontium-90, Tritium, Nickel-63 and by Gamma Spectroscopy.

<u>CLIENT ID</u>	<u>LAB ID</u>	<u>CLIENT ID</u>	<u>LAB ID</u>
B101110FIWC001CV	18-03104-04	B101110FIFC008CV	18-03104-09
B101110FIWC003CV	18-03104-05	B101110FIWC010CV	18-03104-10
B101110FIWC004CV	18-03104-06	B101110FIWC011CV	18-03104-11
B101110FIFC005CV	18-03104-07	B101110FIWC018CV	18-03104-12
B101110FIFC006CV	18-03104-08	B101110FIWC019CV	18-03104-13

ANALYTICAL METHODS

Strontium-90 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 1-sigma value.

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

ANALYTICAL RESULTS CONTINUED

STRONTIUM-90

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 precipitated 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 and decay.

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

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

Samples demonstrated acceptable results for all Nickel-63 analyses. 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.

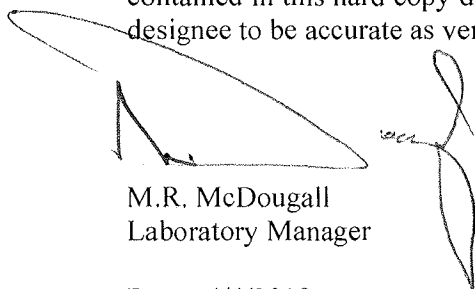
ANALYTICAL RESULTS CONTINUED

GAMMA SPECTROSCOPY CONTINUED

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

CERTIFICATION OF ACCURACY

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



M.R. McDougall
Laboratory Manager

Date: 4/4/2018

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

Eberline Analytical Final Report of Analysis			Report To:					Work Order Details:						
			J Alex Bohacheff					SDG: 18-03104						
			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
18-03104-01	LCS	KNOWN	03/22/18 00:00	3/22/2018	3/27/2018	18-03104	Tritium	LANL ER-210 Modified	2.24E+02	8.06E+00				pCi/g
18-03104-01	LCS	SPIKE	03/22/18 00:00	3/22/2018	3/27/2018	18-03104	Tritium	LANL ER-210 Modified	1.93E+02	5.36E+00	1.21E+01	3.87E+00		pCi/g
18-03104-02	MBL	BLANK	03/22/18 00:00	3/22/2018	3/27/2018	18-03104	Tritium	LANL ER-210 Modified	-2.27E+00	2.16E+00	2.16E+00	3.82E+00	U	pCi/g
18-03104-03	DUP	B101110FIWC001CV	03/15/18 08:35	3/22/2018	3/27/2018	18-03104	Tritium	LANL ER-210 Modified	8.21E+01	9.17E+00	1.03E+01	1.24E+01		pCi/g
18-03104-04	DO	B101110FIWC001CV	03/15/18 08:35	3/22/2018	3/27/2018	18-03104	Tritium	LANL ER-210 Modified	8.80E+01	9.32E+00	1.05E+01	1.24E+01		pCi/g
18-03104-05	TRG	B101110FIWC003CV	03/14/18 14:13	3/22/2018	3/27/2018	18-03104	Tritium	LANL ER-210 Modified	3.40E+01	7.53E+00	7.76E+00	1.15E+01		pCi/g
18-03104-06	TRG	B101110FIWC004CV	03/15/18 08:15	3/22/2018	3/27/2018	18-03104	Tritium	LANL ER-210 Modified	8.87E+01	8.82E+00	1.01E+01	1.16E+01		pCi/g
18-03104-07	TRG	B101110FIFC005CV	03/15/18 09:30	3/22/2018	3/27/2018	18-03104	Tritium	LANL ER-210 Modified	1.21E+02	1.09E+01	1.28E+01	1.39E+01		pCi/g
18-03104-08	TRG	B101110FIFC006CV	03/15/18 09:50	3/22/2018	3/27/2018	18-03104	Tritium	LANL ER-210 Modified	1.09E+02	8.92E+00	1.08E+01	1.11E+01		pCi/g
18-03104-09	TRG	B101110FIFC008CV	03/14/18 14:40	3/22/2018	3/28/2018	18-03104	Tritium	LANL ER-210 Modified	2.29E+02	1.35E+01	1.86E+01	1.48E+01		pCi/g
18-03104-10	TRG	B101110FIWC010CV	03/14/18 13:56	3/22/2018	3/28/2018	18-03104	Tritium	LANL ER-210 Modified	3.44E+01	9.90E+00	1.01E+01	1.55E+01		pCi/g
18-03104-11	TRG	B101110FIWC011CV	03/14/18 13:29	3/22/2018	3/28/2018	18-03104	Tritium	LANL ER-210 Modified	1.30E+02	8.78E+00	1.14E+01	1.02E+01		pCi/g
18-03104-12	TRG	B101110FIWC018CV	03/14/18 09:48	3/22/2018	3/28/2018	18-03104	Tritium	LANL ER-210 Modified	1.37E+03	2.58E+01	8.08E+01	1.39E+01		pCi/g
18-03104-13	TRG	B101110FIWC019CV	03/14/18 10:30	3/22/2018	3/28/2018	18-03104	Tritium	LANL ER-210 Modified	3.01E+03	3.63E+01	1.72E+02	1.32E+01		pCi/g
18-03104-01	LCS	KNOWN	03/22/18 00:00	3/22/2018	3/27/2018	18-03104	Nickel-63	ASTM 3500-Ni Modified	1.49E+03	4.48E+01				pCi/g
18-03104-01	LCS	SPIKE	03/22/18 00:00	3/22/2018	3/27/2018	18-03104	Nickel-63	ASTM 3500-Ni Modified	1.50E+03	9.47E+00	8.90E+01	2.23E+00		pCi/g
18-03104-02	MBL	BLANK	03/22/18 00:00	3/22/2018	3/27/2018	18-03104	Nickel-63	ASTM 3500-Ni Modified	8.82E-01	1.28E+00	1.28E+00	2.16E+00	U	pCi/g
18-03104-03	DUP	B101110FIWC001CV	03/15/18 08:35	3/22/2018	3/27/2018	18-03104	Nickel-63	ASTM 3500-Ni Modified	2.95E+00	9.98E-01	1.01E+00	1.60E+00		pCi/g
18-03104-04	DO	B101110FIWC001CV	03/15/18 08:35	3/22/2018	3/27/2018	18-03104	Nickel-63	ASTM 3500-Ni Modified	6.94E+00	1.06E+00	1.14E+00	1.57E+00		pCi/g
18-03104-05	TRG	B101110FIWC003CV	03/14/18 14:13	3/22/2018	3/27/2018	18-03104	Nickel-63	ASTM 3500-Ni Modified	2.45E+01	1.30E+00	1.94E+00	1.47E+00		pCi/g
18-03104-06	TRG	B101110FIWC004CV	03/15/18 08:15	3/22/2018	3/27/2018	18-03104	Nickel-63	ASTM 3500-Ni Modified	1.76E+00	9.05E-01	9.11E-01	1.48E+00		pCi/g
18-03104-07	TRG	B101110FIFC005CV	03/15/18 09:30	3/22/2018	3/27/2018	18-03104	Nickel-63	ASTM 3500-Ni Modified	5.11E-01	1.05E+00	1.05E+00	1.78E+00	U	pCi/g
18-03104-08	TRG	B101110FIFC006CV	03/15/18 09:50	3/22/2018	3/27/2018	18-03104	Nickel-63	ASTM 3500-Ni Modified	1.19E+00	7.31E-01	7.34E-01	1.21E+00	U	pCi/g
18-03104-09	TRG	B101110FIFC008CV	03/14/18 14:40	3/22/2018	3/27/2018	18-03104	Nickel-63	ASTM 3500-Ni Modified	6.08E-01	1.25E+00	1.25E+00	2.12E+00	U	pCi/g
18-03104-10	TRG	B101110FIWC010CV	03/14/18 13:56	3/22/2018	3/27/2018	18-03104	Nickel-63	ASTM 3500-Ni Modified	7.01E-01	1.13E+00	1.13E+00	1.90E+00	U	pCi/g
18-03104-11	TRG	B101110FIWC011CV	03/14/18 13:29	3/22/2018	3/27/2018	18-03104	Nickel-63	ASTM 3500-Ni Modified	3.98E+00	1.00E+00	1.03E+00	1.57E+00		pCi/g
18-03104-12	TRG	B101110FIWC018CV	03/14/18 09:48	3/22/2018	3/28/2018	18-03104	Nickel-63	ASTM 3500-Ni Modified	2.86E+00	1.16E+00	1.18E+00	1.89E+00		pCi/g
18-03104-13	TRG	B101110FIWC019CV	03/14/18 10:30	3/22/2018	3/28/2018	18-03104	Nickel-63	ASTM 3500-Ni Modified	4.10E+01	2.12E+00	3.21E+00	2.38E+00		pCi/g

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



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			J Alex Bohacheff						SDG:	18-03104				
			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
18-03104-01	LCS	KNOWN	03/22/18 00:00	3/22/2018	3/30/2018	18-03104	Strontium-90	EiChroM SRW01 Modified	5.01E+01	2.81E-01				pCi/g
18-03104-01	LCS	SPIKE	03/22/18 00:00	3/22/2018	3/30/2018	18-03104	Strontium-90	EiChroM SRW01 Modified	4.49E+01	2.68E+00	6.67E+00	1.11E+00		pCi/g
18-03104-02	MBL	BLANK	03/22/18 00:00	3/22/2018	3/30/2018	18-03104	Strontium-90	EiChroM SRW01 Modified	2.34E-01	3.55E-01	3.56E-01	7.33E-01	U	pCi/g
18-03104-03	DUP	B101110FIWC001CV	03/15/18 08:35	3/22/2018	3/30/2018	18-03104	Strontium-90	EiChroM SRW01 Modified	1.29E-01	2.75E-01	2.75E-01	5.73E-01	U	pCi/g
18-03104-04	DO	B101110FIWC001CV	03/15/18 08:35	3/22/2018	3/30/2018	18-03104	Strontium-90	EiChroM SRW01 Modified	4.02E-01	2.84E-01	2.89E-01	5.62E-01	U	pCi/g
18-03104-05	TRG	B101110FIWC003CV	03/14/18 14:13	3/22/2018	3/30/2018	18-03104	Strontium-90	EiChroM SRW01 Modified	7.87E-02	2.73E-01	2.73E-01	5.75E-01	U	pCi/g
18-03104-06	TRG	B101110FIWC004CV	03/15/18 08:15	3/22/2018	3/30/2018	18-03104	Strontium-90	EiChroM SRW01 Modified	3.23E-01	2.76E-01	2.79E-01	5.53E-01	U	pCi/g
18-03104-07	TRG	B101110FIFC005CV	03/15/18 09:30	3/22/2018	3/30/2018	18-03104	Strontium-90	EiChroM SRW01 Modified	5.85E-02	2.89E-01	2.89E-01	6.12E-01	U	pCi/g
18-03104-08	TRG	B101110FIFC006CV	03/15/18 09:50	3/22/2018	3/30/2018	18-03104	Strontium-90	EiChroM SRW01 Modified	2.17E-01	2.26E-01	2.28E-01	4.59E-01	U	pCi/g
18-03104-09	TRG	B101110FIFC008CV	03/14/18 14:40	3/22/2018	3/30/2018	18-03104	Strontium-90	EiChroM SRW01 Modified	2.86E-01	3.13E-01	3.15E-01	6.37E-01	U	pCi/g
18-03104-10	TRG	B101110FIWC010CV	03/14/18 13:56	3/22/2018	3/30/2018	18-03104	Strontium-90	EiChroM SRW01 Modified	3.44E-01	3.26E-01	3.29E-01	6.59E-01	U	pCi/g
18-03104-11	TRG	B101110FIWC011CV	03/14/18 13:29	3/22/2018	3/30/2018	18-03104	Strontium-90	EiChroM SRW01 Modified	2.98E-01	2.91E-01	2.93E-01	5.88E-01	U	pCi/g
18-03104-12	TRG	B101110FIWC018CV	03/14/18 09:48	3/22/2018	3/30/2018	18-03104	Strontium-90	EiChroM SRW01 Modified	2.08E-01	3.13E-01	3.14E-01	6.46E-01	U	pCi/g
18-03104-13	TRG	B101110FIWC019CV	03/14/18 10:30	3/22/2018	3/30/2018	18-03104	Strontium-90	EiChroM SRW01 Modified	9.11E-01	3.73E-01	3.93E-01	6.93E-01		pCi/g
18-03104-01	LCS	KNOWN	03/22/18 00:00	3/22/2018	3/22/2018	18-03104	Cobalt-60	EPA 901.1 Modified	2.71E+02	1.06E+01				pCi/g
18-03104-01	LCS	KNOWN	03/22/18 00:00	3/22/2018	3/22/2018	18-03104	Cesium-137	EPA 901.1 Modified	1.69E+02	6.75E+00				pCi/g
18-03104-01	LCS	SPIKE	03/22/18 00:00	3/22/2018	3/22/2018	18-03104	Cobalt-60	EPA 901.1 Modified	2.72E+02	2.26E+01	2.66E+01	7.87E+00		pCi/g
18-03104-01	LCS	SPIKE	03/22/18 00:00	3/22/2018	3/22/2018	18-03104	Cesium-137	EPA 901.1 Modified	1.94E+02	1.99E+01	2.22E+01	4.94E+00		pCi/g

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



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			J Alex Bohacheff Zion Solutions, LLC 101 Shiloh Blvd Zion, IL 60099						SDG:		18-03104				
									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	
18-03104-02	MBL	BLANK	03/22/18 00:00	3/22/2018	3/22/2018	18-03104	Actinium-228	EPA 901.1 Modified	6.84E-02	8.54E-02	8.55E-02	1.62E-01	U	pCi/g	
18-03104-02	MBL	BLANK	03/22/18 00:00	3/22/2018	3/22/2018	18-03104	Silver-108m	EPA 901.1 Modified	-1.02E-02	2.85E-02	2.85E-02	3.51E-02	U	pCi/g	
18-03104-02	MBL	BLANK	03/22/18 00:00	3/22/2018	3/22/2018	18-03104	Americium-241	EPA 901.1 Modified	2.40E-02	1.70E-02	1.70E-02	6.65E-02	U	pCi/g	
18-03104-02	MBL	BLANK	03/22/18 00:00	3/22/2018	3/22/2018	18-03104	Barium-133	EPA 901.1 Modified	2.84E-03	3.80E-02	3.80E-02	4.42E-02	U	pCi/g	
18-03104-02	MBL	BLANK	03/22/18 00:00	3/22/2018	3/22/2018	18-03104	Bismuth-214	EPA 901.1 Modified	3.18E-02	6.21E-02	6.22E-02	9.56E-02	U	pCi/g	
18-03104-02	MBL	BLANK	03/22/18 00:00	3/22/2018	3/22/2018	18-03104	Cobalt-60	EPA 901.1 Modified	8.26E-03	1.77E-02	1.77E-02	4.02E-02	U	pCi/g	
18-03104-02	MBL	BLANK	03/22/18 00:00	3/22/2018	3/22/2018	18-03104	Cesium-134	EPA 901.1 Modified	-3.73E-02	3.96E-02	3.96E-02	4.46E-02	U	pCi/g	
18-03104-02	MBL	BLANK	03/22/18 00:00	3/22/2018	3/22/2018	18-03104	Cesium-137	EPA 901.1 Modified	1.89E-02	3.45E-02	3.45E-02	5.22E-02	U	pCi/g	
18-03104-02	MBL	BLANK	03/22/18 00:00	3/22/2018	3/22/2018	18-03104	Europium-152	EPA 901.1 Modified	-7.43E-02	9.58E-02	9.58E-02	7.18E-02	U	pCi/g	
18-03104-02	MBL	BLANK	03/22/18 00:00	3/22/2018	3/22/2018	18-03104	Europium-154	EPA 901.1 Modified	6.24E-03	7.83E-02	7.83E-02	3.61E-02	U	pCi/g	
18-03104-02	MBL	BLANK	03/22/18 00:00	3/22/2018	3/22/2018	18-03104	Europium-155	EPA 901.1 Modified	-5.42E-02	3.65E-02	3.66E-02	4.65E-02	U	pCi/g	
18-03104-02	MBL	BLANK	03/22/18 00:00	3/22/2018	3/22/2018	18-03104	Holmium-166m	EPA 901.1 Modified	-1.41E-02	5.67E-02	5.67E-02	2.69E-02	U	pCi/g	
18-03104-02	MBL	BLANK	03/22/18 00:00	3/22/2018	3/22/2018	18-03104	Iodine-129	EPA 901.1 Modified	4.17E-03	1.40E-02	1.40E-02	2.08E-02	U	pCi/g	
18-03104-02	MBL	BLANK	03/22/18 00:00	3/22/2018	3/22/2018	18-03104	Potassium-40	EPA 901.1 Modified	-7.89E-03	1.04E-01	1.04E-01	4.91E-01	U	pCi/g	
18-03104-02	MBL	BLANK	03/22/18 00:00	3/22/2018	3/22/2018	18-03104	Manganese-54	EPA 901.1 Modified	-5.94E-04	2.81E-02	2.81E-02	4.59E-02	U	pCi/g	
18-03104-02	MBL	BLANK	03/22/18 00:00	3/22/2018	3/22/2018	18-03104	Sodium-22	EPA 901.1 Modified	2.22E-03	2.78E-02	2.78E-02	4.72E-02	U	pCi/g	
18-03104-02	MBL	BLANK	03/22/18 00:00	3/22/2018	3/22/2018	18-03104	Niobium-94	EPA 901.1 Modified	-4.30E-03	2.95E-02	2.95E-02	4.25E-02	U	pCi/g	
18-03104-02	MBL	BLANK	03/22/18 00:00	3/22/2018	3/22/2018	18-03104	Lead-210	EPA 901.1 Modified	2.28E-01	2.38E-01	2.39E-01	3.77E-01	U	pCi/g	
18-03104-02	MBL	BLANK	03/22/18 00:00	3/22/2018	3/22/2018	18-03104	Lead-212	EPA 901.1 Modified	3.22E-02	3.45E-02	3.45E-02	5.47E-02	U	pCi/g	
18-03104-02	MBL	BLANK	03/22/18 00:00	3/22/2018	3/22/2018	18-03104	Lead-214	EPA 901.1 Modified	2.33E-02	4.87E-02	4.87E-02	7.80E-02	U	pCi/g	
18-03104-02	MBL	BLANK	03/22/18 00:00	3/22/2018	3/22/2018	18-03104	Promethium-145	EPA 901.1 Modified	-1.64E-02	2.38E-02	2.38E-02	3.33E-02	U	pCi/g	
18-03104-02	MBL	BLANK	03/22/18 00:00	3/22/2018	3/22/2018	18-03104	Radium-226	EPA 901.1 Modified	3.18E-02	6.21E-02	6.22E-02	9.56E-02	U	pCi/g	
18-03104-02	MBL	BLANK	03/22/18 00:00	3/22/2018	3/22/2018	18-03104	Antimony-125	EPA 901.1 Modified	8.40E-03	3.21E-02	3.21E-02	1.05E-01	U	pCi/g	
18-03104-02	MBL	BLANK	03/22/18 00:00	3/22/2018	3/22/2018	18-03104	Thorium-234	EPA 901.1 Modified	4.96E-01	2.82E-01	2.84E-01	4.64E-01	U	pCi/g	
18-03104-02	MBL	BLANK	03/22/18 00:00	3/22/2018	3/22/2018	18-03104	Thallium-208	EPA 901.1 Modified	5.24E-02	9.07E-02	9.08E-02	1.39E-01	U	pCi/g	
18-03104-02	MBL	BLANK	03/22/18 00:00	3/22/2018	3/22/2018	18-03104	Uranium-235	EPA 901.1 Modified	-1.54E-02	2.60E-01	2.60E-01	1.46E-01	U	pCi/g	

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



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EBERLINE ANALYTICAL 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:	18-03104				
			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
18-03104-03	DUP	B101110FIWC001CV	03/15/18 08:35	3/22/2018	3/22/2018	18-03104	Actinium-228	EPA 901.1 Modified	1.53E-01	8.79E-01	8.79E-01	1.28E+00	U	pCi/g
18-03104-03	DUP	B101110FIWC001CV	03/15/18 08:35	3/22/2018	3/22/2018	18-03104	Silver-108m	EPA 901.1 Modified	8.84E-01	2.85E-01	2.88E-01	2.52E-01	U	pCi/g
18-03104-03	DUP	B101110FIWC001CV	03/15/18 08:35	3/22/2018	3/22/2018	18-03104	Americium-241	EPA 901.1 Modified	-1.98E-01	3.01E-01	3.01E-01	3.69E-01	U	pCi/g
18-03104-03	DUP	B101110FIWC001CV	03/15/18 08:35	3/22/2018	3/22/2018	18-03104	Barium-133	EPA 901.1 Modified	3.55E-02	1.83E-01	1.83E-01	3.49E-01	U	pCi/g
18-03104-03	DUP	B101110FIWC001CV	03/15/18 08:35	3/22/2018	3/22/2018	18-03104	Bismuth-214	EPA 901.1 Modified	1.08E+00	3.67E-01	3.71E-01	5.89E-01		pCi/g
18-03104-03	DUP	B101110FIWC001CV	03/15/18 08:35	3/22/2018	3/22/2018	18-03104	Cobalt-60	EPA 901.1 Modified	7.53E+00	5.29E-01	6.55E-01	3.07E-01		pCi/g
18-03104-03	DUP	B101110FIWC001CV	03/15/18 08:35	3/22/2018	3/22/2018	18-03104	Cesium-134	EPA 901.1 Modified	-3.53E-01	2.23E-01	2.23E-01	2.99E-01	U	pCi/g
18-03104-03	DUP	B101110FIWC001CV	03/15/18 08:35	3/22/2018	3/22/2018	18-03104	Cesium-137	EPA 901.1 Modified	8.07E-01	2.91E-01	2.94E-01	4.51E-01		pCi/g
18-03104-03	DUP	B101110FIWC001CV	03/15/18 08:35	3/22/2018	3/22/2018	18-03104	Europium-152	EPA 901.1 Modified	8.91E+01	3.69E+00	5.88E+00	1.56E+00		pCi/g
18-03104-03	DUP	B101110FIWC001CV	03/15/18 08:35	3/22/2018	3/22/2018	18-03104	Europium-154	EPA 901.1 Modified	4.05E+00	6.34E-01	6.67E-01	1.07E+00	U	pCi/g
18-03104-03	DUP	B101110FIWC001CV	03/15/18 08:35	3/22/2018	3/22/2018	18-03104	Europium-155	EPA 901.1 Modified	8.73E-01	3.69E-01	3.72E-01	5.88E-01	U	pCi/g
18-03104-03	DUP	B101110FIWC001CV	03/15/18 08:35	3/22/2018	3/22/2018	18-03104	Holmium-166m	EPA 901.1 Modified	1.21E-01	3.92E-01	3.92E-01	2.21E-01	U	pCi/g
18-03104-03	DUP	B101110FIWC001CV	03/15/18 08:35	3/22/2018	3/22/2018	18-03104	Iodine-129	EPA 901.1 Modified	1.22E+00	2.98E-01	3.04E-01	1.32E+00	U	pCi/g
18-03104-03	DUP	B101110FIWC001CV	03/15/18 08:35	3/22/2018	3/22/2018	18-03104	Potassium-40	EPA 901.1 Modified	7.43E+00	1.88E+00	1.92E+00	2.48E+00		pCi/g
18-03104-03	DUP	B101110FIWC001CV	03/15/18 08:35	3/22/2018	3/22/2018	18-03104	Manganese-54	EPA 901.1 Modified	2.01E-01	2.31E-01	2.32E-01	3.43E-01	U	pCi/g
18-03104-03	DUP	B101110FIWC001CV	03/15/18 08:35	3/22/2018	3/22/2018	18-03104	Sodium-22	EPA 901.1 Modified	1.32E+00	2.57E-01	2.66E-01	3.34E-01		pCi/g
18-03104-03	DUP	B101110FIWC001CV	03/15/18 08:35	3/22/2018	3/22/2018	18-03104	Niobium-94	EPA 901.1 Modified	-2.43E-01	3.52E-01	3.53E-01	3.00E-01	U	pCi/g
18-03104-03	DUP	B101110FIWC001CV	03/15/18 08:35	3/22/2018	3/22/2018	18-03104	Lead-210	EPA 901.1 Modified	1.71E+02	1.47E+01	1.71E+01	9.48E+00	U	pCi/g
18-03104-03	DUP	B101110FIWC001CV	03/15/18 08:35	3/22/2018	3/22/2018	18-03104	Lead-212	EPA 901.1 Modified	5.19E-01	2.51E-01	2.52E-01	1.01E+00	U	pCi/g
18-03104-03	DUP	B101110FIWC001CV	03/15/18 08:35	3/22/2018	3/22/2018	18-03104	Lead-214	EPA 901.1 Modified	9.04E-01	4.70E-01	4.72E-01	6.72E-01	U	pCi/g
18-03104-03	DUP	B101110FIWC001CV	03/15/18 08:35	3/22/2018	3/22/2018	18-03104	Promethium-145	EPA 901.1 Modified	1.12E+01	1.51E+00	1.61E+00	1.59E+00	U	pCi/g
18-03104-03	DUP	B101110FIWC001CV	03/15/18 08:35	3/22/2018	3/22/2018	18-03104	Radium-226	EPA 901.1 Modified	1.08E+00	3.67E-01	3.71E-01	5.89E-01		pCi/g
18-03104-03	DUP	B101110FIWC001CV	03/15/18 08:35	3/22/2018	3/22/2018	18-03104	Antimony-125	EPA 901.1 Modified	-1.49E-01	5.26E-01	5.27E-01	7.57E-01	U	pCi/g
18-03104-03	DUP	B101110FIWC001CV	03/15/18 08:35	3/22/2018	3/22/2018	18-03104	Thorium-234	EPA 901.1 Modified	1.41E+00	2.86E+00	2.86E+00	3.66E+00	U	pCi/g
18-03104-03	DUP	B101110FIWC001CV	03/15/18 08:35	3/22/2018	3/22/2018	18-03104	Thallium-208	EPA 901.1 Modified	1.52E-01	6.82E-01	6.82E-01	5.33E-01	U	pCi/g
18-03104-03	DUP	B101110FIWC001CV	03/15/18 08:35	3/22/2018	3/22/2018	18-03104	Uranium-235	EPA 901.1 Modified	-1.11E+00	2.09E+00	2.09E+00	1.29E+00	U	pCi/g

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



EBERLINE ANALYTICAL CORPORATION

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

[210]

Eberline Analytical Final Report of Analysis			Report To:						Work Order Details:					
			J Alex Bohacheff						SDG:	18-03104				
			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
18-03104-04	DO	B101110FIWC001CV	03/15/18 08:35	3/22/2018	3/22/2018	18-03104	Actinium-228	EPA 901.1 Modified	-7.68E-02	4.62E-01	4.62E-01	1.28E+00	U	pCi/g
18-03104-04	DO	B101110FIWC001CV	03/15/18 08:35	3/22/2018	3/22/2018	18-03104	Silver-108m	EPA 901.1 Modified	5.06E-01	2.79E-01	2.80E-01	2.49E-01	U	pCi/g
18-03104-04	DO	B101110FIWC001CV	03/15/18 08:35	3/22/2018	3/22/2018	18-03104	Americium-241	EPA 901.1 Modified	-2.54E-01	3.01E-01	3.01E-01	3.69E-01	U	pCi/g
18-03104-04	DO	B101110FIWC001CV	03/15/18 08:35	3/22/2018	3/22/2018	18-03104	Barium-133	EPA 901.1 Modified	1.21E-01	1.80E-01	1.80E-01	3.43E-01	U	pCi/g
18-03104-04	DO	B101110FIWC001CV	03/15/18 08:35	3/22/2018	3/22/2018	18-03104	Bismuth-214	EPA 901.1 Modified	8.40E-01	4.71E-01	4.73E-01	7.58E-01		pCi/g
18-03104-04	DO	B101110FIWC001CV	03/15/18 08:35	3/22/2018	3/22/2018	18-03104	Cobalt-60	EPA 901.1 Modified	7.28E+00	5.04E-01	6.27E-01	3.36E-01		pCi/g
18-03104-04	DO	B101110FIWC001CV	03/15/18 08:35	3/22/2018	3/22/2018	18-03104	Cesium-134	EPA 901.1 Modified	-1.30E-01	2.17E-01	2.17E-01	3.04E-01	U	pCi/g
18-03104-04	DO	B101110FIWC001CV	03/15/18 08:35	3/22/2018	3/22/2018	18-03104	Cesium-137	EPA 901.1 Modified	1.30E+00	4.00E-01	4.05E-01	6.10E-01		pCi/g
18-03104-04	DO	B101110FIWC001CV	03/15/18 08:35	3/22/2018	3/22/2018	18-03104	Europium-152	EPA 901.1 Modified	9.10E+01	3.75E+00	5.99E+00	1.36E+00		pCi/g
18-03104-04	DO	B101110FIWC001CV	03/15/18 08:35	3/22/2018	3/22/2018	18-03104	Europium-154	EPA 901.1 Modified	3.56E+00	6.24E-01	6.50E-01	1.06E+00	U	pCi/g
18-03104-04	DO	B101110FIWC001CV	03/15/18 08:35	3/22/2018	3/22/2018	18-03104	Europium-155	EPA 901.1 Modified	1.23E+00	3.77E-01	3.83E-01	5.97E-01	U	pCi/g
18-03104-04	DO	B101110FIWC001CV	03/15/18 08:35	3/22/2018	3/22/2018	18-03104	Holmium-166m	EPA 901.1 Modified	-1.67E-02	4.10E-01	4.10E-01	2.20E-01	U	pCi/g
18-03104-04	DO	B101110FIWC001CV	03/15/18 08:35	3/22/2018	3/22/2018	18-03104	Iodine-129	EPA 901.1 Modified	1.32E+00	3.38E-01	3.45E-01	1.31E+00		pCi/g
18-03104-04	DO	B101110FIWC001CV	03/15/18 08:35	3/22/2018	3/22/2018	18-03104	Potassium-40	EPA 901.1 Modified	6.16E+00	1.72E+00	1.74E+00	5.15E+00		pCi/g
18-03104-04	DO	B101110FIWC001CV	03/15/18 08:35	3/22/2018	3/22/2018	18-03104	Manganese-54	EPA 901.1 Modified	1.43E-01	2.32E-01	2.32E-01	3.43E-01	U	pCi/g
18-03104-04	DO	B101110FIWC001CV	03/15/18 08:35	3/22/2018	3/22/2018	18-03104	Sodium-22	EPA 901.1 Modified	1.44E+00	2.78E-01	2.88E-01	3.65E-01		pCi/g
18-03104-04	DO	B101110FIWC001CV	03/15/18 08:35	3/22/2018	3/22/2018	18-03104	Niobium-94	EPA 901.1 Modified	-1.03E-03	3.44E-01	3.44E-01	3.01E-01	U	pCi/g
18-03104-04	DO	B101110FIWC001CV	03/15/18 08:35	3/22/2018	3/22/2018	18-03104	Lead-210	EPA 901.1 Modified	1.72E+02	1.47E+01	1.71E+01	9.51E+00	U	pCi/g
18-03104-04	DO	B101110FIWC001CV	03/15/18 08:35	3/22/2018	3/22/2018	18-03104	Lead-212	EPA 901.1 Modified	6.10E-01	2.49E-01	2.51E-01	1.07E+00	U	pCi/g
18-03104-04	DO	B101110FIWC001CV	03/15/18 08:35	3/22/2018	3/22/2018	18-03104	Lead-214	EPA 901.1 Modified	8.02E-01	4.67E-01	4.69E-01	6.69E-01	U	pCi/g
18-03104-04	DO	B101110FIWC001CV	03/15/18 08:35	3/22/2018	3/22/2018	18-03104	Promethium-145	EPA 901.1 Modified	1.27E+01	1.59E+00	1.72E+00	1.60E+00	U	pCi/g
18-03104-04	DO	B101110FIWC001CV	03/15/18 08:35	3/22/2018	3/22/2018	18-03104	Radium-226	EPA 901.1 Modified	8.40E-01	4.71E-01	4.73E-01	7.58E-01		pCi/g
18-03104-04	DO	B101110FIWC001CV	03/15/18 08:35	3/22/2018	3/22/2018	18-03104	Antimony-125	EPA 901.1 Modified	-1.04E-01	5.23E-01	5.23E-01	7.55E-01	U	pCi/g
18-03104-04	DO	B101110FIWC001CV	03/15/18 08:35	3/22/2018	3/22/2018	18-03104	Thorium-234	EPA 901.1 Modified	2.80E+00	2.84E+00	2.84E+00	3.67E+00	U	pCi/g
18-03104-04	DO	B101110FIWC001CV	03/15/18 08:35	3/22/2018	3/22/2018	18-03104	Thallium-208	EPA 901.1 Modified	4.17E-01	7.01E-01	7.01E-01	5.95E-01	U	pCi/g
18-03104-04	DO	B101110FIWC001CV	03/15/18 08:35	3/22/2018	3/22/2018	18-03104	Uranium-235	EPA 901.1 Modified	-7.17E-01	2.08E+00	2.08E+00	1.30E+00	U	pCi/g

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



EBERLINE ANALYTICAL CORPORATION

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

[211]

Eberline Analytical Final Report of Analysis			Report To:						Work Order Details:						
			J Alex Bohacheff Zion Solutions, LLC 101 Shiloh Blvd Zion, IL 60099						SDG:		18-03104				
									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	
18-03104-05	TRG	B101110FIWC003CV	03/14/18 14:13	3/22/2018	3/22/2018	18-03104	Actinium-228	EPA 901.1 Modified	-7.27E-01	1.91E+00	1.91E+00	2.79E+00	U	pCi/g	
18-03104-05	TRG	B101110FIWC003CV	03/14/18 14:13	3/22/2018	3/22/2018	18-03104	Silver-108m	EPA 901.1 Modified	9.24E-01	5.79E-01	5.81E-01	8.21E-01	U	pCi/g	
18-03104-05	TRG	B101110FIWC003CV	03/14/18 14:13	3/22/2018	3/22/2018	18-03104	Americium-241	EPA 901.1 Modified	-2.49E+00	5.14E-01	5.29E-01	9.01E-01	U	pCi/g	
18-03104-05	TRG	B101110FIWC003CV	03/14/18 14:13	3/22/2018	3/22/2018	18-03104	Barium-133	EPA 901.1 Modified	-8.65E-01	1.90E+01	1.90E+01	1.11E+00	U	pCi/g	
18-03104-05	TRG	B101110FIWC003CV	03/14/18 14:13	3/22/2018	3/22/2018	18-03104	Bismuth-214	EPA 901.1 Modified	1.51E+00	1.05E+00	1.06E+00	1.23E+00	U	pCi/g	
18-03104-05	TRG	B101110FIWC003CV	03/14/18 14:13	3/22/2018	3/22/2018	18-03104	Cobalt-60	EPA 901.1 Modified	1.24E+01	1.22E+00	1.37E+00	1.25E+00	U	pCi/g	
18-03104-05	TRG	B101110FIWC003CV	03/14/18 14:13	3/22/2018	3/22/2018	18-03104	Cesium-134	EPA 901.1 Modified	2.81E-01	4.45E-01	4.46E-01	7.60E-01	U	pCi/g	
18-03104-05	TRG	B101110FIWC003CV	03/14/18 14:13	3/22/2018	3/22/2018	18-03104	Cesium-137	EPA 901.1 Modified	5.15E+01	5.36E+00	5.98E+00	2.29E+00	U	pCi/g	
18-03104-05	TRG	B101110FIWC003CV	03/14/18 14:13	3/22/2018	3/22/2018	18-03104	Europium-152	EPA 901.1 Modified	1.29E+02	1.51E+01	1.65E+01	3.28E+00		pCi/g	
18-03104-05	TRG	B101110FIWC003CV	03/14/18 14:13	3/22/2018	3/22/2018	18-03104	Europium-154	EPA 901.1 Modified	5.86E+00	4.52E+00	4.53E+00	1.66E+00		pCi/g	
18-03104-05	TRG	B101110FIWC003CV	03/14/18 14:13	3/22/2018	3/22/2018	18-03104	Europium-155	EPA 901.1 Modified	1.91E+00	7.83E-01	7.89E-01	1.25E+00		pCi/g	
18-03104-05	TRG	B101110FIWC003CV	03/14/18 14:13	3/22/2018	3/22/2018	18-03104	Holmium-166m	EPA 901.1 Modified	1.35E-01	4.32E-01	4.32E-01	7.17E-01	U	pCi/g	
18-03104-05	TRG	B101110FIWC003CV	03/14/18 14:13	3/22/2018	3/22/2018	18-03104	Iodine-129	EPA 901.1 Modified	1.42E+01	7.15E+00	7.19E+00	8.12E+00		pCi/g	
18-03104-05	TRG	B101110FIWC003CV	03/14/18 14:13	3/22/2018	3/22/2018	18-03104	Potassium-40	EPA 901.1 Modified	-1.13E+00	1.01E+00	1.02E+00	4.76E+00	U	pCi/g	
18-03104-05	TRG	B101110FIWC003CV	03/14/18 14:13	3/22/2018	3/22/2018	18-03104	Manganese-54	EPA 901.1 Modified	-4.61E-01	5.25E-01	5.25E-01	7.51E-01	U	pCi/g	
18-03104-05	TRG	B101110FIWC003CV	03/14/18 14:13	3/22/2018	3/22/2018	18-03104	Sodium-22	EPA 901.1 Modified	-1.16E-02	1.16E-01	1.16E-01	6.61E-01	U	pCi/g	
18-03104-05	TRG	B101110FIWC003CV	03/14/18 14:13	3/22/2018	3/22/2018	18-03104	Niobium-94	EPA 901.1 Modified	3.94E+00	9.50E-01	9.71E-01	6.88E-01	U	pCi/g	
18-03104-05	TRG	B101110FIWC003CV	03/14/18 14:13	3/22/2018	3/22/2018	18-03104	Lead-210	EPA 901.1 Modified	-3.00E+00	1.81E+00	1.82E+00	2.59E+01	U	pCi/g	
18-03104-05	TRG	B101110FIWC003CV	03/14/18 14:13	3/22/2018	3/22/2018	18-03104	Lead-212	EPA 901.1 Modified	1.56E-01	4.35E-01	4.35E-01	1.67E+00	U	pCi/g	
18-03104-05	TRG	B101110FIWC003CV	03/14/18 14:13	3/22/2018	3/22/2018	18-03104	Lead-214	EPA 901.1 Modified	7.39E+01	1.80E+01	1.84E+01	3.22E+00	U	pCi/g	
18-03104-05	TRG	B101110FIWC003CV	03/14/18 14:13	3/22/2018	3/22/2018	18-03104	Promethium-145	EPA 901.1 Modified	2.51E+02	4.26E+01	4.45E+01	4.92E+00	U	pCi/g	
18-03104-05	TRG	B101110FIWC003CV	03/14/18 14:13	3/22/2018	3/22/2018	18-03104	Radium-226	EPA 901.1 Modified	1.51E+00	1.05E+00	1.06E+00	1.23E+00	U	pCi/g	
18-03104-05	TRG	B101110FIWC003CV	03/14/18 14:13	3/22/2018	3/22/2018	18-03104	Antimony-125	EPA 901.1 Modified	-3.07E-01	1.80E+00	1.80E+00	2.61E+00	U	pCi/g	
18-03104-05	TRG	B101110FIWC003CV	03/14/18 14:13	3/22/2018	3/22/2018	18-03104	Thorium-234	EPA 901.1 Modified	-4.05E+01	6.29E+00	6.63E+00	8.31E+00	U	pCi/g	
18-03104-05	TRG	B101110FIWC003CV	03/14/18 14:13	3/22/2018	3/22/2018	18-03104	Thallium-208	EPA 901.1 Modified	7.96E-01	1.54E+00	1.54E+00	2.17E-01	U	pCi/g	
18-03104-05	TRG	B101110FIWC003CV	03/14/18 14:13	3/22/2018	3/22/2018	18-03104	Uranium-235	EPA 901.1 Modified	-8.58E+00	8.06E+00	8.07E+00	4.08E+00	U	pCi/g	

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



EBERLINE ANALYTICAL CORPORATION

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

[212]

Eberline Analytical Final Report of Analysis			Report To:						Work Order Details:						
			J Alex Bohacheff						SDG:	18-03104					
			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	
18-03104-06	TRG	B101110FIWC004CV	03/15/18 08:15	3/22/2018	3/22/2018	18-03104	Actinium-228	EPA 901.1 Modified	5.08E-01	8.25E-01	8.25E-01	1.23E+00	U	pCi/g	
18-03104-06	TRG	B101110FIWC004CV	03/15/18 08:15	3/22/2018	3/22/2018	18-03104	Silver-108m	EPA 901.1 Modified	8.97E-01	2.86E-01	2.90E-01	2.96E-01	U	pCi/g	
18-03104-06	TRG	B101110FIWC004CV	03/15/18 08:15	3/22/2018	3/22/2018	18-03104	Americium-241	EPA 901.1 Modified	-3.06E-01	3.52E-01	3.53E-01	4.32E-01	U	pCi/g	
18-03104-06	TRG	B101110FIWC004CV	03/15/18 08:15	3/22/2018	3/22/2018	18-03104	Barium-133	EPA 901.1 Modified	7.51E-02	2.46E-01	2.46E-01	3.75E-01	U	pCi/g	
18-03104-06	TRG	B101110FIWC004CV	03/15/18 08:15	3/22/2018	3/22/2018	18-03104	Bismuth-214	EPA 901.1 Modified	6.54E-01	3.26E-01	3.28E-01	7.14E-01	U	pCi/g	
18-03104-06	TRG	B101110FIWC004CV	03/15/18 08:15	3/22/2018	3/22/2018	18-03104	Cobalt-60	EPA 901.1 Modified	4.24E+00	3.29E-01	3.94E-01	2.68E-01		pCi/g	
18-03104-06	TRG	B101110FIWC004CV	03/15/18 08:15	3/22/2018	3/22/2018	18-03104	Cesium-134	EPA 901.1 Modified	-4.97E-02	8.94E-02	8.95E-02	2.71E-01	U	pCi/g	
18-03104-06	TRG	B101110FIWC004CV	03/15/18 08:15	3/22/2018	3/22/2018	18-03104	Cesium-137	EPA 901.1 Modified	4.65E+01	4.55E+00	5.14E+00	6.60E-01		pCi/g	
18-03104-06	TRG	B101110FIWC004CV	03/15/18 08:15	3/22/2018	3/22/2018	18-03104	Europium-152	EPA 901.1 Modified	9.29E+01	3.67E+00	6.02E+00	1.14E+00		pCi/g	
18-03104-06	TRG	B101110FIWC004CV	03/15/18 08:15	3/22/2018	3/22/2018	18-03104	Europium-154	EPA 901.1 Modified	4.21E+00	5.24E-01	5.66E-01	5.75E-01		pCi/g	
18-03104-06	TRG	B101110FIWC004CV	03/15/18 08:15	3/22/2018	3/22/2018	18-03104	Europium-155	EPA 901.1 Modified	1.33E+00	7.45E-01	7.48E-01	8.73E-01		pCi/g	
18-03104-06	TRG	B101110FIWC004CV	03/15/18 08:15	3/22/2018	3/22/2018	18-03104	Holmium-166m	EPA 901.1 Modified	4.82E-01	3.94E-01	3.94E-01	2.54E-01	U	pCi/g	
18-03104-06	TRG	B101110FIWC004CV	03/15/18 08:15	3/22/2018	3/22/2018	18-03104	Iodine-129	EPA 901.1 Modified	-3.19E+00	4.93E-01	5.20E-01	3.88E-01	U	pCi/g	
18-03104-06	TRG	B101110FIWC004CV	03/15/18 08:15	3/22/2018	3/22/2018	18-03104	Potassium-40	EPA 901.1 Modified	5.07E+00	1.48E+00	1.50E+00	2.60E+00	U	pCi/g	
18-03104-06	TRG	B101110FIWC004CV	03/15/18 08:15	3/22/2018	3/22/2018	18-03104	Manganese-54	EPA 901.1 Modified	-4.33E-02	2.37E-01	2.37E-01	3.40E-01	U	pCi/g	
18-03104-06	TRG	B101110FIWC004CV	03/15/18 08:15	3/22/2018	3/22/2018	18-03104	Sodium-22	EPA 901.1 Modified	1.45E+00	2.30E-01	2.41E-01	3.88E-01	U	pCi/g	
18-03104-06	TRG	B101110FIWC004CV	03/15/18 08:15	3/22/2018	3/22/2018	18-03104	Niobium-94	EPA 901.1 Modified	8.08E-01	3.57E-01	3.59E-01	3.24E-01	U	pCi/g	
18-03104-06	TRG	B101110FIWC004CV	03/15/18 08:15	3/22/2018	3/22/2018	18-03104	Lead-210	EPA 901.1 Modified	1.64E+02	1.46E+01	1.69E+01	8.59E+00		pCi/g	
18-03104-06	TRG	B101110FIWC004CV	03/15/18 08:15	3/22/2018	3/22/2018	18-03104	Lead-212	EPA 901.1 Modified	3.02E-01	3.48E-01	3.49E-01	4.50E-01	U	pCi/g	
18-03104-06	TRG	B101110FIWC004CV	03/15/18 08:15	3/22/2018	3/22/2018	18-03104	Lead-214	EPA 901.1 Modified	8.03E-01	4.01E-01	4.03E-01	7.14E-01		pCi/g	
18-03104-06	TRG	B101110FIWC004CV	03/15/18 08:15	3/22/2018	3/22/2018	18-03104	Promethium-145	EPA 901.1 Modified	-1.21E+00	1.38E+00	1.38E+00	7.65E-01	U	pCi/g	
18-03104-06	TRG	B101110FIWC004CV	03/15/18 08:15	3/22/2018	3/22/2018	18-03104	Radium-226	EPA 901.1 Modified	6.54E-01	3.26E-01	3.28E-01	7.14E-01	U	pCi/g	
18-03104-06	TRG	B101110FIWC004CV	03/15/18 08:15	3/22/2018	3/22/2018	18-03104	Antimony-125	EPA 901.1 Modified	2.48E-01	5.63E-01	5.63E-01	9.02E-01	U	pCi/g	
18-03104-06	TRG	B101110FIWC004CV	03/15/18 08:15	3/22/2018	3/22/2018	18-03104	Thorium-234	EPA 901.1 Modified	1.02E+00	3.32E+00	3.32E+00	4.23E+00	U	pCi/g	
18-03104-06	TRG	B101110FIWC004CV	03/15/18 08:15	3/22/2018	3/22/2018	18-03104	Thallium-208	EPA 901.1 Modified	2.17E-01	6.05E-01	6.05E-01	5.60E-01	U	pCi/g	
18-03104-06	TRG	B101110FIWC004CV	03/15/18 08:15	3/22/2018	3/22/2018	18-03104	Uranium-235	EPA 901.1 Modified	-1.56E+00	3.11E+00	3.11E+00	1.47E+00	U	pCi/g	

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EBERLINE ANALYTICAL CORPORATION

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

[213]

Eberline Analytical Final Report of Analysis			Report To:					Work Order Details:						
			J Alex Bohacheff					SDG:	18-03104					
			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
18-03104-07	TRG	B101110FIFC005CV	03/15/18 09:30	3/22/2018	3/22/2018	18-03104	Actinium-228	EPA 901.1 Modified	-4.50E-01	1.91E+00	1.91E+00	2.83E+00	U	pCi/g
18-03104-07	TRG	B101110FIFC005CV	03/15/18 09:30	3/22/2018	3/22/2018	18-03104	Silver-108m	EPA 901.1 Modified	-8.40E-02	1.85E-01	1.85E-01	6.66E-01	U	pCi/g
18-03104-07	TRG	B101110FIFC005CV	03/15/18 09:30	3/22/2018	3/22/2018	18-03104	Americium-241	EPA 901.1 Modified	-5.51E-01	4.08E-01	4.09E-01	8.45E-01	U	pCi/g
18-03104-07	TRG	B101110FIFC005CV	03/15/18 09:30	3/22/2018	3/22/2018	18-03104	Barium-133	EPA 901.1 Modified	-1.56E+00	1.26E+01	1.26E+01	9.54E-01	U	pCi/g
18-03104-07	TRG	B101110FIFC005CV	03/15/18 09:30	3/22/2018	3/22/2018	18-03104	Bismuth-214	EPA 901.1 Modified	-3.51E-01	1.00E+00	1.00E+00	1.30E+00	U	pCi/g
18-03104-07	TRG	B101110FIFC005CV	03/15/18 09:30	3/22/2018	3/22/2018	18-03104	Cobalt-60	EPA 901.1 Modified	6.48E-02	1.36E-01	1.36E-01	9.66E-01	U	pCi/g
18-03104-07	TRG	B101110FIFC005CV	03/15/18 09:30	3/22/2018	3/22/2018	18-03104	Cesium-134	EPA 901.1 Modified	3.51E-02	4.75E-01	4.75E-01	7.28E-01	U	pCi/g
18-03104-07	TRG	B101110FIFC005CV	03/15/18 09:30	3/22/2018	3/22/2018	18-03104	Cesium-137	EPA 901.1 Modified	1.29E-02	2.91E-01	2.91E-01	8.52E-01	U	pCi/g
18-03104-07	TRG	B101110FIFC005CV	03/15/18 09:30	3/22/2018	3/22/2018	18-03104	Europium-152	EPA 901.1 Modified	9.04E+01	9.51E+00	1.06E+01	2.37E+00		pCi/g
18-03104-07	TRG	B101110FIFC005CV	03/15/18 09:30	3/22/2018	3/22/2018	18-03104	Europium-154	EPA 901.1 Modified	6.14E-02	2.59E-01	2.59E-01	1.77E+00	U	pCi/g
18-03104-07	TRG	B101110FIFC005CV	03/15/18 09:30	3/22/2018	3/22/2018	18-03104	Europium-155	EPA 901.1 Modified	1.98E+00	6.01E-01	6.09E-01	1.64E+00		pCi/g
18-03104-07	TRG	B101110FIFC005CV	03/15/18 09:30	3/22/2018	3/22/2018	18-03104	Holmium-166m	EPA 901.1 Modified	-2.08E-01	8.83E-01	8.84E-01	6.33E-01	U	pCi/g
18-03104-07	TRG	B101110FIFC005CV	03/15/18 09:30	3/22/2018	3/22/2018	18-03104	Iodine-129	EPA 901.1 Modified	-2.48E+00	1.23E+00	1.24E+00	7.56E+00	U	pCi/g
18-03104-07	TRG	B101110FIFC005CV	03/15/18 09:30	3/22/2018	3/22/2018	18-03104	Potassium-40	EPA 901.1 Modified	7.40E+00	2.61E+00	2.64E+00	5.10E+00	U	pCi/g
18-03104-07	TRG	B101110FIFC005CV	03/15/18 09:30	3/22/2018	3/22/2018	18-03104	Manganese-54	EPA 901.1 Modified	-3.47E-01	5.27E-01	5.28E-01	7.64E-01	U	pCi/g
18-03104-07	TRG	B101110FIFC005CV	03/15/18 09:30	3/22/2018	3/22/2018	18-03104	Sodium-22	EPA 901.1 Modified	2.19E-02	9.23E-02	9.23E-02	6.30E-01	U	pCi/g
18-03104-07	TRG	B101110FIFC005CV	03/15/18 09:30	3/22/2018	3/22/2018	18-03104	Niobium-94	EPA 901.1 Modified	2.22E+00	7.19E-01	7.28E-01	7.15E-01	U	pCi/g
18-03104-07	TRG	B101110FIFC005CV	03/15/18 09:30	3/22/2018	3/22/2018	18-03104	Lead-210	EPA 901.1 Modified	8.62E+02	8.63E+01	9.70E+01	2.72E+01	U	pCi/g
18-03104-07	TRG	B101110FIFC005CV	03/15/18 09:30	3/22/2018	3/22/2018	18-03104	Lead-212	EPA 901.1 Modified	1.01E+00	7.09E-01	7.11E-01	1.99E+00	U	pCi/g
18-03104-07	TRG	B101110FIFC005CV	03/15/18 09:30	3/22/2018	3/22/2018	18-03104	Lead-214	EPA 901.1 Modified	1.69E+00	9.74E-01	9.78E-01	2.86E+00	U	pCi/g
18-03104-07	TRG	B101110FIFC005CV	03/15/18 09:30	3/22/2018	3/22/2018	18-03104	Promethium-145	EPA 901.1 Modified	1.75E+02	2.97E+01	3.10E+01	5.12E+00	U	pCi/g
18-03104-07	TRG	B101110FIFC005CV	03/15/18 09:30	3/22/2018	3/22/2018	18-03104	Radium-226	EPA 901.1 Modified	-3.51E-01	1.00E+00	1.00E+00	1.30E+00	U	pCi/g
18-03104-07	TRG	B101110FIFC005CV	03/15/18 09:30	3/22/2018	3/22/2018	18-03104	Antimony-125	EPA 901.1 Modified	1.63E-02	1.38E+00	1.38E+00	2.02E+00	U	pCi/g
18-03104-07	TRG	B101110FIFC005CV	03/15/18 09:30	3/22/2018	3/22/2018	18-03104	Thorium-234	EPA 901.1 Modified	-1.25E+01	4.85E+00	4.89E+00	7.88E+00	U	pCi/g
18-03104-07	TRG	B101110FIFC005CV	03/15/18 09:30	3/22/2018	3/22/2018	18-03104	Thallium-208	EPA 901.1 Modified	3.56E-01	1.56E+00	1.56E+00	5.69E-01	U	pCi/g
18-03104-07	TRG	B101110FIFC005CV	03/15/18 09:30	3/22/2018	3/22/2018	18-03104	Uranium-235	EPA 901.1 Modified	-3.26E+00	6.96E+00	6.96E+00	3.72E+00	U	pCi/g

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



EBERLINE ANALYTICAL CORPORATION

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

[214]

Eberline Analytical Final Report of Analysis			Report To:					Work Order Details:						
			J Alex Bohacheff					SDG:	18-03104					
			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
18-03104-08	TRG	B101110FIFC006CV	03/15/18 09:50	3/22/2018	3/22/2018	18-03104	Actinium-228	EPA 901.1 Modified	-7.74E-02	7.90E-01	7.90E-01	1.15E+00	U	pCi/g
18-03104-08	TRG	B101110FIFC006CV	03/15/18 09:50	3/22/2018	3/22/2018	18-03104	Silver-108m	EPA 901.1 Modified	4.98E-01	2.50E-01	2.52E-01	1.99E-01	U	pCi/g
18-03104-08	TRG	B101110FIFC006CV	03/15/18 09:50	3/22/2018	3/22/2018	18-03104	Americium-241	EPA 901.1 Modified	1.71E-01	2.80E-01	2.80E-01	3.64E-01	U	pCi/g
18-03104-08	TRG	B101110FIFC006CV	03/15/18 09:50	3/22/2018	3/22/2018	18-03104	Barium-133	EPA 901.1 Modified	7.62E-02	1.34E-01	1.34E-01	2.65E-01	U	pCi/g
18-03104-08	TRG	B101110FIFC006CV	03/15/18 09:50	3/22/2018	3/22/2018	18-03104	Bismuth-214	EPA 901.1 Modified	6.37E-01	4.56E-01	4.57E-01	7.44E-01	U	pCi/g
18-03104-08	TRG	B101110FIFC006CV	03/15/18 09:50	3/22/2018	3/22/2018	18-03104	Cobalt-60	EPA 901.1 Modified	3.42E+00	2.78E-01	3.29E-01	2.79E-01		pCi/g
18-03104-08	TRG	B101110FIFC006CV	03/15/18 09:50	3/22/2018	3/22/2018	18-03104	Cesium-134	EPA 901.1 Modified	5.29E-02	1.03E-01	1.03E-01	2.39E-01	U	pCi/g
18-03104-08	TRG	B101110FIFC006CV	03/15/18 09:50	3/22/2018	3/22/2018	18-03104	Cesium-137	EPA 901.1 Modified	5.78E-01	2.60E-01	2.62E-01	4.13E-01		pCi/g
18-03104-08	TRG	B101110FIFC006CV	03/15/18 09:50	3/22/2018	3/22/2018	18-03104	Europium-152	EPA 901.1 Modified	7.61E+01	3.05E+00	4.95E+00	1.08E+00		pCi/g
18-03104-08	TRG	B101110FIFC006CV	03/15/18 09:50	3/22/2018	3/22/2018	18-03104	Europium-154	EPA 901.1 Modified	2.74E+00	4.76E-01	4.97E-01	5.45E-01		pCi/g
18-03104-08	TRG	B101110FIFC006CV	03/15/18 09:50	3/22/2018	3/22/2018	18-03104	Europium-155	EPA 901.1 Modified	1.15E+00	4.42E-01	4.46E-01	7.10E-01		pCi/g
18-03104-08	TRG	B101110FIFC006CV	03/15/18 09:50	3/22/2018	3/22/2018	18-03104	Holmium-166m	EPA 901.1 Modified	5.50E-02	3.75E-01	3.75E-01	2.05E-01	U	pCi/g
18-03104-08	TRG	B101110FIFC006CV	03/15/18 09:50	3/22/2018	3/22/2018	18-03104	Iodine-129	EPA 901.1 Modified	1.37E+00	2.39E-01	2.50E-01	3.39E-01	U	pCi/g
18-03104-08	TRG	B101110FIFC006CV	03/15/18 09:50	3/22/2018	3/22/2018	18-03104	Potassium-40	EPA 901.1 Modified	5.56E+00	1.42E+00	1.44E+00	2.94E+00		pCi/g
18-03104-08	TRG	B101110FIFC006CV	03/15/18 09:50	3/22/2018	3/22/2018	18-03104	Manganese-54	EPA 901.1 Modified	4.95E-02	1.92E-01	1.92E-01	3.18E-01	U	pCi/g
18-03104-08	TRG	B101110FIFC006CV	03/15/18 09:50	3/22/2018	3/22/2018	18-03104	Sodium-22	EPA 901.1 Modified	9.10E-01	2.08E-01	2.13E-01	2.72E-01	U	pCi/g
18-03104-08	TRG	B101110FIFC006CV	03/15/18 09:50	3/22/2018	3/22/2018	18-03104	Niobium-94	EPA 901.1 Modified	7.79E-01	3.33E-01	3.35E-01	2.87E-01	U	pCi/g
18-03104-08	TRG	B101110FIFC006CV	03/15/18 09:50	3/22/2018	3/22/2018	18-03104	Lead-210	EPA 901.1 Modified	1.55E+02	1.36E+01	1.58E+01	6.95E+00		pCi/g
18-03104-08	TRG	B101110FIFC006CV	03/15/18 09:50	3/22/2018	3/22/2018	18-03104	Lead-212	EPA 901.1 Modified	4.18E-01	2.20E-01	2.21E-01	8.41E-01	U	pCi/g
18-03104-08	TRG	B101110FIFC006CV	03/15/18 09:50	3/22/2018	3/22/2018	18-03104	Lead-214	EPA 901.1 Modified	7.98E-01	3.32E-01	3.35E-01	5.88E-01		pCi/g
18-03104-08	TRG	B101110FIFC006CV	03/15/18 09:50	3/22/2018	3/22/2018	18-03104	Promethium-145	EPA 901.1 Modified	2.15E+00	1.35E+00	1.36E+00	2.56E+00	U	pCi/g
18-03104-08	TRG	B101110FIFC006CV	03/15/18 09:50	3/22/2018	3/22/2018	18-03104	Radium-226	EPA 901.1 Modified	6.37E-01	4.56E-01	4.57E-01	7.44E-01	U	pCi/g
18-03104-08	TRG	B101110FIFC006CV	03/15/18 09:50	3/22/2018	3/22/2018	18-03104	Antimony-125	EPA 901.1 Modified	7.95E-02	3.70E-01	3.70E-01	5.97E-01	U	pCi/g
18-03104-08	TRG	B101110FIFC006CV	03/15/18 09:50	3/22/2018	3/22/2018	18-03104	Thorium-234	EPA 901.1 Modified	-1.07E+00	2.83E+00	2.83E+00	3.54E+00	U	pCi/g
18-03104-08	TRG	B101110FIFC006CV	03/15/18 09:50	3/22/2018	3/22/2018	18-03104	Thallium-208	EPA 901.1 Modified	4.05E-01	2.71E-01	2.72E-01	5.23E-01	U	pCi/g
18-03104-08	TRG	B101110FIFC006CV	03/15/18 09:50	3/22/2018	3/22/2018	18-03104	Uranium-235	EPA 901.1 Modified	-8.63E-01	2.45E+00	2.45E+00	1.20E+00	U	pCi/g

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



EBERLINE ANALYTICAL CORPORATION

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

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Eberline Analytical Final Report of Analysis			Report To:						Work Order Details:						
			J Alex Bohacheff Zion Solutions, LLC 101 Shiloh Blvd Zion, IL 60099						SDG: 18-03104						
									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	
18-03104-09	TRG	B101110FIFC008CV	03/14/18 14:40	3/22/2018	3/22/2018	18-03104	Actinium-228	EPA 901.1 Modified	6.58E-01	1.08E+00	1.08E+00	1.59E+00	U	pCi/g	
18-03104-09	TRG	B101110FIFC008CV	03/14/18 14:40	3/22/2018	3/22/2018	18-03104	Silver-108m	EPA 901.1 Modified	7.19E-01	3.50E-01	3.52E-01	3.25E-01	U	pCi/g	
18-03104-09	TRG	B101110FIFC008CV	03/14/18 14:40	3/22/2018	3/22/2018	18-03104	Americium-241	EPA 901.1 Modified	-4.25E-01	3.95E-01	3.95E-01	4.79E-01	U	pCi/g	
18-03104-09	TRG	B101110FIFC008CV	03/14/18 14:40	3/22/2018	3/22/2018	18-03104	Barium-133	EPA 901.1 Modified	-7.95E-02	2.35E-01	2.35E-01	4.46E-01	U	pCi/g	
18-03104-09	TRG	B101110FIFC008CV	03/14/18 14:40	3/22/2018	3/22/2018	18-03104	Bismuth-214	EPA 901.1 Modified	8.01E-01	3.86E-01	3.88E-01	8.31E-01	U	pCi/g	
18-03104-09	TRG	B101110FIFC008CV	03/14/18 14:40	3/22/2018	3/22/2018	18-03104	Cobalt-60	EPA 901.1 Modified	7.72E+00	5.28E-01	6.60E-01	3.62E-01		pCi/g	
18-03104-09	TRG	B101110FIFC008CV	03/14/18 14:40	3/22/2018	3/22/2018	18-03104	Cesium-134	EPA 901.1 Modified	-1.01E-02	1.65E-01	1.65E-01	3.73E-01	U	pCi/g	
18-03104-09	TRG	B101110FIFC008CV	03/14/18 14:40	3/22/2018	3/22/2018	18-03104	Cesium-137	EPA 901.1 Modified	7.12E-01	2.94E-01	2.96E-01	4.60E-01		pCi/g	
18-03104-09	TRG	B101110FIFC008CV	03/14/18 14:40	3/22/2018	3/22/2018	18-03104	Europium-152	EPA 901.1 Modified	1.37E+02	5.60E+00	8.97E+00	1.82E+00		pCi/g	
18-03104-09	TRG	B101110FIFC008CV	03/14/18 14:40	3/22/2018	3/22/2018	18-03104	Europium-154	EPA 901.1 Modified	4.70E+00	7.70E-01	8.07E-01	1.29E+00	U	pCi/g	
18-03104-09	TRG	B101110FIFC008CV	03/14/18 14:40	3/22/2018	3/22/2018	18-03104	Europium-155	EPA 901.1 Modified	1.15E+00	4.95E-01	4.99E-01	7.80E-01	U	pCi/g	
18-03104-09	TRG	B101110FIFC008CV	03/14/18 14:40	3/22/2018	3/22/2018	18-03104	Holmium-166m	EPA 901.1 Modified	1.12E-01	5.21E-01	5.21E-01	2.85E-01	U	pCi/g	
18-03104-09	TRG	B101110FIFC008CV	03/14/18 14:40	3/22/2018	3/22/2018	18-03104	Iodine-129	EPA 901.1 Modified	1.94E+00	4.04E-01	4.16E-01	1.69E+00		pCi/g	
18-03104-09	TRG	B101110FIFC008CV	03/14/18 14:40	3/22/2018	3/22/2018	18-03104	Potassium-40	EPA 901.1 Modified	6.55E+00	1.97E+00	2.00E+00	3.44E+00		pCi/g	
18-03104-09	TRG	B101110FIFC008CV	03/14/18 14:40	3/22/2018	3/22/2018	18-03104	Manganese-54	EPA 901.1 Modified	1.29E-02	2.92E-01	2.92E-01	4.25E-01	U	pCi/g	
18-03104-09	TRG	B101110FIFC008CV	03/14/18 14:40	3/22/2018	3/22/2018	18-03104	Sodium-22	EPA 901.1 Modified	1.70E+00	3.46E-01	3.57E-01	4.69E-01		pCi/g	
18-03104-09	TRG	B101110FIFC008CV	03/14/18 14:40	3/22/2018	3/22/2018	18-03104	Niobium-94	EPA 901.1 Modified	-2.09E-01	4.60E-01	4.60E-01	3.90E-01	U	pCi/g	
18-03104-09	TRG	B101110FIFC008CV	03/14/18 14:40	3/22/2018	3/22/2018	18-03104	Lead-210	EPA 901.1 Modified	2.48E+02	2.10E+01	2.46E+01	1.24E+01	U	pCi/g	
18-03104-09	TRG	B101110FIFC008CV	03/14/18 14:40	3/22/2018	3/22/2018	18-03104	Lead-212	EPA 901.1 Modified	2.31E-01	2.15E-01	2.15E-01	4.90E-01	U	pCi/g	
18-03104-09	TRG	B101110FIFC008CV	03/14/18 14:40	3/22/2018	3/22/2018	18-03104	Lead-214	EPA 901.1 Modified	1.73E+00	6.30E-01	6.36E-01	8.74E-01	U	pCi/g	
18-03104-09	TRG	B101110FIFC008CV	03/14/18 14:40	3/22/2018	3/22/2018	18-03104	Promethium-145	EPA 901.1 Modified	1.73E+01	2.14E+00	2.32E+00	2.11E+00	U	pCi/g	
18-03104-09	TRG	B101110FIFC008CV	03/14/18 14:40	3/22/2018	3/22/2018	18-03104	Radium-226	EPA 901.1 Modified	8.01E-01	3.86E-01	3.88E-01	8.31E-01	U	pCi/g	
18-03104-09	TRG	B101110FIFC008CV	03/14/18 14:40	3/22/2018	3/22/2018	18-03104	Antimony-125	EPA 901.1 Modified	-8.64E-03	6.85E-01	6.85E-01	9.93E-01	U	pCi/g	
18-03104-09	TRG	B101110FIFC008CV	03/14/18 14:40	3/22/2018	3/22/2018	18-03104	Thorium-234	EPA 901.1 Modified	3.37E+00	3.75E+00	3.75E+00	4.81E+00	U	pCi/g	
18-03104-09	TRG	B101110FIFC008CV	03/14/18 14:40	3/22/2018	3/22/2018	18-03104	Thallium-208	EPA 901.1 Modified	-1.51E-01	3.59E-01	3.59E-01	6.93E-01	U	pCi/g	
18-03104-09	TRG	B101110FIFC008CV	03/14/18 14:40	3/22/2018	3/22/2018	18-03104	Uranium-235	EPA 901.1 Modified	3.59E-01	2.76E+00	2.76E+00	1.67E+00	U	pCi/g	

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



EBERLINE ANALYTICAL CORPORATION

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

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Eberline Analytical Final Report of Analysis			Report To:						Work Order Details:						
			J Alex Bohacheff Zion Solutions, LLC 101 Shiloh Blvd Zion, IL 60099						SDG:		18-03104				
									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	
18-03104-10	TRG	B101110FIWC010CV	03/14/18 13:56	3/22/2018	3/22/2018	18-03104	Actinium-228	EPA 901.1 Modified	-6.50E-01	9.20E-01	9.21E-01	1.32E+00	U	pCi/g	
18-03104-10	TRG	B101110FIWC010CV	03/14/18 13:56	3/22/2018	3/22/2018	18-03104	Silver-108m	EPA 901.1 Modified	3.90E-01	2.63E-01	2.63E-01	3.30E-01	U	pCi/g	
18-03104-10	TRG	B101110FIWC010CV	03/14/18 13:56	3/22/2018	3/22/2018	18-03104	Americium-241	EPA 901.1 Modified	-5.59E-01	1.40E-01	1.43E-01	4.58E-01	U	pCi/g	
18-03104-10	TRG	B101110FIWC010CV	03/14/18 13:56	3/22/2018	3/22/2018	18-03104	Barium-133	EPA 901.1 Modified	-3.88E-02	6.54E-02	6.54E-02	4.85E-01	U	pCi/g	
18-03104-10	TRG	B101110FIWC010CV	03/14/18 13:56	3/22/2018	3/22/2018	18-03104	Bismuth-214	EPA 901.1 Modified	1.35E+00	4.94E-01	4.99E-01	7.04E-01		pCi/g	
18-03104-10	TRG	B101110FIWC010CV	03/14/18 13:56	3/22/2018	3/22/2018	18-03104	Cobalt-60	EPA 901.1 Modified	-5.32E-02	5.75E-02	5.76E-02	4.68E-01	U	pCi/g	
18-03104-10	TRG	B101110FIWC010CV	03/14/18 13:56	3/22/2018	3/22/2018	18-03104	Cesium-134	EPA 901.1 Modified	-3.63E-02	1.17E-01	1.17E-01	3.92E-01	U	pCi/g	
18-03104-10	TRG	B101110FIWC010CV	03/14/18 13:56	3/22/2018	3/22/2018	18-03104	Cesium-137	EPA 901.1 Modified	4.18E-02	1.20E-01	1.20E-01	4.43E-01	U	pCi/g	
18-03104-10	TRG	B101110FIWC010CV	03/14/18 13:56	3/22/2018	3/22/2018	18-03104	Europium-152	EPA 901.1 Modified	3.47E+01	3.67E+00	4.08E+00	2.88E+00		pCi/g	
18-03104-10	TRG	B101110FIWC010CV	03/14/18 13:56	3/22/2018	3/22/2018	18-03104	Europium-154	EPA 901.1 Modified	1.00E+00	4.65E-01	4.68E-01	8.36E-01	U	pCi/g	
18-03104-10	TRG	B101110FIWC010CV	03/14/18 13:56	3/22/2018	3/22/2018	18-03104	Europium-155	EPA 901.1 Modified	1.24E+00	3.38E-01	3.44E-01	9.56E-01		pCi/g	
18-03104-10	TRG	B101110FIWC010CV	03/14/18 13:56	3/22/2018	3/22/2018	18-03104	Holmium-166m	EPA 901.1 Modified	-2.10E-01	3.85E-01	3.86E-01	3.28E-01	U	pCi/g	
18-03104-10	TRG	B101110FIWC010CV	03/14/18 13:56	3/22/2018	3/22/2018	18-03104	Iodine-129	EPA 901.1 Modified	-1.15E+00	5.93E-01	5.96E-01	3.57E+00	U	pCi/g	
18-03104-10	TRG	B101110FIWC010CV	03/14/18 13:56	3/22/2018	3/22/2018	18-03104	Potassium-40	EPA 901.1 Modified	3.66E+00	1.62E+00	1.63E+00	3.00E+00	U	pCi/g	
18-03104-10	TRG	B101110FIWC010CV	03/14/18 13:56	3/22/2018	3/22/2018	18-03104	Manganese-54	EPA 901.1 Modified	-1.24E-01	2.46E-01	2.46E-01	3.60E-01	U	pCi/g	
18-03104-10	TRG	B101110FIWC010CV	03/14/18 13:56	3/22/2018	3/22/2018	18-03104	Sodium-22	EPA 901.1 Modified	3.57E-01	1.66E-01	1.67E-01	2.98E-01	U	pCi/g	
18-03104-10	TRG	B101110FIWC010CV	03/14/18 13:56	3/22/2018	3/22/2018	18-03104	Niobium-94	EPA 901.1 Modified	2.82E-02	7.65E-02	7.65E-02	3.56E-01	U	pCi/g	
18-03104-10	TRG	B101110FIWC010CV	03/14/18 13:56	3/22/2018	3/22/2018	18-03104	Lead-210	EPA 901.1 Modified	7.35E+01	9.52E+00	1.02E+01	1.06E+01		pCi/g	
18-03104-10	TRG	B101110FIWC010CV	03/14/18 13:56	3/22/2018	3/22/2018	18-03104	Lead-212	EPA 901.1 Modified	7.70E-01	3.55E-01	3.58E-01	8.95E-01	U	pCi/g	
18-03104-10	TRG	B101110FIWC010CV	03/14/18 13:56	3/22/2018	3/22/2018	18-03104	Lead-214	EPA 901.1 Modified	1.87E+01	4.62E+00	4.71E+00	1.46E+00	U	pCi/g	
18-03104-10	TRG	B101110FIWC010CV	03/14/18 13:56	3/22/2018	3/22/2018	18-03104	Promethium-145	EPA 901.1 Modified	6.02E+01	1.02E+01	1.07E+01	2.40E+00	U	pCi/g	
18-03104-10	TRG	B101110FIWC010CV	03/14/18 13:56	3/22/2018	3/22/2018	18-03104	Radium-226	EPA 901.1 Modified	1.35E+00	4.94E-01	4.99E-01	7.04E-01		pCi/g	
18-03104-10	TRG	B101110FIWC010CV	03/14/18 13:56	3/22/2018	3/22/2018	18-03104	Antimony-125	EPA 901.1 Modified	-9.01E-02	6.81E-01	6.81E-01	9.99E-01	U	pCi/g	
18-03104-10	TRG	B101110FIWC010CV	03/14/18 13:56	3/22/2018	3/22/2018	18-03104	Thorium-234	EPA 901.1 Modified	-1.43E+00	7.07E-01	7.11E-01	4.20E+00	U	pCi/g	
18-03104-10	TRG	B101110FIWC010CV	03/14/18 13:56	3/22/2018	3/22/2018	18-03104	Thallium-208	EPA 901.1 Modified	3.49E-01	7.70E-01	7.70E-01	2.68E-01	U	pCi/g	
18-03104-10	TRG	B101110FIWC010CV	03/14/18 13:56	3/22/2018	3/22/2018	18-03104	Uranium-235	EPA 901.1 Modified	-1.19E+00	3.55E+00	3.55E+00	1.94E+00	U	pCi/g	

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



EBERLINE ANALYTICAL CORPORATION

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

[217]

Eberline Analytical Final Report of Analysis			Report To:					Work Order Details:						
			J Alex Bohacheff					SDG: 18-03104						
			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
18-03104-11	TRG	B101110FIWC011CV	03/14/18 13:29	3/22/2018	3/23/2018	18-03104	Actinium-228	EPA 901.1 Modified	-3.32E-01	1.52E+00	1.52E+00	2.25E+00	U	pCi/g
18-03104-11	TRG	B101110FIWC011CV	03/14/18 13:29	3/22/2018	3/23/2018	18-03104	Silver-108m	EPA 901.1 Modified	1.10E+00	4.67E-01	4.70E-01	5.57E-01	U	pCi/g
18-03104-11	TRG	B101110FIWC011CV	03/14/18 13:29	3/22/2018	3/23/2018	18-03104	Americium-241	EPA 901.1 Modified	-4.12E-01	2.84E-01	2.85E-01	6.89E-01	U	pCi/g
18-03104-11	TRG	B101110FIWC011CV	03/14/18 13:29	3/22/2018	3/23/2018	18-03104	Barium-133	EPA 901.1 Modified	-1.91E-01	6.10E+00	6.10E+00	7.68E-01	U	pCi/g
18-03104-11	TRG	B101110FIWC011CV	03/14/18 13:29	3/22/2018	3/23/2018	18-03104	Bismuth-214	EPA 901.1 Modified	4.34E-01	7.99E-01	7.99E-01	1.11E+00	U	pCi/g
18-03104-11	TRG	B101110FIWC011CV	03/14/18 13:29	3/22/2018	3/23/2018	18-03104	Cobalt-60	EPA 901.1 Modified	5.52E+00	6.46E-01	7.06E-01	8.29E-01	U	pCi/g
18-03104-11	TRG	B101110FIWC011CV	03/14/18 13:29	3/22/2018	3/23/2018	18-03104	Cesium-134	EPA 901.1 Modified	-1.36E-01	3.88E-01	3.88E-01	5.85E-01	U	pCi/g
18-03104-11	TRG	B101110FIWC011CV	03/14/18 13:29	3/22/2018	3/23/2018	18-03104	Cesium-137	EPA 901.1 Modified	6.47E+00	9.54E-01	1.01E+00	1.05E+00		pCi/g
18-03104-11	TRG	B101110FIWC011CV	03/14/18 13:29	3/22/2018	3/23/2018	18-03104	Europium-152	EPA 901.1 Modified	9.46E+01	7.35E+00	8.81E+00	2.97E+00		pCi/g
18-03104-11	TRG	B101110FIWC011CV	03/14/18 13:29	3/22/2018	3/23/2018	18-03104	Europium-154	EPA 901.1 Modified	4.28E+00	8.78E-01	9.05E-01	1.51E+00	U	pCi/g
18-03104-11	TRG	B101110FIWC011CV	03/14/18 13:29	3/22/2018	3/23/2018	18-03104	Europium-155	EPA 901.1 Modified	5.53E+00	8.84E-01	9.29E-01	9.95E-01	U	pCi/g
18-03104-11	TRG	B101110FIWC011CV	03/14/18 13:29	3/22/2018	3/23/2018	18-03104	Holmium-166m	EPA 901.1 Modified	-3.83E-01	7.13E-01	7.13E-01	5.27E-01	U	pCi/g
18-03104-11	TRG	B101110FIWC011CV	03/14/18 13:29	3/22/2018	3/23/2018	18-03104	Iodine-129	EPA 901.1 Modified	1.44E+01	6.99E+00	7.02E+00	6.25E+00		pCi/g
18-03104-11	TRG	B101110FIWC011CV	03/14/18 13:29	3/22/2018	3/23/2018	18-03104	Potassium-40	EPA 901.1 Modified	1.01E+01	2.35E+00	2.41E+00	3.75E+00		pCi/g
18-03104-11	TRG	B101110FIWC011CV	03/14/18 13:29	3/22/2018	3/23/2018	18-03104	Manganese-54	EPA 901.1 Modified	-1.07E-01	4.20E-01	4.20E-01	6.19E-01	U	pCi/g
18-03104-11	TRG	B101110FIWC011CV	03/14/18 13:29	3/22/2018	3/23/2018	18-03104	Sodium-22	EPA 901.1 Modified	1.53E+00	3.13E-01	3.23E-01	5.40E-01	U	pCi/g
18-03104-11	TRG	B101110FIWC011CV	03/14/18 13:29	3/22/2018	3/23/2018	18-03104	Niobium-94	EPA 901.1 Modified	2.54E+00	6.74E-01	6.87E-01	5.46E-01	U	pCi/g
18-03104-11	TRG	B101110FIWC011CV	03/14/18 13:29	3/22/2018	3/23/2018	18-03104	Lead-210	EPA 901.1 Modified	2.28E+02	2.59E+01	2.84E+01	1.86E+01		pCi/g
18-03104-11	TRG	B101110FIWC011CV	03/14/18 13:29	3/22/2018	3/23/2018	18-03104	Lead-212	EPA 901.1 Modified	-6.43E-02	2.17E-01	2.17E-01	1.27E+00	U	pCi/g
18-03104-11	TRG	B101110FIWC011CV	03/14/18 13:29	3/22/2018	3/23/2018	18-03104	Lead-214	EPA 901.1 Modified	5.59E-01	8.71E+00	8.71E+00	2.36E+00	U	pCi/g
18-03104-11	TRG	B101110FIWC011CV	03/14/18 13:29	3/22/2018	3/23/2018	18-03104	Promethium-145	EPA 901.1 Modified	1.82E+02	3.09E+01	3.23E+01	4.00E+00	U	pCi/g
18-03104-11	TRG	B101110FIWC011CV	03/14/18 13:29	3/22/2018	3/23/2018	18-03104	Radium-226	EPA 901.1 Modified	4.34E-01	7.99E-01	7.99E-01	1.11E+00	U	pCi/g
18-03104-11	TRG	B101110FIWC011CV	03/14/18 13:29	3/22/2018	3/23/2018	18-03104	Antimony-125	EPA 901.1 Modified	-9.35E-02	1.16E+00	1.16E+00	1.69E+00	U	pCi/g
18-03104-11	TRG	B101110FIWC011CV	03/14/18 13:29	3/22/2018	3/23/2018	18-03104	Thorium-234	EPA 901.1 Modified	-3.75E+00	2.58E+00	2.59E+00	6.32E+00	U	pCi/g
18-03104-11	TRG	B101110FIWC011CV	03/14/18 13:29	3/22/2018	3/23/2018	18-03104	Thallium-208	EPA 901.1 Modified	5.10E-01	1.26E+00	1.26E+00	4.60E-01	U	pCi/g
18-03104-11	TRG	B101110FIWC011CV	03/14/18 13:29	3/22/2018	3/23/2018	18-03104	Uranium-235	EPA 901.1 Modified	1.83E+00	5.77E+00	5.77E+00	3.08E+00	U	pCi/g

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



EBERLINE ANALYTICAL CORPORATION

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

[218]

Eberline Analytical Final Report of Analysis			Report To:					Work Order Details:						
			J Alex Bohacheff					SDG:	18-03104					
			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
18-03104-12	TRG	B101110FIWC018CV	03/14/18 09:48	3/22/2018	3/23/2018	18-03104	Actinium-228	EPA 901.1 Modified	1.08E+00	1.14E+00	1.14E+00	2.54E+00	U	pCi/g
18-03104-12	TRG	B101110FIWC018CV	03/14/18 09:48	3/22/2018	3/23/2018	18-03104	Silver-108m	EPA 901.1 Modified	3.97E+00	7.62E-01	7.88E-01	5.40E-01	U	pCi/g
18-03104-12	TRG	B101110FIWC018CV	03/14/18 09:48	3/22/2018	3/23/2018	18-03104	Americium-241	EPA 901.1 Modified	-6.04E-01	6.35E-01	6.36E-01	7.83E-01	U	pCi/g
18-03104-12	TRG	B101110FIWC018CV	03/14/18 09:48	3/22/2018	3/23/2018	18-03104	Barium-133	EPA 901.1 Modified	-2.59E+00	6.74E-01	6.87E-01	7.35E-01	U	pCi/g
18-03104-12	TRG	B101110FIWC018CV	03/14/18 09:48	3/22/2018	3/23/2018	18-03104	Bismuth-214	EPA 901.1 Modified	-2.71E-01	3.76E-01	3.76E-01	1.03E+00	U	pCi/g
18-03104-12	TRG	B101110FIWC018CV	03/14/18 09:48	3/22/2018	3/23/2018	18-03104	Cobalt-60	EPA 901.1 Modified	2.53E+01	1.55E+00	2.02E+00	7.63E-01		pCi/g
18-03104-12	TRG	B101110FIWC018CV	03/14/18 09:48	3/22/2018	3/23/2018	18-03104	Cesium-134	EPA 901.1 Modified	-6.36E-02	3.91E-01	3.91E-01	6.30E-01	U	pCi/g
18-03104-12	TRG	B101110FIWC018CV	03/14/18 09:48	3/22/2018	3/23/2018	18-03104	Cesium-137	EPA 901.1 Modified	1.11E+00	5.37E-01	5.40E-01	8.70E-01		pCi/g
18-03104-12	TRG	B101110FIWC018CV	03/14/18 09:48	3/22/2018	3/23/2018	18-03104	Europium-152	EPA 901.1 Modified	4.49E+02	1.79E+01	2.92E+01	4.41E+00		pCi/g
18-03104-12	TRG	B101110FIWC018CV	03/14/18 09:48	3/22/2018	3/23/2018	18-03104	Europium-154	EPA 901.1 Modified	2.02E+01	2.05E+00	2.30E+00	2.34E+00	U	pCi/g
18-03104-12	TRG	B101110FIWC018CV	03/14/18 09:48	3/22/2018	3/23/2018	18-03104	Europium-155	EPA 901.1 Modified	8.28E+00	1.60E+00	1.65E+00	1.75E+00		pCi/g
18-03104-12	TRG	B101110FIWC018CV	03/14/18 09:48	3/22/2018	3/23/2018	18-03104	Holmium-166m	EPA 901.1 Modified	-6.98E-02	3.57E-01	3.57E-01	4.62E-01	U	pCi/g
18-03104-12	TRG	B101110FIWC018CV	03/14/18 09:48	3/22/2018	3/23/2018	18-03104	Iodine-129	EPA 901.1 Modified	5.70E+00	7.63E-01	8.17E-01	2.88E+00		pCi/g
18-03104-12	TRG	B101110FIWC018CV	03/14/18 09:48	3/22/2018	3/23/2018	18-03104	Potassium-40	EPA 901.1 Modified	6.10E+00	3.33E+00	3.34E+00	6.63E+00	U	pCi/g
18-03104-12	TRG	B101110FIWC018CV	03/14/18 09:48	3/22/2018	3/23/2018	18-03104	Manganese-54	EPA 901.1 Modified	-3.02E-01	5.03E-01	5.03E-01	7.10E-01	U	pCi/g
18-03104-12	TRG	B101110FIWC018CV	03/14/18 09:48	3/22/2018	3/23/2018	18-03104	Sodium-22	EPA 901.1 Modified	7.13E+00	7.72E-01	8.54E-01	6.65E-01		pCi/g
18-03104-12	TRG	B101110FIWC018CV	03/14/18 09:48	3/22/2018	3/23/2018	18-03104	Niobium-94	EPA 901.1 Modified	-1.27E+00	8.03E-01	8.06E-01	6.51E-01	U	pCi/g
18-03104-12	TRG	B101110FIWC018CV	03/14/18 09:48	3/22/2018	3/23/2018	18-03104	Lead-210	EPA 901.1 Modified	7.61E+02	6.17E+01	7.30E+01	2.00E+01	U	pCi/g
18-03104-12	TRG	B101110FIWC018CV	03/14/18 09:48	3/22/2018	3/23/2018	18-03104	Lead-212	EPA 901.1 Modified	3.58E-01	3.52E-01	3.52E-01	7.95E-01	U	pCi/g
18-03104-12	TRG	B101110FIWC018CV	03/14/18 09:48	3/22/2018	3/23/2018	18-03104	Lead-214	EPA 901.1 Modified	5.30E+00	1.25E+00	1.28E+00	1.44E+00	U	pCi/g
18-03104-12	TRG	B101110FIWC018CV	03/14/18 09:48	3/22/2018	3/23/2018	18-03104	Promethium-145	EPA 901.1 Modified	5.71E+01	5.49E+00	6.22E+00	3.38E+00	U	pCi/g
18-03104-12	TRG	B101110FIWC018CV	03/14/18 09:48	3/22/2018	3/23/2018	18-03104	Radium-226	EPA 901.1 Modified	-2.71E-01	3.76E-01	3.76E-01	1.03E+00	U	pCi/g
18-03104-12	TRG	B101110FIWC018CV	03/14/18 09:48	3/22/2018	3/23/2018	18-03104	Antimony-125	EPA 901.1 Modified	-2.35E-01	4.60E-01	4.60E-01	1.62E+00	U	pCi/g
18-03104-12	TRG	B101110FIWC018CV	03/14/18 09:48	3/22/2018	3/23/2018	18-03104	Thorium-234	EPA 901.1 Modified	-1.19E+00	6.12E+00	6.12E+00	7.66E+00	U	pCi/g
18-03104-12	TRG	B101110FIWC018CV	03/14/18 09:48	3/22/2018	3/23/2018	18-03104	Thallium-208	EPA 901.1 Modified	8.73E-02	7.62E-01	7.62E-01	5.93E-01	U	pCi/g
18-03104-12	TRG	B101110FIWC018CV	03/14/18 09:48	3/22/2018	3/23/2018	18-03104	Uranium-235	EPA 901.1 Modified	-2.77E+00	4.54E+00	4.54E+00	2.78E+00	U	pCi/g

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



EBERLINE ANALYTICAL CORPORATION

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

[219]

Eberline Analytical Final Report of Analysis			Report To:					Work Order Details:						
			J Alex Bohacheff					SDG:	18-03104					
			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
18-03104-13	TRG	B101110FIWC019CV	03/14/18 10:30	3/22/2018	3/23/2018	18-03104	Actinium-228	EPA 901.1 Modified	6.21E-01	6.10E+00	6.10E+00	8.74E+00	U	pCi/g
18-03104-13	TRG	B101110FIWC019CV	03/14/18 10:30	3/22/2018	3/23/2018	18-03104	Silver-108m	EPA 901.1 Modified	2.23E+01	3.09E+00	3.30E+00	1.45E+00	U	pCi/g
18-03104-13	TRG	B101110FIWC019CV	03/14/18 10:30	3/22/2018	3/23/2018	18-03104	Americium-241	EPA 901.1 Modified	-4.21E+00	2.05E+00	2.06E+00	2.50E+00	U	pCi/g
18-03104-13	TRG	B101110FIWC019CV	03/14/18 10:30	3/22/2018	3/23/2018	18-03104	Barium-133	EPA 901.1 Modified	1.99E+00	1.45E+00	1.46E+00	2.38E+00	U	pCi/g
18-03104-13	TRG	B101110FIWC019CV	03/14/18 10:30	3/22/2018	3/23/2018	18-03104	Bismuth-214	EPA 901.1 Modified	-4.82E-01	3.03E+00	3.03E+00	2.69E+00	U	pCi/g
18-03104-13	TRG	B101110FIWC019CV	03/14/18 10:30	3/22/2018	3/23/2018	18-03104	Cobalt-60	EPA 901.1 Modified	1.97E+02	1.14E+01	1.52E+01	1.98E+00		pCi/g
18-03104-13	TRG	B101110FIWC019CV	03/14/18 10:30	3/22/2018	3/23/2018	18-03104	Cesium-134	EPA 901.1 Modified	8.33E-02	1.11E+00	1.11E+00	1.75E+00	U	pCi/g
18-03104-13	TRG	B101110FIWC019CV	03/14/18 10:30	3/22/2018	3/23/2018	18-03104	Cesium-137	EPA 901.1 Modified	-2.15E-01	1.54E+00	1.54E+00	2.48E+00	U	pCi/g
18-03104-13	TRG	B101110FIWC019CV	03/14/18 10:30	3/22/2018	3/23/2018	18-03104	Europium-152	EPA 901.1 Modified	2.90E+03	1.08E+02	1.84E+02	7.70E+00		pCi/g
18-03104-13	TRG	B101110FIWC019CV	03/14/18 10:30	3/22/2018	3/23/2018	18-03104	Europium-154	EPA 901.1 Modified	8.74E+01	9.83E+00	1.08E+01	3.90E+00		pCi/g
18-03104-13	TRG	B101110FIWC019CV	03/14/18 10:30	3/22/2018	3/23/2018	18-03104	Europium-155	EPA 901.1 Modified	4.48E+01	4.69E+00	5.22E+00	5.36E+00		pCi/g
18-03104-13	TRG	B101110FIWC019CV	03/14/18 10:30	3/22/2018	3/23/2018	18-03104	Holmium-166m	EPA 901.1 Modified	-1.51E+00	1.18E+00	1.18E+00	1.44E+00	U	pCi/g
18-03104-13	TRG	B101110FIWC019CV	03/14/18 10:30	3/22/2018	3/23/2018	18-03104	Iodine-129	EPA 901.1 Modified	4.89E+01	4.65E+00	5.28E+00	2.47E+00	U	pCi/g
18-03104-13	TRG	B101110FIWC019CV	03/14/18 10:30	3/22/2018	3/23/2018	18-03104	Potassium-40	EPA 901.1 Modified	-2.22E+00	1.59E+00	1.60E+00	1.07E+01	U	pCi/g
18-03104-13	TRG	B101110FIWC019CV	03/14/18 10:30	3/22/2018	3/23/2018	18-03104	Manganese-54	EPA 901.1 Modified	-1.70E+00	1.74E+00	1.74E+00	2.44E+00	U	pCi/g
18-03104-13	TRG	B101110FIWC019CV	03/14/18 10:30	3/22/2018	3/23/2018	18-03104	Sodium-22	EPA 901.1 Modified	4.19E+00	4.83E+00	4.83E+00	2.47E+00		pCi/g
18-03104-13	TRG	B101110FIWC019CV	03/14/18 10:30	3/22/2018	3/23/2018	18-03104	Niobium-94	EPA 901.1 Modified	2.51E+01	4.32E+00	4.51E+00	2.17E+00	U	pCi/g
18-03104-13	TRG	B101110FIWC019CV	03/14/18 10:30	3/22/2018	3/23/2018	18-03104	Lead-210	EPA 901.1 Modified	6.00E+03	4.85E+02	5.74E+02	6.77E+01	U	pCi/g
18-03104-13	TRG	B101110FIWC019CV	03/14/18 10:30	3/22/2018	3/23/2018	18-03104	Lead-212	EPA 901.1 Modified	1.30E+00	1.93E+00	1.94E+00	2.44E+00	U	pCi/g
18-03104-13	TRG	B101110FIWC019CV	03/14/18 10:30	3/22/2018	3/23/2018	18-03104	Lead-214	EPA 901.1 Modified	1.08E+00	2.09E+00	2.09E+00	3.15E+00	U	pCi/g
18-03104-13	TRG	B101110FIWC019CV	03/14/18 10:30	3/22/2018	3/23/2018	18-03104	Promethium-145	EPA 901.1 Modified	-5.35E+02	4.76E+01	5.49E+01	5.28E+00	U	pCi/g
18-03104-13	TRG	B101110FIWC019CV	03/14/18 10:30	3/22/2018	3/23/2018	18-03104	Radium-226	EPA 901.1 Modified	-4.82E-01	3.03E+00	3.03E+00	2.69E+00	U	pCi/g
18-03104-13	TRG	B101110FIWC019CV	03/14/18 10:30	3/22/2018	3/23/2018	18-03104	Antimony-125	EPA 901.1 Modified	-6.26E-01	2.79E+00	2.79E+00	4.37E+00	U	pCi/g
18-03104-13	TRG	B101110FIWC019CV	03/14/18 10:30	3/22/2018	3/23/2018	18-03104	Thorium-234	EPA 901.1 Modified	-3.39E+01	1.95E+01	1.96E+01	2.39E+01	U	pCi/g
18-03104-13	TRG	B101110FIWC019CV	03/14/18 10:30	3/22/2018	3/23/2018	18-03104	Thallium-208	EPA 901.1 Modified	1.03E+00	1.96E+00	1.96E+00	1.05E+00	U	pCi/g
18-03104-13	TRG	B101110FIWC019CV	03/14/18 10:30	3/22/2018	3/23/2018	18-03104	Uranium-235	EPA 901.1 Modified	-3.62E-01	1.77E+01	1.77E+01	8.64E+00	U	pCi/g

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



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Attachment 1 – Chain-of-Custody Form

18-03104

	Sample ID	Sample Log	Matrix	Sample Type	Sample Container				Sample Date	Sample Time	Analysis Type	Preservative	Remarks
					Vol	Unit	Type	Qty					
4	B101110FIWC001CV	N/A	CONCRETE	CONCRETE	57.94	cm ³	Puck	1	03/15/2018	0835	5ROC/HTD/H3	N/A	0.0-0.5" 134.18g
5	B101110FIWC003CV	N/A	CONCRETE	CONCRETE	57.94	cm ³	Puck	1	03/14/2018	1413	5ROC/HTD/H3	N/A	0.0-0.5" 114.73g
6	B101110FIWC004CV	N/A	CONCRETE	CONCRETE	57.94	cm ³	Puck	1	03/15/2018	0815	5ROC/HTD/H3	N/A	0.0-0.5" 144.21g
7	B101110FIFC005CV	N/A	CONCRETE	CONCRETE	57.94	cm ³	Puck	1	03/15/2018	0930	5ROC/HTD/H3	N/A	0.0-0.5" 73.42g
8	B101110FIFC006CV	N/A	CONCRETE	CONCRETE	57.94	cm ³	Puck	1	03/15/2018	0950	5ROC/HTD/H3	N/A	0.0-0.5" 135.85g
9	B101110FIFC008CV	N/A	CONCRETE	CONCRETE	57.94	cm ³	Puck	1	03/14/2018	1440	5ROC/HTD/H3	N/A	0.0-0.5" 112.38g
10	B101110FIWC010CV	N/A	CONCRETE	CONCRETE	57.94	cm ³	Puck	1	03/14/2018	1356	5ROC/HTD/H3	N/A	0.0-0.5" 114.63g
11	B101110FIWC011CV	N/A	CONCRETE	CONCRETE	57.94	cm ³	Puck	1	03/14/2018	1329	5ROC/HTD/H3	N/A	0.0-0.5" 122.03g
12	B101110FIWC018CV	N/A	CONCRETE	CONCRETE	57.94	cm ³	Puck	1	03/14/2018	0948	5ROC/HTD/H3	N/A	0.0-0.5" 130.80g
13	B101110FIWC019CV	N/A	CONCRETE	CONCRETE	57.94	cm ³	Puck	1	03/14/2018	1030	5ROC/HTD/H3	N/A	0.0-0.5" 88.20g
	B101110FIFC003CV	N/A	CONCRETE	CONCRETE	57.94	cm ³	Puck	1	03/13/2018	0845	5ROC/HTD/H3	N/A	0.0-0.5" 143.35g
	B101110FIWC014CV	N/A	CONCRETE	CONCRETE	57.94	cm ³	Puck	1	03/13/2018	1510	5ROC/HTD/H3	N/A	0.0-0.5" 164.81g
	B101110FIWC015CV	N/A	CONCRETE	CONCRETE	57.94	cm ³	Puck	1	03/13/2018	1325	5ROC/HTD/H3	N/A	0.0-0.5" 108.97g
	B101110FIWC016CV	N/A	CONCRETE	CONCRETE	57.94	cm ³	Puck	1	03/13/2018	1430	5ROC/HTD/H3	N/A	0.0-0.5" 115.55g

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Information Use

B101110IFIWC017CV	N/A	CONCRETE	CONCRETE	57.94	cm ³	Puck	1	03/13/2018	1007	5ROC/HTD/H3	N/A	0.0-0.5" 155.47g
B101110IFIWC018CV	N/A	CONCRETE	CONCRETE	57.94	cm ³	Puck	1	03/13/2018	1400	5ROC/HTD/H3	N/A	0.0-0.5" 91.78g
B101110IFIWC019CV	N/A	CONCRETE	CONCRETE	57.94	cm ³	Puck	1	03/13/2018	0945	5ROC/HTD/H3	N/A	0.0-0.5" 162.88g
B101110IFIWC020CV	N/A	CONCRETE	CONCRETE	57.94	cm ³	Puck	1	03/14/2018	0911	5ROC/HTD/H3	N/A	0.0-0.5" 88.81g
B101110IFIFC021CV	N/A	CONCRETE	CONCRETE	57.94	cm ³	Puck	1	03/13/2018	0900	5ROC/HTD/H3	N/A	0.0-0.5" 162.07g
Laboratory: <u>Eberline Labs</u>			Date Submitted To Lab:			Ship Container No.: <u>N/A</u>		Cooler Temperature: <u>N/A</u>		Airbill Number: <i>Fed Ex</i> <i>8107-0645-6699</i>		
Relinquished by: ALEX BOHACHEFF		Date (mm/dd/yyyy): <i>03/21/2018</i>	Time: <i>1100</i>		Received by: <i>Richard E. Ricker</i>		Date: (mm/dd/yyyy): <i>03/21/2018</i>		Time: <i>1100</i>			
Relinquished by: <i>Richard E. Ricker</i>		Date (mm/dd/yyyy): <i>03/21/2018</i>	Time: <i>1600</i>		Received by: <i>Fed Ex</i>		Date: (mm/dd/yyyy): <i>03/21/2018</i>		Time: <i>1600</i>			
Relinquished by:		Date (mm/dd/yyyy):	Time:		Received by: <i>[Signature]</i>		Date: (mm/dd/yyyy): <i>3-22-18</i>		Time: <i>0800</i>			
Relinquished by:		Date (mm/dd/yyyy):	Time:		Received by:		Date: (mm/dd/yyyy):		Time:			
Comments PO# 677118 14 day turnaround 5-ROC / HTD / H-3												



EBERLINE ANALYTICAL CORPORATION
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EBS-OR-43602

April 4, 2018

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

CASE NARRATIVE
Work Order # 18-03105-OR

SAMPLE RECEIPT

This work order contains nine solid samples received 03/22/2018. Samples were analyzed for Strontium-90, Tritium, Nickel-63 and by Gamma Spectroscopy.

<u>CLIENT ID</u>	<u>LAB ID</u>	<u>CLIENT ID</u>	<u>LAB ID</u>
B101110IFIFC003CV	18-03105-04	B101110IFIWC018CV	18-03105-09
B101110IFIWC014CV	18-03105-05	B101110IFIWC019CV	18-03105-10
B101110IFIWC015CV	18-03105-06	B101110IFIWC020CV	18-03105-11
B101110IFIWC016CV	18-03105-07	B101110IFIFC021CV	18-03105-12
B101110IFIWC017CV	18-03105-08		

ANALYTICAL METHODS

Strontium-90 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 1-sigma value.

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

ANALYTICAL RESULTS CONTINUED

STRONTIUM-90

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

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. Results for laboratory fractions -03 and -04 (Client ID: B101110IFIFC003CV DUP & DO) 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; however, normalized difference is within acceptable limits for the analytical technique. 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.

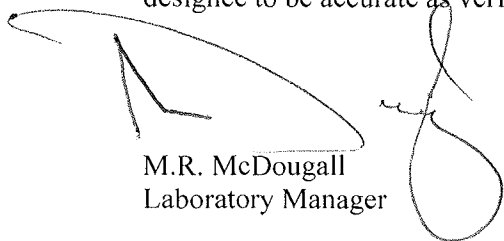
ANALYTICAL RESULTS CONTINUED

GAMMA SPECTROSCOPY CONTINUED

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

CERTIFICATION OF ACCURACY

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



M.R. McDougall
Laboratory Manager

Date: 4/4/2018

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

Eberline Analytical Final Report of Analysis			Report To:					Work Order Details:						
			J Alex Bohacheff					SDG: 18-03105						
			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
18-03105-01	LCS	KNOWN	03/22/18 00:00	3/22/2018	3/28/2018	18-03105	Tritium	LANL ER-210 Modified	2.26E+02	8.15E+00				pCi/g
18-03105-01	LCS	SPIKE	03/22/18 00:00	3/22/2018	3/28/2018	18-03105	Tritium	LANL ER-210 Modified	1.96E+02	5.34E+00	1.22E+01	3.77E+00		pCi/g
18-03105-02	MBL	BLANK	03/22/18 00:00	3/22/2018	3/28/2018	18-03105	Tritium	LANL ER-210 Modified	1.88E-01	2.19E+00	2.19E+00	3.76E+00	U	pCi/g
18-03105-03	DUP	B101110IFIFC003CV	03/13/18 08:45	3/22/2018	3/28/2018	18-03105	Tritium	LANL ER-210 Modified	1.59E+02	9.81E+00	1.32E+01	1.10E+01		pCi/g
18-03105-04	DO	B101110IFIFC003CV	03/13/18 08:45	3/22/2018	3/28/2018	18-03105	Tritium	LANL ER-210 Modified	1.59E+02	9.84E+00	1.33E+01	1.10E+01		pCi/g
18-03105-05	TRG	B101110IFIWC014CV	03/13/18 15:10	3/22/2018	3/28/2018	18-03105	Tritium	LANL ER-210 Modified	5.95E+02	1.48E+01	3.64E+01	9.73E+00		pCi/g
18-03105-06	TRG	B101110IFIWC015CV	03/13/18 13:25	3/22/2018	3/29/2018	18-03105	Tritium	LANL ER-210 Modified	8.09E+01	7.42E+00	8.70E+00	9.50E+00		pCi/g
18-03105-07	TRG	B101110IFIWC016CV	03/13/18 14:30	3/22/2018	3/29/2018	18-03105	Tritium	LANL ER-210 Modified	2.19E+02	1.25E+01	1.75E+01	1.34E+01		pCi/g
18-03105-08	TRG	B101110IFIWC017CV	03/13/18 10:07	3/22/2018	3/29/2018	18-03105	Tritium	LANL ER-210 Modified	1.17E+02	1.03E+01	1.22E+01	1.30E+01		pCi/g
18-03105-09	TRG	B101110IFIWC018CV	03/13/18 14:00	3/22/2018	3/29/2018	18-03105	Tritium	LANL ER-210 Modified	1.94E+02	1.17E+01	1.60E+01	1.29E+01		pCi/g
18-03105-10	TRG	B101110IFIWC019CV	03/13/18 09:45	3/22/2018	3/29/2018	18-03105	Tritium	LANL ER-210 Modified	7.95E+01	8.50E+00	9.60E+00	1.13E+01		pCi/g
18-03105-11	TRG	B101110IFIWC020CV	03/14/18 09:11	3/22/2018	3/29/2018	18-03105	Tritium	LANL ER-210 Modified	1.55E+02	9.61E+00	1.30E+01	1.07E+01		pCi/g
18-03105-12	TRG	B101110IFIFC021CV	03/13/18 09:00	3/22/2018	3/29/2018	18-03105	Tritium	LANL ER-210 Modified	1.53E+02	1.25E+01	1.51E+01	1.54E+01		pCi/g
18-03105-01	LCS	KNOWN	03/22/18 00:00	3/22/2018	3/28/2018	18-03105	Nickel-63	ASTM 3500-Ni Modified	1.53E+03	4.58E+01				pCi/g
18-03105-01	LCS	SPIKE	03/22/18 00:00	3/22/2018	3/28/2018	18-03105	Nickel-63	ASTM 3500-Ni Modified	1.52E+03	9.25E+00	8.96E+01	2.20E+00		pCi/g
18-03105-02	MBL	BLANK	03/22/18 00:00	3/22/2018	3/28/2018	18-03105	Nickel-63	ASTM 3500-Ni Modified	-8.83E-02	1.31E+00	1.31E+00	2.24E+00	U	pCi/g
18-03105-03	DUP	B101110IFIFC003CV	03/13/18 08:45	3/22/2018	3/28/2018	18-03105	Nickel-63	ASTM 3500-Ni Modified	7.62E-01	1.43E+00	1.43E+00	2.42E+00	U	pCi/g
18-03105-04	DO	B101110IFIFC003CV	03/13/18 08:45	3/22/2018	3/28/2018	18-03105	Nickel-63	ASTM 3500-Ni Modified	-8.97E-02	1.33E+00	1.33E+00	2.28E+00	U	pCi/g
18-03105-05	TRG	B101110IFIWC014CV	03/13/18 15:10	3/22/2018	3/28/2018	18-03105	Nickel-63	ASTM 3500-Ni Modified	5.22E-01	7.15E-01	7.16E-01	1.20E+00	U	pCi/g
18-03105-06	TRG	B101110IFIWC015CV	03/13/18 13:25	3/22/2018	3/28/2018	18-03105	Nickel-63	ASTM 3500-Ni Modified	2.12E+00	1.13E+00	1.14E+00	1.86E+00		pCi/g
18-03105-07	TRG	B101110IFIWC016CV	03/13/18 14:30	3/22/2018	3/28/2018	18-03105	Nickel-63	ASTM 3500-Ni Modified	3.77E-01	1.13E+00	1.13E+00	1.92E+00	U	pCi/g
18-03105-08	TRG	B101110IFIWC017CV	03/13/18 10:07	3/22/2018	3/28/2018	18-03105	Nickel-63	ASTM 3500-Ni Modified	2.08E+00	7.63E-01	7.73E-01	1.23E+00		pCi/g
18-03105-09	TRG	B101110IFIWC018CV	03/13/18 14:00	3/22/2018	3/29/2018	18-03105	Nickel-63	ASTM 3500-Ni Modified	6.83E-01	8.60E-01	8.61E-01	1.45E+00	U	pCi/g
18-03105-10	TRG	B101110IFIWC019CV	03/13/18 09:45	3/22/2018	3/29/2018	18-03105	Nickel-63	ASTM 3500-Ni Modified	4.75E+01	1.40E+00	3.13E+00	1.22E+00		pCi/g
18-03105-11	TRG	B101110IFIWC020CV	03/14/18 09:11	3/22/2018	3/29/2018	18-03105	Nickel-63	ASTM 3500-Ni Modified	2.84E+01	1.36E+00	2.15E+00	1.51E+00		pCi/g
18-03105-12	TRG	B101110IFIFC021CV	03/13/18 09:00	3/22/2018	3/29/2018	18-03105	Nickel-63	ASTM 3500-Ni Modified	4.79E-01	8.00E-01	8.01E-01	1.35E+00	U	pCi/g

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



EBERLINE ANALYTICAL CORPORATION

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

[226]

Eberline Analytical Final Report of Analysis			Report To:					Work Order Details:						
			J Alex Bohacheff					SDG:	18-03105					
			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
18-03105-01	LCS	KNOWN	03/22/18 00:00	3/22/2018	3/30/2018	18-03105	Strontium-90	EiChroM SRW01 Modified	5.05E+01	2.83E-01				pCi/g
18-03105-01	LCS	SPIKE	03/22/18 00:00	3/22/2018	3/30/2018	18-03105	Strontium-90	EiChroM SRW01 Modified	4.84E+01	1.37E+00	6.72E+00	7.02E-01		pCi/g
18-03105-02	MBL	BLANK	03/22/18 00:00	3/22/2018	3/30/2018	18-03105	Strontium-90	EiChroM SRW01 Modified	-1.83E-02	3.83E-01	3.83E-01	8.16E-01	U	pCi/g
18-03105-03	DUP	B101110IFIFC003CV	03/13/18 08:45	3/22/2018	3/30/2018	18-03105	Strontium-90	EiChroM SRW01 Modified	4.14E-01	3.76E-01	3.80E-01	7.58E-01	U	pCi/g
18-03105-04	DO	B101110IFIFC003CV	03/13/18 08:45	3/22/2018	3/30/2018	18-03105	Strontium-90	EiChroM SRW01 Modified	9.64E-01	3.83E-01	4.05E-01	7.10E-01		pCi/g
18-03105-05	TRG	B101110IFIWC014CV	03/13/18 15:10	3/22/2018	3/30/2018	18-03105	Strontium-90	EiChroM SRW01 Modified	1.86E-01	2.34E-01	2.36E-01	4.81E-01	U	pCi/g
18-03105-06	TRG	B101110IFIWC015CV	03/13/18 13:25	3/22/2018	3/30/2018	18-03105	Strontium-90	EiChroM SRW01 Modified	5.47E-01	3.57E-01	3.65E-01	7.04E-01	U	pCi/g
18-03105-07	TRG	B101110IFIWC016CV	03/13/18 14:30	3/22/2018	3/30/2018	18-03105	Strontium-90	EiChroM SRW01 Modified	9.83E-02	3.43E-01	3.43E-01	7.22E-01	U	pCi/g
18-03105-08	TRG	B101110IFIWC017CV	03/13/18 10:07	3/22/2018	3/30/2018	18-03105	Strontium-90	EiChroM SRW01 Modified	2.21E-01	2.22E-01	2.24E-01	4.50E-01	U	pCi/g
18-03105-09	TRG	B101110IFIWC018CV	03/13/18 14:00	3/22/2018	3/30/2018	18-03105	Strontium-90	EiChroM SRW01 Modified	1.37E-01	2.69E-01	2.70E-01	5.60E-01	U	pCi/g
18-03105-10	TRG	B101110IFIWC019CV	03/13/18 09:45	3/22/2018	3/30/2018	18-03105	Strontium-90	EiChroM SRW01 Modified	2.82E-01	2.03E-01	2.06E-01	4.02E-01	U	pCi/g
18-03105-11	TRG	B101110IFIWC020CV	03/14/18 09:11	3/22/2018	3/30/2018	18-03105	Strontium-90	EiChroM SRW01 Modified	7.04E-01	2.76E-01	2.92E-01	5.13E-01		pCi/g
18-03105-12	TRG	B101110IFIFC021CV	03/13/18 09:00	3/22/2018	3/30/2018	18-03105	Strontium-90	EiChroM SRW01 Modified	2.99E-02	2.26E-01	2.26E-01	4.80E-01	U	pCi/g
18-03105-01	LCS	KNOWN	03/22/18 00:00	3/22/2018	3/23/2018	18-03105	Cobalt-60	EPA 901.1 Modified	2.71E+02	1.06E+01				pCi/g
18-03105-01	LCS	KNOWN	03/22/18 00:00	3/22/2018	3/23/2018	18-03105	Cesium-137	EPA 901.1 Modified	1.69E+02	6.75E+00				pCi/g
18-03105-01	LCS	SPIKE	03/22/18 00:00	3/22/2018	3/23/2018	18-03105	Cobalt-60	EPA 901.1 Modified	2.73E+02	1.54E+01	2.08E+01	1.84E+00		pCi/g
18-03105-01	LCS	SPIKE	03/22/18 00:00	3/22/2018	3/23/2018	18-03105	Cesium-137	EPA 901.1 Modified	1.76E+02	1.49E+01	1.75E+01	2.90E+00		pCi/g

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



EBERLINE ANALYTICAL CORPORATION

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[227]

Eberline Analytical Final Report of Analysis			Report To:					Work Order Details:						
			J Alex Bohacheff					SDG:		18-03105				
			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
18-03105-02	MBL	BLANK	03/22/18 00:00	3/22/2018	3/23/2018	18-03105	Actinium-228	EPA 901.1 Modified	-7.07E-02	9.49E-02	9.50E-02	1.34E-01	U	pCi/g
18-03105-02	MBL	BLANK	03/22/18 00:00	3/22/2018	3/23/2018	18-03105	Silver-108m	EPA 901.1 Modified	-1.36E-02	3.14E-02	3.14E-02	3.27E-02	U	pCi/g
18-03105-02	MBL	BLANK	03/22/18 00:00	3/22/2018	3/23/2018	18-03105	Americium-241	EPA 901.1 Modified	-5.73E-02	3.44E-02	3.46E-02	4.40E-02	U	pCi/g
18-03105-02	MBL	BLANK	03/22/18 00:00	3/22/2018	3/23/2018	18-03105	Barium-133	EPA 901.1 Modified	-3.14E-03	1.06E-02	1.06E-02	4.40E-02	U	pCi/g
18-03105-02	MBL	BLANK	03/22/18 00:00	3/22/2018	3/23/2018	18-03105	Bismuth-214	EPA 901.1 Modified	-4.04E-02	7.72E-02	7.73E-02	9.96E-02	U	pCi/g
18-03105-02	MBL	BLANK	03/22/18 00:00	3/22/2018	3/23/2018	18-03105	Cobalt-60	EPA 901.1 Modified	-2.29E-03	9.10E-03	9.10E-03	4.34E-02	U	pCi/g
18-03105-02	MBL	BLANK	03/22/18 00:00	3/22/2018	3/23/2018	18-03105	Cesium-134	EPA 901.1 Modified	3.21E-03	3.37E-02	3.37E-02	4.69E-02	U	pCi/g
18-03105-02	MBL	BLANK	03/22/18 00:00	3/22/2018	3/23/2018	18-03105	Cesium-137	EPA 901.1 Modified	2.34E-02	3.03E-02	3.03E-02	5.00E-02	U	pCi/g
18-03105-02	MBL	BLANK	03/22/18 00:00	3/22/2018	3/23/2018	18-03105	Europium-152	EPA 901.1 Modified	-1.32E-02	9.00E-02	9.00E-02	6.34E-02	U	pCi/g
18-03105-02	MBL	BLANK	03/22/18 00:00	3/22/2018	3/23/2018	18-03105	Europium-154	EPA 901.1 Modified	-1.25E-02	6.64E-02	6.64E-02	3.14E-02	U	pCi/g
18-03105-02	MBL	BLANK	03/22/18 00:00	3/22/2018	3/23/2018	18-03105	Europium-155	EPA 901.1 Modified	-1.01E-02	3.42E-02	3.42E-02	4.78E-02	U	pCi/g
18-03105-02	MBL	BLANK	03/22/18 00:00	3/22/2018	3/23/2018	18-03105	Holmium-166m	EPA 901.1 Modified	-3.12E-02	6.73E-02	6.73E-02	2.61E-02	U	pCi/g
18-03105-02	MBL	BLANK	03/22/18 00:00	3/22/2018	3/23/2018	18-03105	Iodine-129	EPA 901.1 Modified	-9.59E-03	1.46E-02	1.46E-02	2.05E-02	U	pCi/g
18-03105-02	MBL	BLANK	03/22/18 00:00	3/22/2018	3/23/2018	18-03105	Potassium-40	EPA 901.1 Modified	1.06E-01	2.58E-01	2.58E-01	4.91E-01	U	pCi/g
18-03105-02	MBL	BLANK	03/22/18 00:00	3/22/2018	3/23/2018	18-03105	Manganese-54	EPA 901.1 Modified	-1.36E-02	2.64E-02	2.64E-02	3.96E-02	U	pCi/g
18-03105-02	MBL	BLANK	03/22/18 00:00	3/22/2018	3/23/2018	18-03105	Niobium-94	EPA 901.1 Modified	9.62E-03	2.43E-02	2.43E-02	4.25E-02	U	pCi/g
18-03105-02	MBL	BLANK	03/22/18 00:00	3/22/2018	3/23/2018	18-03105	Lead-210	EPA 901.1 Modified	1.68E-01	2.36E-01	2.36E-01	3.67E-01	U	pCi/g
18-03105-02	MBL	BLANK	03/22/18 00:00	3/22/2018	3/23/2018	18-03105	Lead-212	EPA 901.1 Modified	3.81E-02	3.19E-02	3.19E-02	5.17E-02	U	pCi/g
18-03105-02	MBL	BLANK	03/22/18 00:00	3/22/2018	3/23/2018	18-03105	Lead-214	EPA 901.1 Modified	1.83E-02	5.09E-02	5.10E-02	8.02E-02	U	pCi/g
18-03105-02	MBL	BLANK	03/22/18 00:00	3/22/2018	3/23/2018	18-03105	Promethium-145	EPA 901.1 Modified	4.48E-03	2.42E-02	2.42E-02	3.58E-02	U	pCi/g
18-03105-02	MBL	BLANK	03/22/18 00:00	3/22/2018	3/23/2018	18-03105	Radium-226	EPA 901.1 Modified	-4.04E-02	7.72E-02	7.73E-02	9.96E-02	U	pCi/g
18-03105-02	MBL	BLANK	03/22/18 00:00	3/22/2018	3/23/2018	18-03105	Antimony-125	EPA 901.1 Modified	-2.88E-02	7.62E-02	7.62E-02	9.87E-02	U	pCi/g
18-03105-02	MBL	BLANK	03/22/18 00:00	3/22/2018	3/23/2018	18-03105	Thorium-234	EPA 901.1 Modified	6.47E-01	2.74E-01	2.76E-01	4.64E-01	U	pCi/g
18-03105-02	MBL	BLANK	03/22/18 00:00	3/22/2018	3/23/2018	18-03105	Thallium-208	EPA 901.1 Modified	2.86E-02	9.97E-02	9.97E-02	1.46E-01	U	pCi/g
18-03105-02	MBL	BLANK	03/22/18 00:00	3/22/2018	3/23/2018	18-03105	Uranium-235	EPA 901.1 Modified	6.45E-02	2.71E-01	2.71E-01	1.46E-01	U	pCi/g

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


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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:	18-03105					
			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	
18-03105-03	DUP	B101110IFIFC003CV	03/13/18 08:45	3/22/2018	3/23/2018	18-03105	Actinium-228	EPA 901.1 Modified	-6.91E-01	1.43E+00	1.43E+00	2.08E+00	U	pCi/g	
18-03105-03	DUP	B101110IFIFC003CV	03/13/18 08:45	3/22/2018	3/23/2018	18-03105	Silver-108m	EPA 901.1 Modified	8.61E-01	4.26E-01	4.29E-01	4.90E-01	U	pCi/g	
18-03105-03	DUP	B101110IFIFC003CV	03/13/18 08:45	3/22/2018	3/23/2018	18-03105	Americium-241	EPA 901.1 Modified	-7.28E+00	6.86E-01	7.81E-01	6.53E-01	U	pCi/g	
18-03105-03	DUP	B101110IFIFC003CV	03/13/18 08:45	3/22/2018	3/23/2018	18-03105	Barium-133	EPA 901.1 Modified	4.28E-02	1.48E+01	1.48E+01	7.00E-01	U	pCi/g	
18-03105-03	DUP	B101110IFIFC003CV	03/13/18 08:45	3/22/2018	3/23/2018	18-03105	Bismuth-214	EPA 901.1 Modified	6.81E-01	7.79E-01	7.80E-01	7.56E-01	U	pCi/g	
18-03105-03	DUP	B101110IFIFC003CV	03/13/18 08:45	3/22/2018	3/23/2018	18-03105	Cobalt-60	EPA 901.1 Modified	5.33E+00	4.57E-01	5.33E-01	4.43E-01		pCi/g	
18-03105-03	DUP	B101110IFIFC003CV	03/13/18 08:45	3/22/2018	3/23/2018	18-03105	Cesium-134	EPA 901.1 Modified	8.47E-03	2.05E-01	2.05E-01	5.55E-01	U	pCi/g	
18-03105-03	DUP	B101110IFIFC003CV	03/13/18 08:45	3/22/2018	3/23/2018	18-03105	Cesium-137	EPA 901.1 Modified	3.47E-01	4.08E-01	4.09E-01	6.82E-01	U	pCi/g	
18-03105-03	DUP	B101110IFIFC003CV	03/13/18 08:45	3/22/2018	3/23/2018	18-03105	Europium-152	EPA 901.1 Modified	9.89E+01	6.63E+00	8.35E+00	2.89E+00		pCi/g	
18-03105-03	DUP	B101110IFIFC003CV	03/13/18 08:45	3/22/2018	3/23/2018	18-03105	Europium-154	EPA 901.1 Modified	2.77E+00	7.93E-01	8.06E-01	1.32E+00	U	pCi/g	
18-03105-03	DUP	B101110IFIFC003CV	03/13/18 08:45	3/22/2018	3/23/2018	18-03105	Europium-155	EPA 901.1 Modified	-1.33E-01	1.93E-01	1.93E-01	9.60E-01	U	pCi/g	
18-03105-03	DUP	B101110IFIFC003CV	03/13/18 08:45	3/22/2018	3/23/2018	18-03105	Holmium-166m	EPA 901.1 Modified	-1.78E-01	5.83E-01	5.83E-01	5.07E-01	U	pCi/g	
18-03105-03	DUP	B101110IFIFC003CV	03/13/18 08:45	3/22/2018	3/23/2018	18-03105	Iodine-129	EPA 901.1 Modified	-1.34E+00	7.56E-01	7.60E-01	5.47E+00	U	pCi/g	
18-03105-03	DUP	B101110IFIFC003CV	03/13/18 08:45	3/22/2018	3/23/2018	18-03105	Potassium-40	EPA 901.1 Modified	7.98E+00	1.99E+00	2.04E+00	4.62E+00		pCi/g	
18-03105-03	DUP	B101110IFIFC003CV	03/13/18 08:45	3/22/2018	3/23/2018	18-03105	Manganese-54	EPA 901.1 Modified	-4.14E-01	4.11E-01	4.11E-01	5.86E-01	U	pCi/g	
18-03105-03	DUP	B101110IFIFC003CV	03/13/18 08:45	3/22/2018	3/23/2018	18-03105	Niobium-94	EPA 901.1 Modified	3.14E+00	7.43E-01	7.60E-01	5.22E-01	U	pCi/g	
18-03105-03	DUP	B101110IFIFC003CV	03/13/18 08:45	3/22/2018	3/23/2018	18-03105	Lead-210	EPA 901.1 Modified	-2.04E+01	2.89E+00	3.07E+00	1.97E+01	U	pCi/g	
18-03105-03	DUP	B101110IFIFC003CV	03/13/18 08:45	3/22/2018	3/23/2018	18-03105	Lead-212	EPA 901.1 Modified	-2.02E-01	2.98E-01	2.98E-01	1.20E+00	U	pCi/g	
18-03105-03	DUP	B101110IFIFC003CV	03/13/18 08:45	3/22/2018	3/23/2018	18-03105	Lead-214	EPA 901.1 Modified	5.42E+01	1.32E+01	1.35E+01	2.18E+00	U	pCi/g	
18-03105-03	DUP	B101110IFIFC003CV	03/13/18 08:45	3/22/2018	3/23/2018	18-03105	Promethium-145	EPA 901.1 Modified	1.79E+02	3.02E+01	3.16E+01	3.69E+00	U	pCi/g	
18-03105-03	DUP	B101110IFIFC003CV	03/13/18 08:45	3/22/2018	3/23/2018	18-03105	Radium-226	EPA 901.1 Modified	6.81E-01	7.79E-01	7.80E-01	7.56E-01	U	pCi/g	
18-03105-03	DUP	B101110IFIFC003CV	03/13/18 08:45	3/22/2018	3/23/2018	18-03105	Antimony-125	EPA 901.1 Modified	3.71E-01	1.03E+00	1.03E+00	1.51E+00	U	pCi/g	
18-03105-03	DUP	B101110IFIFC003CV	03/13/18 08:45	3/22/2018	3/23/2018	18-03105	Thorium-234	EPA 901.1 Modified	-9.39E+01	8.64E+00	9.89E+00	6.05E+00	U	pCi/g	
18-03105-03	DUP	B101110IFIFC003CV	03/13/18 08:45	3/22/2018	3/23/2018	18-03105	Thallium-208	EPA 901.1 Modified	7.97E-01	1.18E+00	1.18E+00	4.33E-01	U	pCi/g	
18-03105-03	DUP	B101110IFIFC003CV	03/13/18 08:45	3/22/2018	3/23/2018	18-03105	Uranium-235	EPA 901.1 Modified	-6.01E+00	5.55E+00	5.56E+00	2.92E+00	U	pCi/g	

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



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: 18-03105						
			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
18-03105-04	DO	B101110IFIFC003CV	03/13/18 08:45	3/22/2018	3/23/2018	18-03105	Actinium-228	EPA 901.1 Modified	2.32E-02	1.22E+00	1.22E+00	2.06E+00	U	pCi/g
18-03105-04	DO	B101110IFIFC003CV	03/13/18 08:45	3/22/2018	3/23/2018	18-03105	Silver-108m	EPA 901.1 Modified	8.45E-01	4.28E-01	4.30E-01	4.88E-01	U	pCi/g
18-03105-04	DO	B101110IFIFC003CV	03/13/18 08:45	3/22/2018	3/23/2018	18-03105	Americium-241	EPA 901.1 Modified	-5.95E+00	5.84E-01	6.59E-01	6.54E-01	U	pCi/g
18-03105-04	DO	B101110IFIFC003CV	03/13/18 08:45	3/22/2018	3/23/2018	18-03105	Barium-133	EPA 901.1 Modified	1.90E+00	1.49E+01	1.49E+01	7.01E-01	U	pCi/g
18-03105-04	DO	B101110IFIFC003CV	03/13/18 08:45	3/22/2018	3/23/2018	18-03105	Bismuth-214	EPA 901.1 Modified	7.19E-01	4.07E-01	4.09E-01	8.89E-01	U	pCi/g
18-03105-04	DO	B101110IFIFC003CV	03/13/18 08:45	3/22/2018	3/23/2018	18-03105	Cobalt-60	EPA 901.1 Modified	5.50E+00	4.58E-01	5.38E-01	4.29E-01		pCi/g
18-03105-04	DO	B101110IFIFC003CV	03/13/18 08:45	3/22/2018	3/23/2018	18-03105	Cesium-134	EPA 901.1 Modified	-3.58E-01	2.52E-01	2.53E-01	5.53E-01	U	pCi/g
18-03105-04	DO	B101110IFIFC003CV	03/13/18 08:45	3/22/2018	3/23/2018	18-03105	Cesium-137	EPA 901.1 Modified	8.98E-01	4.61E-01	4.64E-01	6.72E-01	U	pCi/g
18-03105-04	DO	B101110IFIFC003CV	03/13/18 08:45	3/22/2018	3/23/2018	18-03105	Europium-152	EPA 901.1 Modified	1.03E+02	7.66E+00	9.30E+00	2.89E+00		pCi/g
18-03105-04	DO	B101110IFIFC003CV	03/13/18 08:45	3/22/2018	3/23/2018	18-03105	Europium-154	EPA 901.1 Modified	3.39E+00	7.78E-01	7.97E-01	1.32E+00	U	pCi/g
18-03105-04	DO	B101110IFIFC003CV	03/13/18 08:45	3/22/2018	3/23/2018	18-03105	Europium-155	EPA 901.1 Modified	3.81E+00	6.85E-01	7.13E-01	1.50E+00		pCi/g
18-03105-04	DO	B101110IFIFC003CV	03/13/18 08:45	3/22/2018	3/23/2018	18-03105	Holmium-166m	EPA 901.1 Modified	-5.49E-01	6.49E-01	6.50E-01	5.00E-01	U	pCi/g
18-03105-04	DO	B101110IFIFC003CV	03/13/18 08:45	3/22/2018	3/23/2018	18-03105	Iodine-129	EPA 901.1 Modified	1.39E+01	6.77E+00	6.81E+00	5.44E+00		pCi/g
18-03105-04	DO	B101110IFIFC003CV	03/13/18 08:45	3/22/2018	3/23/2018	18-03105	Potassium-40	EPA 901.1 Modified	6.59E+00	1.77E+00	1.80E+00	4.05E+00		pCi/g
18-03105-04	DO	B101110IFIFC003CV	03/13/18 08:45	3/22/2018	3/23/2018	18-03105	Manganese-54	EPA 901.1 Modified	3.72E-01	3.99E-01	4.00E-01	6.00E-01	U	pCi/g
18-03105-04	DO	B101110IFIFC003CV	03/13/18 08:45	3/22/2018	3/23/2018	18-03105	Niobium-94	EPA 901.1 Modified	2.95E+00	7.17E-01	7.33E-01	5.32E-01	U	pCi/g
18-03105-04	DO	B101110IFIFC003CV	03/13/18 08:45	3/22/2018	3/23/2018	18-03105	Lead-210	EPA 901.1 Modified	-1.99E+01	2.87E+00	3.05E+00	1.97E+01	U	pCi/g
18-03105-04	DO	B101110IFIFC003CV	03/13/18 08:45	3/22/2018	3/23/2018	18-03105	Lead-212	EPA 901.1 Modified	-1.59E-01	2.07E-01	2.07E-01	1.22E+00	U	pCi/g
18-03105-04	DO	B101110IFIFC003CV	03/13/18 08:45	3/22/2018	3/23/2018	18-03105	Lead-214	EPA 901.1 Modified	5.21E+01	1.27E+01	1.30E+01	2.19E+00	U	pCi/g
18-03105-04	DO	B101110IFIFC003CV	03/13/18 08:45	3/22/2018	3/23/2018	18-03105	Promethium-145	EPA 901.1 Modified	1.79E+02	3.02E+01	3.16E+01	3.69E+00	U	pCi/g
18-03105-04	DO	B101110IFIFC003CV	03/13/18 08:45	3/22/2018	3/23/2018	18-03105	Radium-226	EPA 901.1 Modified	7.19E-01	4.07E-01	4.09E-01	8.89E-01	U	pCi/g
18-03105-04	DO	B101110IFIFC003CV	03/13/18 08:45	3/22/2018	3/23/2018	18-03105	Antimony-125	EPA 901.1 Modified	-3.44E-01	5.79E-01	5.79E-01	1.52E+00	U	pCi/g
18-03105-04	DO	B101110IFIFC003CV	03/13/18 08:45	3/22/2018	3/23/2018	18-03105	Thorium-234	EPA 901.1 Modified	-5.40E+01	5.47E+00	6.13E+00	6.03E+00	U	pCi/g
18-03105-04	DO	B101110IFIFC003CV	03/13/18 08:45	3/22/2018	3/23/2018	18-03105	Thallium-208	EPA 901.1 Modified	-3.01E-01	1.16E+00	1.16E+00	4.65E-01	U	pCi/g
18-03105-04	DO	B101110IFIFC003CV	03/13/18 08:45	3/22/2018	3/23/2018	18-03105	Uranium-235	EPA 901.1 Modified	4.51E+00	5.47E+00	5.48E+00	2.95E+00	U	pCi/g

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



EBERLINE ANALYTICAL CORPORATION

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

[230]

Eberline Analytical Final Report of Analysis			Report To:						Work Order Details:						
			J Alex Bohacheff Zion Solutions, LLC 101 Shiloh Blvd Zion, IL 60099						SDG:		18-03105				
									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	
18-03105-05	TRG	B101110IFIWC014CV	03/13/18 15:10	3/22/2018	3/23/2018	18-03105	Actinium-228	EPA 901.1 Modified	1.27E+00	2.16E+00	2.16E+00	3.27E+00	U	pCi/g	
18-03105-05	TRG	B101110IFIWC014CV	03/13/18 15:10	3/22/2018	3/23/2018	18-03105	Silver-108m	EPA 901.1 Modified	2.78E+00	7.82E-01	7.95E-01	6.17E-01	U	pCi/g	
18-03105-05	TRG	B101110IFIWC014CV	03/13/18 15:10	3/22/2018	3/23/2018	18-03105	Americium-241	EPA 901.1 Modified	-7.04E-01	4.88E-01	4.89E-01	6.82E-01	U	pCi/g	
18-03105-05	TRG	B101110IFIWC014CV	03/13/18 15:10	3/22/2018	3/23/2018	18-03105	Barium-133	EPA 901.1 Modified	4.21E-01	6.19E-01	6.19E-01	8.19E-01	U	pCi/g	
18-03105-05	TRG	B101110IFIWC014CV	03/13/18 15:10	3/22/2018	3/23/2018	18-03105	Bismuth-214	EPA 901.1 Modified	4.92E-01	1.23E+00	1.23E+00	1.26E+00	U	pCi/g	
18-03105-05	TRG	B101110IFIWC014CV	03/13/18 15:10	3/22/2018	3/23/2018	18-03105	Cobalt-60	EPA 901.1 Modified	1.46E+01	9.82E-01	1.24E+00	6.42E-01		pCi/g	
18-03105-05	TRG	B101110IFIWC014CV	03/13/18 15:10	3/22/2018	3/23/2018	18-03105	Cesium-134	EPA 901.1 Modified	-2.70E-01	5.95E-01	5.95E-01	7.77E-01	U	pCi/g	
18-03105-05	TRG	B101110IFIWC014CV	03/13/18 15:10	3/22/2018	3/23/2018	18-03105	Cesium-137	EPA 901.1 Modified	3.73E-01	7.10E-01	7.11E-01	9.50E-01	U	pCi/g	
18-03105-05	TRG	B101110IFIWC014CV	03/13/18 15:10	3/22/2018	3/23/2018	18-03105	Europium-152	EPA 901.1 Modified	2.77E+02	1.29E+01	1.92E+01	2.65E+00		pCi/g	
18-03105-05	TRG	B101110IFIWC014CV	03/13/18 15:10	3/22/2018	3/23/2018	18-03105	Europium-154	EPA 901.1 Modified	1.12E+01	1.67E+00	1.77E+00	1.34E+00		pCi/g	
18-03105-05	TRG	B101110IFIWC014CV	03/13/18 15:10	3/22/2018	3/23/2018	18-03105	Europium-155	EPA 901.1 Modified	3.87E+00	8.59E-01	8.82E-01	1.16E+00	U	pCi/g	
18-03105-05	TRG	B101110IFIWC014CV	03/13/18 15:10	3/22/2018	3/23/2018	18-03105	Holmium-166m	EPA 901.1 Modified	7.53E-01	1.17E+00	1.18E+00	4.78E-01	U	pCi/g	
18-03105-05	TRG	B101110IFIWC014CV	03/13/18 15:10	3/22/2018	3/23/2018	18-03105	Iodine-129	EPA 901.1 Modified	-1.70E+00	3.12E-01	3.24E-01	3.97E-01	U	pCi/g	
18-03105-05	TRG	B101110IFIWC014CV	03/13/18 15:10	3/22/2018	3/23/2018	18-03105	Potassium-40	EPA 901.1 Modified	1.18E+01	2.82E+00	2.88E+00	4.97E+00	U	pCi/g	
18-03105-05	TRG	B101110IFIWC014CV	03/13/18 15:10	3/22/2018	3/23/2018	18-03105	Manganese-54	EPA 901.1 Modified	-3.82E-01	6.15E-01	6.16E-01	9.11E-01	U	pCi/g	
18-03105-05	TRG	B101110IFIWC014CV	03/13/18 15:10	3/22/2018	3/23/2018	18-03105	Niobium-94	EPA 901.1 Modified	7.30E+00	2.02E+00	2.05E+00	8.22E-01	U	pCi/g	
18-03105-05	TRG	B101110IFIWC014CV	03/13/18 15:10	3/22/2018	3/23/2018	18-03105	Lead-210	EPA 901.1 Modified	5.11E+02	3.76E+01	4.59E+01	2.58E+01		pCi/g	
18-03105-05	TRG	B101110IFIWC014CV	03/13/18 15:10	3/22/2018	3/23/2018	18-03105	Lead-212	EPA 901.1 Modified	5.33E-02	4.57E-01	4.57E-01	8.54E-01	U	pCi/g	
18-03105-05	TRG	B101110IFIWC014CV	03/13/18 15:10	3/22/2018	3/23/2018	18-03105	Lead-214	EPA 901.1 Modified	2.80E-01	6.20E-01	6.20E-01	1.16E+00	U	pCi/g	
18-03105-05	TRG	B101110IFIWC014CV	03/13/18 15:10	3/22/2018	3/23/2018	18-03105	Promethium-145	EPA 901.1 Modified	3.86E+01	2.79E+00	3.42E+00	1.83E+00	U	pCi/g	
18-03105-05	TRG	B101110IFIWC014CV	03/13/18 15:10	3/22/2018	3/23/2018	18-03105	Radium-226	EPA 901.1 Modified	4.92E-01	1.23E+00	1.23E+00	1.26E+00	U	pCi/g	
18-03105-05	TRG	B101110IFIWC014CV	03/13/18 15:10	3/22/2018	3/23/2018	18-03105	Antimony-125	EPA 901.1 Modified	8.30E-01	1.41E+00	1.41E+00	1.87E+00	U	pCi/g	
18-03105-05	TRG	B101110IFIWC014CV	03/13/18 15:10	3/22/2018	3/23/2018	18-03105	Thorium-234	EPA 901.1 Modified	-5.41E+00	4.71E+00	4.72E+00	6.61E+00	U	pCi/g	
18-03105-05	TRG	B101110IFIWC014CV	03/13/18 15:10	3/22/2018	3/23/2018	18-03105	Thallium-208	EPA 901.1 Modified	2.75E-01	1.21E+00	1.21E+00	9.53E-01	U	pCi/g	
18-03105-05	TRG	B101110IFIWC014CV	03/13/18 15:10	3/22/2018	3/23/2018	18-03105	Uranium-235	EPA 901.1 Modified	2.49E+00	5.15E+00	5.15E+00	2.74E+00	U	pCi/g	

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



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 Zion Solutions, LLC 101 Shiloh Blvd Zion, IL 60099						SDG: 18-03105						
									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	
18-03105-06	TRG	B101110IFIWC015CV	03/13/18 13:25	3/22/2018	3/23/2018	18-03105	Actinium-228	EPA 901.1 Modified	-5.26E-01	1.03E+00	1.03E+00	1.46E+00	U	pCi/g	
18-03105-06	TRG	B101110IFIWC015CV	03/13/18 13:25	3/22/2018	3/23/2018	18-03105	Silver-108m	EPA 901.1 Modified	8.61E-01	3.39E-01	3.42E-01	3.01E-01	U	pCi/g	
18-03105-06	TRG	B101110IFIWC015CV	03/13/18 13:25	3/22/2018	3/23/2018	18-03105	Americium-241	EPA 901.1 Modified	-5.91E-01	3.64E-01	3.66E-01	4.31E-01	U	pCi/g	
18-03105-06	TRG	B101110IFIWC015CV	03/13/18 13:25	3/22/2018	3/23/2018	18-03105	Barium-133	EPA 901.1 Modified	1.20E-01	1.86E-01	1.86E-01	4.16E-01	U	pCi/g	
18-03105-06	TRG	B101110IFIWC015CV	03/13/18 13:25	3/22/2018	3/23/2018	18-03105	Bismuth-214	EPA 901.1 Modified	4.03E-01	5.19E-01	5.19E-01	7.71E-01	U	pCi/g	
18-03105-06	TRG	B101110IFIWC015CV	03/13/18 13:25	3/22/2018	3/23/2018	18-03105	Cobalt-60	EPA 901.1 Modified	6.71E+00	4.87E-01	5.97E-01	4.18E-01		pCi/g	
18-03105-06	TRG	B101110IFIWC015CV	03/13/18 13:25	3/22/2018	3/23/2018	18-03105	Cesium-134	EPA 901.1 Modified	-9.13E-02	2.57E-01	2.57E-01	3.61E-01	U	pCi/g	
18-03105-06	TRG	B101110IFIWC015CV	03/13/18 13:25	3/22/2018	3/23/2018	18-03105	Cesium-137	EPA 901.1 Modified	3.02E+00	5.73E-01	5.94E-01	7.46E-01		pCi/g	
18-03105-06	TRG	B101110IFIWC015CV	03/13/18 13:25	3/22/2018	3/23/2018	18-03105	Europium-152	EPA 901.1 Modified	1.08E+02	4.45E+00	7.10E+00	1.82E+00		pCi/g	
18-03105-06	TRG	B101110IFIWC015CV	03/13/18 13:25	3/22/2018	3/23/2018	18-03105	Europium-154	EPA 901.1 Modified	4.45E+00	7.55E-01	7.89E-01	1.29E+00	U	pCi/g	
18-03105-06	TRG	B101110IFIWC015CV	03/13/18 13:25	3/22/2018	3/23/2018	18-03105	Europium-155	EPA 901.1 Modified	1.45E+00	4.43E-01	4.49E-01	7.02E-01	U	pCi/g	
18-03105-06	TRG	B101110IFIWC015CV	03/13/18 13:25	3/22/2018	3/23/2018	18-03105	Holmium-166m	EPA 901.1 Modified	-1.74E-01	4.82E-01	4.82E-01	2.59E-01	U	pCi/g	
18-03105-06	TRG	B101110IFIWC015CV	03/13/18 13:25	3/22/2018	3/23/2018	18-03105	Iodine-129	EPA 901.1 Modified	1.86E+00	4.19E-01	4.29E-01	1.57E+00		pCi/g	
18-03105-06	TRG	B101110IFIWC015CV	03/13/18 13:25	3/22/2018	3/23/2018	18-03105	Potassium-40	EPA 901.1 Modified	6.26E+00	1.90E+00	1.92E+00	3.19E+00		pCi/g	
18-03105-06	TRG	B101110IFIWC015CV	03/13/18 13:25	3/22/2018	3/23/2018	18-03105	Manganese-54	EPA 901.1 Modified	-1.68E-01	2.82E-01	2.82E-01	3.97E-01	U	pCi/g	
18-03105-06	TRG	B101110IFIWC015CV	03/13/18 13:25	3/22/2018	3/23/2018	18-03105	Niobium-94	EPA 901.1 Modified	-2.79E-01	4.19E-01	4.19E-01	3.65E-01	U	pCi/g	
18-03105-06	TRG	B101110IFIWC015CV	03/13/18 13:25	3/22/2018	3/23/2018	18-03105	Lead-210	EPA 901.1 Modified	2.08E+02	1.79E+01	2.08E+01	1.17E+01	U	pCi/g	
18-03105-06	TRG	B101110IFIWC015CV	03/13/18 13:25	3/22/2018	3/23/2018	18-03105	Lead-212	EPA 901.1 Modified	7.02E-02	2.86E-01	2.86E-01	4.52E-01	U	pCi/g	
18-03105-06	TRG	B101110IFIWC015CV	03/13/18 13:25	3/22/2018	3/23/2018	18-03105	Lead-214	EPA 901.1 Modified	1.48E+00	5.77E-01	5.82E-01	8.13E-01	U	pCi/g	
18-03105-06	TRG	B101110IFIWC015CV	03/13/18 13:25	3/22/2018	3/23/2018	18-03105	Promethium-145	EPA 901.1 Modified	1.65E+01	2.02E+00	2.19E+00	2.00E+00	U	pCi/g	
18-03105-06	TRG	B101110IFIWC015CV	03/13/18 13:25	3/22/2018	3/23/2018	18-03105	Radium-226	EPA 901.1 Modified	4.03E-01	5.19E-01	5.19E-01	7.71E-01	U	pCi/g	
18-03105-06	TRG	B101110IFIWC015CV	03/13/18 13:25	3/22/2018	3/23/2018	18-03105	Antimony-125	EPA 901.1 Modified	-2.58E-01	6.39E-01	6.39E-01	9.12E-01	U	pCi/g	
18-03105-06	TRG	B101110IFIWC015CV	03/13/18 13:25	3/22/2018	3/23/2018	18-03105	Thorium-234	EPA 901.1 Modified	4.27E+00	3.43E+00	3.44E+00	4.46E+00	U	pCi/g	
18-03105-06	TRG	B101110IFIWC015CV	03/13/18 13:25	3/22/2018	3/23/2018	18-03105	Thallium-208	EPA 901.1 Modified	3.26E-02	8.39E-01	8.39E-01	6.82E-01	U	pCi/g	
18-03105-06	TRG	B101110IFIWC015CV	03/13/18 13:25	3/22/2018	3/23/2018	18-03105	Uranium-235	EPA 901.1 Modified	-6.31E-01	2.46E+00	2.46E+00	1.50E+00	U	pCi/g	

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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:	18-03105					
			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
18-03105-07	TRG	B101110IFIWC016CV	03/13/18 14:30	3/22/2018	3/23/2018	18-03105	Actinium-228	EPA 901.1 Modified	1.40E-01	1.23E+00	1.23E+00	1.80E+00	U	pCi/g
18-03105-07	TRG	B101110IFIWC016CV	03/13/18 14:30	3/22/2018	3/23/2018	18-03105	Silver-108m	EPA 901.1 Modified	1.41E+00	4.16E-01	4.22E-01	3.08E-01	U	pCi/g
18-03105-07	TRG	B101110IFIWC016CV	03/13/18 14:30	3/22/2018	3/23/2018	18-03105	Americium-241	EPA 901.1 Modified	5.12E-03	4.44E-01	4.44E-01	5.61E-01	U	pCi/g
18-03105-07	TRG	B101110IFIWC016CV	03/13/18 14:30	3/22/2018	3/23/2018	18-03105	Barium-133	EPA 901.1 Modified	-2.72E-02	2.16E-01	2.16E-01	4.17E-01	U	pCi/g
18-03105-07	TRG	B101110IFIWC016CV	03/13/18 14:30	3/22/2018	3/23/2018	18-03105	Bismuth-214	EPA 901.1 Modified	1.09E+00	4.55E-01	4.59E-01	1.05E+00		pCi/g
18-03105-07	TRG	B101110IFIWC016CV	03/13/18 14:30	3/22/2018	3/23/2018	18-03105	Cobalt-60	EPA 901.1 Modified	8.76E+00	6.12E-01	7.59E-01	3.96E-01		pCi/g
18-03105-07	TRG	B101110IFIWC016CV	03/13/18 14:30	3/22/2018	3/23/2018	18-03105	Cesium-134	EPA 901.1 Modified	-5.77E-02	2.39E-01	2.39E-01	3.77E-01	U	pCi/g
18-03105-07	TRG	B101110IFIWC016CV	03/13/18 14:30	3/22/2018	3/23/2018	18-03105	Cesium-137	EPA 901.1 Modified	2.94E-01	3.64E-01	3.64E-01	5.39E-01	U	pCi/g
18-03105-07	TRG	B101110IFIWC016CV	03/13/18 14:30	3/22/2018	3/23/2018	18-03105	Europium-152	EPA 901.1 Modified	1.65E+02	6.39E+00	1.06E+01	1.68E+00		pCi/g
18-03105-07	TRG	B101110IFIWC016CV	03/13/18 14:30	3/22/2018	3/23/2018	18-03105	Europium-154	EPA 901.1 Modified	5.79E+00	8.33E-01	8.84E-01	8.49E-01		pCi/g
18-03105-07	TRG	B101110IFIWC016CV	03/13/18 14:30	3/22/2018	3/23/2018	18-03105	Europium-155	EPA 901.1 Modified	2.98E+00	7.81E-01	7.96E-01	1.17E+00		pCi/g
18-03105-07	TRG	B101110IFIWC016CV	03/13/18 14:30	3/22/2018	3/23/2018	18-03105	Holmium-166m	EPA 901.1 Modified	7.62E-01	5.92E-01	5.93E-01	3.15E-01	U	pCi/g
18-03105-07	TRG	B101110IFIWC016CV	03/13/18 14:30	3/22/2018	3/23/2018	18-03105	Iodine-129	EPA 901.1 Modified	2.50E+00	3.92E-01	4.13E-01	5.17E-01	U	pCi/g
18-03105-07	TRG	B101110IFIWC016CV	03/13/18 14:30	3/22/2018	3/23/2018	18-03105	Potassium-40	EPA 901.1 Modified	7.74E+00	1.95E+00	1.99E+00	4.44E+00		pCi/g
18-03105-07	TRG	B101110IFIWC016CV	03/13/18 14:30	3/22/2018	3/23/2018	18-03105	Manganese-54	EPA 901.1 Modified	-8.63E-02	3.60E-01	3.60E-01	5.16E-01	U	pCi/g
18-03105-07	TRG	B101110IFIWC016CV	03/13/18 14:30	3/22/2018	3/23/2018	18-03105	Niobium-94	EPA 901.1 Modified	1.61E+00	5.42E-01	5.48E-01	4.55E-01	U	pCi/g
18-03105-07	TRG	B101110IFIWC016CV	03/13/18 14:30	3/22/2018	3/23/2018	18-03105	Lead-210	EPA 901.1 Modified	3.28E+02	2.78E+01	3.25E+01	1.06E+01		pCi/g
18-03105-07	TRG	B101110IFIWC016CV	03/13/18 14:30	3/22/2018	3/23/2018	18-03105	Lead-212	EPA 901.1 Modified	1.09E+00	4.89E-01	4.92E-01	1.43E+00	U	pCi/g
18-03105-07	TRG	B101110IFIWC016CV	03/13/18 14:30	3/22/2018	3/23/2018	18-03105	Lead-214	EPA 901.1 Modified	1.10E+00	5.18E-01	5.21E-01	9.24E-01		pCi/g
18-03105-07	TRG	B101110IFIWC016CV	03/13/18 14:30	3/22/2018	3/23/2018	18-03105	Promethium-145	EPA 901.1 Modified	-2.57E+01	2.58E+00	2.90E+00	1.09E+00	U	pCi/g
18-03105-07	TRG	B101110IFIWC016CV	03/13/18 14:30	3/22/2018	3/23/2018	18-03105	Radium-226	EPA 901.1 Modified	1.09E+00	4.55E-01	4.59E-01	1.05E+00		pCi/g
18-03105-07	TRG	B101110IFIWC016CV	03/13/18 14:30	3/22/2018	3/23/2018	18-03105	Antimony-125	EPA 901.1 Modified	2.71E-01	5.96E-01	5.96E-01	9.58E-01	U	pCi/g
18-03105-07	TRG	B101110IFIWC016CV	03/13/18 14:30	3/22/2018	3/23/2018	18-03105	Thorium-234	EPA 901.1 Modified	-1.41E+00	4.26E+00	4.26E+00	5.34E+00	U	pCi/g
18-03105-07	TRG	B101110IFIWC016CV	03/13/18 14:30	3/22/2018	3/23/2018	18-03105	Thallium-208	EPA 901.1 Modified	-4.59E-01	8.35E-01	8.35E-01	6.27E-01	U	pCi/g
18-03105-07	TRG	B101110IFIWC016CV	03/13/18 14:30	3/22/2018	3/23/2018	18-03105	Uranium-235	EPA 901.1 Modified	-3.41E+00	3.93E+00	3.93E+00	1.89E+00	U	pCi/g

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



EBERLINE ANALYTICAL CORPORATION

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

[233]

Eberline Analytical Final Report of Analysis			Report To:					Work Order Details:						
			J Alex Bohacheff					SDG:	18-03105					
			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
18-03105-08	TRG	B101110IFIWC017CV	03/13/18 10:07	3/22/2018	3/23/2018	18-03105	Actinium-228	EPA 901.1 Modified	6.01E-01	1.32E+00	1.32E+00	2.03E+00	U	pCi/g
18-03105-08	TRG	B101110IFIWC017CV	03/13/18 10:07	3/22/2018	3/23/2018	18-03105	Silver-108m	EPA 901.1 Modified	9.59E-01	4.31E-01	4.34E-01	3.88E-01	U	pCi/g
18-03105-08	TRG	B101110IFIWC017CV	03/13/18 10:07	3/22/2018	3/23/2018	18-03105	Americium-241	EPA 901.1 Modified	-5.19E-01	3.03E-01	3.05E-01	4.18E-01	U	pCi/g
18-03105-08	TRG	B101110IFIWC017CV	03/13/18 10:07	3/22/2018	3/23/2018	18-03105	Barium-133	EPA 901.1 Modified	2.89E-01	3.83E-01	3.83E-01	5.15E-01	U	pCi/g
18-03105-08	TRG	B101110IFIWC017CV	03/13/18 10:07	3/22/2018	3/23/2018	18-03105	Bismuth-214	EPA 901.1 Modified	5.91E-01	7.58E-01	7.59E-01	1.03E+00	U	pCi/g
18-03105-08	TRG	B101110IFIWC017CV	03/13/18 10:07	3/22/2018	3/23/2018	18-03105	Cobalt-60	EPA 901.1 Modified	5.66E+00	4.74E-01	5.56E-01	3.91E-01		pCi/g
18-03105-08	TRG	B101110IFIWC017CV	03/13/18 10:07	3/22/2018	3/23/2018	18-03105	Cesium-134	EPA 901.1 Modified	-1.07E-01	3.70E-01	3.70E-01	4.86E-01	U	pCi/g
18-03105-08	TRG	B101110IFIWC017CV	03/13/18 10:07	3/22/2018	3/23/2018	18-03105	Cesium-137	EPA 901.1 Modified	2.01E-01	4.32E-01	4.32E-01	5.86E-01	U	pCi/g
18-03105-08	TRG	B101110IFIWC017CV	03/13/18 10:07	3/22/2018	3/23/2018	18-03105	Europium-152	EPA 901.1 Modified	9.37E+01	4.81E+00	6.80E+00	1.82E+00		pCi/g
18-03105-08	TRG	B101110IFIWC017CV	03/13/18 10:07	3/22/2018	3/23/2018	18-03105	Europium-154	EPA 901.1 Modified	6.88E+00	1.86E+00	1.89E+00	9.21E-01		pCi/g
18-03105-08	TRG	B101110IFIWC017CV	03/13/18 10:07	3/22/2018	3/23/2018	18-03105	Europium-155	EPA 901.1 Modified	3.33E+00	9.36E-01	9.51E-01	9.55E-01		pCi/g
18-03105-08	TRG	B101110IFIWC017CV	03/13/18 10:07	3/22/2018	3/23/2018	18-03105	Holmium-166m	EPA 901.1 Modified	9.16E-01	7.27E-01	7.29E-01	2.87E-01	U	pCi/g
18-03105-08	TRG	B101110IFIWC017CV	03/13/18 10:07	3/22/2018	3/23/2018	18-03105	Iodine-129	EPA 901.1 Modified	-5.40E-01	1.92E-01	1.94E-01	2.56E-01	U	pCi/g
18-03105-08	TRG	B101110IFIWC017CV	03/13/18 10:07	3/22/2018	3/23/2018	18-03105	Potassium-40	EPA 901.1 Modified	6.72E+00	2.74E+00	2.76E+00	4.15E+00		pCi/g
18-03105-08	TRG	B101110IFIWC017CV	03/13/18 10:07	3/22/2018	3/23/2018	18-03105	Manganese-54	EPA 901.1 Modified	-1.99E-01	3.78E-01	3.78E-01	5.63E-01	U	pCi/g
18-03105-08	TRG	B101110IFIWC017CV	03/13/18 10:07	3/22/2018	3/23/2018	18-03105	Niobium-94	EPA 901.1 Modified	2.64E-01	1.99E-01	2.00E-01	5.21E-01	U	pCi/g
18-03105-08	TRG	B101110IFIWC017CV	03/13/18 10:07	3/22/2018	3/23/2018	18-03105	Lead-210	EPA 901.1 Modified	2.01E+02	1.55E+01	1.86E+01	1.60E+01		pCi/g
18-03105-08	TRG	B101110IFIWC017CV	03/13/18 10:07	3/22/2018	3/23/2018	18-03105	Lead-212	EPA 901.1 Modified	2.28E-02	3.25E-01	3.25E-01	5.28E-01	U	pCi/g
18-03105-08	TRG	B101110IFIWC017CV	03/13/18 10:07	3/22/2018	3/23/2018	18-03105	Lead-214	EPA 901.1 Modified	5.45E-01	3.94E-01	3.95E-01	7.25E-01	U	pCi/g
18-03105-08	TRG	B101110IFIWC017CV	03/13/18 10:07	3/22/2018	3/23/2018	18-03105	Promethium-145	EPA 901.1 Modified	1.35E+01	1.16E+00	1.35E+00	1.18E+00	U	pCi/g
18-03105-08	TRG	B101110IFIWC017CV	03/13/18 10:07	3/22/2018	3/23/2018	18-03105	Radium-226	EPA 901.1 Modified	5.91E-01	7.58E-01	7.59E-01	1.03E+00	U	pCi/g
18-03105-08	TRG	B101110IFIWC017CV	03/13/18 10:07	3/22/2018	3/23/2018	18-03105	Antimony-125	EPA 901.1 Modified	-8.34E-02	8.71E-01	8.71E-01	1.16E+00	U	pCi/g
18-03105-08	TRG	B101110IFIWC017CV	03/13/18 10:07	3/22/2018	3/23/2018	18-03105	Thorium-234	EPA 901.1 Modified	-4.07E-01	2.88E+00	2.88E+00	4.11E+00	U	pCi/g
18-03105-08	TRG	B101110IFIWC017CV	03/13/18 10:07	3/22/2018	3/23/2018	18-03105	Thallium-208	EPA 901.1 Modified	1.13E+00	1.19E+00	1.19E+00	1.32E+00	U	pCi/g
18-03105-08	TRG	B101110IFIWC017CV	03/13/18 10:07	3/22/2018	3/23/2018	18-03105	Uranium-235	EPA 901.1 Modified	-3.08E-01	3.17E+00	3.17E+00	1.66E+00	U	pCi/g

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



EBERLINE ANALYTICAL CORPORATION

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

[234]

Eberline Analytical Final Report of Analysis			Report To:						Work Order Details:						
			J Alex Bohacheff						SDG: 18-03105						
			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	
18-03105-09	TRG	B101110IFIWC018CV	03/13/18 14:00	3/22/2018	3/23/2018	18-03105	Actinium-228	EPA 901.1 Modified	4.66E-01	1.48E+00	1.48E+00	2.16E+00	U	pCi/g	
18-03105-09	TRG	B101110IFIWC018CV	03/13/18 14:00	3/22/2018	3/23/2018	18-03105	Silver-108m	EPA 901.1 Modified	8.19E-01	5.03E-01	5.05E-01	4.56E-01	U	pCi/g	
18-03105-09	TRG	B101110IFIWC018CV	03/13/18 14:00	3/22/2018	3/23/2018	18-03105	Americium-241	EPA 901.1 Modified	-1.19E+00	5.54E-01	5.57E-01	6.50E-01	U	pCi/g	
18-03105-09	TRG	B101110IFIWC018CV	03/13/18 14:00	3/22/2018	3/23/2018	18-03105	Barium-133	EPA 901.1 Modified	1.16E-01	2.78E-01	2.78E-01	6.21E-01	U	pCi/g	
18-03105-09	TRG	B101110IFIWC018CV	03/13/18 14:00	3/22/2018	3/23/2018	18-03105	Bismuth-214	EPA 901.1 Modified	8.71E-01	7.70E-01	7.71E-01	1.06E+00	U	pCi/g	
18-03105-09	TRG	B101110IFIWC018CV	03/13/18 14:00	3/22/2018	3/23/2018	18-03105	Cobalt-60	EPA 901.1 Modified	1.13E+01	7.89E-01	9.78E-01	5.64E-01		pCi/g	
18-03105-09	TRG	B101110IFIWC018CV	03/13/18 14:00	3/22/2018	3/23/2018	18-03105	Cesium-134	EPA 901.1 Modified	-1.02E-02	2.38E-01	2.38E-01	5.29E-01	U	pCi/g	
18-03105-09	TRG	B101110IFIWC018CV	03/13/18 14:00	3/22/2018	3/23/2018	18-03105	Cesium-137	EPA 901.1 Modified	1.46E-02	4.55E-01	4.55E-01	6.58E-01	U	pCi/g	
18-03105-09	TRG	B101110IFIWC018CV	03/13/18 14:00	3/22/2018	3/23/2018	18-03105	Europium-152	EPA 901.1 Modified	2.29E+02	9.28E+00	1.50E+01	2.58E+00		pCi/g	
18-03105-09	TRG	B101110IFIWC018CV	03/13/18 14:00	3/22/2018	3/23/2018	18-03105	Europium-154	EPA 901.1 Modified	7.73E+00	1.15E+00	1.22E+00	1.84E+00	U	pCi/g	
18-03105-09	TRG	B101110IFIWC018CV	03/13/18 14:00	3/22/2018	3/23/2018	18-03105	Europium-155	EPA 901.1 Modified	2.56E+00	6.99E-01	7.12E-01	1.09E+00	U	pCi/g	
18-03105-09	TRG	B101110IFIWC018CV	03/13/18 14:00	3/22/2018	3/23/2018	18-03105	Holmium-166m	EPA 901.1 Modified	-2.64E-02	3.03E-01	3.03E-01	3.94E-01	U	pCi/g	
18-03105-09	TRG	B101110IFIWC018CV	03/13/18 14:00	3/22/2018	3/23/2018	18-03105	Iodine-129	EPA 901.1 Modified	3.10E+00	5.88E-01	6.09E-01	2.39E+00		pCi/g	
18-03105-09	TRG	B101110IFIWC018CV	03/13/18 14:00	3/22/2018	3/23/2018	18-03105	Potassium-40	EPA 901.1 Modified	8.82E+00	2.37E+00	2.42E+00	3.93E+00	U	pCi/g	
18-03105-09	TRG	B101110IFIWC018CV	03/13/18 14:00	3/22/2018	3/23/2018	18-03105	Manganese-54	EPA 901.1 Modified	4.58E-01	4.26E-01	4.27E-01	6.26E-01	U	pCi/g	
18-03105-09	TRG	B101110IFIWC018CV	03/13/18 14:00	3/22/2018	3/23/2018	18-03105	Niobium-94	EPA 901.1 Modified	-6.82E-01	6.56E-01	6.57E-01	5.47E-01	U	pCi/g	
18-03105-09	TRG	B101110IFIWC018CV	03/13/18 14:00	3/22/2018	3/23/2018	18-03105	Lead-210	EPA 901.1 Modified	4.42E+02	3.66E+01	4.31E+01	1.81E+01	U	pCi/g	
18-03105-09	TRG	B101110IFIWC018CV	03/13/18 14:00	3/22/2018	3/23/2018	18-03105	Lead-212	EPA 901.1 Modified	1.55E-01	2.95E-01	2.95E-01	6.76E-01	U	pCi/g	
18-03105-09	TRG	B101110IFIWC018CV	03/13/18 14:00	3/22/2018	3/23/2018	18-03105	Lead-214	EPA 901.1 Modified	3.19E+00	9.41E-01	9.55E-01	1.24E+00	U	pCi/g	
18-03105-09	TRG	B101110IFIWC018CV	03/13/18 14:00	3/22/2018	3/23/2018	18-03105	Promethium-145	EPA 901.1 Modified	3.50E+01	3.75E+00	4.16E+00	3.11E+00	U	pCi/g	
18-03105-09	TRG	B101110IFIWC018CV	03/13/18 14:00	3/22/2018	3/23/2018	18-03105	Radium-226	EPA 901.1 Modified	8.71E-01	7.70E-01	7.71E-01	1.06E+00	U	pCi/g	
18-03105-09	TRG	B101110IFIWC018CV	03/13/18 14:00	3/22/2018	3/23/2018	18-03105	Antimony-125	EPA 901.1 Modified	-4.81E-01	9.64E-01	9.64E-01	1.37E+00	U	pCi/g	
18-03105-09	TRG	B101110IFIWC018CV	03/13/18 14:00	3/22/2018	3/23/2018	18-03105	Thorium-234	EPA 901.1 Modified	4.29E+00	5.13E+00	5.14E+00	6.52E+00	U	pCi/g	
18-03105-09	TRG	B101110IFIWC018CV	03/13/18 14:00	3/22/2018	3/23/2018	18-03105	Thallium-208	EPA 901.1 Modified	8.72E-02	6.67E-01	6.67E-01	7.56E-01	U	pCi/g	
18-03105-09	TRG	B101110IFIWC018CV	03/13/18 14:00	3/22/2018	3/23/2018	18-03105	Uranium-235	EPA 901.1 Modified	1.34E-01	3.78E+00	3.78E+00	2.35E+00	U	pCi/g	

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



EBERLINE ANALYTICAL CORPORATION

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

[235]

Eberline Analytical Final Report of Analysis			Report To:						Work Order Details:						
			J Alex Bohacheff Zion Solutions, LLC 101 Shiloh Blvd Zion, IL 60099						SDG: 18-03105						
									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	
18-03105-10	TRG	B101110IFIWC019CV	03/13/18 09:45	3/22/2018	3/23/2018	18-03105	Actinium-228	EPA 901.1 Modified	7.95E-01	8.70E-01	8.71E-01	1.29E+00	U	pCi/g	
18-03105-10	TRG	B101110IFIWC019CV	03/13/18 09:45	3/22/2018	3/23/2018	18-03105	Silver-108m	EPA 901.1 Modified	8.25E-01	2.90E-01	2.93E-01	2.66E-01	U	pCi/g	
18-03105-10	TRG	B101110IFIWC019CV	03/13/18 09:45	3/22/2018	3/23/2018	18-03105	Americium-241	EPA 901.1 Modified	-1.59E-01	3.28E-01	3.28E-01	4.10E-01	U	pCi/g	
18-03105-10	TRG	B101110IFIWC019CV	03/13/18 09:45	3/22/2018	3/23/2018	18-03105	Barium-133	EPA 901.1 Modified	-2.07E-02	2.25E-01	2.25E-01	3.39E-01	U	pCi/g	
18-03105-10	TRG	B101110IFIWC019CV	03/13/18 09:45	3/22/2018	3/23/2018	18-03105	Bismuth-214	EPA 901.1 Modified	8.37E-01	3.04E-01	3.07E-01	4.62E-01		pCi/g	
18-03105-10	TRG	B101110IFIWC019CV	03/13/18 09:45	3/22/2018	3/23/2018	18-03105	Cobalt-60	EPA 901.1 Modified	7.94E+00	5.25E-01	6.65E-01	2.66E-01		pCi/g	
18-03105-10	TRG	B101110IFIWC019CV	03/13/18 09:45	3/22/2018	3/23/2018	18-03105	Cesium-134	EPA 901.1 Modified	7.59E-02	1.39E-01	1.39E-01	2.64E-01	U	pCi/g	
18-03105-10	TRG	B101110IFIWC019CV	03/13/18 09:45	3/22/2018	3/23/2018	18-03105	Cesium-137	EPA 901.1 Modified	3.03E+01	2.98E+00	3.36E+00	5.71E-01		pCi/g	
18-03105-10	TRG	B101110IFIWC019CV	03/13/18 09:45	3/22/2018	3/23/2018	18-03105	Europium-152	EPA 901.1 Modified	9.65E+01	3.80E+00	6.24E+00	1.22E+00		pCi/g	
18-03105-10	TRG	B101110IFIWC019CV	03/13/18 09:45	3/22/2018	3/23/2018	18-03105	Europium-154	EPA 901.1 Modified	4.58E+00	5.36E-01	5.85E-01	6.18E-01		pCi/g	
18-03105-10	TRG	B101110IFIWC019CV	03/13/18 09:45	3/22/2018	3/23/2018	18-03105	Europium-155	EPA 901.1 Modified	1.12E+00	4.32E-01	4.35E-01	8.31E-01		pCi/g	
18-03105-10	TRG	B101110IFIWC019CV	03/13/18 09:45	3/22/2018	3/23/2018	18-03105	Holmium-166m	EPA 901.1 Modified	3.21E-01	4.05E-01	4.05E-01	2.40E-01	U	pCi/g	
18-03105-10	TRG	B101110IFIWC019CV	03/13/18 09:45	3/22/2018	3/23/2018	18-03105	Iodine-129	EPA 901.1 Modified	-4.65E-01	2.89E-01	2.90E-01	3.54E-01	U	pCi/g	
18-03105-10	TRG	B101110IFIWC019CV	03/13/18 09:45	3/22/2018	3/23/2018	18-03105	Potassium-40	EPA 901.1 Modified	5.34E+00	1.35E+00	1.37E+00	2.44E+00	U	pCi/g	
18-03105-10	TRG	B101110IFIWC019CV	03/13/18 09:45	3/22/2018	3/23/2018	18-03105	Manganese-54	EPA 901.1 Modified	-1.06E-01	2.43E-01	2.43E-01	3.47E-01	U	pCi/g	
18-03105-10	TRG	B101110IFIWC019CV	03/13/18 09:45	3/22/2018	3/23/2018	18-03105	Niobium-94	EPA 901.1 Modified	1.12E+00	3.69E-01	3.73E-01	3.12E-01	U	pCi/g	
18-03105-10	TRG	B101110IFIWC019CV	03/13/18 09:45	3/22/2018	3/23/2018	18-03105	Lead-210	EPA 901.1 Modified	1.72E+02	1.51E+01	1.75E+01	8.21E+00		pCi/g	
18-03105-10	TRG	B101110IFIWC019CV	03/13/18 09:45	3/22/2018	3/23/2018	18-03105	Lead-212	EPA 901.1 Modified	5.60E-01	2.61E-01	2.63E-01	1.02E+00	U	pCi/g	
18-03105-10	TRG	B101110IFIWC019CV	03/13/18 09:45	3/22/2018	3/23/2018	18-03105	Lead-214	EPA 901.1 Modified	8.03E-01	3.80E-01	3.82E-01	6.73E-01		pCi/g	
18-03105-10	TRG	B101110IFIWC019CV	03/13/18 09:45	3/22/2018	3/23/2018	18-03105	Promethium-145	EPA 901.1 Modified	-1.34E+01	1.41E+00	1.57E+00	7.18E-01	U	pCi/g	
18-03105-10	TRG	B101110IFIWC019CV	03/13/18 09:45	3/22/2018	3/23/2018	18-03105	Radium-226	EPA 901.1 Modified	8.37E-01	3.04E-01	3.07E-01	4.62E-01		pCi/g	
18-03105-10	TRG	B101110IFIWC019CV	03/13/18 09:45	3/22/2018	3/23/2018	18-03105	Antimony-125	EPA 901.1 Modified	2.69E-01	5.05E-01	5.05E-01	8.11E-01	U	pCi/g	
18-03105-10	TRG	B101110IFIWC019CV	03/13/18 09:45	3/22/2018	3/23/2018	18-03105	Thorium-234	EPA 901.1 Modified	-1.93E-01	3.18E+00	3.18E+00	3.99E+00	U	pCi/g	
18-03105-10	TRG	B101110IFIWC019CV	03/13/18 09:45	3/22/2018	3/23/2018	18-03105	Thallium-208	EPA 901.1 Modified	-4.89E-01	5.93E-01	5.93E-01	6.08E-01	U	pCi/g	
18-03105-10	TRG	B101110IFIWC019CV	03/13/18 09:45	3/22/2018	3/23/2018	18-03105	Uranium-235	EPA 901.1 Modified	2.43E-01	2.90E+00	2.90E+00	1.41E+00	U	pCi/g	

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



EBERLINE ANALYTICAL CORPORATION

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

[236]

Eberline Analytical Final Report of Analysis			Report To:					Work Order Details:						
			J Alex Bohacheff					SDG: 18-03105						
			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
18-03105-11	TRG	B101110IFIWC020CV	03/14/18 09:11	3/22/2018	3/26/2018	18-03105	Actinium-228	EPA 901.1 Modified	3.51E-02	1.31E+00	1.31E+00	1.90E+00	U	pCi/g
18-03105-11	TRG	B101110IFIWC020CV	03/14/18 09:11	3/22/2018	3/26/2018	18-03105	Silver-108m	EPA 901.1 Modified	6.35E-01	4.05E-01	4.06E-01	3.76E-01	U	pCi/g
18-03105-11	TRG	B101110IFIWC020CV	03/14/18 09:11	3/22/2018	3/26/2018	18-03105	Americium-241	EPA 901.1 Modified	-6.32E-01	4.54E-01	4.55E-01	5.48E-01	U	pCi/g
18-03105-11	TRG	B101110IFIWC020CV	03/14/18 09:11	3/22/2018	3/26/2018	18-03105	Barium-133	EPA 901.1 Modified	-1.09E-01	2.72E-01	2.72E-01	5.06E-01	U	pCi/g
18-03105-11	TRG	B101110IFIWC020CV	03/14/18 09:11	3/22/2018	3/26/2018	18-03105	Bismuth-214	EPA 901.1 Modified	8.98E-01	7.23E-01	7.25E-01	9.66E-01	U	pCi/g
18-03105-11	TRG	B101110IFIWC020CV	03/14/18 09:11	3/22/2018	3/26/2018	18-03105	Cobalt-60	EPA 901.1 Modified	1.38E+01	9.34E-01	1.17E+00	5.20E-01		pCi/g
18-03105-11	TRG	B101110IFIWC020CV	03/14/18 09:11	3/22/2018	3/26/2018	18-03105	Cesium-134	EPA 901.1 Modified	-8.37E-03	1.98E-01	1.98E-01	4.41E-01	U	pCi/g
18-03105-11	TRG	B101110IFIWC020CV	03/14/18 09:11	3/22/2018	3/26/2018	18-03105	Cesium-137	EPA 901.1 Modified	4.28E-01	3.68E-01	3.69E-01	6.09E-01	U	pCi/g
18-03105-11	TRG	B101110IFIWC020CV	03/14/18 09:11	3/22/2018	3/26/2018	18-03105	Europium-152	EPA 901.1 Modified	1.32E+02	5.47E+00	8.70E+00	2.07E+00		pCi/g
18-03105-11	TRG	B101110IFIWC020CV	03/14/18 09:11	3/22/2018	3/26/2018	18-03105	Europium-154	EPA 901.1 Modified	4.00E+00	8.00E-01	8.26E-01	1.40E+00	U	pCi/g
18-03105-11	TRG	B101110IFIWC020CV	03/14/18 09:11	3/22/2018	3/26/2018	18-03105	Europium-155	EPA 901.1 Modified	9.28E-01	5.42E-01	5.44E-01	8.63E-01	U	pCi/g
18-03105-11	TRG	B101110IFIWC020CV	03/14/18 09:11	3/22/2018	3/26/2018	18-03105	Holmium-166m	EPA 901.1 Modified	2.87E-01	5.99E-01	6.00E-01	3.27E-01	U	pCi/g
18-03105-11	TRG	B101110IFIWC020CV	03/14/18 09:11	3/22/2018	3/26/2018	18-03105	Iodine-129	EPA 901.1 Modified	1.93E+00	4.77E-01	4.87E-01	1.89E+00		pCi/g
18-03105-11	TRG	B101110IFIWC020CV	03/14/18 09:11	3/22/2018	3/26/2018	18-03105	Potassium-40	EPA 901.1 Modified	4.81E+00	1.99E+00	2.01E+00	6.61E+00	U	pCi/g
18-03105-11	TRG	B101110IFIWC020CV	03/14/18 09:11	3/22/2018	3/26/2018	18-03105	Manganese-54	EPA 901.1 Modified	-1.51E-01	3.03E-01	3.03E-01	4.89E-01	U	pCi/g
18-03105-11	TRG	B101110IFIWC020CV	03/14/18 09:11	3/22/2018	3/26/2018	18-03105	Niobium-94	EPA 901.1 Modified	-4.50E-01	5.32E-01	5.32E-01	4.75E-01	U	pCi/g
18-03105-11	TRG	B101110IFIWC020CV	03/14/18 09:11	3/22/2018	3/26/2018	18-03105	Lead-210	EPA 901.1 Modified	2.22E+02	1.92E+01	2.23E+01	1.33E+01	U	pCi/g
18-03105-11	TRG	B101110IFIWC020CV	03/14/18 09:11	3/22/2018	3/26/2018	18-03105	Lead-212	EPA 901.1 Modified	3.16E-01	2.49E-01	2.50E-01	5.63E-01	U	pCi/g
18-03105-11	TRG	B101110IFIWC020CV	03/14/18 09:11	3/22/2018	3/26/2018	18-03105	Lead-214	EPA 901.1 Modified	1.39E+00	6.94E-01	6.98E-01	9.88E-01	U	pCi/g
18-03105-11	TRG	B101110IFIWC020CV	03/14/18 09:11	3/22/2018	3/26/2018	18-03105	Promethium-145	EPA 901.1 Modified	1.44E+01	2.05E+00	2.18E+00	2.24E+00	U	pCi/g
18-03105-11	TRG	B101110IFIWC020CV	03/14/18 09:11	3/22/2018	3/26/2018	18-03105	Radium-226	EPA 901.1 Modified	8.98E-01	7.23E-01	7.25E-01	9.66E-01	U	pCi/g
18-03105-11	TRG	B101110IFIWC020CV	03/14/18 09:11	3/22/2018	3/26/2018	18-03105	Antimony-125	EPA 901.1 Modified	-7.92E-01	7.94E-01	7.95E-01	1.10E+00	U	pCi/g
18-03105-11	TRG	B101110IFIWC020CV	03/14/18 09:11	3/22/2018	3/26/2018	18-03105	Thorium-234	EPA 901.1 Modified	1.42E+00	4.36E+00	4.36E+00	5.48E+00	U	pCi/g
18-03105-11	TRG	B101110IFIWC020CV	03/14/18 09:11	3/22/2018	3/26/2018	18-03105	Thallium-208	EPA 901.1 Modified	-1.58E-01	1.04E+00	1.04E+00	8.27E-01	U	pCi/g
18-03105-11	TRG	B101110IFIWC020CV	03/14/18 09:11	3/22/2018	3/26/2018	18-03105	Uranium-235	EPA 901.1 Modified	2.35E+00	3.13E+00	3.13E+00	1.92E+00	U	pCi/g

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



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: 18-03105						
			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	
18-03105-12	TRG	B101110IFIC021CV	03/13/18 09:00	3/22/2018	3/26/2018	18-03105	Actinium-228	EPA 901.1 Modified	5.61E-01	8.44E-01	8.45E-01	1.25E+00	U	pCi/g	
18-03105-12	TRG	B101110IFIC021CV	03/13/18 09:00	3/22/2018	3/26/2018	18-03105	Silver-108m	EPA 901.1 Modified	5.22E-01	2.60E-01	2.61E-01	1.97E-01	U	pCi/g	
18-03105-12	TRG	B101110IFIC021CV	03/13/18 09:00	3/22/2018	3/26/2018	18-03105	Americium-241	EPA 901.1 Modified	1.51E-02	2.82E-01	2.82E-01	3.56E-01	U	pCi/g	
18-03105-12	TRG	B101110IFIC021CV	03/13/18 09:00	3/22/2018	3/26/2018	18-03105	Barium-133	EPA 901.1 Modified	2.80E-02	1.73E-01	1.73E-01	2.65E-01	U	pCi/g	
18-03105-12	TRG	B101110IFIC021CV	03/13/18 09:00	3/22/2018	3/26/2018	18-03105	Bismuth-214	EPA 901.1 Modified	6.03E-01	2.76E-01	2.78E-01	6.00E-01		pCi/g	
18-03105-12	TRG	B101110IFIC021CV	03/13/18 09:00	3/22/2018	3/26/2018	18-03105	Cobalt-60	EPA 901.1 Modified	8.85E+00	5.76E-01	7.33E-01	2.83E-01		pCi/g	
18-03105-12	TRG	B101110IFIC021CV	03/13/18 09:00	3/22/2018	3/26/2018	18-03105	Cesium-134	EPA 901.1 Modified	3.89E-02	1.25E-01	1.25E-01	2.38E-01	U	pCi/g	
18-03105-12	TRG	B101110IFIC021CV	03/13/18 09:00	3/22/2018	3/26/2018	18-03105	Cesium-137	EPA 901.1 Modified	1.95E-03	2.35E-01	2.35E-01	3.42E-01	U	pCi/g	
18-03105-12	TRG	B101110IFIC021CV	03/13/18 09:00	3/22/2018	3/26/2018	18-03105	Europium-152	EPA 901.1 Modified	8.14E+01	3.22E+00	5.28E+00	1.04E+00		pCi/g	
18-03105-12	TRG	B101110IFIC021CV	03/13/18 09:00	3/22/2018	3/26/2018	18-03105	Europium-154	EPA 901.1 Modified	2.81E+00	4.45E-01	4.68E-01	5.25E-01		pCi/g	
18-03105-12	TRG	B101110IFIC021CV	03/13/18 09:00	3/22/2018	3/26/2018	18-03105	Europium-155	EPA 901.1 Modified	1.04E+00	4.30E-01	4.34E-01	5.55E-01	U	pCi/g	
18-03105-12	TRG	B101110IFIC021CV	03/13/18 09:00	3/22/2018	3/26/2018	18-03105	Holmium-166m	EPA 901.1 Modified	2.32E-01	3.83E-01	3.83E-01	2.00E-01	U	pCi/g	
18-03105-12	TRG	B101110IFIC021CV	03/13/18 09:00	3/22/2018	3/26/2018	18-03105	Iodine-129	EPA 901.1 Modified	1.05E+00	2.07E-01	2.14E-01	2.96E-01	U	pCi/g	
18-03105-12	TRG	B101110IFIC021CV	03/13/18 09:00	3/22/2018	3/26/2018	18-03105	Potassium-40	EPA 901.1 Modified	8.06E+00	1.70E+00	1.75E+00	2.10E+00		pCi/g	
18-03105-12	TRG	B101110IFIC021CV	03/13/18 09:00	3/22/2018	3/26/2018	18-03105	Manganese-54	EPA 901.1 Modified	1.74E-01	2.24E-01	2.24E-01	3.34E-01	U	pCi/g	
18-03105-12	TRG	B101110IFIC021CV	03/13/18 09:00	3/22/2018	3/26/2018	18-03105	Niobium-94	EPA 901.1 Modified	8.24E-01	3.31E-01	3.34E-01	2.91E-01	U	pCi/g	
18-03105-12	TRG	B101110IFIC021CV	03/13/18 09:00	3/22/2018	3/26/2018	18-03105	Lead-210	EPA 901.1 Modified	1.43E+02	1.27E+01	1.47E+01	7.12E+00		pCi/g	
18-03105-12	TRG	B101110IFIC021CV	03/13/18 09:00	3/22/2018	3/26/2018	18-03105	Lead-212	EPA 901.1 Modified	2.89E-01	2.72E-01	2.72E-01	3.54E-01	U	pCi/g	
18-03105-12	TRG	B101110IFIC021CV	03/13/18 09:00	3/22/2018	3/26/2018	18-03105	Lead-214	EPA 901.1 Modified	5.42E-01	2.99E-01	3.01E-01	5.09E-01		pCi/g	
18-03105-12	TRG	B101110IFIC021CV	03/13/18 09:00	3/22/2018	3/26/2018	18-03105	Promethium-145	EPA 901.1 Modified	-1.06E+01	1.15E+00	1.27E+00	6.09E-01	U	pCi/g	
18-03105-12	TRG	B101110IFIC021CV	03/13/18 09:00	3/22/2018	3/26/2018	18-03105	Radium-226	EPA 901.1 Modified	6.03E-01	2.76E-01	2.78E-01	6.00E-01		pCi/g	
18-03105-12	TRG	B101110IFIC021CV	03/13/18 09:00	3/22/2018	3/26/2018	18-03105	Antimony-125	EPA 901.1 Modified	5.50E-03	3.85E-01	3.85E-01	6.12E-01	U	pCi/g	
18-03105-12	TRG	B101110IFIC021CV	03/13/18 09:00	3/22/2018	3/26/2018	18-03105	Thorium-234	EPA 901.1 Modified	4.76E-01	2.77E+00	2.77E+00	3.51E+00	U	pCi/g	
18-03105-12	TRG	B101110IFIC021CV	03/13/18 09:00	3/22/2018	3/26/2018	18-03105	Thallium-208	EPA 901.1 Modified	3.56E-01	3.57E-01	3.57E-01	5.12E-01	U	pCi/g	
18-03105-12	TRG	B101110IFIC021CV	03/13/18 09:00	3/22/2018	3/26/2018	18-03105	Uranium-235	EPA 901.1 Modified	-3.18E-01	2.44E+00	2.44E+00	1.19E+00	U	pCi/g	

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



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Attachment 1 – Chain-of-Custody Form

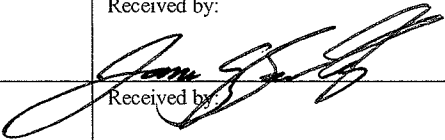
18-03105

Sample ID	Sample Log	Matrix	Sample Type	Sample Container				Sample Date	Sample Time	Analysis Type	Preservative	Remarks
				Vol	Unit	Type	Qty					
B101110FIWC001CV	N/A	CONCRETE	CONCRETE	57.94	cm ³	Puck	1	03/15/2018	0835	5ROC/HTD/H3	N/A	0.0-0.5" 134.18g
B101110FIWC003CV	N/A	CONCRETE	CONCRETE	57.94	cm ³	Puck	1	03/14/2018	1413	5ROC/HTD/H3	N/A	0.0-0.5" 114.73g
B101110FIWC004CV	N/A	CONCRETE	CONCRETE	57.94	cm ³	Puck	1	03/15/2018	0815	5ROC/HTD/H3	N/A	0.0-0.5" 144.21g
B101110FIFC005CV	N/A	CONCRETE	CONCRETE	57.94	cm ³	Puck	1	03/15/2018	0930	5ROC/HTD/H3	N/A	0.0-0.5" 73.42g
B101110FIFC006CV	N/A	CONCRETE	CONCRETE	57.94	cm ³	Puck	1	03/15/2018	0950	5ROC/HTD/H3	N/A	0.0-0.5" 135.85g
B101110FIFC008CV	N/A	CONCRETE	CONCRETE	57.94	cm ³	Puck	1	03/14/2018	1440	5ROC/HTD/H3	N/A	0.0-0.5" 112.38g
B101110FIWC010CV	N/A	CONCRETE	CONCRETE	57.94	cm ³	Puck	1	03/14/2018	1356	5ROC/HTD/H3	N/A	0.0-0.5" 114.63g
B101110FIWC011CV	N/A	CONCRETE	CONCRETE	57.94	cm ³	Puck	1	03/14/2018	1329	5ROC/HTD/H3	N/A	0.0-0.5" 122.03g
B101110FIWC018CV	N/A	CONCRETE	CONCRETE	57.94	cm ³	Puck	1	03/14/2018	0948	5ROC/HTD/H3	N/A	0.0-0.5" 130.80g
B101110FIWC019CV	N/A	CONCRETE	CONCRETE	57.94	cm ³	Puck	1	03/14/2018	1030	5ROC/HTD/H3	N/A	0.0-0.5" 88.20g
B101110FIFC003CV	N/A	CONCRETE	CONCRETE	57.94	cm ³	Puck	1	03/13/2018	0845	5ROC/HTD/H3	N/A	0.0-0.5" 143.35g
B101110FIWC014CV	N/A	CONCRETE	CONCRETE	57.94	cm ³	Puck	1	03/13/2018	1510	5ROC/HTD/H3	N/A	0.0-0.5" 164.81g
B101110FIWC015CV	N/A	CONCRETE	CONCRETE	57.94	cm ³	Puck	1	03/13/2018	1325	5ROC/HTD/H3	N/A	0.0-0.5" 108.97g
B101110FIWC016CV	N/A	CONCRETE	CONCRETE	57.94	cm ³	Puck	1	03/13/2018	1430	5ROC/HTD/H3	N/A	0.0-0.5" 115.55g

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8	B101110IFIWC017CV	N/A	CONCRETE	CONCRETE	57.94	cm ³	Puck	1	03/13/2018	1007	5ROC/HTD/H3	N/A	0.0-0.5" 155.47g
9	B101110IFIWC018CV	N/A	CONCRETE	CONCRETE	57.94	cm ³	Puck	1	03/13/2018	1400	5ROC/HTD/H3	N/A	0.0-0.5" 91.78g
10	B101110IFIWC019CV	N/A	CONCRETE	CONCRETE	57.94	cm ³	Puck	1	03/13/2018	0945	5ROC/HTD/H3	N/A	0.0-0.5" 162.88g
11	B101110IFIWC020CV	N/A	CONCRETE	CONCRETE	57.94	cm ³	Puck	1	03/14/2018	0911	5ROC/HTD/H3	N/A	0.0-0.5" 88.81g
12	B101110IFIFC021CV	N/A	CONCRETE	CONCRETE	57.94	cm ³	Puck	1	03/13/2018	0900	5ROC/HTD/H3	N/A	0.0-0.5" 162.07g
Laboratory:			Date Submitted To Lab:			Ship Container No.:		Cooler Temperature:		Airbill Number:			
Eberline Labs						N/A		N/A		Fed Ex 8107-0645-6699			
Relinquished by:		Date (mm/dd/yyyy):	Time:		Received by:		Date: (mm/dd/yyyy):		Time:				
ALEX BOHACHEFF		03/21/2018	1100		Richard E. Ricker		03/21/2018		1100				
Relinquished by:		Date (mm/dd/yyyy):	Time:		Received by:		Date: (mm/dd/yyyy):		Time:				
Richard E. Ricker		03/21/2018	1600		Fed Ex		03/21/2018		1600				
Relinquished by:		Date (mm/dd/yyyy):	Time:		Received by:		Date: (mm/dd/yyyy):		Time:				
							3-22-18		0800				
Relinquished by:		Date (mm/dd/yyyy):	Time:		Received by:		Date: (mm/dd/yyyy):		Time:				
Comments													
PO# 677118 14 day turnaround 5-ROC / HTD / H-3													