ERM

0526033
Henning Management

STANDARD LEVEL IV
REPORT OF ANALYSIS

WORK ORDER #20-03062-OR

April 20, 2020

EBERLINE ANALYTICAL/OAK RIDGE LABORATORY
OAK RIDGE, TN

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Eberline Services – Oak Ridge Laboratory

LABORATORY DATA SUPPORT CHECKLIST

MP-001-3

Eberline Services Work Order # 20-03062

The checklist items listed below are to be initialed by appropriate staff upon completion/verification.

Date for Partial	Initials	Date	Initials	Checklist Items
		3/12/20	[illegible]	Sample Log-In
		3/24/20	[illegible]	Data Compilation
		3-27-20	[illegible]	First Technical Data Review
		3/30/20	DB	Second Technical Data Review
		4/15/20	CW	Data Entry/Electronic Deliverable
		4/15/20	CW	Case Narrative
		4/17/20	EyT	Electronic Deliverable Proof
		4/17/20	DB	Samples Analyzed within Holding Time Yes? ✓ No?
		4/17/20	JB	QA/QC Review
		4/20/20	EyT	Client in Possession of Data Electronic or Hard Copy
				Invoiced by Laboratory

Technical/Clerical Corrections, Signatures Needed, Problems, Etc	Date/Initials

Date package approved by: [signature] 4/24/20

Laboratory Manager Date

SECTION I

CHAIN OF CUSTODY
& pH CHECK

Chain of Custody Record

№

Eberline Services
601 Scarboro Road
Oak Ridge, TN 37830
(865) 481-0683 Phone • (865) 483-4621 Fax

EBERLINE SERVICES

REC'D MAR 12 2020

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20F03062

Purchase Order #: ______

Project Name: Henning Management		Project Number: 0526033	
Send Report To: David Angle		Sampler (Print Name): David Sanguinetti	
Address: 840 W Sam Houston Pkwy		Sampler (Print Name):	
Houston, TX 77024		Shipment Method: FedEx Ground	
		Airbill Number:	
Phone: 832-786-4781		Laboratory Receiving:	
Fax:			

Analysis Requested: Rad 226, Rad 228

	Field Sample ID	Sample Date	Sample Time	Sample Matrix	Number of Containers	Rad 226	Rad 228	Comments, Special Instructions, etc.	Lab Sample ID (to be completed by lab)
4	H-12 (50-60)	3/5/20	1105	W	1	X	X		
5	H-9 (50-55)	3/5/20	1335	|	|	|	|		
6	H-10 (35-40)	3/5/20	1530	|	|	|	|		
7	H-2 (30-35)	3/5/20	1655	|	|	|	|		
8	H-16 (35-40)	3/6/20	0815	|	|	|	|		
9	H-18 (35-40)	3/6/20	0950	|	|	|	|		
10	H-3 (22-27)	3/6/20	1315	|	|	|	|		
11	H-1 (35-40)	3/6/20	1110	|	|	|	|		

Relinquished by: (Signature)	Received by: (Signature)	Date:	Time:
D S [signature]	Randolph Spencer #52 3-12-20	3/9/20	1600
Relinquished by: (Signature)	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Received by: (Signature)	Date:	Time:

Sample Custodian Remarks (Completed By Laboratory):

QA/QC Level		Turnaround		Sample Receipt	
Level I	☐	Routine	☑	Total # Containers Received?	
Level II	☐	24 Hour	☐	COC Seals Present?	
Level III	☐	1 Week	☐	COC Seals Intact?	
Other	☐	Other ______		Received Containers Intact?	
				Temperature?	

EBERLINE SERVICES
Oak Ridge Laboratory

Internal Chain of Custody

Work Order #	20-03062
Lab Deadline	3/27/2020
Analysis	Ra226 - Level 4
Sample Matrix	Water

Comments	Sample Fraction	HP 210 / 270 Detector Activity	Storage Location
	04	50	MM1.4
	05	20	MM1.4
	06	20	MM1.4
	07	30	MM1.4
	08	30	MM1.4
	09	30	MM1.4
	10	30	MM1.4
	11	30	MM1.4

	Location (circle one)					Initials	Date
Received by	(Sample Storage)	Rough Prep	Prep	Separations	Count Room	[illegible]	3/16/2020 0930
Relinquished by	Sample Storage	Rough Prep	(Prep)	Separations	Count Room	[illegible]	3/17/2020 0830
Received by	Sample Storage	Rough Prep	Prep	(Separations)	Count Room	DB 3/17/20	0835
Relinquished by	Sample Storage	Rough Prep	Prep	(Separations)	Count Room	DB 3/18/20	1235
Received by	Sample Storage	Rough Prep	Prep	Separations	(Count Room)	ICB 3/18/20	1236
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	(Count Room)	ICB 3/18/20	1657
Received by	(Sample Storage)	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		

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EBERLINE SERVICES
Oak Ridge Laboratory

Internal Chain of Custody

Work Order #	**20-03062**
Lab Deadline	**3/27/2020**
Analysis	**Ra228 - Level 4**
Sample Matrix	**Water**

Comments	Sample Fraction	HP 210 / 270 Detector Activity	Storage Location
	04	50	MM1.4
	05	20	MM1.4
	06	20	MM1.4
	07	30	MM1.4
	08	30	MM1.4
	09	30	MM1.4
	10	30	MM1.4
	11	30	MM1.4

	Location (circle one)					Initials	Date
Received by	(Sample Storage)	Rough Prep	Prep	Separations	Count Room	[illegible]	3/16/2020 0730
Relinquished by	Sample Storage	Rough Prep	(Prep)	Separations	Count Room	[illegible]	3/17/2020 0830
Received by	Sample Storage	Rough Prep	Prep	(Separations)	Count Room	DB 3/17/20	0835
Relinquished by	Sample Storage	Rough Prep	Prep	(Separations)	Count Room	DB 3/18/20	1235
Received by	Sample Storage	Rough Prep	Prep	Separations	(Count Room)	KB 3/18/20	1236
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	(Count Room)	KB 3/18/20	1605
Received by	Sample Storage	Rough Prep	Prep	(Separations)	Count Room	DB 3/19/20	0825
Relinquished by	Sample Storage	Rough Prep	Prep	(Separations)	Count Room	DB 3/23/20	1215
Received by	Sample Storage	Rough Prep	Prep	Separations	(Count Room)	KB 3/23/20	1220
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	(Count Room)	KB 3/23/20	1425
Received by	(Sample Storage)	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		

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EBERLINE SERVICES
Oak Ridge Laboratory

Internal Chain of Custody

Work Order #	20-03062
Lab Deadline	3/12/2020
Analysis	TDS - Level 4
Sample Matrix	Water

Comments

Sample Fraction	HP 210 / 270 Detector Activity	Storage Location
04	50	MM1.4
05	20	MM1.4
06	20	MM1.4
07	30	MM1.4
08	30	MM1.4
09	30	MM1.4
10	30	MM1.4
11	30	MM1.4

	Location (circle one)					Initials	Date
Received by	Sample Storage (circled)	Rough Prep (circled)	Prep	Separations	Count Room 0900	[illegible]	3-13-20
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	MG	16MAR20 3/30
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		

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EBERLINE SERVICES

Sample Receiving Report
(Volumes, pH, & CPM)

Internal Work Order: **20-03062**

Received By: RSPENCER

FR	ClientID	# Btls	Comments	Matrix	Storage	Rec Vol Ttl	CPM Max
01	LCS	0		WA	MM1.4		
02	BLANK	0		WA	MM1.4		
03	DUP	0		WA	MM1.4		
04	H-12 50-60	1		WA	MM1.4	3.76	50
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	7	7	3.7600	50
05	H-9 50-55	1		WA	MM1.4	3.76	20
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	7	7	3.7600	20
06	H-10 35-40	1		WA	MM1.4	3.76	20
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	7	7	3.7600	20
07	H-2 30-35	1		WA	MM1.4	3.76	30
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	7	7	3.7600	30
08	H-16 35-40	1		WA	MM1.4	3.76	30
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	7	7	3.7600	30
09	H-18 35-40	1		WA	MM1.4	3.76	30
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	7	7	3.7600	30
10	H-3 22-27	1		WA	MM1.4	3.76	30
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	7	7	3.7600	30
11	H-1 35-40	1		WA	MM1.4	3.76	30
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	7	7	3.7600	30

3/12/20

Received by: Randolph Spencer Date: 3-12-20

SECTION II

SAMPLE ACKNOWLEDGEMENT

Client Name	Contract/PO	Project Type	Date Received	Required Turnaround Days	Eberline Services Work Order
ERM	0526033	Environmental	03/12/2020	21	20-03062
Project Name	**Client WO**	**Sample Disp**	**Lab Deadline**	**Internal Deadline**	**Client Deadline**
Henning Management	0526033	W	03/27/2020	04/02/2020	04/02/2020

Internal ID	Client ID	Sample Date	Matrix	Storage	Ra226	Ra228	TDS																						Ttl
01	LCS	03/12/20	WA	MM1.4	X	X	X																						3
02	BLANK	03/12/20	WA	MM1.4	X	X	X																						3
03	DUP	03/12/20	WA	MM1.4	X	X	X																						3
04	H-12 50-60	03/05/20 11:05	WA	MM1.4	X	X	X																						3
05	H-9 50-55	03/05/20 13:35	WA	MM1.4	X	X	X																						3
06	H-10 35-40	03/05/20 15:30	WA	MM1.4	X	X	X																						3
07	H-2 30-35	03/05/20 16:55	WA	MM1.4	X	X	X																						3
08	H-16 35-40	03/06/20 08:15	WA	MM1.4	X	X	X																						3
09	H-18 35-40	03/06/20 09:50	WA	MM1.4	X	X	X																						3
10	H-3 22-27	03/06/20 13:15	WA	MM1.4	X	X	X																						3
11	H-1 35-40	03/06/20 11:10	WA	MM1.4	X	X	X																						3
																													0
																													0
																													0
																													0
																													0
																													0
																													0
																													0
																													0
Totals Per Analysis (non QA samples)					8	8	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

EBERLINE SERVICES

Sample Log In Report

Oak Ridge Laboratory
601 Scarboro Rd.
Oak Ridge, TN 37830

Voice: (865) 481-0683
Fax: (865) 483-4621

Invoice		Report Data	
	Accounts Payable		Dave Angle
	ERM		ERM
	840 W Sam Houston Pkwy N Suite 600		840 W Sam Houston Pkwy N Suite 600
	Houston, TX 77024		Houston, TX 77024
Voice	281-242-5700	Voice	281-242-5700
Fax	281-520-4625	Fax	281-242-1737
Contact	Dave Angle		
Voice	281-242-5700		
Fax	281-242-1737		

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Eberline Services – Oak Ridge Laboratory

SAMPLE RECEIPT CHECKLIST
MP-001-2

WORK ORDER # 20F03062

SAMPLE MATRIX/MATRICES:

(CIRCLE ONE OR BOTH)

(AQUEOUS) NON-AQUEOUS

(CIRCLE EITHER YES, NO, OR N/A)

WERE SAMPLES:

Received in good condition?	(Y)	N	
If aqueous, properly preserved	(Y)	N	N/A

WERE CHAIN OF CUSTODY SEALS:

Present on outside of package?	(Y)	N
Unbroken on outside of package?	(Y)	N
Present on samples?	(Y)	N
Unbroken on samples?	(Y)	N
Was chain of custody present upon sample receipt?	(Y)	N

IF THE RESPONSE TO ANY OF THE ABOVE IS **NO**, A DISCREPANT SAMPLE RECEIPT REPORT (DSR) HAS BEEN ISSUED.

REMARKS: _____

SIGNATURE: Randolph Spencer DATE: 3-12-20

SECTION III

CASE NARRATIVE

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

EBS-OR-47097

April 20, 2020

Dave Angle
ERM
840 W Sam Houston Pkwy N #600
Houston, TX 77478

CASE NARRATIVE
Work Order # 20-03062-OR

SAMPLE RECEIPT

This work order contains eight water samples received 03/12/2020. Samples were analyzed for Radium-226/228 and Total Dissolved Solids.

CLIENT ID	LAB ID	CLIENT ID	LAB ID
H-12 50-60	20-03062-04	H-16 35-40	20-03062-08
H-9 50-55	20-03062-05	H-18 35-40	20-03062-09
H-10 35-40	20-03062-06	H-3 22-27	20-03062-10
H-2 30-35	20-03062-07	H-1 35-40	20-03062-11

ANALYTICAL METHODS

Radium-226 was analyzed using EPA Method 903.0 Modified. Radium-228 was analyzed using EPA Method 904.0. Total Dissolved Solids were performed using Standard Methods 2540C.

ANALYTICAL RESULTS

Combined Standard Uncertainty is reported at 1-sigma value.

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

SPECIAL CIRCUMSTANCES

Chemical recovery for sample fraction -08 (Client ID: H-16 35-40) was low. Due to this circumstance, chemical recovery was estimated at 100 percent.

ANALYTICAL RESULTS CONTINUED

RADIUM-226

Samples were prepared by removing representative aliquots followed by mixed acid digestions as appropriate. This was followed by precipitations of Radium/Barium Sulfate. Precipitates were dissolved in alkaline EDTA. Radium was selectively precipitated and then mounted on micro-porous filter media. Samples were counted by alpha spectroscopy using an energy specific region of interest for Radium-226. The final result was corrected for inherent self-absorption from elemental Barium. Chemical recovery was calculated using a Barium-133 tracer, which was determined by HPGe gamma spectroscopy.

Samples demonstrated acceptable results for all Radium-226 analyses. Sample fractions -04 and -05 (Client ID: H-12 50-60 and H-9 50-55) demonstrated slightly high method detection limits. Chemical recovery was acceptable for all samples. The Radium-226 method blank demonstrated an acceptable result. Results for the Radium-226 duplicate demonstrated an acceptable relative percent difference and normalized difference. Results for the Radium-226 laboratory control sample demonstrated an acceptable percent recovery.

RADIUM-228

Following alpha spectroscopy analysis of Radium-226, Barium/Radium Sulfate precipitates were redissolved and allowed for sufficient ingrowth of the Actinium-228 daughter. After ingrowth, Actinium-228 was selectively precipitated. Precipitates were filtered and beta emissions for Actinium-228 were then counted on a gas proportional counter. Chemical recovery was determined using a Barium-133 tracer, the activity of which was determined by HPGe gamma spectroscopy and an elemental Yttrium carrier by gravimetric measurements. The product of these two recoveries was used to calculate chemical yield.

Samples demonstrated acceptable results for all Radium-228 analyses. Chemical recovery was acceptable for all samples. The Radium-228 method blank demonstrated an acceptable result. Results for the Radium-228 duplicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Radium-228 laboratory control sample demonstrated an acceptable percent recovery.

TOTAL DISSOLVED SOLIDS (TDS)

A volumetric aliquot of each sample was filtered through 0.45µm filter media into a tared 250 ml beaker. Samples were dried on a hot plate and allowed to cool. The TDS content was determined by reweighing tared beakers.

Samples demonstrated Total Dissolved Solids content that ranged from 239.0 to 64,986.0 mg/L.

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: 4/20/2020

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.

SECTION IV

ANALYTICAL RESULTS SUMMARY

Eberline Analytical
Final Report of Analysis

Report To:
Dave Angle
ERM
840 W Sam Houston Pkwy N Suite 600
Houston, TX 77024

Work Order Details:
SDG: 20-03062
Project: 0526033 Henning Management
Analysis Category: ENVIRONMENTAL
Sample Matrix: WA

Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Report Units
20-03062-01	LCS	KNOWN	03/12/20 00:00	3/12/2020	3/18/2020	20-03062	Radium-226	EPA 903.0 Modified	9.90E+00	4.56E-01			pCi/l
20-03062-01	LCS	SPIKE	03/12/20 00:00	3/12/2020	3/18/2020	20-03062	Radium-226	EPA 903.0 Modified	9.65E+00	1.47E+00	2.52E+00	3.47E-01	pCi/l
20-03062-02	MBL	BLANK	03/12/20 00:00	3/12/2020	3/18/2020	20-03062	Radium-226	EPA 903.0 Modified	2.34E-02	9.75E-02	9.76E-02	2.50E-01	pCi/l
20-03062-03	DUP	H-10 35-40	03/05/20 15:30	3/12/2020	3/18/2020	20-03062	Radium-226	EPA 903.0 Modified	5.51E-01	2.74E-01	2.97E-01	1.45E-01	pCi/l
20-03062-04	TRG	H-12 50-60	03/05/20 11:05	3/12/2020	3/18/2020	20-03062	Radium-226	EPA 903.0 Modified	6.79E-01	8.88E-01	9.00E-01	1.36E+00	pCi/l
20-03062-05	TRG	H-9 50-55	03/05/20 13:35	3/12/2020	3/18/2020	20-03062	Radium-226	EPA 903.0 Modified	3.94E-01	8.22E-01	8.26E-01	1.57E+00	pCi/l
20-03062-06	DO	H-10 35-40	03/05/20 15:30	3/12/2020	3/18/2020	20-03062	Radium-226	EPA 903.0 Modified	6.15E-01	3.71E-01	3.93E-01	3.67E-01	pCi/l
20-03062-07	TRG	H-2 30-35	03/05/20 16:55	3/12/2020	3/18/2020	20-03062	Radium-226	EPA 903.0 Modified	2.56E-01	2.10E-01	2.16E-01	2.57E-01	pCi/l
20-03062-08	TRG	H-16 35-40	03/06/20 08:15	3/12/2020	3/18/2020	20-03062	Radium-226	EPA 903.0 Modified	-2.69E-02	8.56E-02	8.58E-02	2.83E-01	pCi/l
20-03062-09	TRG	H-18 35-40	03/06/20 09:50	3/12/2020	3/18/2020	20-03062	Radium-226	EPA 903.0 Modified	1.15E+00	4.32E-01	4.96E-01	2.44E-01	pCi/l
20-03062-10	TRG	H-3 22-27	03/06/20 13:15	3/12/2020	3/18/2020	20-03062	Radium-226	EPA 903.0 Modified	1.74E-01	1.95E-01	1.99E-01	2.76E-01	pCi/l
20-03062-11	TRG	H-1 35-40	03/06/20 11:10	3/12/2020	3/18/2020	20-03062	Radium-226	EPA 903.0 Modified	1.26E+00	5.01E-01	5.67E-01	2.81E-01	pCi/l
20-03062-01	LCS	KNOWN	03/12/20 00:00	3/12/2020	3/23/2020	20-03062	Radium-228	EPA 904.0	9.03E+00	4.60E-01			pCi/l
20-03062-01	LCS	SPIKE	03/12/20 00:00	3/12/2020	3/23/2020	20-03062	Radium-228	EPA 904.0	9.42E+00	7.60E-01	2.26E+00	8.78E-01	pCi/l
20-03062-02	MBL	BLANK	03/12/20 00:00	3/12/2020	3/23/2020	20-03062	Radium-228	EPA 904.0	1.83E-01	3.95E-01	3.97E-01	8.23E-01	pCi/l
20-03062-03	DUP	H-10 35-40	03/05/20 15:30	3/12/2020	3/23/2020	20-03062	Radium-228	EPA 904.0	1.19E+00	4.38E-01	5.14E-01	8.05E-01	pCi/l
20-03062-04	TRG	H-12 50-60	03/05/20 11:05	3/12/2020	3/23/2020	20-03062	Radium-228	EPA 904.0	1.40E+00	7.62E-01	8.26E-01	1.47E+00	pCi/l
20-03062-05	TRG	H-9 50-55	03/05/20 13:35	3/12/2020	3/23/2020	20-03062	Radium-228	EPA 904.0	3.93E-01	5.69E-01	5.76E-01	1.17E+00	pCi/l
20-03062-06	DO	H-10 35-40	03/05/20 15:30	3/12/2020	3/23/2020	20-03062	Radium-228	EPA 904.0	2.02E+00	6.18E-01	7.69E-01	1.10E+00	pCi/l
20-03062-07	TRG	H-2 30-35	03/05/20 16:55	3/12/2020	3/23/2020	20-03062	Radium-228	EPA 904.0	4.16E-01	5.26E-01	5.34E-01	1.08E+00	pCi/l
20-03062-08	TRG	H-16 35-40	03/06/20 08:15	3/12/2020	3/23/2020	20-03062	Radium-228	EPA 904.0	1.04E-01	3.90E-01	3.91E-01	8.25E-01	pCi/l
20-03062-09	TRG	H-18 35-40	03/06/20 09:50	3/12/2020	3/23/2020	20-03062	Radium-228	EPA 904.0	4.81E-01	6.46E-01	6.55E-01	1.33E+00	pCi/l
20-03062-10	TRG	H-3 22-27	03/06/20 13:15	3/12/2020	3/23/2020	20-03062	Radium-228	EPA 904.0	4.48E-01	5.10E-01	5.20E-01	1.04E+00	pCi/l
20-03062-11	TRG	H-1 35-40	03/06/20 11:10	3/12/2020	3/23/2020	20-03062	Radium-228	EPA 904.0	1.92E+00	5.32E-01	6.87E-01	9.25E-01	pCi/l

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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
Final Report of Analysis

Report To:
Dave Angle
ERM
840 W Sam Houston Pkwy N Suite 600
Houston, TX 77024

Work Order Details:

SDG:	20-03062
Project:	0526033 Henning Management
Analysis Category:	ENVIRONMENTAL
Sample Matrix:	WA

Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Report Units
20-03062-04	TRG	H-12 50-60	03/05/20 11:05	3/12/2020	3/16/2020	20-03062	TDS	SM2540C	6.50E+04				mg/l
20-03062-05	TRG	H-9 50-55	03/05/20 13:35	3/12/2020	3/16/2020	20-03062	TDS	SM2540C	3.84E+04				mg/l
20-03062-06	TRG	H-10 35-40	03/05/20 15:30	3/12/2020	3/16/2020	20-03062	TDS	SM2540C	2.24E+03				mg/l
20-03062-07	TRG	H-2 30-35	03/05/20 16:55	3/12/2020	3/16/2020	20-03062	TDS	SM2540C	2.77E+03				mg/l
20-03062-08	TRG	H-16 35-40	03/06/20 08:15	3/12/2020	3/16/2020	20-03062	TDS	SM2540C	2.36E+04				mg/l
20-03062-09	TRG	H-18 35-40	03/06/20 09:50	3/12/2020	3/16/2020	20-03062	TDS	SM2540C	6.43E+03				mg/l
20-03062-10	TRG	H-3 22-27	03/06/20 13:15	3/12/2020	3/16/2020	20-03062	TDS	SM2540C	2.39E+02				mg/l
20-03062-11	TRG	H-1 35-40	03/06/20 11:10	3/12/2020	3/16/2020	20-03062	TDS	SM2540C	1.98E+03				mg/l

0019

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

SECTION V

ANALYTICAL STANDARD

Ra-5

QA/QC REVIEWED
Date 2/8/94 Initials WT

CERTIFICATE OF CALIBRATION
ALPHA STANDARD SOLUTION

Radionuclide:	Ra-226	Customer:	TMA EBERLINE
Half Life:	1600 ± 7 years	P.O.No.:	VH1888
Catalog No.:	7226	Reference Date:	February 1 1994 12:00 PST.
Source No.:	453-26	Contained Radioactivity: (Ra-226)	1.001 μCi.
		Contained Radioactivity: (Ra-226)	37.0 kBq.

Description of Solution

a. Mass of solution:	5.1864 g (in a 5 ml Flame Sealed Ampoule)	
b. Chemical form:	Ra(NO3)2 in 1 N HNO3	
c. Carrier content:	None added	
d. Density:	1.0318	g/ml @ 20°C.

Radioimpurities: None detected(other than daughters)

Radioactive Daughters
Rn-222, Po-218, At-218, Pb-214, Bi-214, Po-214, Tl-210, Pb-210, Bi-210, Po-210 and Tl-206.

Radionuclide Concentration

(Ra-226) 0.1929 μCi/g.

Method of Calibration

Weighed aliquots of the solution were assayed using gamma spectrometry:
Energy peak(s) integrated under: 186 keV.
Branching ratio(s) used: 0.0351 gamma rays per decay.

Uncertainty of Measurement

a. Systematic uncertainty in instrument calibration:	±3.4%
b. Random uncertainty in assay:	±3.1%
c. Random uncertainty in weighing(s):	±0.2%
d. Total uncertainty at the 99% confidence level:	±4.6%

NIST Traceability

This calibration is implicitly traceable to the National Institute of Standards and Technology.

Leak Test(s)

See reverse side for Leak Test(s) applied to this source.

Notes

1. Nuclear data were taken from "Table of Radioactive Isotopes", edited by Virginia S. Shirley, 1986.
2. IPL participates in an NIST measurement assurance program to establish and maintain implicit traceability for a number of nuclides, based on the blind assay (and later NIST certification) of Standard Reference Materials (As in NRC Regulatory Guide 4.15).

Ana U. Kuen
QUALITY CONTROL

Feb. 3, 1994
Date Signed

ISOTOPE PRODUCTS LABORATORIES
1800 North Keystone Street
Burbank, California 91504
(818) 843 - 7000

EBERLINE SERVICES

QUALITY CONTROL PROGRAM

MP 009

Rev.8; 11/01/03
Title: Radioactive Reference Standards Solutions & Records

EBERLINE SERVICES - OAK RIDGE LABORATORY
RADIOACTIVE REFERENCE SOLUTIONS
PRIMARY DILUTION RECERTIFICATION
MP 009

		CURRENT DATE	9/12/2019 0:00
SOLUTION REFERENCE #	IPL 453-26	**SOLUTION #**	Ra-5

Principal Radionuclide	**Half Life, Years**	**Half Life, Days**
^{226}Radium	1.600E+03	5.844E+05

Radionuclide	^{226}Radium	**Reference Date**	2/1/1994 0:00
Certified Activity	1.001E+00	µCi	
Certified Concentration		µCi per gram	

Ampoule /Solution Gross		**Weight, Grams**
Empty Ampoule		**Weight, Grams**
Solution Net		**Weight, Grams**
Total Activity in Ampoule	1.0010	µCi

Chemical Composition of Standard Solution

$^{226}Ra(NO_3)_2$ in 1M HNO_3

Dilution Instructions: **Dilution Solvent Used** 1M HNO_3

Dilute to a volume of 1000.00 **milliliters**

Certified Total Activity of 1.0010 µCi **Which Equals** 2.222E+06 **dpm at the date listed above**

And after dilution the activity of this solution is **2.222E+03** **dpm/ml**

This activity concentration is based on the original reference date listed above. All activities are corrected to the date and time of analysis by the laboratory data processing software.

Expiration Date: September 9, 2020

Verified & Approved By _____ Date: 9/12/2019

QC Approval _____ Date: 9/16/19

EBERLINE SERVICES

QUALITY CONTROL PROGRAM
MP 009

Rev.8; 11/01/03
Title: **Radioactive Reference Standards Solutions & Records**

EBERLINE SERVICES - OAK RIDGE LABORATORY
RADIOACTIVE REFERENCE STANDARD SOLUTIONS
SECONDARY DILUTION RECERTIFICATION

	MP 009	Date	9/12/2019 0:00
Solution Reference #	IPL-453-26	Solution #	Ra-5b

Principal Radionuclide	Half Life, Years	Half Life, Days
^{226}Radium	1.600E+03	5.844E+05

Radionuclide of Interest: ^{226}Radium
Parent Solution Conc.: 2.22E+03 dpm/ml

Reference Date: 2/1/1994 0:00

Chemical Composition of Standard Solution
$^{226}Ra(NO_3)_2$ in 1M HNO_3

Dilution Instructions:

Dilution Solvent Used: 1M HNO_3

SECONDARY VOLUMETRIC DILUTION

Vol. Parent Solution:	20.0000	ml
Total Activity:	4.4440E+04	dpm
Final Volume:	1000.00	ml

Final Activity Concentration: 4.4440E+01 dpm/ml

This activity concentration is based on the original reference date listed above. All activities are corrected to the date and time of analysis by the laboratory data processing software.

NOTES:

Expiration Date: 9-Sep-20

Verified & Approved By _____ Date: 9/12/2019 0:00

QC Approval _____ Date: 9/16/19

ANALYTICS #411 Rec'd 2/15/06 [signature]

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318 • U.S.A.

Phone (404) 352-8677
Fax (404) 352-2837

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

Ra 228

72325-207

Ra-228 5 mL Liquid in Flame Sealed Vial

This standard radionuclide source was prepared gravimetrically from a calibrated master solution. The master solution was calibrated using a germanium gamma spectrometer system.

Radionuclide purity and calibration were checked using a germanium gamma spectrometer system. The nuclear decay rate and assay date for this source are given below.

ANALYTICS maintains traceability to the National Institute of Standards and Technology through Measurements Assurance Programs as described in USNRC Reg. Guide 4.15, Revision 1.

ISOTOPE:	Ra-228
ACTIVITY (dps):	4.022 E3
HALF-LIFE:	5.75 years
CALIBRATION DATE:	February 10, 2006 12:00 EST
RELATIIVE EXPANDED UNCERTAINTY (k=2):	4.0%

Impurities: γ-impurities <0.1%

5.10721 grams 0.1M HCl solution with 50 µg/g Ba carrier.

P O NUMBER 00003181, Item 1

SOURCE PREPARED BY: [signature: M Taskaeva]
M. Taskaeva, Radiochemist

Q A APPROVED: [signature] 2-13-06

EBERLINE SERVICES

QUALITY CONTROL PROGRAM

MP-009

Rev.8; 1/10/03
Title: Radioactive Reference Standards Solutions & Records

EBERLINE SERVICES - OAK RIDGE LABORATORY
RADIOACTIVE REFERENCE SOLUTIONS
RECERTIFICATION
MP 009

		CURRENT DATE	1/15/2020 0:00
SOLUTION REFERENCE #	Analytics 7235-207	**SOLUTION #**	Ra-12

Principal Radionuclide	**Half Life, Years**	**Half Life, Days**
^{228}Ra	5.750E+00	2.100E+03

Radionuclide	^{228}Ra		
Certified Activity	1.087E-01	µCi	
Certified Concentration		µCi per gram	
Reference Date	2/10/2006 0:00		

Ampoule /Solution Gross	9.0741	**Weight, Grams**
Empty Ampoule	3.9858	**Weight, Grams**
Solution Net	5.0883	**Weight, Grams**
Total Activity in Ampoule	0.1087	µCi

Chemical Composition of Standard Solution

$^{228}Ra(NO_3)_2$ in 0.5 M HCl

Dilution Instructions: **Dilution Solvent Used** 0.5 M HCl

Dilute to a volume of 991.00 **Kg**

Certified Total Activity of 0.1087 µCi **Which Equals** 2.413E+05 **dpm at the date listed above**

And after dilution the activity of this solution is **2.435E+02** **dpm/ml**

This activity concentration is based on the original reference date listed above. All activities are corrected to the date and time of analysis by the laboratory data processing software.

Expiration Date: January 15, 2021

Recertified By _____ Date: 1/15/20

QC Approval _____ Date: 1/15/20

Ba-6
(& 6a)

National Institute of Standards & Technology

Certificate

ORIGINAL

ORIGINAL

Standard Reference Material 4251C
Barium-133 Radioactivity Standard

This Standard Reference Material (SRM) consists of radioactive barium-133 chloride, non-radioactive barium chloride, and hydrochloric acid dissolved in 5 mL of distilled water. The solution is contained in a flame-sealed NIST borosilicate-glass ampoule. The SRM is intended for the calibration of ionization chambers and solid-state gamma-ray spectrometry systems.

Radiological Hazard

The SRM ampoule contains barium-133 with a total activity of approximately 2.5 MBq. Barium-133 decays by electron capture and during the decay process X-rays and gamma rays with energies from 4 to 400 keV are emitted. Most of these photons escape from the SRM ampoule and can represent a radiation hazard. Approximate unshielded dose rates at several distances (as of the reference time) are given in note [a]*. Appropriate shielding and/or distance should be used to minimize personnel exposure. The SRM should be used only by persons qualified to handle radioactive material.

Chemical Hazard

The SRM ampoule contains hydrochloric acid (HCl) with a concentration of 1 mole per liter of water. The solution is corrosive and represents a health hazard if it comes in contact with eyes or skin. If the ampoule is to be opened to transfer the solution, the recommended procedure is given on page 2. The ampoule should be opened only by persons qualified to handle both radioactive material and strong acid solution.

Storage and Handling

The SRM should be stored and used at a temperature between 5 and 65 °C. The solution in an unopened ampoule should remain stable and homogeneous until at least June 2004.

The ampoule (or any subsequent container) should always be clearly marked as containing radioactive material. If the ampoule is transported it should be packed, marked, labeled, and shipped in accordance with the applicable national, international, and carrier regulations. The solution in the ampoule is a dangerous good (hazardous material) both because of the radioactivity and because of the strong acid.

Preparation

This Standard Reference Material was prepared in the Physics Laboratory, Ionizing Radiation Division, Radioactivity Group, J.M.R. Hutchinson, Group Leader. The overall technical direction and physical measurements leading to certification were provided by L.L. Lucas of the Radioactivity Group and D.B. Golas, Nuclear Energy Institute Research Associate.

The support aspects involved in the preparation, certification, and issuance of this SRM were coordinated through the Standard Reference Materials Program by N.M. Trahey.

Gaithersburg, Maryland 20899
October 1994

Thomas E. Gills, Chief
Standard Reference Materials Program

*Notes and references are on pages 5 and 6.

EBERLINE SERVICES

QUALITY CONTROL PROGRAM
QCP-009

Rev.8; 11/10/03
Title: **Radioactive Reference Standards Solutions & Records**

EBERLINE SERVICES - OAK RIDGE LABORATORY
RADIOACTIVE REFERENCE STANDARD SOLUTIONS
SECONDARY DILUTION RECERTIFICATION

	QCP-009-1-A	Date	4/26/19
Solution Reference #	NIST SRM4251C	Solution #	Ba-6a

Principal Radionuclide	Half Life, Years	Half Life, Days
^{133}Ba	1.048E+01	3.828E+03

Radionuclide of Interest	^{133}Ba	Reference Date	9/1/1993 0:00
Parent Solution Conc.	1.48E+05 dpm/ml		

Chemical Composition of Standard Solution
$^{133}BaCl_2$ in 1M HCl

Dilution Instructions: **Dilution Solvent Used** 1M HCl

SECONDARY VOLUMETRIC DILUTION

Vol. Parent Solution:	25.0000 ml		
Total Activity:	3.6950E+06 dpm	Final Activity Concentration:	3.6950E+03 dpm/ml
Final Volume:	1000.00 ml		

NOTES:

This activity concentration is based on the original reference date listed above. All activities are corrected to the date and time of analysis by the laboratory data processing software.

Expiration Date: April 25, 2020

Verified & Approved By _____ Date: 4/26/19

QC Approval _____ Date: 4/26/19

SECTION VI

QUALITY CONTROL SAMPLE RESULTS SUMMARY

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
20-03062	Ra226	1	pCi	l	ERM

Laboratory Control Sample

Analyte		LCS Measured	CSU Measured	LCS Expected	Uncert. Expected	Known	Known Error	Result	CSU	Standard ID	Standard ACT (dpm)	Standard Error	Standard Added (g)
RA-226		97.45%	26.08%	100.00%	4.60%	9.90E+00	4.56E-01	9.65E+00	2.52E+00	Ra-5b	4.39E+01	4.60E+00	5.00E-01

Matrix Spike

Analyte	*Normalized Difference*	*MS Actual % Rec*	*Expected MS Result*	*Expected MS Uncert*	*Actual MS Result*	*Actual MS CSU*	*Sample Result*	*Sample CSU*	*Sample Aliquot*	*Standard ID*	*Standard ACT (dpm)*	*Standard Error %*	*Standard Added (g)*

Replicate Sample

Analyte	*Normalized Difference*	*RPD*	*Original Result*	*Original CSU*	*Replicate Result*	*Replicate CSU*
RA-226	0.26	11.06	6.15E-01	3.93E-01	5.51E-01	2.97E-01

QC Summary

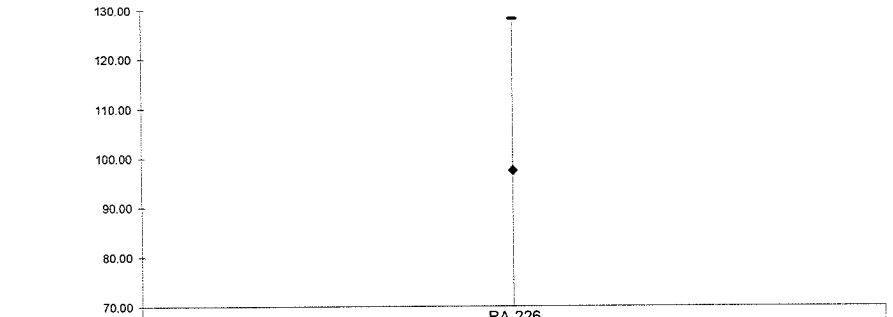
LCS Relative Bias	*LCS % R*		*MS % R*	*MS ND*	*Rep RPD*	*Rep ND*
0.97	OK				NA	OK

0029

Version

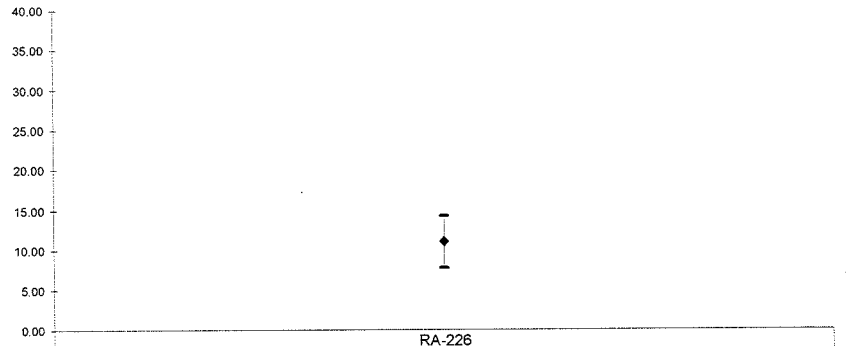
WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
20-03062	Ra226	1	pCi	l	ERM

LCS % Recovery



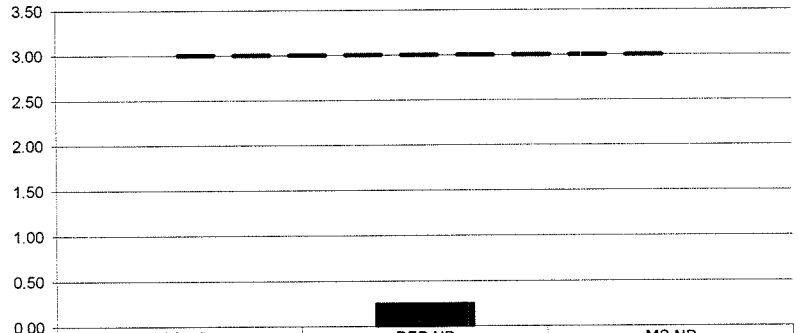
	RA-226
Lower Error	66.78
Upper Error	128.13
%R	97.45
LCL	75
Mean	100
UCL	125

Replicate Sample RPD



	RA-226
Lower Error	14.34
Upper Error	7.78
RPD	11.06
CL	35

Normalized Difference



	LCS ND	REP ND	MS ND
RA-226	0.00	0.26	0.00
UCL	3	3	3

No Matrix Spike

0030

Version

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
20-03062	Ra228	1	pCi	l	ERM

Laboratory Control Sample

Analyte	LCS Measured	CSU Measured	LCS Expected	Uncert. Expected	Known	Known Error	Result	CSU	Standard ID	Standard ACT (dpm)	Standard Error	Standard Added (g)
RA-228	104.37%	24.04%	100.00%	5.10%	9.03E+00	4.60E-01	9.42E+00	2.26E+00	Ra-12	4.44E+01	5.10E+00	4.51E-01

Matrix Spike

Analyte	*Normalized Difference*	*MS Actual % Rec*	*Expected MS Result*	*Expected MS Uncert*	*Actual MS Result*	*Actual MS CSU*	*Sample Result*	*Sample CSU*	*Sample Aliquot*	*Standard ID*	*Standard ACT (dpm)*	*Standard Error %*	*Standard Added (g)*

Replicate Sample

Analyte	*Normalized Difference*	*RPD*	*Original Result*	*Original CSU*	*Replicate Result*	*Replicate CSU*
RA-228	1.75	51.56	2.02E+00	7.69E-01	1.19E+00	5.14E-01

QC Summary

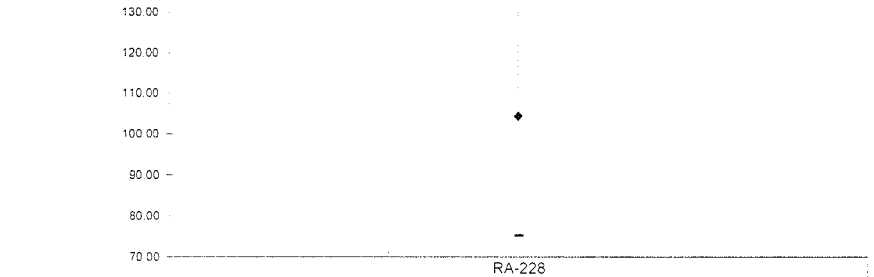
LCS Relative Bias	*LCS % R*	*MS % R*	*MS ND*	*Rep RPD*	*Rep ND*
1.04	OK			NA	OK

0031

Version

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
20-03062	Ra228	1	pCi	I	ERM

LCS % Recovery

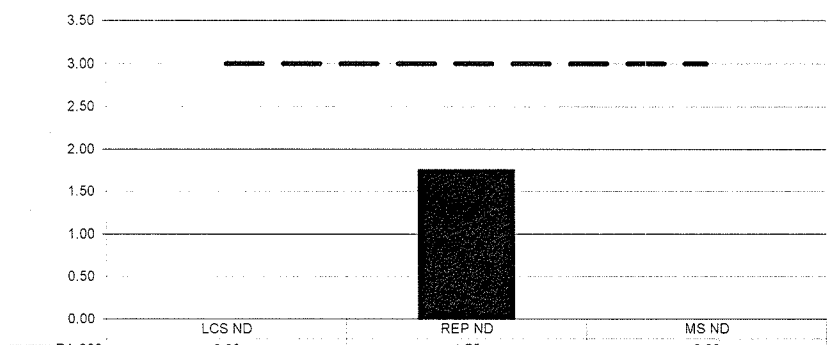


	RA-228
Lower Error	75.23
Upper Error	133.51
%R	104.37
LCL	75
Mean	100
UCL	125

Replicate Sample RPD

	RA-228
Lower Error	61.87
Upper Error	41.26
RPD	51.56
CL	35

Normalized Difference



	LCS ND	REP ND	MS ND
RA-228	0.00	1.75	0.00
UCL	3	3	3

No Matrix Spike

0032

Version

SECTION VII

LABORATORY TECHNICIAN'S NOTES

RA-226 NOTES

EBERLINE SERVICES

Work Order Analysis Notes

Oak Ridge Laboratory
601 Scarboro Rd.
Oak Ridge, TN 37830
Voice: 865.481.0683
www.eberlineservices.com

Internal Work Order	20-03062
Analysis Code	Ra226
Run Number	1

#	Date	Dept	User	Notes
1	03/16/20 11:11	PREP	JHARVEY	ALIQUOTED AND FILTERED FRACTIONS 4 AND 5- ADDED SPIKE AND TRACER TO ALL SAMPLES- PH'D SAMPLES- PRECIPITATED WITH BA AND PB CARRIERS AND AMMONIUM SULFATE- DECANTED SAMPLES AND CENTRIFUGED- SUBMITTED RADIUM PRECIP TO SEPARATIONS

JHarvey
3/16/2020

EBERLINE SERVICES

Work Order Analysis Notes

Oak Ridge Laboratory
601 Scarboro Rd.
Oak Ridge, TN 37830
Voice: 865.481.0683
www.eberlineservices.com

Internal Work Order	20-03062
Analysis Code	Ra226
Run Number	1

#	Date	Dept	User	Notes
1	03/16/20 11:11	PREP	JHARVEY	ALIQUOTED AND FILTERED FRACTIONS 4 AND 5- ADDED SPIKE AND TRACER TO ALL SAMPLES- PH'D SAMPLES- PRECIPITATED WITH BA AND PB CARRIERS AND AMMONIUM SULFATE- DECANTED SAMPLES AND CENTRIFUGED- SUBMITTED RADIUM PRECIP TO SEPARATIONS
2	03/18/20 12:35	CHEM	DBUSH	ADDED EDTA TO SAMPLES AND LET SIT. ADDED AMMONIUM SULFATE AND ACETIC ACID TO SAMPLES. FILTERED ONTO TARED FILTER PAPERS, LET DRY UNDER HEAT LAMP, REWEIGHED, AND SUBMITTED TO COUNT.

DyLan Bush
3/18/20

EBERLINE SERVICES

Reagents Used in an Analysis

Internal Work Order	
20-03062	
Analysis Code	Run
Ra226	1

Reagent ID	Reagent Name	Reagent Concentration	Analyst ID	Date Recorded
021318P	Ammonium Hydroxide	Reagent Grade	JHARVEY	3/16/2020
021302D07	Ammonium Sulfate	200 mg/ml	JHARVEY	3/16/2020
020921D15	Barium Carrier	1 mg/ml	JHARVEY	3/16/2020
021343D01	Lead Carrier	166 mg/ml	JHARVEY	3/16/2020
021951P	Nitric Acid	Reagent Grade	JHARVEY	3/16/2020
021557P	Acetic Acid	Reagent Grade	DBUSH	3/18/2020
021302D05	Ammonium Sulfate	200 mg/ml	DBUSH	3/18/2020
021573S	EDTA	0.25M	DBUSH	3/18/2020

Alpha Bank 3

Date	Sample #	Client	Load Time	Count Time	Analysis	Tech
3/16/20	2003052A(1-4)	UCOR	0814	2hr50min	Th	ICP
3/16/20	2003052A (1-4)	UCOR	0815	2hr50min	UU	ICP
3/16/20	2003052A (1)	UCOR	0815	2hr50min	Np	ICP
3/16/20	2003052A (1-4)	UCOR	0815	2hr50min	Th^{229}	ICP
3/16/20	Reagent 132A (1)	Lab	0817	1hr	UNT	ICP
3/16/20	Reagent 133A (1)	Lab	0817	1hr	UNT	ICP
3/16/20	2003056A(1-7)	UCOR	1114	2hr50=	Ra	ICP
3/16/20	2003052A(1-2)	UCOR	1117	2hr50=	Pu^{242}	ICP
3/16/20	2003052A(1-2)	UCOR	1117	2hr50=	Pu	ICP
3/16/20	2003052A(1-4)	UCOR	1137	2hr50=	Ra	ICP
3/16/20	2003040A(1-4,6)	USA	1431	2hr50=	Ra	ICP
3/17/20	Daily Pulser	Lab	0510	10min	NA	ICP
3/17/20	2003056A (1-7)	UCOR	0830	2hr50min	Pu	ICP
3/17/20	2003056A (1-7)	UCOR	0830	2hr50min	UU	ICP
3/17/20	2003056A (1-7)	UCOR	0831	2hr50min	Np	ICP
3/17/20	2003053A(1-5)	UCOR	1126	2hr50=	Ra	ICP
3/17/20	2003063A(1-5)	Uniteck	1127	2hr50=	UU	ICP
3/17/20	2003056A(1-7)	UCOR	1128	2hr50=	Th	ICP
3/17/20	2003040A(1-4)	USA	1129	2hr50=	UU	ICP
3/17/20	2003040A(6)	USA	1422	2hr50=	UU	ICP
3/17/20	2003048A(1-6)	DOE	1423	5hr30=	UU	ICP
3/18/20	Daily Pulser	Lab	0517	10min	NA	ICP
3/18/20	2003053A (5)	UCOR	0800	2hr50min	Th	ICP
3/18/20	2003053A (1-3)	UCOR	0800	2hr50min	UU	ICP
3/18/20	2003048A (4-6)	DOE	0802	5hr35min	Am^{241}	ICP
3/18/20	2003048A (1-6)	DOE	0803	5hr35min	Pu	ICP
3/18/20	2003047A (1-4,6)	DOE	0804	5hr35min	UU	ICP
3/18/20	2003053A(4-5)	UCOR	1052	2hr50=	UU	ICP
3/18/20	2003062A(1-11)	ERM	1352	2hr50=	Ra	ICP

RA-228 NOTES

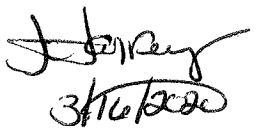
EBERLINE SERVICES

Work Order Analysis Notes

Oak Ridge Laboratory
601 Scarboro Rd.
Oak Ridge, TN 37830
Voice: 865.481.0683
www.eberlineservices.com

Internal Work Order	20-03062
Analysis Code	Ra228
Run Number	1

#	Date	Dept	User	Notes
1	03/16/20 11:11	PREP	JHARVEY	ALIQUOTED AND FILTERED FRACTIONS 4 AND 5- ADDED SPIKE AND TRACER TO ALL SAMPLES- PH'D SAMPLES- PRECIPITATED WITH BA AND PB CARRIERS AND AMMONIUM SULFATE- DECANTED SAMPLES AND CENTRIFUGED- SUBMITTED RADIUM PRECIP TO SEPARATIONS



EBERLINE SERVICES

Work Order Analysis Notes

Oak Ridge Laboratory
601 Scarboro Rd.
Oak Ridge, TN 37830
Voice: 865.481.0683
www.eberlineservices.com

Internal Work Order	20-03062
Analysis Code	Ra228
Run Number	1

#	Date	Dept	User	Notes
1	03/16/20 11:11	PREP	JHARVEY	ALIQUOTED AND FILTERED FRACTIONS 4 AND 5- ADDED SPIKE AND TRACER TO ALL SAMPLES- PH'D SAMPLES- PRECIPITATED WITH BA AND PB CARRIERS AND AMMONIUM SULFATE- DECANTED SAMPLES AND CENTRIFUGED- SUBMITTED RADIUM PRECIP TO SEPARATIONS
2	03/23/20 10:28	CHEM	DBUSH	ADDED FILTER PAPERS FROM COUNT ROOM TO LABELED C-TUBES, FILLED WITH EDTA SOLUTION AND LET SIT OVERNIGHT. REMOVED FILTER FROM EDTA-ADDED 2MLS YTTRIUM 9MG/ML CARRIER ADDED 18N NAOH TO SAMPLES AND RECORDED T1. HOT BATHED FOR 15 MIN, CENTRIFUGED AND DISCARDED SUPERNANT. ADDED 6N HNO3, DI WATER, AND 10N NAOH. HOT BATHED FOR 15 MIN, CENTRIFUGED AND DISCARDED SUPERNANT. ADDED 1N HNO3, DI WATER, AND AMMONIUM OXALATE. FILTERED ONTO TARED FILTER PAPERS. LET DRY UNDER HEAT LAMP, REWEIGHED AND SUBMITTED TO COUNT.

Dylan Bush
3/23/20

EBERLINE SERVICES

Reagents Used in an Analysis

Internal Work Order	
20-03062	
Analysis Code	Run
Ra228	1

Reagent ID	Reagent Name	Reagent Concentration	Analyst ID	Date Recorded
021318P	Ammonium Hydroxide	Reagent Grade	JHARVEY	3/16/2020
021302D07	Ammonium Sulfate	200 mg/ml	JHARVEY	3/16/2020
020921D15	Barium Carrier	1 mg/ml	JHARVEY	3/16/2020
021343D01	Lead Carrier	166 mg/ml	JHARVEY	3/16/2020
021951P	Nitric Acid	Reagent Grade	JHARVEY	3/16/2020
021198D01	Ammonium Oxalate	5%	DBUSH	3/23/2020
021573S	EDTA	0.25M	DBUSH	3/23/2020
020241D07	Nitric Acid	1N	DBUSH	3/23/2020
020774D19	Nitric Acid	6N	DBUSH	3/23/2020
021257D06	Sodium Hydroxide	10M	DBUSH	3/23/2020
021257D01	Sodium Hydroxide	18M	DBUSH	3/23/2020
021833S	Yttrium Carrier	9 mg/ml	DBUSH	3/23/2020

EBERLINE SERVICES

Reagents Used in an Analysis

Internal Work Order	
20-03062	
Analysis Code	Run
Ra228	1

Reagent ID	Reagent Name	Reagent Concentration	Analyst ID	Date Recorded
021318P	Ammonium Hydroxide	Reagent Grade	JHARVEY	3/16/2020
021302D07	Ammonium Sulfate	200 mg/ml	JHARVEY	3/16/2020
020921D15	Barium Carrier	1 mg/ml	JHARVEY	3/16/2020
021343D01	Lead Carrier	166 mg/ml	JHARVEY	3/16/2020
021951P	Nitric Acid	Reagent Grade	JHARVEY	3/16/2020
021198D01	Ammonium Oxalate	5%	DBUSH	3/23/2020
021573S	EDTA	0.25M	DBUSH	3/23/2020
020241D07	Nitric Acid	1N	DBUSH	3/23/2020
020774D19	Nitric Acid	6N	DBUSH	3/23/2020
021257D06	Sodium Hydroxide	10M	DBUSH	3/23/2020
021257D01	Sodium Hydroxide	18M	DBUSH	3/23/2020
021833S	Yttrium Carrier	9 mg/ml	DBUSH	3/23/2020

Aqua LB4110

Date	Sample #	Client	Load Time	Count time	Analysis	Tech
3/23/20	20030845r (1)	UCOR	0716	30 min	Tot Sr	ICP
3/23/20	20030845r (2-4,6)	UCOR	0716	1 hr	Tot Sr	ICP
3/23/20	20030660AB (1-4)	Univ. of GA	0717	2 hrs	Ra B	ICP
3/23/20	20030547Np (1-35)	UCOR.	0800	10 min	Np	ICP
3/23/20	20030622Ra (1-11)	ERM	1222	2 hrs	Ra B	ICP

TDS NOTES

EBERLINE SERVICES

Work Order Analysis Notes

Oak Ridge Laboratory
601 Scarboro Rd.
Oak Ridge, TN 37830
Voice: 865.481.0683
www.eberlineservices.com

Internal Work Order	20-03062
Analysis Code	TDS
Run Number	1

#	Date	Dept	User	Notes
1	03/16/20 01:10	PREP	MHIGHTOWER	Filtered sample into tared beaker, dried, re-weighed

MH 16 MAR 20

SECTION VIII

ANALYTICAL DATA (RADIUM-226)

20-03062
Ra226
Run 1

Work Order	20-03062
Analysis Code	Ra226
Run	1
Date Received	3/12/2020
Lab Deadline	3/27/2020
Client	ERM
Project	Henning Management
Report Level	4
Activity Units	pCi
Aliquot Units	l
Matrix	WA
Method	EPA 903.0 Modified
Instrument Type	Alpha Spectroscopy
Radiometric Tracer	Ba-133
Radiometric Sol#	Ba-6a
Tracer Act (dpm/g)	429.7
Carrier	
Carrier Conc (mg/ml)	

Internal Fraction	Sample Desc	Client ID	Login CPM	Sample Date	Sample Aliquot
01	LCS	LCS		03/12/20 00:00	1.0000E+00
02	MBL	BLANK		03/12/20 00:00	1.0000E+00
03	DUP	H-10 35-40	20	03/05/20 15:30	1.0000E+00
04	TRG	H-12 50-60	50	03/05/20 11:05	3.3333E-01
05	TRG	H-9 50-55	20	03/05/20 13:35	2.5000E-01
06	DO	H-10 35-40	20	03/05/20 15:30	1.0000E+00
07	TRG	H-2 30-35	30	03/05/20 16:55	1.0000E+00
08	TRG	H-16 35-40	30	03/06/20 08:15	1.0000E+00
09	TRG	H-18 35-40	30	03/06/20 09:50	1.0000E+00
10	TRG	H-3 22-27	30	03/06/20 13:15	1.0000E+00
11	TRG	H-1 35-40	30	03/06/20 11:10	1.0000E+00

0048

* SAF1 is used for Gross Alpha and all other radionuclides. SAF2 is used for Gross Beta only. ^ Indicates estimated SAF value.
** Actual mass exceeded the calibration curve range. Results should be qualified as appropriate.

20-03062
Ra226
Run 1

Internal Fraction	Sample Desc	Tracer Aliquot (g)	Tracer Total ACT (dpm)	Radiometric Tracer (pCi)	Radiometric % Rec	Grav Carrier Added (ml)	Grav Filter Tare (g)	Grav Filter Final (g)	Grav Filter Net (g)	Grav % Rec	Mean % Rec	SAF 1*	SAF 2*
01	LCS	2.2057	947.8	485.0	113.60		0.0196	0.0308	0.0112		110.00	3.00^	1.00
02	MBL	2.1933	942.5	461.0	108.59		0.0197	0.0304	0.0107		108.59	3.00^	1.00
03	DUP	2.1919	941.9	418.0	98.52		0.0196	0.0249	0.0053		98.52	1.86	1.00
04	TRG	2.1892	940.7	272.0	64.19		0.0194	0.0272	0.0078		64.19	2.72	1.00
05	TRG	2.1798	936.7	374.0	88.64		0.0196	0.0265	0.0069		88.64	2.47	1.00
06	DO	2.1827	937.9	337.0	79.77		0.0196	0.0263	0.0067		79.77	2.40	1.00
07	TRG	2.1781	935.9	383.0	90.85		0.0195	0.0252	0.0057		90.85	2.04	1.00
08	TRG	2.1771	935.5	6.0	1.42		0.0195	0.0257	0.0062		1.42	2.23	1.00
09	TRG	2.1731	933.8	273.0	64.90		0.0196	0.0242	0.0046		64.90	1.49	1.00
10	TRG	2.1720	933.3	409.0	97.29		0.0196	0.0276	0.0080		97.29	2.77	1.00
11	TRG	2.1633	929.6	352.0	84.06		0.0197	0.0270	0.0073		84.06	2.58	1.00

0049

* SAF1 is used for Gross Alpha and all other radionuclides. SAF2 is used for Gross Beta only. ^ Indicates estimated SAF value.
** Actual mass exceeded the calibration curve range. Results should be qualified as appropriate.

20-03062
Ra226
Run 1

Internal Fraction	Sample Desc	Rough Prep Date	Rough Prep By	Prep Date	Prep By	Sep t0 Date/Time	Sep t0 By	Sep t1 Date/Time	Sep t1 By
01	LCS			03/16/20 07:49	JHARVEY	03/18/20 10:36	DBUSH		
02	MBL			03/16/20 07:49	JHARVEY	03/18/20 10:36	DBUSH		
03	DUP			03/16/20 07:49	JHARVEY	03/18/20 10:36	DBUSH		
04	TRG			03/16/20 07:49	JHARVEY	03/18/20 12:12	DBUSH		
05	TRG			03/16/20 07:49	JHARVEY	03/18/20 12:12	DBUSH		
06	DO			03/16/20 07:49	JHARVEY	03/18/20 10:36	DBUSH		
07	TRG			03/16/20 07:49	JHARVEY	03/18/20 10:36	DBUSH		
08	TRG			03/16/20 07:49	JHARVEY	03/18/20 12:12	DBUSH		
09	TRG			03/16/20 07:49	JHARVEY	03/18/20 10:36	DBUSH		
10	TRG			03/16/20 07:49	JHARVEY	03/18/20 10:36	DBUSH		
11	TRG			03/16/20 07:49	JHARVEY	03/18/20 10:36	DBUSH		

* SAF1 is used for Gross Alpha and all other radionuclides. SAF2 is used for Gross Beta only. ^ Indicates estimated SAF value.
** Actual mass exceeded the calibration curve range. Results should be qualified as appropriate.

Preliminary Data Report & Analytical Calculations
Work Order: 20-03062-Ra226-1

Run: 1
Analysis Code: Ra226
Eberline Services Work Order: 20-03062
Client: ERM

Lab Fraction	Nuclide	Sample Desc	Client Identification	Activity Units	Results	Error Estimate	MDA	LCS Known	LCS %R	LCS Flag	RPD Flag	MDA Flag	Blank Flag
01	RA-226	LCS	LCS	pCi/l	9.65E+00	1.47E+00	3.47E-01	9.90E+00	97.45	OK		OK	
02	RA-226	MBL	BLANK	pCi/l	2.34E-02	9.75E-02	2.50E-01					OK	OK
03	RA-226	DUP	H-10 35-40	pCi/l	5.51E-01	2.74E-01	1.45E-01				NA	OK	
04	RA-226	TRG	H-12 50-60	pCi/l	6.79E-01	8.88E-01	1.36E+00					INV	
05	RA-226	TRG	H-9 50-55	pCi/l	3.94E-01	8.22E-01	1.57E+00					INV	
06	RA-226	DO	H-10 35-40	pCi/l	6.15E-01	3.71E-01	3.67E-01					OK	
07	RA-226	TRG	H-2 30-35	pCi/l	2.56E-01	2.10E-01	2.57E-01					OK	
08	RA-226	TRG	H-16 35-40	pCi/l	-2.69E-02	8.56E-02	2.83E-01					OK	
09	RA-226	TRG	H-18 35-40	pCi/l	1.15E+00	4.32E-01	2.44E-01					OK	
10	RA-226	TRG	H-3 22-27	pCi/l	1.74E-01	1.95E-01	2.76E-01					OK	
11	RA-226	TRG	H-1 35-40	pCi/l	1.26E+00	5.01E-01	2.81E-01					OK	

Client: ERM
Eberline Services Work Order: 20-03062
Analysis Code: Ra226
Run: 1

Lab Fraction	Nuclide	Sample Desc	Sample Date	Sample Aliquot	Radiometric % Rec	Grav % Rec	Mean % Rec	SAF	Sep t0 Date/Time	Sep t1 Date/Time
01	RA-226	LCS	03/12/20 00:00	1.00E+00	100.00	0.00	110.00		3/18/2020 10:36	
02	RA-226	MBL	03/12/20 00:00	1.00E+00	100.00	0.00	108.59		3/18/2020 10:36	
03	RA-226	DUP	03/05/20 15:30	1.00E+00	98.52	0.00	98.52		3/18/2020 10:36	
04	RA-226	TRG	03/05/20 11:05	3.33E-01	64.19	0.00	64.19		3/18/2020 12:12	
05	RA-226	TRG	03/05/20 13:35	2.50E-01	88.64	0.00	88.64		3/18/2020 12:12	
06	RA-226	DO	03/05/20 15:30	1.00E+00	79.77	0.00	79.77		3/18/2020 10:36	
07	RA-226	TRG	03/05/20 16:55	1.00E+00	90.85	0.00	90.85		3/18/2020 10:36	
08	RA-226	TRG	03/06/20 08:15	1.00E+00	100.00	0.00	1.42		3/18/2020 12:12	
09	RA-226	TRG	03/06/20 09:50	1.00E+00	64.90	0.00	64.90		3/18/2020 10:36	
10	RA-226	TRG	03/06/20 13:15	1.00E+00	97.29	0.00	97.29		3/18/2020 10:36	
11	RA-226	TRG	03/06/20 11:10	1.00E+00	84.06	0.00	84.06		3/18/2020 10:36	

Run: 1
Analysis Code: Ra226
Eberline Services Work Order: 20-03062
Client: ERM

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Halflife (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	RA-226	LCS	03/18/20 13:51		A_Spec	Alpha_035	170	1.75 E+02	6.00 E-03	14.4
02	RA-226	MBL	03/18/20 13:51		A_Spec	Alpha_036	170	4.90 E-01	3.00 E-03	16.7
03	RA-226	DUP	03/18/20 13:51		A_Spec	Alpha_037	170	1.58 E+01	1.00 E-03	14.4
04	RA-226	TRG	03/18/20 13:51		A_Spec	Alpha_038	170	3.00 E+00	0.00 E+00	14.9
05	RA-226	TRG	03/18/20 13:51		A_Spec	Alpha_039	170	1.96 E+00	1.20 E-02	14.7
06	RA-226	DO	03/18/20 13:51		A_Spec	Alpha_040	170	1.23 E+01	1.00 E-02	15.9
07	RA-226	TRG	03/18/20 13:51		A_Spec	Alpha_041	170	7.30 E+00	1.00 E-02	17
08	RA-226	TRG	03/18/20 13:51		A_Spec	Alpha_042	170	-7.00 E-01	1.00 E-02	15.4
09	RA-226	TRG	03/18/20 13:51		A_Spec	Alpha_043	170	2.81 E+01	5.00 E-03	14.9
10	RA-226	TRG	03/18/20 13:51		A_Spec	Alpha_044	170	3.98 E+00	6.00 E-03	17.2
11	RA-226	TRG	03/18/20 13:51		A_Spec	Alpha_045	170	2.53 E+01	4.00 E-03	16.3

Internal Fraction	Sample Desc	Client ID	Sample Date	Sample Aliquot	Tracer Aliquot (g)	Tracer ACT (dpm)	Radiometric Tracer (pCi)	Radiometric % Rec	SAF 1*	SAF 2*
01	LCS	LCS	03/12/20 00:00	1.0000	2.2057	947.7893	485.0000	113.60	3.00^	1.00
02	MBL	BLANK	03/12/20 00:00	1.0000	2.1933	942.4610	461.0000	108.59	3.00^	1.00
03	DUP	H-10 35-40	03/05/20 15:30	1.0000	2.1919	941.8594	418.0000	98.52	1.86	1.00
04	TRG	H-12 50-60	03/05/20 11:05	0.3333	2.1892	940.6992	272.0000	64.19	2.72	1.00
05	TRG	H-9 50-55	03/05/20 13:35	0.2500	2.1798	936.6601	374.0000	88.64	2.47	1.00
06	DO	H-10 35-40	03/05/20 15:30	1.0000	2.1827	937.9062	337.0000	79.77	2.40	1.00
07	TRG	H-2 30-35	03/05/20 16:55	1.0000	2.1781	935.9296	383.0000	90.85	2.04	1.00
08	TRG	H-16 35-40	03/06/20 08:15	1.0000	2.1771	935.4999	5.9800	1.42	2.23	1.00
09	TRG	H-18 35-40	03/06/20 09:50	1.0000	2.1731	933.7811	273.0000	64.90	1.49	1.00
10	TRG	H-3 22-27	03/06/20 13:15	1.0000	2.1720	933.3084	409.0000	97.29	2.77	1.00
11	TRG	H-1 35-40	03/06/20 11:10	1.0000	2.1633	929.5700	352.0000	84.06	2.58	1.00

Eberline Services
Oak Ridge Laboratory

Spike and Tracer Worksheet

Internal Work Order	Run	Analysis Code	Date	Technician	Technician Initials	Witness Initials
20-03062	1	Ra226	3/16/2020 7:42	JHARVEY		

LCS & Matrix Spikes

Isotope	Sol #	Activity dpm/g	Solution Date	Approx Addition	LCS Volume Used (g)	MS Volume Used (g)	LCSD Volume Used (g)	MSD Volume Used (g)	LCS Known pCi	LCS Error Estimate	MS Added pCi	MS Error Estimate	LCSD Known pCi	LCSD Error Estimate	MSD Added pCi	MSD Error Estimate
Ra-226	Ra-5b	43.940	3/16/2020	0.500	0.5003				9.90	0.456	0.00	0.000	0.00	0.000	0.00	0.000
Tc-99 MS	Tc-2a	22043.636	7/5/2014	0.1												

Tracers

fraction	Isotope	Sol #	Activity dpm/g	Solution Date	Volume Used (g)	Approx Addition
01	Ba-133	Ba-6a	429.700	3/16/2020	2.2057	2.3600
02	Ba-133	Ba-6a	429.700	3/16/2020	2.1933	2.3600
03	Ba-133	Ba-6a	429.700	3/16/2020	2.1919	2.3600
04	Ba-133	Ba-6a	429.700	3/16/2020	2.1892	2.3600
05	Ba-133	Ba-6a	429.700	3/16/2020	2.1798	2.3600
06	Ba-133	Ba-6a	429.700	3/16/2020	2.1827	2.3600
07	Ba-133	Ba-6a	429.700	3/16/2020	2.1781	2.3600
08	Ba-133	Ba-6a	429.700	3/16/2020	2.1771	2.3600
09	Ba-133	Ba-6a	429.700	3/16/2020	2.1731	2.3600
10	Ba-133	Ba-6a	429.700	3/16/2020	2.1720	2.3600
11	Ba-133	Ba-6a	429.700	3/16/2020	2.1633	2.3600

Balance Printer Tapes

Tracer	LCS

Matrix Spike

0055

Eberline Analytical
Oak Ridge Laboratory

Aliquot Worksheet

Printed: 3/18/2020 12:12 PM

Work Order	Run	Analysis Code	Rpt Units	Lab Deadline	Technician
20-03062	1	Ra226	liters	3/27/2020	DBUSH

Lab Fraction	ERM Client ID	Sample Type	Muffle Data Ratio Post/Pre	Dilution Data No of Dils	Dil Factor	Ratio	Aliquot Data Aliquot	Net Equiv	MS Aliquot Data Aliquot	Net Equiv	H-3 Solids Only Water Added (ml)	H3 Dist Aliq
01	LCS	LCS				1.00E+00	1.0000E+00	1.0000E+00				
02	BLANK	MBL				1.00E+00	1.0000E+00	1.0000E+00				
03	H-10 35-40	DUP				1.00E+00	1.0000E+00	1.0000E+00				
04	H-12 50-60	TRG				1.00E+00	3.3333E-01	3.3333E-01				
05	H-9 50-55	TRG				1.00E+00	2.5000E-01	2.5000E-01				
06	H-10 35-40	DO				1.00E+00	1.0000E+00	1.0000E+00				
07	H-2 30-35	TRG				1.00E+00	1.0000E+00	1.0000E+00				
08	H-16 35-40	TRG				1.00E+00	1.0000E+00	1.0000E+00				
09	H-18 35-40	TRG				1.00E+00	1.0000E+00	1.0000E+00				
10	H-3 22-27	TRG				1.00E+00	1.0000E+00	1.0000E+00				
11	H-1 35-40	TRG				1.00E+00	1.0000E+00	1.0000E+00				

Comments	

0056

Technician: DylanBush Date: 3, 18, 20

Gravimetric Worksheet

Work Order	Run	Analysis Code	Gravimetric Carrier	Carrier Conc (mg/ml)	Technician
20-03062	**1**	**Ra226**			**DBUSH**

TRetec Fraction	ERM Client ID	Sample Type	Carrier Data	Filter Data			Gravimetric
			Carrier Added (ml)	Filter Tare (g)	Filter Final (g)	Filter Net (g)	% Recovery
01	LCS	LCS		0.0196	0.0308	**0.0112**	
02	BLANK	MBL		0.0197	0.0304	**0.0107**	
03	DUP	DUP		0.0196	0.0249	**0.0053**	
04	H-12 50-60	TRG		0.0194	0.0272	**0.0078**	
05	H-9 50-55	TRG		0.0196	0.0265	**0.0069**	
06	H-10 35-40	DO		0.0196	0.0263	**0.0067**	
07	H-2 30-35	TRG		0.0195	0.0252	**0.0057**	
08	H-16 35-40	TRG		0.0195	0.0257	**0.0062**	
09	H-18 35-40	TRG		0.0196	0.0242	**0.0046**	
10	H-3 22-27	TRG		0.0196	0.0276	**0.0080**	
11	H-1 35-40	TRG		0.0197	0.0270	**0.0073**	

0057

Technician: DyBush Date: 3/18/20

LD 3/18/20

Apex-Alpha™

Sample Description: SPIKE
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00002703
Batch Identification: 2003062A-RA
Sample Identification: 01
Sample Geometry: Shelf 2
Procedure Description: Ra

Detector Name: Alpha_035
Chamber Serial Number: 04026477A
Detector Serial Number: 58771
Env. Background: System Bkgd 275078
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Generic Mult. Factor: 3.000E+000 Generic Div. Factor: 1.000E+000
Sample Date/Time: 3/18/2020 12:40:56 PM
Acquisition Date/Time: 3/18/2020 1:51:28 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 1.0000 +/- 0.0000
Counting Efficiency: 0.1441 +/- 0.0026 on 2/28/2020 7:44:08 AM
Effective Efficiency: 0.1441 +/- 0.0026

Control Certificate Name: Ra226_Ra-5b
Chem. Recov. of Control: RA-226 0.324832 +/- 0.027115
Peak Match Tolerance: 0.350 MeV

PEAK AREA REPORT

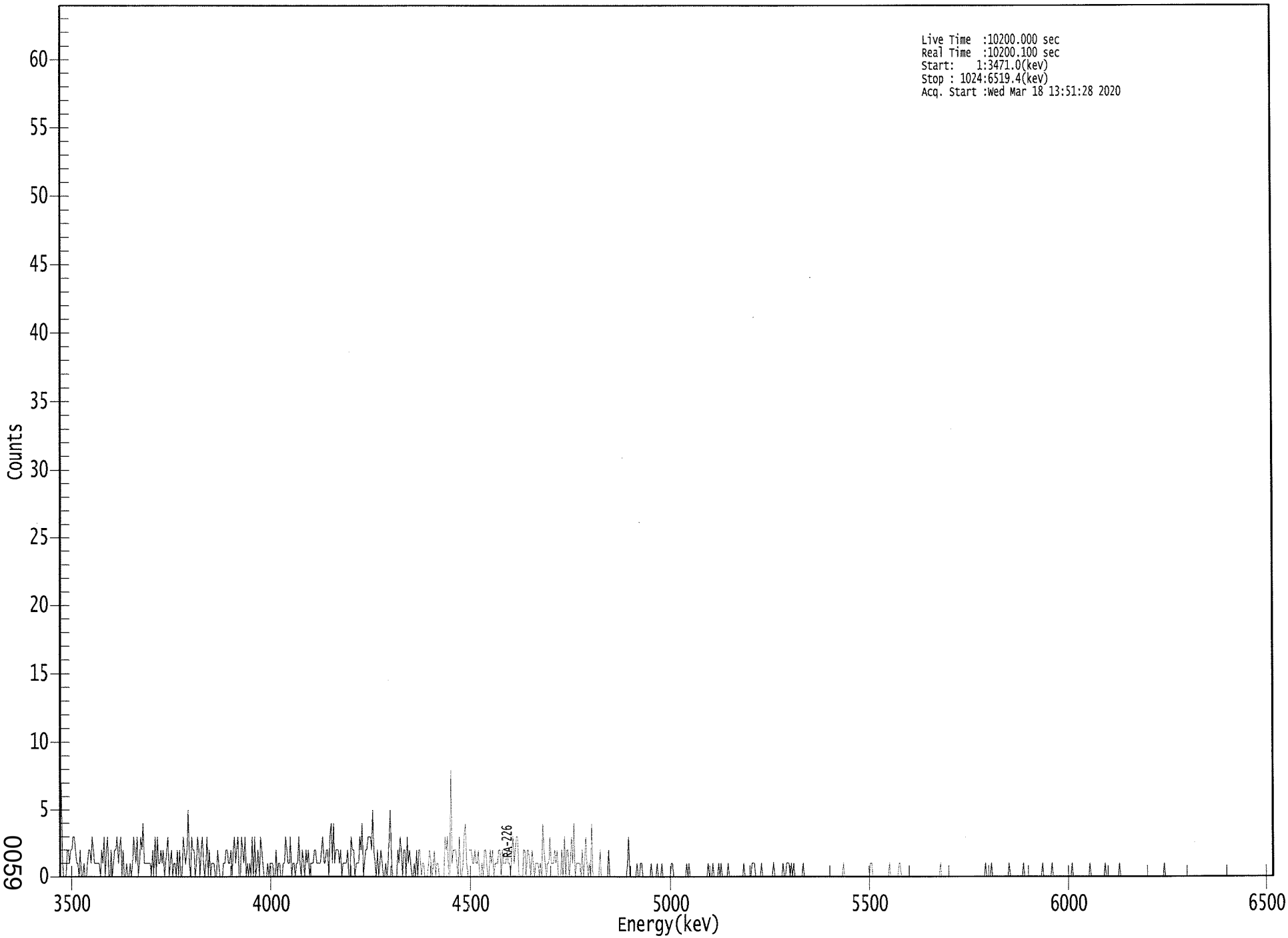
Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.547	6.32	82.73	0.68	0.00E+000	3.0
RA-226	4.595	174.98	14.87	1.02	0.00E+000	3.2

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.975	5685.50*	3.67E-001 +/- 3.03E-001	3.27E-001 +/- 1.14E-002
RA-226	0.954	4785.00*	9.65E+000 +/- 1.47E+000	3.47E-001 +/- 1.21E-002

AG
3/19/20

0000270320.CNF



****
***** S P E C T R A L D A T A R E P O R T *****
****

Sample Title: 01

Elapsed Live time: 10200
Elapsed Real Time: 10200

Channel							
1:	1	7	1	0	0	0	2	2
9:	1	2	2	3	3	2	1	1
17:	0	2	0	0	1	0	0	1
25:	2	2	1	3	2	1	1	1
33:	1	1	0	2	1	3	0	2
41:	3	0	0	2	0	1	2	2
49:	3	1	2	3	0	2	0	0
57:	1	0	0	1	0	1	3	2
65:	1	3	0	1	3	2	4	1
73:	1	1	1	1	1	0	2	0
81:	3	0	3	1	1	2	1	2
89:	0	1	2	3	0	1	2	0
97:	1	1	0	2	0	2	0	0
105:	3	2	1	2	5	1	0	3
113:	2	2	0	1	3	2	0	2
121:	3	1	0	1	3	0	2	0
129:	1	1	1	0	0	2	1	0
137:	0	0	1	1	2	2	1	1
145:	2	0	2	3	1	2	3	0
153:	0	3	2	1	3	0	1	0
161:	1	0	3	0	3	0	1	2
169:	0	3	2	1	0	0	0	1
177:	0	1	1	1	0	0	2	0
185:	1	1	0	0	1	1	3	2
193:	1	1	3	0	1	1	0	1
201:	1	3	1	0	2	1	0	2
209:	1	2	0	1	1	1	2	2
217:	1	1	1	1	2	3	1	1
225:	2	2	0	3	4	1	4	1
233:	2	2	2	1	2	0	1	1
241:	1	1	2	0	0	3	2	2
249:	0	1	1	1	3	2	4	0
257:	1	2	2	3	3	3	2	5
265:	2	1	0	2	0	1	2	1
273:	0	0	1	0	1	3	5	1
281:	0	0	0	0	2	1	3	2
289:	0	2	2	0	3	1	2	1
297:	0	0	1	0	2	0	2	2
305:	0	1	1	0	0	0	1	2
313:	1	0	1	2	0	1	1	0
321:	0	0	0	0	3	2	3	0
329:	0	8	1	2	2	2	1	0
337:	3	0	0	1	3	4	1	0
345:	2	2	2	1	1	2	1	1
353:	2	0	0	1	0	2	2	1
361:	0	0	2	1	2	0	1	1

369:	1	2	2	0	2	1	1	1

Sample Title: 01

Channel								
377:	2	1	1	0	2	3	1	2
385:	3	3	0	0	0	0	2	2
393:	0	2	2	1	0	2	1	0
401:	1	1	1	0	1	0	4	2
409:	1	0	1	1	3	1	1	1
417:	2	1	2	0	0	0	2	0
425:	3	0	2	2	0	1	3	1
433:	4	0	1	1	1	1	0	2
441:	0	1	3	1	0	1	0	4
449:	0	0	0	0	0	0	2	0
457:	0	0	0	0	0	2	0	0
465:	0	0	0	0	0	0	0	0
473:	0	0	0	0	0	1	3	0
481:	0	0	0	0	0	1	0	0
489:	1	1	0	0	0	0	0	0
497:	0	1	0	0	0	0	1	0
505:	0	0	1	0	0	0	0	0
513:	0	0	1	1	0	0	0	0
521:	0	0	0	0	0	0	0	1
529:	0	1	0	0	0	0	0	0
537:	0	0	0	0	0	0	0	0
545:	0	1	0	0	0	1	0	0
553:	0	0	1	0	1	0	0	0
561:	0	0	1	0	0	0	0	0
569:	0	0	0	0	0	0	0	1
577:	0	0	0	0	0	0	1	1
585:	1	0	0	0	0	0	1	0
593:	0	0	0	0	0	0	0	0
601:	1	0	0	0	0	0	0	0
609:	1	0	0	1	1	1	0	1
617:	0	1	0	0	0	0	0	0
625:	0	1	0	0	0	0	0	0
633:	0	0	0	0	0	0	0	0
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	1	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	1	1	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	1	0	0	0	0	0
705:	0	0	1	1	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	1	0	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	1	0	0	0	0
785:	1	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	1

801:	0	0	0	0	0	0	0	0

Sample Title: 01

Channel								
809:	0	0	0	1	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	1	0	0	0	0
833:	0	0	0	1	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	0	0	0	0	1	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	1	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	1	0	0	0	0	0	0	0
889:	0	0	0	0	1	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	1	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0

KD 3/18/20

Apex-Alpha™

Sample Description: BLANK
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00002703
Batch Identification: 2003062A-RA
Sample Identification: 02
Sample Geometry: Shelf 2
Procedure Description: Ra

Detector Name: Alpha_036
Chamber Serial Number: 04026477B
Detector Serial Number: 84167
Env. Background: System Bkgd 275079
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Generic Mult. Factor: 3.000E+000 Generic Div. Factor: 1.000E+000
Sample Date/Time: 3/18/2020 12:40:56 PM
Acquisition Date/Time: 3/18/2020 1:51:30 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 1.0000 +/- 0.0000
Counting Efficiency: 0.1666 +/- 0.0029 on 2/28/2020 7:44:09 AM
Effective Efficiency: 0.1666 +/- 0.0029

Peak Match Tolerance: 0.350 MeV

PEAK AREA REPORT

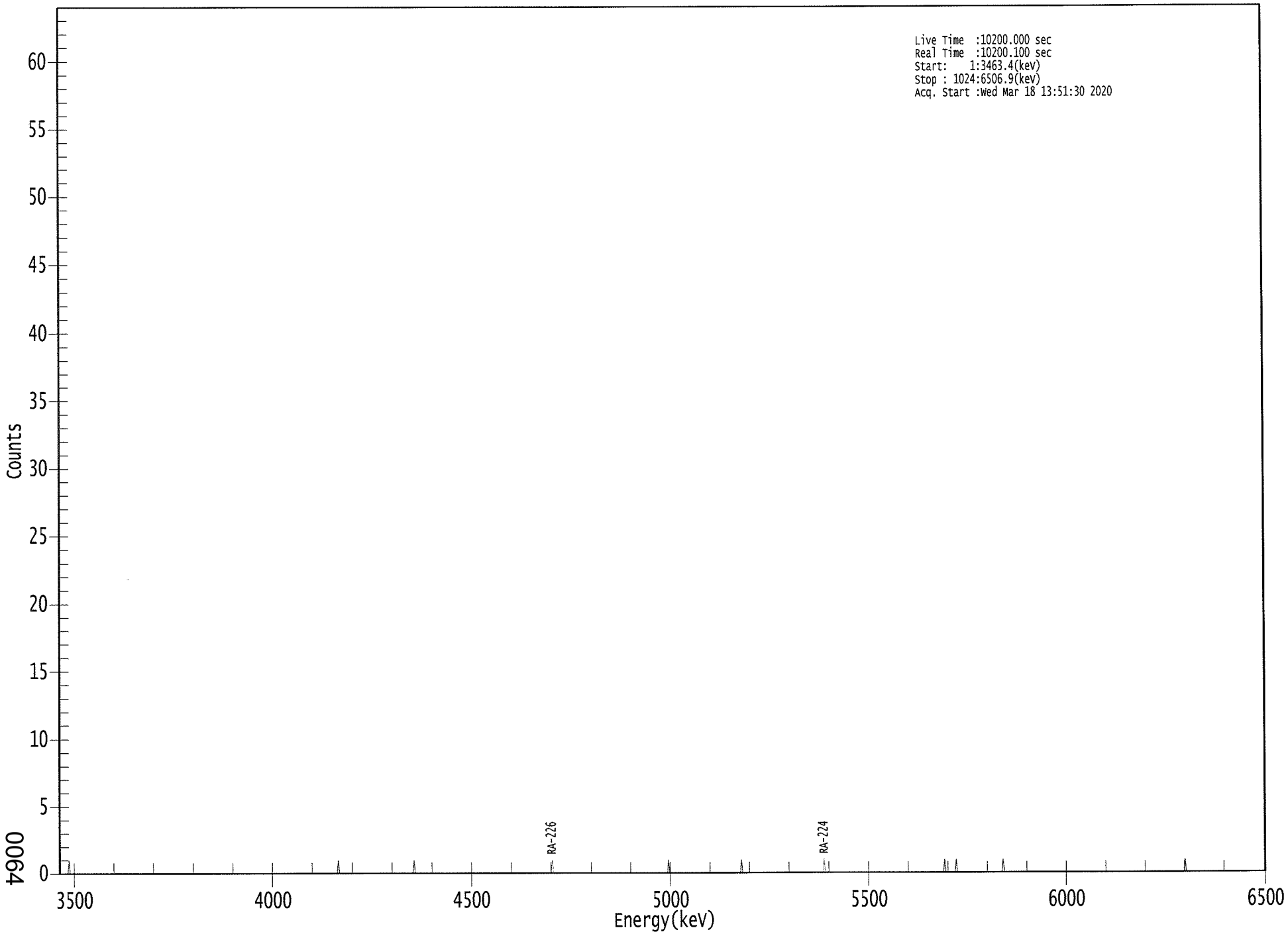
Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.388	-1.38	168.33	2.38	0.00E+000	3.0
RA-226	4.704	0.49	416.98	0.51	0.00E+000	3.0

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.891	5685.50*	-6.92E-002 +/- 1.17E-001	4.11E-001 +/- 1.40E-002
RA-226	0.991	4785.00*	2.34E-002 +/- 9.75E-002	2.50E-001 +/- 8.52E-003

AG
3/19/20

0000270319.CNF



ROI Type: 1

****
***** S P E C T R A L D A T A R E P O R T *****
****

Sample Title: 02

Elapsed Live time: 10200
Elapsed Real Time: 10200

Channel								
1:	0	0	0	0	0	0	0	0
9:	1	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0	0
137:	0	0	0	0	0	0	0	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	0	0
161:	0	0	0	0	0	0	0	0
169:	0	0	0	0	0	0	0	0
177:	0	0	0	0	0	0	0	0
185:	0	0	0	0	0	0	0	0
193:	0	0	0	0	0	0	0	0
201:	0	0	0	0	0	0	0	0
209:	0	0	0	0	0	0	0	0
217:	0	0	0	0	0	0	0	0
225:	0	0	0	0	0	0	0	0
233:	0	0	0	0	1	0	0	0
241:	0	0	0	0	0	0	0	0
249:	0	0	0	0	0	0	0	0
257:	0	0	0	0	0	0	0	0
265:	0	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	1	0	0	0
305:	0	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	0	0
321:	0	0	0	0	0	0	0	0
329:	0	0	0	0	0	0	0	0
337:	0	0	0	0	0	0	0	0
345:	0	0	0	0	0	0	0	0
353:	0	0	0	0	0	0	0	0
361:	0	0	0	0	0	0	0	0

369:	0	0	0	0	0	0	0	0

Sample Title: 02

Channel								
377:	0	0	0	0	0	0	0	0
385:	0	0	0	0	0	0	0	0
393:	0	0	0	0	0	0	0	0
401:	0	0	0	0	0	0	0	0
409:	0	0	0	0	0	0	0	0
417:	0	1	0	0	0	0	0	0
425:	0	0	0	0	0	0	0	0
433:	0	0	0	0	0	0	0	0
441:	0	0	0	0	0	0	0	0
449:	0	0	0	0	0	0	0	0
457:	0	0	0	0	0	0	0	0
465:	0	0	0	0	0	0	0	0
473:	0	0	0	0	0	0	0	0
481:	0	0	0	0	0	0	0	0
489:	0	0	0	0	0	0	0	0
497:	0	0	0	0	0	0	0	0
505:	0	0	0	0	0	0	0	0
513:	0	0	0	1	0	0	0	0
521:	0	0	0	0	0	0	0	0
529:	0	0	0	0	0	0	0	0
537:	0	0	0	0	0	0	0	0
545:	0	0	0	0	0	0	0	0
553:	0	0	0	0	0	0	0	0
561:	0	0	0	0	0	0	0	0
569:	0	0	0	0	0	0	0	0
577:	0	1	0	0	0	0	0	0
585:	0	0	0	0	0	0	0	0
593:	0	0	0	0	0	0	0	0
601:	0	0	0	0	0	0	0	0
609:	0	0	0	0	0	0	0	0
617:	0	0	0	0	0	0	0	0
625:	0	0	0	0	0	0	0	0
633:	0	0	0	0	0	0	0	0
641:	0	0	0	0	0	0	0	1
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	1	0	0
753:	0	0	0	0	0	0	0	1
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	1

801:	0	0	0	0	0	0	0	0

Sample Title: 02

Channel								
809:	0	0	0	0	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	1	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0

Apex-Alpha™

PB 3/18/20

Sample Description: H-10 35-40 DUP
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00002703
Batch Identification: 2003062A-RA
Sample Identification: 03
Sample Geometry: Shelf 2
Procedure Description: Ra

Detector Name: Alpha_037
Chamber Serial Number: 04026478A
Detector Serial Number: 91133
Env. Background: System Bkgd 275080
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Generic Mult. Factor: 1.860E+000 Generic Div. Factor: 1.000E+000
Sample Date/Time: 3/5/2020 12:40:56 PM
Acquisition Date/Time: 3/18/2020 1:51:32 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9852 +/- 0.0000
Counting Efficiency: 0.1438 +/- 0.0025 on 2/28/2020 7:44:10 AM
Effective Efficiency: 0.1417 +/- 0.0025

Peak Match Tolerance: 0.350 MeV

PEAK AREA REPORT

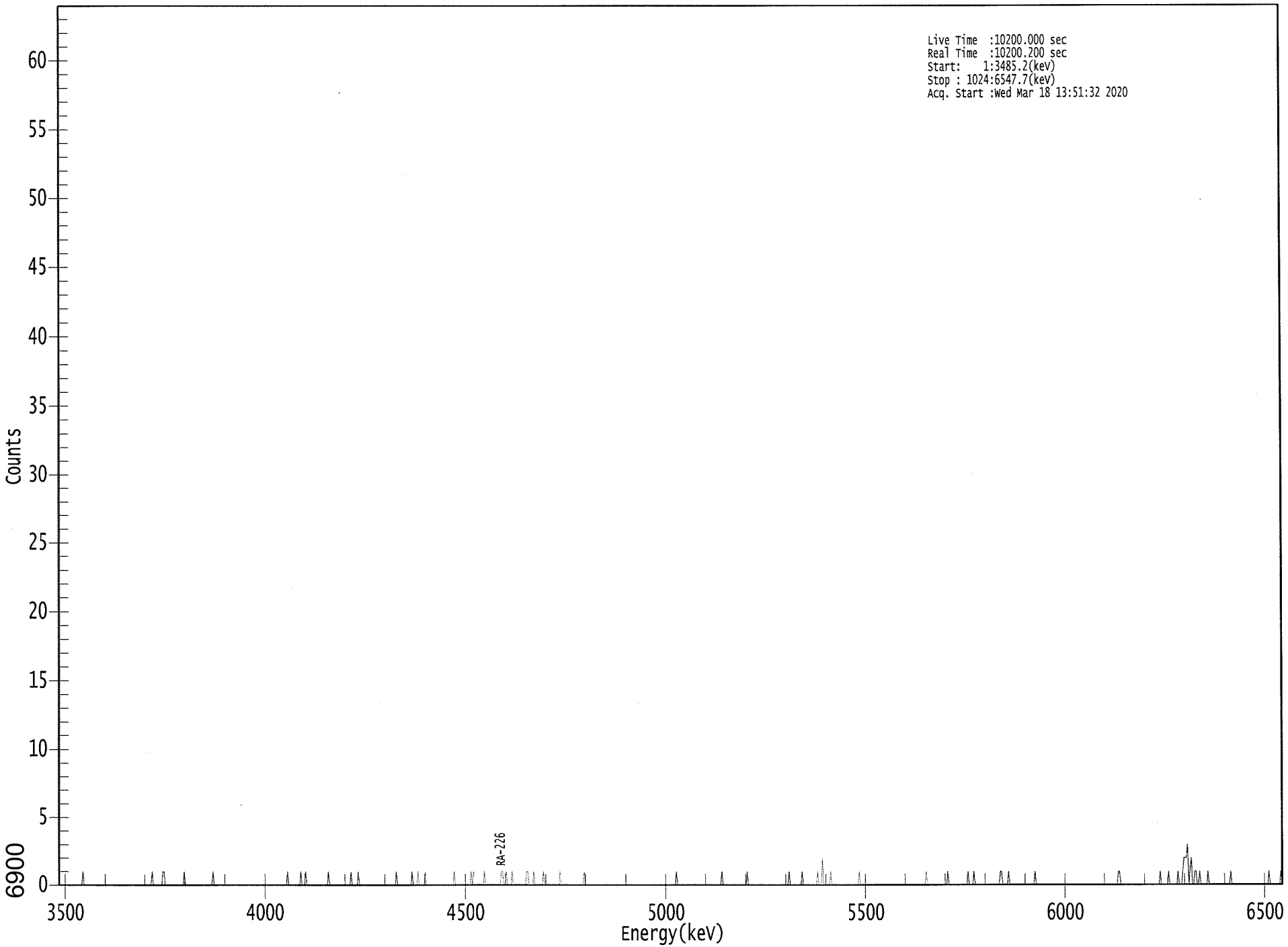
Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.453	5.32	91.11	0.68	0.00E+000	3.0
RA-226	4.591	15.83	49.57	0.17	0.00E+000	3.0

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.932	5685.50*	1.95E-001 +/- 1.78E-001	2.07E-001 +/- 7.19E-003
RA-226	0.952	4785.00*	5.51E-001 +/- 2.74E-001	1.45E-001 +/- 5.03E-003

AG 3/19/20

0000270316.CNF



ROI Type: 1

****
***** S P E C T R A L D A T A R E P O R T *****
****

Sample Title: 03

Elapsed Live time: 10200
Elapsed Real Time: 10200

Channel								
1:	0	0	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	1	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	1	0
81:	0	0	0	0	0	0	0	1
89:	1	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	1	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	0	0
129:	0	1	0	0	0	0	0	0
137:	0	0	0	0	0	0	0	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	0	0
161:	0	0	0	0	0	0	0	0
169:	0	0	0	0	0	0	0	0
177:	0	0	0	0	0	0	0	0
185:	0	0	0	0	0	0	0	1
193:	0	0	0	0	0	0	0	0
201:	0	0	1	0	0	0	1	0
209:	0	0	0	0	0	0	0	0
217:	0	0	0	0	0	0	0	0
225:	0	1	0	0	0	0	0	0
233:	0	0	0	0	0	0	0	0
241:	0	0	0	0	1	0	0	0
249:	0	0	1	0	0	0	0	0
257:	0	0	0	0	0	0	0	0
265:	0	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	0	1	0	0	0	0	0
289:	0	0	0	0	0	0	0	1
297:	0	0	0	0	1	0	0	0
305:	0	0	1	0	0	0	0	0
313:	0	0	0	0	0	0	0	0
321:	0	0	0	0	0	0	0	0
329:	0	0	1	0	0	0	0	0
337:	0	0	0	0	0	0	0	0
345:	1	0	1	0	0	0	0	0
353:	0	0	0	1	0	0	0	0
361:	0	0	0	0	0	0	0	0

369:	0	1	1	0	0	1	0	0

Sample Title: 03

Channel								
377:	0	0	1	0	0	0	0	0
385:	0	0	0	0	0	0	1	1
393:	0	0	0	0	1	0	0	0
401:	0	0	0	0	1	0	0	0
409:	0	0	0	0	0	0	0	0
417:	0	0	1	0	0	0	0	0
425:	0	0	0	0	0	0	0	0
433:	0	0	0	0	0	0	1	0
441:	0	0	0	0	0	0	0	0
449:	0	0	0	0	0	0	0	0
457:	0	0	0	0	0	0	0	0
465:	0	0	0	0	0	0	0	0
473:	0	0	0	0	0	0	0	0
481:	0	0	0	0	0	0	0	0
489:	0	0	0	0	0	0	0	0
497:	0	0	0	0	0	0	0	0
505:	0	0	0	0	0	0	0	0
513:	0	0	0	1	0	0	0	0
521:	0	0	0	0	0	0	0	0
529:	0	0	0	0	0	0	0	0
537:	0	0	0	0	0	0	0	0
545:	0	0	0	0	0	0	0	0
553:	0	1	0	0	0	0	0	0
561:	0	0	0	0	0	0	0	0
569:	0	0	0	0	0	0	1	0
577:	0	0	0	0	0	0	0	0
585:	0	0	0	0	0	0	0	0
593:	0	0	0	0	0	0	0	0
601:	0	0	0	0	0	0	0	0
609:	0	1	0	0	0	0	0	0
617:	0	0	0	0	1	0	0	0
625:	0	0	0	0	0	0	0	0
633:	0	1	0	0	0	2	0	0
641:	0	0	0	0	1	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	1	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	1	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	1	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	1
761:	0	0	0	0	1	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	1	1	0	0	0	0
793:	0	1	0	0	0	0	0	0

801:	0	0	0	0	0	0	0	0

Sample Title: 03

Channel								
809:	0	0	0	0	0	0	0	1
817:	0	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	1	1	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	1	0	0	0	0	0	0	1
929:	0	0	0	0	0	0	0	1
937:	0	0	0	1	2	2	2	3
945:	0	1	2	0	0	1	1	0
953:	0	1	0	0	0	0	0	0
961:	1	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	1	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	1	0	0	0	0
1017:	0	0	0	0	0	1	0	0

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Apex-Alpha™

Sample Description: H-12 50-60
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00002703
Batch Identification: 2003062A-RA
Sample Identification: 04
Sample Geometry: Shelf 2
Procedure Description: Ra

Detector Name: Alpha_038
Chamber Serial Number: 04026478B
Detector Serial Number: 91134
Env. Background: System Bkgd 275081
Reagent Blank: <not performed>

Sample Size: 3.333E-001 +/- 0.000E+000 liter
Generic Mult. Factor: 2.720E+000 Generic Div. Factor: 1.000E+000
Sample Date/Time: 3/5/2020 12:40:56 PM
Acquisition Date/Time: 3/18/2020 1:51:34 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.6419 +/- 0.0000
Counting Efficiency: 0.1487 +/- 0.0026 on 2/28/2020 7:44:11 AM
Effective Efficiency: 0.0955 +/- 0.0017

Peak Match Tolerance: 0.350 MeV

PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.530	-0.17	1169.4	0.17	0.00E+000	0.0
RA-226	4.645	3.00	130.67	0.00	0.00E+000	3.0

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.969	5685.50*	-4.07E-002 +/- 4.76E-001	9.98E-001 +/- 3.44E-002
RA-226	0.975	4785.00*	6.79E-001 +/- 8.88E-001	1.36E+000 +/- 4.68E-002

AG
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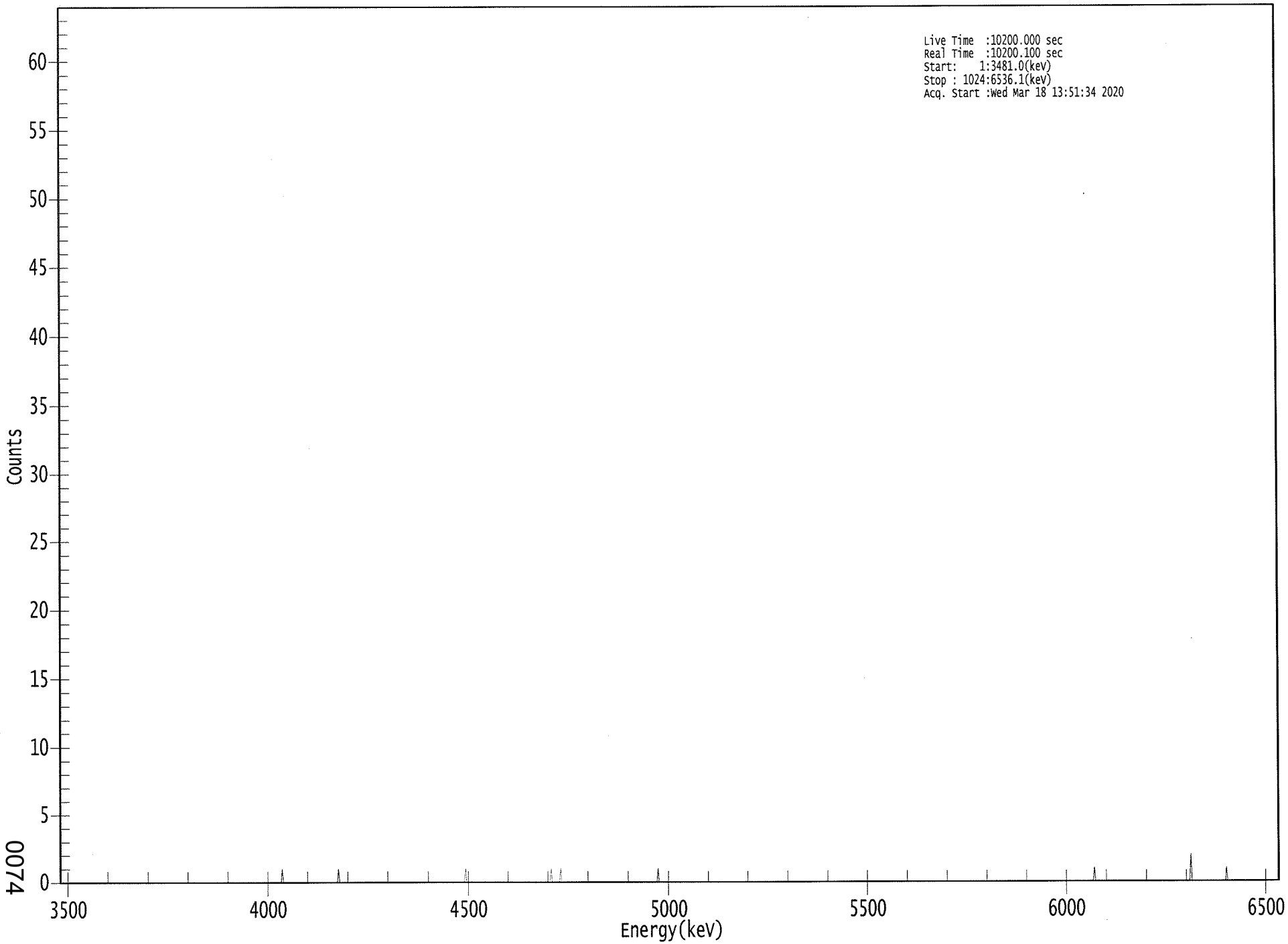
0000270315.CNF



ROI Type: 1

****
***** S P E C T R A L D A T A R E P O R T *****
****

Sample Title: 04

Elapsed Live time: 10200
Elapsed Real Time: 10200

Channel								
1:	0	0	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0	0
137:	0	0	0	0	0	0	0	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	0	0
161:	0	0	0	0	0	0	0	0
169:	0	0	0	0	0	0	0	0
177:	0	0	0	0	0	0	0	0
185:	0	0	1	0	0	0	0	0
193:	0	0	0	0	0	0	0	0
201:	0	0	0	0	0	0	0	0
209:	0	0	0	0	0	0	0	0
217:	0	0	0	0	0	0	0	0
225:	0	0	0	0	0	0	0	0
233:	0	1	0	0	0	0	0	0
241:	0	0	0	0	0	0	0	0
249:	0	0	0	0	0	0	0	0
257:	0	0	0	0	0	0	0	0
265:	0	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	0	0
321:	0	0	0	0	0	0	0	0
329:	0	0	0	0	0	0	0	0
337:	0	0	0	1	0	0	0	0
345:	0	0	0	0	0	0	0	0
353:	0	0	0	0	0	0	0	0
361:	0	0	0	0	0	0	0	0

369:	0	0	0	0	0	0	0	0

Sample Title: 04

Channel								
377:	0	0	0	0	0	0	0	0
385:	0	0	0	0	0	0	0	0
393:	0	0	0	0	0	0	0	0
401:	0	0	0	0	0	0	0	0
409:	0	0	0	1	0	0	0	0
417:	0	0	0	1	0	0	0	0
425:	0	0	0	0	0	0	0	0
433:	0	0	0	0	0	0	0	0
441:	0	0	0	0	0	0	0	0
449:	0	0	0	0	0	0	0	0
457:	0	0	0	0	0	0	0	0
465:	0	0	0	0	0	0	0	0
473:	0	0	0	0	0	0	0	0
481:	0	0	0	0	0	0	0	0
489:	0	0	0	0	0	0	0	0
497:	0	0	0	0	1	0	0	0
505:	0	0	0	0	0	0	0	0
513:	0	0	0	0	0	0	0	0
521:	0	0	0	0	0	0	0	0
529:	0	0	0	0	0	0	0	0
537:	0	0	0	0	0	0	0	0
545:	0	0	0	0	0	0	0	0
553:	0	0	0	0	0	0	0	0
561:	0	0	0	0	0	0	0	0
569:	0	0	0	0	0	0	0	0
577:	0	0	0	0	0	0	0	0
585:	0	0	0	0	0	0	0	0
593:	0	0	0	0	0	0	0	0
601:	0	0	0	0	0	0	0	0
609:	0	0	0	0	0	0	0	0
617:	0	0	0	0	0	0	0	0
625:	0	0	0	0	0	0	0	0
633:	0	0	0	0	0	0	0	0
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801:	0	0	0	0	0	0	0	0

Sample Title: 04

Channel								
809:	0	0	0	0	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	1	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	2	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	1	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	1

Apex-Alpha™

KD 3/18/20

Sample Description: H-9 50-55
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00002703
Batch Identification: 2003062A-RA
Sample Identification: 05
Sample Geometry: Shelf 2
Procedure Description: Ra

Detector Name: Alpha_039
Chamber Serial Number: 06027396A
Detector Serial Number: 83109
Env. Background: System Bkgd 275082
Reagent Blank: <not performed>

Sample Size: 2.500E-001 +/- 0.000E+000 liter
Generic Mult. Factor: 2.470E+000 Generic Div. Factor: 1.000E+000
Sample Date/Time: 3/5/2020 12:40:56 PM
Acquisition Date/Time: 3/18/2020 1:51:36 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.8864 +/- 0.0000
Counting Efficiency: 0.1468 +/- 0.0026 on 2/28/2020 7:44:13 AM
Effective Efficiency: 0.1301 +/- 0.0023

Peak Match Tolerance: 0.350 MeV

PEAK AREA REPORT

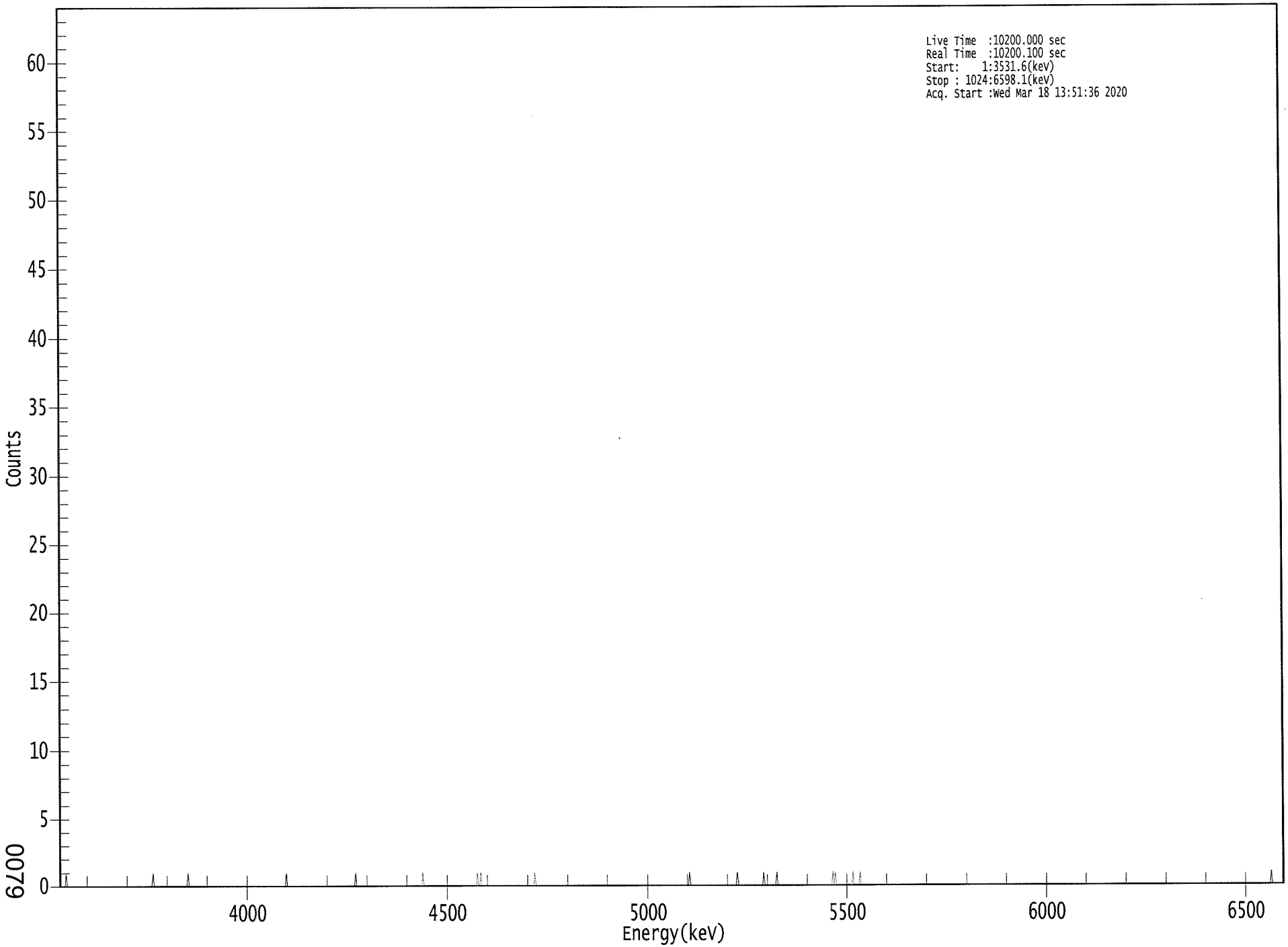
Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.497	2.47	163.78	1.53	0.00E+000	3.0
RA-226	4.579	1.96	208.49	2.04	0.00E+000	3.0

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.954	5685.50*	5.25E-001 +/- 8.60E-001	1.51E+000 +/- 5.22E-002
RA-226	0.946	4785.00*	3.94E-001 +/- 8.22E-001	1.57E+000 +/- 5.42E-002

AG 3/19/20

0000270310.CNF



ROI Type: 1

****
***** S P E C T R A L D A T A R E P O R T *****
****

Sample Title: 05

Elapsed Live time: 10200
Elapsed Real Time: 10200

Channel							
1:	0	0	0	0	0	1	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	1	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	0	1	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0	0
137:	0	0	0	0	0	0	0	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	0	0
161:	0	0	0	0	0	0	0	0
169:	0	0	0	0	0	0	0	0
177:	0	0	0	0	0	0	0	0
185:	0	0	0	0	0	1	0	0
193:	0	0	0	0	0	0	0	0
201:	0	0	0	0	0	0	0	0
209:	0	0	0	0	0	0	0	0
217:	0	0	0	0	0	0	0	0
225:	0	0	0	0	0	0	0	0
233:	0	0	0	0	0	0	0	0
241:	0	0	0	0	0	0	0	1
249:	0	0	0	0	0	0	0	0
257:	0	0	0	0	0	0	0	0
265:	0	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0	1
305:	0	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	0	0
321:	0	0	0	0	0	0	0	0
329:	0	0	0	0	0	0	0	0
337:	0	0	0	0	0	0	0	0
345:	0	0	0	0	1	0	0	1
353:	0	0	0	0	0	0	0	0
361:	0	0	0	0	0	0	0	0

369:	0	0	0	0	0	0	0	0

Sample Title: 05

Channel								
377:	0	0	0	0	0	0	0	0
385:	0	0	0	0	0	0	0	0
393:	0	0	0	0	1	0	0	0
401:	0	0	0	0	0	0	0	0
409:	0	0	0	0	0	0	0	0
417:	0	0	0	0	0	0	0	0
425:	0	0	0	0	0	0	0	0
433:	0	0	0	0	0	0	0	0
441:	0	0	0	0	0	0	0	0
449:	0	0	0	0	0	0	0	0
457:	0	0	0	0	0	0	0	0
465:	0	0	0	0	0	0	0	0
473:	0	0	0	0	0	0	0	0
481:	0	0	0	0	0	0	0	0
489:	0	0	0	0	0	0	0	0
497:	0	0	0	0	0	0	0	0
505:	0	0	0	0	0	0	0	0
513:	0	0	0	0	0	0	0	0
521:	0	0	0	0	0	1	0	0
529:	0	0	0	0	0	0	0	0
537:	0	0	0	0	0	0	0	0
545:	0	0	0	0	0	0	0	0
553:	0	0	0	0	0	0	0	0
561:	0	0	0	0	0	1	0	0
569:	0	0	0	0	0	0	0	0
577:	0	0	0	0	0	0	0	0
585:	0	0	0	1	0	0	0	0
593:	0	0	0	0	0	0	1	0
601:	0	0	0	0	0	0	0	0
609:	0	0	0	0	0	0	0	0
617:	0	0	0	0	0	0	0	0
625:	0	0	0	0	0	0	0	0
633:	0	0	0	0	0	0	0	0
641:	0	0	0	0	0	1	0	1
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	1	0
665:	0	0	0	0	1	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801:	0	0	0	0	0	0	0	0

Sample Title: 05

Channel								
809:	0	0	0	0	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	1	0	0	0
1017:	0	0	0	0	0	0	0	0

Apex-Alpha™

KB 3/18/20

Sample Description: H-10 35-40
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00002703
Batch Identification: 2003062A-RA
Sample Identification: 06
Sample Geometry: Shelf 2
Procedure Description: Ra

Detector Name: Alpha_040
Chamber Serial Number: 06027396B
Detector Serial Number: 91135
Env. Background: System Bkgd 275083
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Generic Mult. Factor: 2.400E+000 Generic Div. Factor: 1.000E+000
Sample Date/Time: 3/5/2020 12:40:56 PM
Acquisition Date/Time: 3/18/2020 1:51:38 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.7977 +/- 0.0000
Counting Efficiency: 0.1594 +/- 0.0032 on 2/29/2020 12:52:21 PM
Effective Efficiency: 0.1272 +/- 0.0025

Peak Match Tolerance: 0.350 MeV

PEAK AREA REPORT

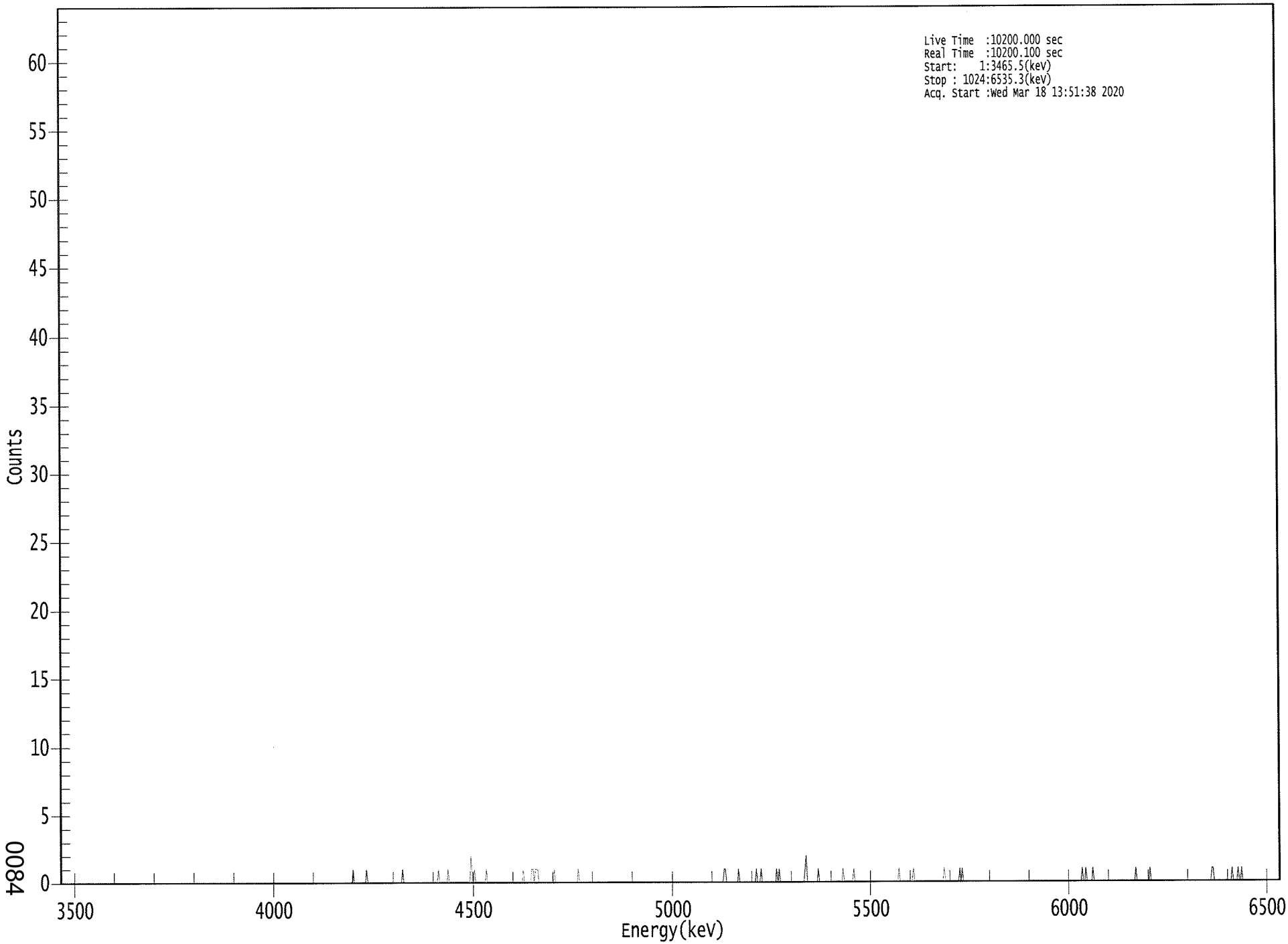
Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.551	4.49	98.45	0.51	0.00E+000	3.0
RA-226	4.589	12.30	60.24	1.70	0.00E+000	3.0

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.977	5685.50*	2.37E-001 +/- 2.34E-001	2.77E-001 +/- 1.09E-002
RA-226	0.951	4785.00*	6.15E-001 +/- 3.71E-001	3.67E-001 +/- 1.44E-002

AG 3/19/20

0000270311.CNF



0084

ROI Type: 1

****
***** S P E C T R A L D A T A R E P O R T *****
****

Sample Title: 06

Elapsed Live time: 10200
Elapsed Real Time: 10200

Channel								
1:	0	0	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0	0
137:	0	0	0	0	0	0	0	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	0	0
161:	0	0	0	0	0	0	0	0
169:	0	0	0	0	0	0	0	0
177:	0	0	0	0	0	0	0	0
185:	0	0	0	0	0	0	0	0
193:	0	0	0	0	0	0	0	0
201:	0	0	0	0	0	0	0	0
209:	0	0	0	0	0	0	0	0
217:	0	0	0	0	0	0	0	0
225:	0	0	0	0	0	0	0	0
233:	0	0	0	0	0	0	0	0
241:	0	0	0	0	0	1	0	0
249:	0	0	0	0	0	0	0	0
257:	1	0	0	0	0	0	0	0
265:	0	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	1	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	0	0
313:	0	0	0	0	1	0	0	0
321:	0	0	0	0	1	0	0	0
329:	0	0	0	0	0	0	0	0
337:	0	0	0	0	0	0	0	2
345:	0	0	1	0	0	0	0	0
353:	0	0	0	0	1	0	0	0
361:	0	0	0	0	0	0	0	0

369:	0	0	0	0	0	0	0	0

Sample Title: 06

Channel								
377:	0	0	0	0	0	0	0	0
385:	0	0	0	1	0	0	0	0
393:	0	0	1	1	0	1	1	1
401:	0	0	0	0	0	0	0	0
409:	0	0	0	0	0	1	0	0
417:	0	0	0	0	0	0	0	0
425:	0	0	0	0	0	0	0	0
433:	0	1	0	0	0	0	0	0
441:	0	0	0	0	0	0	0	0
449:	0	0	0	0	0	0	0	0
457:	0	0	0	0	0	0	0	0
465:	0	0	0	0	0	0	0	0
473:	0	0	0	0	0	0	0	0
481:	0	0	0	0	0	0	0	0
489:	0	0	0	0	0	0	0	0
497:	0	0	0	0	0	0	0	0
505:	0	0	0	0	0	0	0	0
513:	0	0	0	0	0	0	0	0
521:	0	0	0	0	0	0	0	0
529:	0	0	0	0	0	0	0	0
537:	0	0	0	0	0	0	0	0
545:	0	0	0	0	0	0	0	0
553:	0	0	0	1	1	0	0	0
561:	0	0	0	0	0	0	0	1
569:	0	0	0	0	0	0	0	0
577:	0	0	0	0	0	0	1	0
585:	0	0	1	0	0	0	0	0
593:	0	0	0	0	0	0	0	1
601:	0	1	0	0	0	0	0	0
609:	0	0	0	0	0	0	0	0
617:	0	0	0	0	0	0	0	1
625:	2	0	0	0	0	0	0	0
633:	0	0	1	0	0	0	0	0
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	1
657:	0	0	0	0	0	0	0	0
665:	1	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	1	0
705:	0	0	0	0	0	0	0	0
713:	0	0	1	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	1	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	1	0	1	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801:	0	0	0	0	0	0	0	0

Sample Title: 06

Channel								
809:	0	0	0	0	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	1	0	0	1	0	0	0	0
865:	0	1	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	1	0	0
905:	0	0	0	0	0	0	0	0
913:	0	1	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	1	1	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	1	0
985:	0	0	0	1	0	0	1	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0

KB 3/19/20

Apex-Alpha™

Sample Description: H-2 30-35
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00002703
Batch Identification: 2003062A-RA
Sample Identification: 07
Sample Geometry: Shelf 2
Procedure Description: Ra

Detector Name: Alpha_041
Chamber Serial Number: 05026930A
Detector Serial Number: 91087
Env. Background: System Bkgd 275084
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Generic Mult. Factor: 2.040E+000 Generic Div. Factor: 1.000E+000
Sample Date/Time: 3/5/2020 12:40:56 PM
Acquisition Date/Time: 3/18/2020 1:51:41 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9085 +/- 0.0000
Counting Efficiency: 0.1698 +/- 0.0029 on 2/28/2020 7:44:04 AM
Effective Efficiency: 0.1543 +/- 0.0027

Peak Match Tolerance: 0.350 MeV

PEAK AREA REPORT

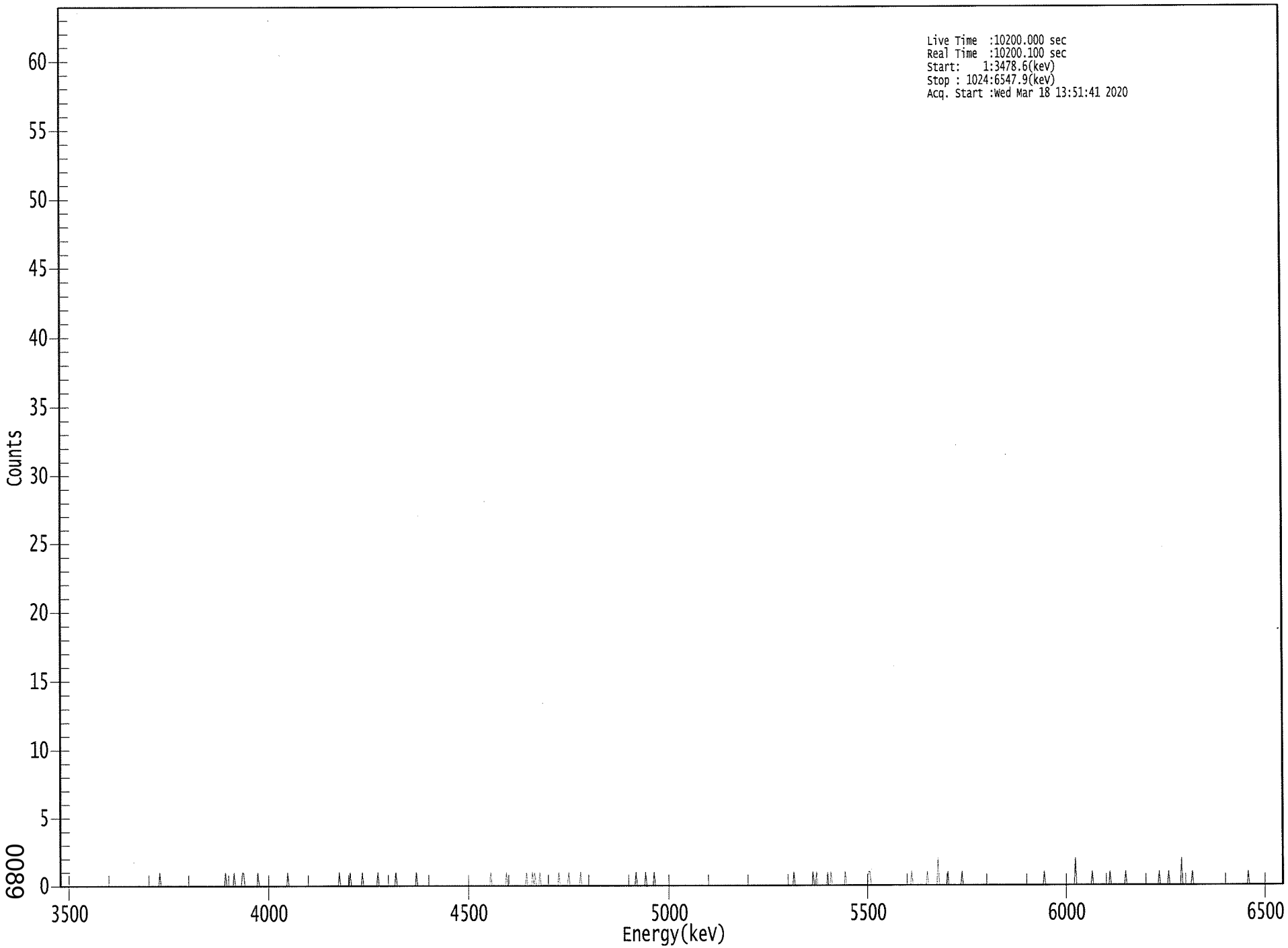
Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.525	9.49	65.59	0.51	0.00E+000	3.0
RA-226	4.673	7.30	81.83	1.70	0.00E+000	3.0

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.967	5685.50*	3.51E-001 +/- 2.31E-001	1.94E-001 +/- 6.58E-003
RA-226	0.984	4785.00*	2.56E-001 +/- 2.10E-001	2.57E-001 +/- 8.72E-003

AG
3/19/20

0000270312.CNF



ROI Type: 1

****
***** S P E C T R A L D A T A R E P O R T *****
****

Sample Title: 07

Elapsed Live time: 10200
Elapsed Real Time: 10200

Channel								
1:	0	0	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	1	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0	0
137:	0	0	1	0	0	0	0	0
145:	0	1	0	0	0	0	0	0
153:	1	1	0	0	0	0	0	0
161:	0	0	0	0	0	1	0	0
169:	0	0	0	0	0	0	0	0
177:	0	0	0	0	0	0	0	0
185:	0	0	0	0	0	0	1	0
193:	0	0	0	0	0	0	0	0
201:	0	0	0	0	0	0	0	0
209:	0	0	0	0	0	0	0	0
217:	0	0	0	0	0	0	0	0
225:	0	0	0	0	0	0	0	0
233:	0	1	0	0	0	0	0	0
241:	0	0	1	0	0	0	0	0
249:	0	0	0	0	1	0	0	0
257:	0	0	0	0	0	0	0	0
265:	0	1	0	0	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	1	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	0	0
297:	0	1	0	0	0	0	0	0
305:	0	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	0	0
321:	0	0	0	0	0	0	0	0
329:	0	0	0	0	0	0	0	0
337:	0	0	0	0	0	0	0	0
345:	0	0	0	0	0	0	0	0
353:	0	0	0	0	0	0	0	1
361:	0	0	0	0	0	0	0	0

369:	0	0	0	0	1	0	0	0

Sample Title: 07

Channel								
377:	0	0	0	0	0	0	0	0
385:	0	0	0	0	0	1	0	0
393:	0	0	1	0	1	0	0	0
401:	1	0	0	0	0	0	0	0
409:	0	0	0	0	0	0	0	0
417:	1	0	0	0	0	0	0	0
425:	1	0	0	0	0	0	0	0
433:	0	0	1	0	0	0	0	0
441:	0	0	0	0	0	0	0	0
449:	0	0	0	0	0	0	0	0
457:	0	0	0	0	0	0	0	0
465:	0	0	0	0	0	0	0	0
473:	0	0	0	0	0	0	0	0
481:	1	0	0	0	0	0	0	0
489:	1	0	0	0	0	0	0	1
497:	0	0	0	0	0	0	0	0
505:	0	0	0	0	0	0	0	0
513:	0	0	0	0	0	0	0	0
521:	0	0	0	0	0	0	0	0
529:	0	0	0	0	0	0	0	0
537:	0	0	0	0	0	0	0	0
545:	0	0	0	0	0	0	0	0
553:	0	0	0	0	0	0	0	0
561:	0	0	0	0	0	0	0	0
569:	0	0	0	0	0	0	0	0
577:	0	0	0	0	0	0	0	0
585:	0	0	0	0	0	0	0	0
593:	0	0	0	0	0	0	0	0
601:	0	0	0	0	0	0	0	0
609:	0	0	0	0	1	0	0	0
617:	0	0	0	0	0	0	0	0
625:	0	0	0	0	1	0	0	1
633:	0	0	0	0	0	0	0	0
641:	1	0	0	1	0	0	0	0
649:	0	0	0	0	0	0	0	1
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	1	1	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	1
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	1	0	0	0
729:	0	0	0	0	0	2	0	0
737:	0	0	0	0	0	1	0	0
745:	0	0	0	0	0	0	0	0
753:	0	1	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801:	0	0	0	0	0	0	0	0

Sample Title: 07

Channel								
809:	0	0	0	0	0	0	0	0
817:	0	0	0	0	0	0	1	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	2	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	1	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	1	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	1	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	1	0
921:	0	0	0	0	0	0	1	0
929:	0	0	0	0	0	0	0	0
937:	0	2	0	0	0	0	0	0
945:	0	0	1	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	1	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0

Apex-Alpha™

Sample Description: H-16 35-40
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00002703
Batch Identification: 2003062A-RA
Sample Identification: 08
Sample Geometry: Shelf 2
Procedure Description: Ra

Detector Name: Alpha_042
Chamber Serial Number: 05026930B
Detector Serial Number: 84185
Env. Background: System Bkgd 275085
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Generic Mult. Factor: 2.230E+000 Generic Div. Factor: 1.000E+000
Sample Date/Time: 3/6/2020 12:40:56 PM
Acquisition Date/Time: 3/18/2020 1:51:43 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 1.0000 +/- 0.0000
Counting Efficiency: 0.1536 +/- 0.0027 on 2/28/2020 7:44:14 AM
Effective Efficiency: 0.1536 +/- 0.0027

Peak Match Tolerance: 0.350 MeV

PEAK AREA REPORT

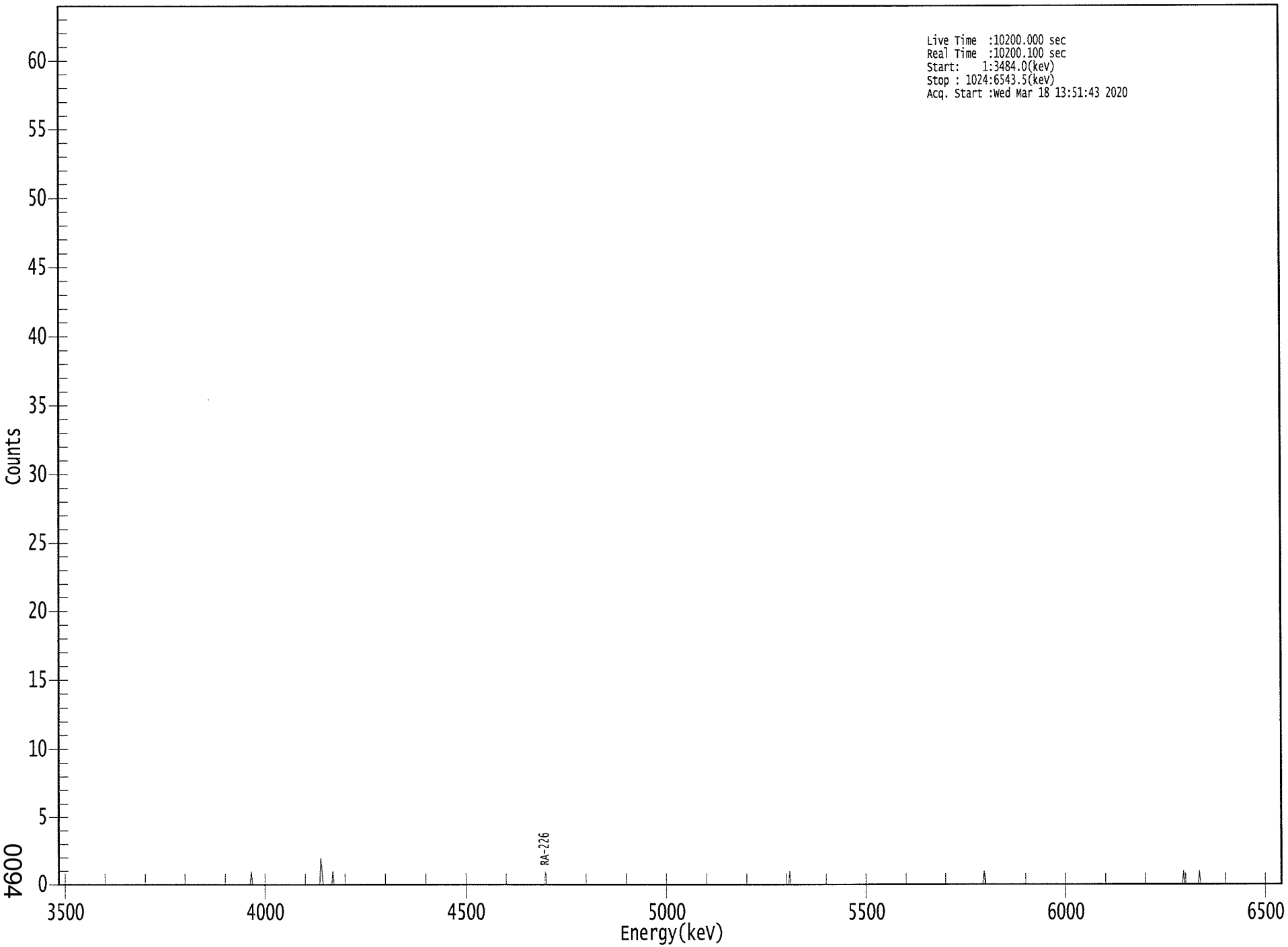
Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.530	-1.19	180.60	1.19	0.00E+000	0.0
RA-226	4.698	-0.70	317.90	1.70	0.00E+000	3.0

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.969	5685.50*	-4.83E-002 +/- 8.73E-002	2.68E-001 +/- 9.16E-003
RA-226	0.990	4785.00*	-2.69E-002 +/- 8.56E-002	2.83E-001 +/- 9.67E-003

AG
3/19/20

0000270313.CNF



ROI Type: 1

****
***** S P E C T R A L D A T A R E P O R T *****
****

Sample Title: 08

Elapsed Live time: 10200
Elapsed Real Time: 10200

Channel							
1:	0	0	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0	0
137:	0	0	0	0	0	0	0	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	0	0
161:	0	1	0	0	0	0	0	0
169:	0	0	0	0	0	0	0	0
177:	0	0	0	0	0	0	0	0
185:	0	0	0	0	0	0	0	0
193:	0	0	0	0	0	0	0	0
201:	0	0	0	0	0	0	0	0
209:	0	0	0	0	0	0	0	0
217:	0	0	0	2	1	0	0	0
225:	0	0	0	0	0	1	0	0
233:	0	0	0	0	0	0	0	0
241:	0	0	0	0	0	0	0	0
249:	0	0	0	0	0	0	0	0
257:	0	0	0	0	0	0	0	0
265:	0	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	0	0
321:	0	0	0	0	0	0	0	0
329:	0	0	0	0	0	0	0	0
337:	0	0	0	0	0	0	0	0
345:	0	0	0	0	0	0	0	0
353:	0	0	0	0	0	0	0	0
361:	0	0	0	0	0	0	0	0

369:	0	0	0	0	0	0	0	0

Sample Title: 08

Channel								
377:	0	0	0	0	0	0	0	0
385:	0	0	0	0	0	0	0	0
393:	0	0	0	0	0	0	0	0
401:	0	0	0	0	0	0	1	0
409:	0	0	0	0	0	0	0	0
417:	0	0	0	0	0	0	0	0
425:	0	0	0	0	0	0	0	0
433:	0	0	0	0	0	0	0	0
441:	0	0	0	0	0	0	0	0
449:	0	0	0	0	0	0	0	0
457:	0	0	0	0	0	0	0	0
465:	0	0	0	0	0	0	0	0
473:	0	0	0	0	0	0	0	0
481:	0	0	0	0	0	0	0	0
489:	0	0	0	0	0	0	0	0
497:	0	0	0	0	0	0	0	0
505:	0	0	0	0	0	0	0	0
513:	0	0	0	0	0	0	0	0
521:	0	0	0	0	0	0	0	0
529:	0	0	0	0	0	0	0	0
537:	0	0	0	0	0	0	0	0
545:	0	0	0	0	0	0	0	0
553:	0	0	0	0	0	0	0	0
561:	0	0	0	0	0	0	0	0
569:	0	0	0	0	0	0	0	0
577:	0	0	0	0	0	0	0	0
585:	0	0	0	0	0	0	0	0
593:	0	0	0	0	0	0	0	0
601:	0	0	0	0	0	0	0	0
609:	0	0	1	0	0	0	0	0
617:	0	0	0	0	0	0	0	0
625:	0	0	0	0	0	0	0	0
633:	0	0	0	0	0	0	0	0
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	1	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801:	0	0	0	0	0	0	0	0

Sample Title: 08

Channel								
809:	0	0	0	0	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	1	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	1	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0

Apex-Alpha™

KP 3/19/20

Sample Description: H-18 35-40
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00002703
Batch Identification: 2003062A-RA
Sample Identification: 09
Sample Geometry: Shelf 2
Procedure Description: Ra

Detector Name: Alpha_043
Chamber Serial Number: 04026481A
Detector Serial Number: 91088
Env. Background: System Bkgd 275086
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Generic Mult. Factor: 1.490E+000 Generic Div. Factor: 1.000E+000
Sample Date/Time: 3/6/2020 12:40:56 PM
Acquisition Date/Time: 3/18/2020 1:51:45 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.6490 +/- 0.0000
Counting Efficiency: 0.1495 +/- 0.0026 on 2/28/2020 7:44:05 AM
Effective Efficiency: 0.0970 +/- 0.0017

Peak Match Tolerance: 0.350 MeV

PEAK AREA REPORT

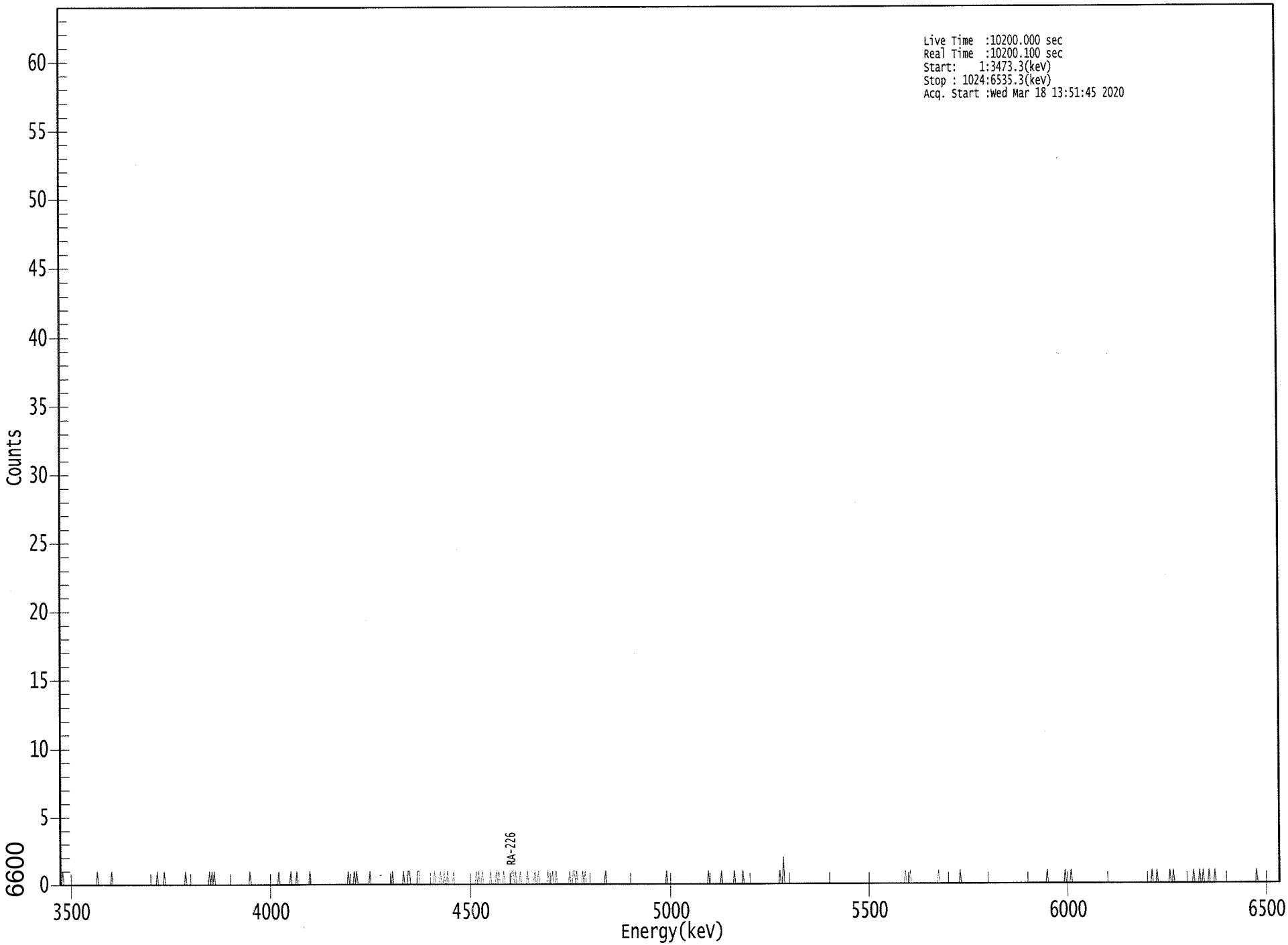
Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.624	1.64	214.83	1.36	0.00E+000	3.0
RA-226	4.604	28.15	37.59	0.85	0.00E+000	3.0

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.995	5685.50*	7.05E-002 +/- 1.51E-001	2.95E-001 +/- 1.02E-002
RA-226	0.958	4785.00*	1.15E+000 +/- 4.32E-001	2.44E-001 +/- 8.42E-003

AG 3/19/20

0000270318.CNF



ROI Type: 1

****
***** S P E C T R A L D A T A R E P O R T *****
****

Sample Title: 09

Elapsed Live time: 10200
Elapsed Real Time: 10200

Channel							
1:	0	0	1	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	1
33:	0	0	0	0	0	0	0	0
41:	0	0	0	1	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	1	0	0	0	0	0	1
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	1	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	0	0	0	0	0	1	0	1
129:	0	1	0	0	0	0	0	0
137:	0	0	0	0	0	0	0	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	0	1
161:	0	0	0	0	0	0	0	0
169:	0	0	0	0	0	0	0	0
177:	0	0	0	0	0	0	0	1
185:	0	0	0	0	0	0	0	0
193:	0	1	0	0	0	0	1	0
201:	0	0	0	0	0	0	0	0
209:	0	1	0	0	0	0	0	0
217:	0	0	0	0	0	0	0	0
225:	0	0	0	0	0	0	0	0
233:	0	0	0	0	0	0	0	0
241:	0	1	0	0	0	0	1	0
249:	1	0	0	0	0	0	0	0
257:	0	0	0	1	0	0	0	0
265:	0	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	1	0
281:	0	0	0	0	0	0	0	1
289:	0	0	0	1	1	0	0	0
297:	0	0	0	1	1	0	0	0
305:	0	0	0	0	0	0	0	0
313:	0	1	0	0	0	0	1	0
321:	0	1	0	0	1	0	0	0
329:	0	1	0	0	0	0	0	0
337:	0	0	0	0	0	0	0	0
345:	0	0	0	0	1	0	1	0
353:	0	1	0	0	0	0	0	0
361:	1	0	0	0	0	1	0	1

369:	0	0	0	1	0	0	0	0

Sample Title: 09

Channel								
377:	0	0	1	1	0	1	0	0
385:	0	1	0	0	0	0	0	1
393:	0	0	0	0	0	1	0	0
401:	1	0	0	0	0	0	0	0
409:	1	0	0	0	1	0	0	1
417:	0	0	0	0	0	0	0	0
425:	0	0	1	0	0	1	1	0
433:	1	0	0	0	0	1	0	1
441:	0	0	0	0	0	0	0	0
449:	0	0	0	0	0	0	0	0
457:	1	0	0	0	0	0	0	0
465:	0	0	0	0	0	0	0	0
473:	0	0	0	0	0	0	0	0
481:	0	0	0	0	0	0	0	0
489:	0	0	0	0	0	0	0	0
497:	0	0	0	0	0	0	0	0
505:	0	0	0	1	0	0	0	0
513:	0	0	0	0	0	0	0	0
521:	0	0	0	0	0	0	0	0
529:	0	0	0	0	0	0	0	0
537:	0	0	0	0	0	0	1	0
545:	0	0	0	0	0	0	0	0
553:	0	1	0	0	0	0	0	0
561:	0	0	0	0	1	0	0	0
569:	0	0	0	1	0	0	0	0
577:	0	0	0	0	0	0	0	0
585:	0	0	0	0	0	0	0	0
593:	0	0	0	0	0	0	0	0
601:	0	0	1	0	0	2	0	0
609:	0	0	0	0	0	0	0	0
617:	0	0	0	0	0	0	0	0
625:	0	0	0	0	0	0	0	0
633:	0	0	0	0	0	0	0	0
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	1	0	0	0
713:	1	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	1	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	0	1	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801:	0	0	0	0	0	0	0	0

Sample Title: 09

Channel								
809:	0	0	0	0	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	1	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	1	0	0	0	0	1
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	1	0	0	0	1
921:	0	0	0	0	0	0	0	0
929:	0	0	1	0	0	1	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	1	0
953:	0	0	0	1	0	0	1	0
961:	0	0	0	1	0	0	0	0
969:	1	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	1	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0

KB 3/19/20

Apex-Alpha™

Sample Description: H-3 22-27
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00002703
Batch Identification: 2003062A-RA
Sample Identification: 10
Sample Geometry: Shelf 2
Procedure Description: Ra

Detector Name: Alpha_044
Chamber Serial Number: 04026481B
Detector Serial Number: 84168
Env. Background: System Bkgd 275087
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Generic Mult. Factor: 2.770E+000 Generic Div. Factor: 1.000E+000
Sample Date/Time: 3/6/2020 12:40:56 PM
Acquisition Date/Time: 3/18/2020 1:51:48 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9729 +/- 0.0000
Counting Efficiency: 0.1722 +/- 0.0030 on 2/28/2020 7:44:06 AM
Effective Efficiency: 0.1675 +/- 0.0029

Peak Match Tolerance: 0.350 MeV

PEAK AREA REPORT

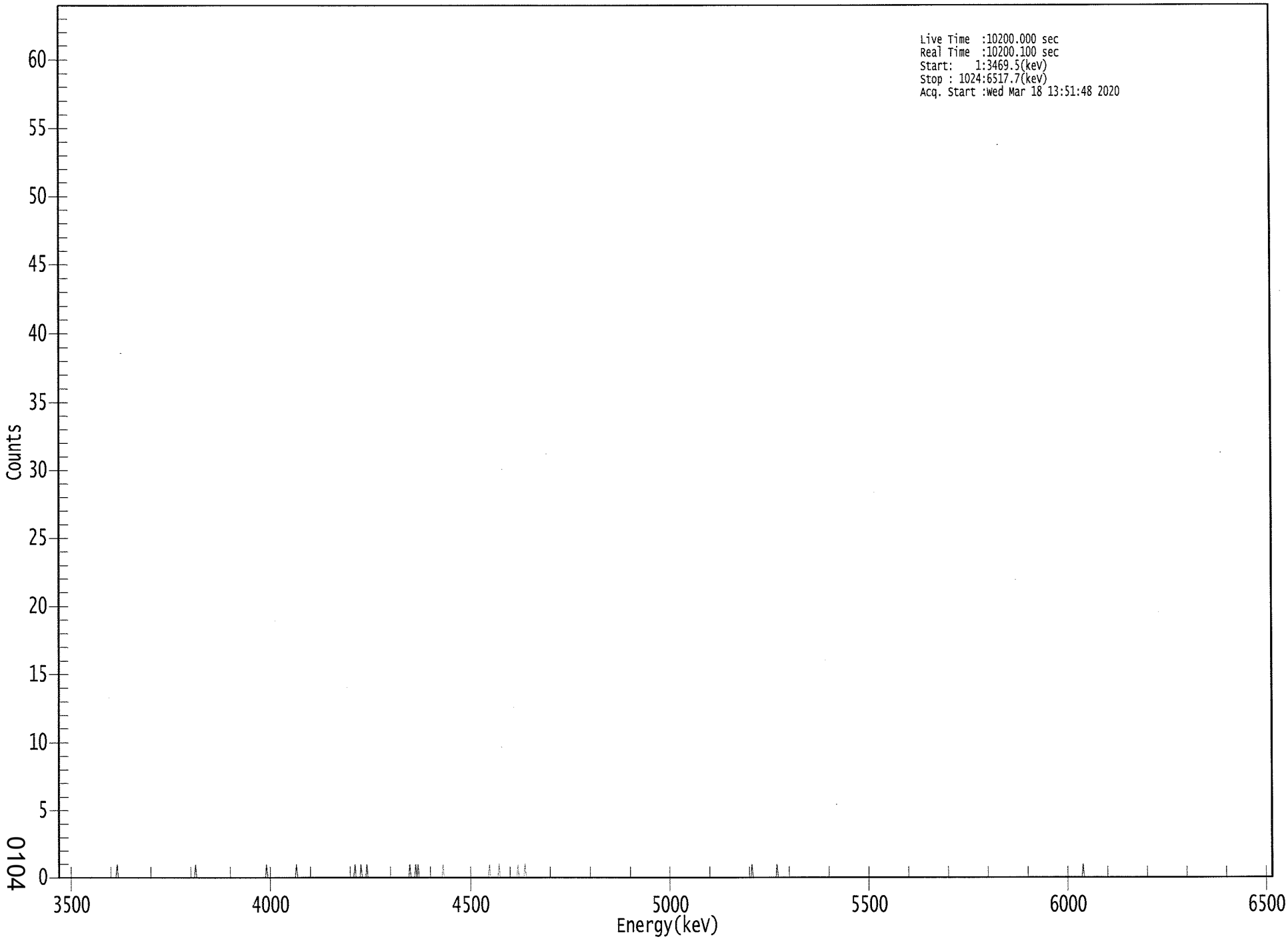
Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.531	-1.53	143.80	1.53	0.00E+000	0.0
RA-226	4.562	3.98	112.01	1.02	0.00E+000	3.0

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.969	5685.50*	-7.08E-002 +/- 1.02E-001	3.29E-001 +/- 1.12E-002
RA-226	0.937	4785.00*	1.74E-001 +/- 1.95E-001	2.76E-001 +/- 9.37E-003

AG 3/19/20

0000270317.CNF



ROI Type: 1

****
***** S P E C T R A L D A T A R E P O R T *****
****

Sample Title: 10

Elapsed Live time: 10200
Elapsed Real Time: 10200

Channel								
1:	0	0	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	1	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	1	0	0	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0	0
137:	0	0	0	0	0	0	0	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	0	0
161:	0	0	0	0	0	0	0	0
169:	0	0	0	0	0	0	0	1
177:	0	0	0	0	0	0	0	0
185:	0	0	0	0	0	0	0	0
193:	0	0	0	0	0	0	0	0
201:	1	0	0	0	0	0	0	0
209:	0	0	0	0	0	0	0	0
217:	0	0	0	0	0	0	0	0
225:	0	0	0	0	0	0	0	0
233:	0	0	0	0	0	0	0	0
241:	0	0	0	0	0	0	0	0
249:	0	1	0	0	0	0	1	0
257:	0	0	0	1	0	0	0	0
265:	0	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	0	1
297:	0	0	0	0	1	0	1	0
305:	0	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	0	0
321:	0	0	0	1	0	0	0	0
329:	0	0	0	0	0	0	0	0
337:	0	0	0	0	0	0	0	0
345:	0	0	0	0	0	0	0	0
353:	0	0	0	0	0	0	0	0
361:	0	0	1	0	0	0	0	0

369:	0	0	1	0	0	0	0	0

Sample Title: 10

Channel								
377:	0	0	0	0	0	0	0	0
385:	0	0	1	0	0	0	0	0
393:	1	0	0	0	0	0	0	0
401:	0	0	0	0	0	0	0	0
409:	0	0	0	0	0	0	0	0
417:	0	0	0	0	0	0	0	0
425:	0	0	0	0	0	0	0	0
433:	0	0	0	0	0	0	0	0
441:	0	0	0	0	0	0	0	0
449:	0	0	0	0	0	0	0	0
457:	0	0	0	0	0	0	0	0
465:	0	0	0	0	0	0	0	0
473:	0	0	0	0	0	0	0	0
481:	0	0	0	0	0	0	0	0
489:	0	0	0	0	0	0	0	0
497:	0	0	0	0	0	0	0	0
505:	0	0	0	0	0	0	0	0
513:	0	0	0	0	0	0	0	0
521:	0	0	0	0	0	0	0	0
529:	0	0	0	0	0	0	0	0
537:	0	0	0	0	0	0	0	0
545:	0	0	0	0	0	0	0	0
553:	0	0	0	0	0	0	0	0
561:	0	0	0	0	0	0	0	0
569:	0	0	0	0	0	0	0	0
577:	0	0	0	0	0	0	0	1
585:	0	0	0	0	0	0	0	0
593:	0	0	0	0	0	0	0	0
601:	0	0	0	0	1	0	0	0
609:	0	0	0	0	0	0	0	0
617:	0	0	0	0	0	0	0	0
625:	0	0	0	0	0	0	0	0
633:	0	0	0	0	0	0	0	0
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801:	0	0	0	0	0	0	0	0

Sample Title: 10

Channel								
809:	0	0	0	0	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	1	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0

Apex-Alpha™

KB 3/18/20

Sample Description: H-1 35-40
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00002703
Batch Identification: 2003062A-RA
Sample Identification: 11
Sample Geometry: Shelf 2
Procedure Description: Ra

Detector Name: Alpha_045
Chamber Serial Number: 04026482A
Detector Serial Number: 91131
Env. Background: System Bkgd 275088
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Generic Mult. Factor: 2.580E+000 Generic Div. Factor: 1.000E+000
Sample Date/Time: 3/6/2020 12:40:56 PM
Acquisition Date/Time: 3/18/2020 1:51:51 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.8406 +/- 0.0000
Counting Efficiency: 0.1633 +/- 0.0028 on 2/28/2020 7:44:06 AM
Effective Efficiency: 0.1372 +/- 0.0024

Peak Match Tolerance: 0.350 MeV

PEAK AREA REPORT

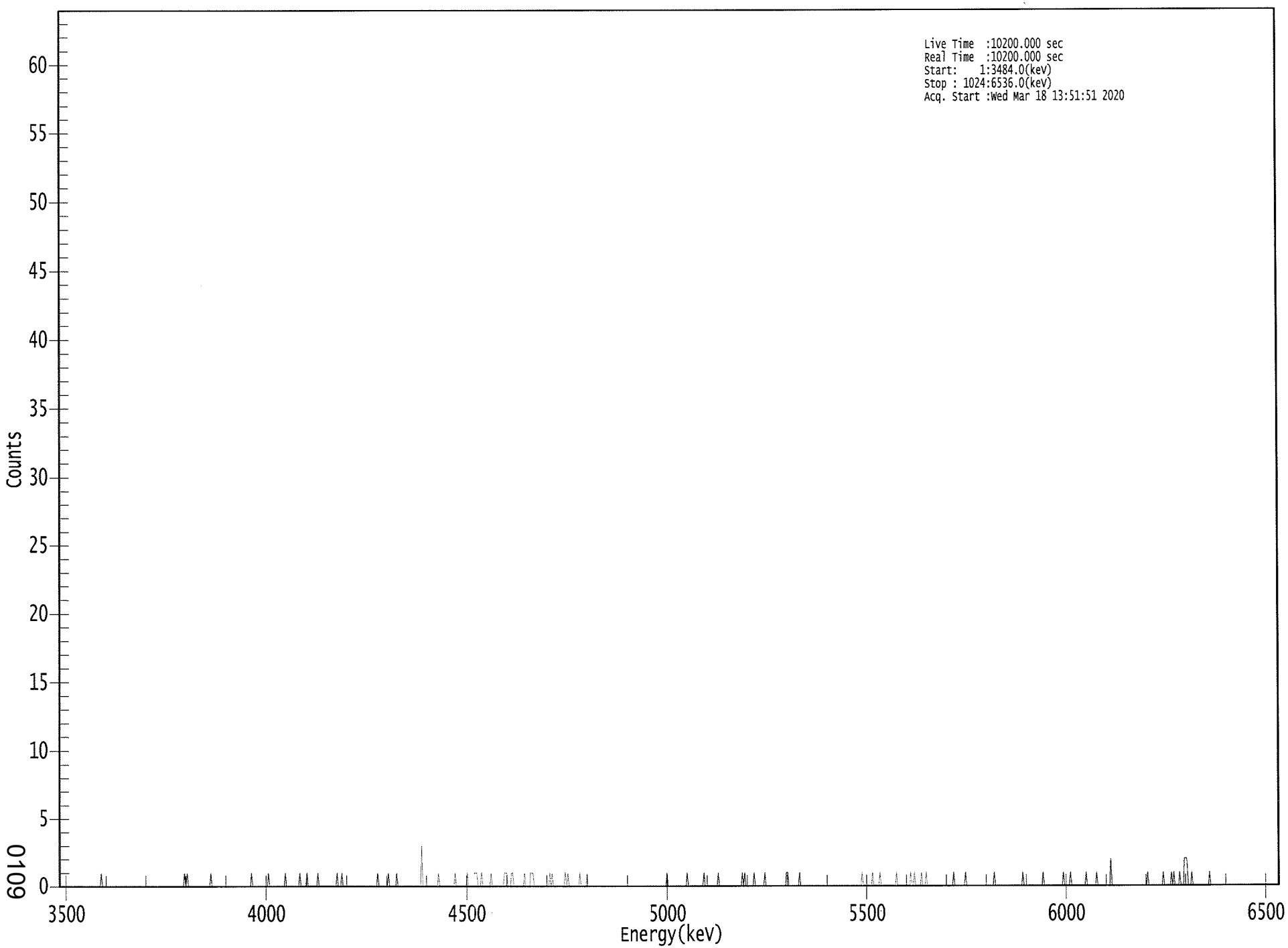
Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.579	6.81	82.43	1.19	0.00E+000	3.0
RA-226	4.592	25.32	39.56	0.68	0.00E+000	3.0

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.985	5685.50*	3.58E-001 +/- 2.95E-001	3.46E-001 +/- 1.18E-002
RA-226	0.952	4785.00*	1.26E+000 +/- 5.01E-001	2.81E-001 +/- 9.60E-003

AG 3/19/20

0000270314.CNF



ROI Type: 1

****
***** S P E C T R A L D A T A R E P O R T *****
****

Sample Title: 11

Elapsed Live time: 10200
Elapsed Real Time: 10200

Channel							
1:	0	0	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	1	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	1	0	1	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	0	1
129:	0	0	0	0	0	0	0	0
137:	0	0	0	0	0	0	0	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	0	0
161:	0	1	0	0	0	0	0	0
169:	0	0	0	0	0	0	0	1
177:	0	0	0	0	0	0	0	0
185:	0	0	0	0	0	1	0	0
193:	0	0	0	0	0	0	0	0
201:	0	1	0	0	0	0	0	1
209:	0	0	0	0	0	0	0	0
217:	1	0	0	0	0	0	0	0
225:	0	0	0	0	0	0	0	0
233:	1	0	0	0	1	0	0	0
241:	0	0	0	0	0	0	0	0
249:	0	0	0	0	0	0	0	0
257:	0	0	0	0	0	0	0	0
265:	0	0	1	0	0	0	0	0
273:	0	0	0	1	0	0	0	0
281:	0	0	1	0	0	0	0	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0	3
305:	0	0	0	0	0	0	0	0
313:	0	0	0	0	0	1	0	0
321:	0	0	0	0	0	0	0	0
329:	0	0	0	1	0	0	0	0
337:	0	0	0	0	0	1	0	0
345:	0	0	0	1	1	1	0	0
353:	0	1	0	0	0	0	0	0
361:	0	1	0	0	0	0	0	0

369:	0	0	0	0	1	1	1	0

Sample Title: 11

Channel								
377:	0	0	1	1	0	0	0	0
385:	0	0	0	0	0	1	0	0
393:	0	0	1	1	1	0	0	0
401:	0	0	0	0	0	0	0	0
409:	0	0	1	0	1	0	0	0
417:	0	0	0	0	0	0	0	1
425:	0	1	0	0	0	0	0	0
433:	0	0	0	1	0	0	0	0
441:	0	1	0	0	0	0	0	0
449:	0	0	0	0	0	0	0	0
457:	0	0	0	0	0	0	0	0
465:	0	0	0	0	0	0	0	0
473:	0	0	0	0	0	0	0	0
481:	0	0	0	0	0	0	0	0
489:	0	0	0	0	0	0	0	0
497:	0	0	0	0	0	0	0	0
505:	0	0	0	0	1	0	0	0
513:	0	0	0	0	0	0	0	0
521:	0	0	0	0	0	1	0	0
529:	0	0	0	0	0	0	0	0
537:	0	0	0	1	0	0	0	0
545:	0	0	0	0	0	0	0	1
553:	0	0	0	0	0	0	0	0
561:	0	0	0	0	0	0	0	0
569:	0	0	0	1	0	1	0	0
577:	0	0	0	0	0	1	0	0
585:	0	0	0	0	0	0	1	0
593:	0	0	0	0	0	0	0	0
601:	0	0	0	0	0	0	0	0
609:	1	1	0	0	0	0	0	0
617:	0	0	0	1	0	0	0	0
625:	0	0	0	0	0	0	0	0
633:	0	0	0	0	0	0	0	0
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	1	0	0	0	0	0	0	0
681:	0	1	0	0	0	0	0	1
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	1	0	0
705:	0	0	0	0	0	0	0	0
713:	0	1	0	0	1	0	0	0
721:	0	0	1	0	0	0	1	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	1	0	0
753:	0	0	0	0	0	0	0	1
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	1
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801:	0	0	0	0	0	0	0	1

Sample Title: 11

Channel								
809:	0	0	0	0	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	1	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	1	0	0	0	0	0	1
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	1	0	0	0
865:	0	0	0	0	0	1	0	0
873:	0	0	0	0	0	0	0	0
881:	0	2	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	1	0	0	0	0	0	0	0
921:	0	0	0	0	0	1	0	0
929:	0	0	0	0	1	0	1	0
937:	0	0	0	1	0	0	0	2
945:	2	2	0	0	0	1	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	1	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0

3/18/2020 5:39:00 AM

Apex-Alpha™

QA SUMMARY REPORT
Review Of QA Results - Pulser Check

Date : 3/18/2020
Time : 5:39:00 AM

CHAMBER	DEVICE	PARAMETER	FLAG	DATE
Alpha_001	21f	ALL	Not Done	
Alpha_002	21f	ALL	Not Done	
Alpha_003	21f	ALL	Not Done	
Alpha_004	21f	ALL	Not Done	
Alpha_005	21f	ALL	Not Done	
Alpha_006	21f	ALL	Not Done	
Alpha_007	21f	ALL	Not Done	
Alpha_008	21f	ALL	Not Done	
Alpha_009	21f	ALL	Not Done	
Alpha_010	21f	ALL	Passed	3/18/2020 5:16:22 AM
Alpha_011	21f	ALL	Passed	3/12/2020 5:55:11 AM
Alpha_012	21f	ALL	Passed	3/18/2020 5:16:24 AM
Alpha_013	21f	ALL	Not Done	
Alpha_014	21f	ALL	Not Done	
Alpha_015	21f	ALL	Not Done	
Alpha_016	21f	ALL	Not Done	
Alpha_033	Alpha Analyst100DC	ALL	Not Done	
Alpha_034	Alpha Analyst100DC	ALL	Not Done	
Alpha_035	Alpha Analyst100DC	ALL	Passed	3/18/2020 5:16:25 AM
Alpha_036	Alpha Analyst100DC	ALL	Passed	3/18/2020 5:16:26 AM
Alpha_037	Alpha Analyst100DC	ALL	Passed	3/18/2020 5:16:28 AM
Alpha_038	Alpha Analyst100DC	ALL	Passed	3/18/2020 5:16:29 AM
Alpha_039	Alpha Analyst100DC	Peak FWHM	Action	3/18/2020 5:16:31 AM
Alpha_040	Alpha Analyst100DC	ALL	Passed	3/18/2020 5:16:32 AM
Alpha_041	Alpha Analyst100DC	ALL	Passed	3/18/2020 5:16:34 AM
Alpha_042	Alpha Analyst100DC	ALL	Not Done	
Alpha_043	Alpha Analyst100DC	ALL	Passed	3/18/2020 5:16:37 AM
Alpha_044	Alpha Analyst100DC	ALL	Passed	3/18/2020 5:16:39 AM
Alpha_045	Alpha Analyst100DC	ALL	Passed	3/18/2020 5:16:41 AM
Alpha_046	Alpha Analyst100DC	ALL	Not Done	
Alpha_047	Alpha Analyst100DC	Peak FWHM	Action	3/18/2020 5:16:44 AM
Alpha_048	Alpha Analyst100DC	ALL	Passed	3/18/2020 5:16:46 AM
Alpha_049	Alpha Analyst100DC	ALL	Passed	3/18/2020 5:16:48 AM
Alpha_050	Alpha Analyst100DC	ALL	Passed	3/18/2020 5:16:49 AM
Alpha_051	Alpha Analyst100DC	ALL	Not Done	
Alpha_052	Alpha Analyst100DC	ALL	Not Done	
Alpha_053	Alpha Analyst100DC	ALL	Passed	3/18/2020 5:16:52 AM
Alpha_054	Alpha Analyst100DC	ALL	Not Done	
Alpha_055	Alpha Analyst100DC	ALL	Passed	3/13/2020 5:00:34 AM
Alpha_056	Alpha Analyst100DC	ALL	Not Done	
Alpha_057	Alpha Analyst100DC	ALL	Passed	3/18/2020 5:16:54 AM
Alpha_058	Alpha Analyst100DC	ALL	Passed	3/18/2020 5:16:56 AM

Review of QA Results - Pulser Check

3/18/2020 5:39:00 AM

CHAMBER	DEVICE	PARAMETER	FLAG	DATE
Alpha_059	Alpha Analyst100DC	ALL	Passed	3/18/2020 5:16:59 AM
Alpha_060	Alpha Analyst100DC	ALL	Passed	3/18/2020 5:17:02 AM

APPROVED BY: KP

APPROVAL DATE: 3/18/20

****
***** L I B R A R Y L I S T I N G R E P O R T *****
****

Nuclide Library Title: Radium

Nuclide Library Description: Ra-226, Po-218, Rn-222

Nuclide Name	Half-Life (Seconds)	Energy (keV)	Energy Uncert. (keV)	Yield (%)	Yield Uncert.(Abs.+-)
PO-218	5.049E+010	6003.000*	0.000	99.9800	0.0000
RN-222	5.049E+010	5490.000*	0.000	99.9200	0.0000
RA-226	5.049E+010	4785.000*	0.000	100.0000	0.0000

* = key line

TOTALS: 3 Nuclides 3 Energy Lines

SECTION IX

ANALYTICAL DATA (RADIUM-228)

20-03062
Ra228
Run 1

Work Order	20-03062
Analysis Code	Ra228
Run	1
Date Received	3/12/2020
Lab Deadline	3/27/2020
Client	ERM
Project	Henning Management
Report Level	4
Activity Units	pCi
Aliquot Units	l
Matrix	WA
Method	EPA 904.0
Instrument Type	Alpha/Beta GPC
Radiometric Tracer	Ba-133
Radiometric Sol#	Ba-6a
Tracer Act (dpm/g)	429.16
Carrier	Yttrium
Carrier Conc (mg/ml)	34.083

Internal Fraction	Sample Desc	Client ID	Login CPM	Sample Date	Sample Aliquot
01	LCS	LCS		03/12/20 00:00	1.0000E+00
02	MBL	BLANK		03/12/20 00:00	1.0000E+00
03	DUP	H-10 35-40	20	03/05/20 15:30	1.0000E+00
04	TRG	H-12 50-60	50	03/05/20 11:05	1.0000E+00
05	TRG	H-9 50-55	20	03/05/20 13:35	1.0000E+00
06	DO	H-10 35-40	20	03/05/20 15:30	1.0000E+00
07	TRG	H-2 30-35	30	03/05/20 16:55	1.0000E+00
08	TRG	H-16 35-40	30	03/06/20 08:15	1.0000E+00
09	TRG	H-18 35-40	30	03/06/20 09:50	1.0000E+00
10	TRG	H-3 22-27	30	03/06/20 13:15	1.0000E+00
11	TRG	H-1 35-40	30	03/06/20 11:10	1.0000E+00

0117

* SAF1 is used for Gross Alpha and all other radionuclides. SAF2 is used for Gross Beta only. ^ Indicates estimated SAF value.
** Actual mass exceeded the calibration curve range. Results should be qualified as appropriate.

20-03062
Ra228
Run 1

Internal Fraction	Sample Desc	Tracer Aliquot (g)	Tracer Total ACT (dpm)	Radiometric Tracer (pCi)	Radiometric % Rec	Grav Carrier Added (ml)	Grav Filter Tare (g)	Grav Filter Final (g)	Grav Filter Net (g)	Grav % Rec	Mean % Rec	SAF 1*	SAF 2*
01	LCS	2.2057	946.6	485.0	113.74	2.000	0.0713	0.1299	0.0586	85.97	94.56	1.00	1.00
02	MBL	2.1933	941.3	461.0	108.73	2.000	0.0711	0.1382	0.0671	98.44	107.03	1.00	1.00
03	DUP	2.1919	940.7	418.0	98.65	2.000	0.0704	0.1379	0.0675	99.02	97.68	1.00	1.00
04	TRG	2.1892	939.5	272.0	64.27	2.000	0.0705	0.1278	0.0573	84.06	54.03	1.00	1.00
05	TRG	2.1798	935.5	374.0	88.75	2.000	0.0713	0.1299	0.0586	85.97	76.30	1.00	1.00
06	DO	2.1827	936.7	337.0	79.87	2.000	0.0704	0.1337	0.0633	92.86	74.17	1.00	1.00
07	TRG	2.1781	934.8	383.0	90.96	2.000	0.0711	0.1331	0.0620	90.95	82.73	1.00	1.00
08	TRG	2.1771	934.3	425.0	100.98	2.000	0.0702	0.1344	0.0642	94.18	95.11	1.00	1.00
09	TRG	2.1731	932.6	273.0	64.99	2.000	0.0696	0.1332	0.0636	93.30	60.63	1.00	1.00
10	TRG	2.1720	932.1	409.0	97.41	2.000	0.0686	0.1334	0.0648	95.06	92.60	1.00	1.00
11	TRG	2.1633	928.4	352.0	84.17	2.000	0.0683	0.1348	0.0665	97.56	82.11	1.00	1.00

0118

* SAF1 is used for Gross Alpha and all other radionuclides. SAF2 is used for Gross Beta only. ^ Indicates estimated SAF value.
** Actual mass exceeded the calibration curve range. Results should be qualified as appropriate.

20-03062
Ra228
Run 1

Internal Fraction	Sample Desc	Rough Prep Date	Rough Prep By	Prep Date	Prep By	Sep t0 Date/Time	Sep t0 By	Sep t1 Date/Time	Sep t1 By
01	LCS			03/23/20 10:25	DBUSH	03/18/20 10:37	DBUSH	03/23/20 10:37	DBUSH
02	MBL			03/23/20 10:25	DBUSH	03/18/20 10:37	DBUSH	03/23/20 10:37	DBUSH
03	DUP			03/23/20 10:25	DBUSH	03/18/20 10:37	DBUSH	03/23/20 10:37	DBUSH
04	TRG			03/23/20 10:25	DBUSH	03/18/20 12:12	DBUSH	03/23/20 10:37	DBUSH
05	TRG			03/23/20 10:25	DBUSH	03/18/20 12:12	DBUSH	03/23/20 10:37	DBUSH
06	DO			03/23/20 10:25	DBUSH	03/18/20 10:37	DBUSH	03/23/20 10:37	DBUSH
07	TRG			03/23/20 10:25	DBUSH	03/18/20 10:37	DBUSH	03/23/20 10:37	DBUSH
08	TRG			03/23/20 10:25	DBUSH	03/18/20 12:12	DBUSH	03/23/20 10:37	DBUSH
09	TRG			03/23/20 10:25	DBUSH	03/18/20 10:37	DBUSH	03/23/20 10:37	DBUSH
10	TRG			03/23/20 10:25	DBUSH	03/18/20 10:37	DBUSH	03/23/20 10:37	DBUSH
11	TRG			03/23/20 10:25	DBUSH	03/18/20 10:37	DBUSH	03/23/20 10:37	DBUSH

0119

* SAF1 is used for Gross Alpha and all other radionuclides. SAF2 is used for Gross Beta only. ^ Indicates estimated SAF value.
** Actual mass exceeded the calibration curve range. Results should be qualified as appropriate.

Client: ERM
Eberline Services Work Order: 20-03062
Analysis Code: Ra228
Run: 1

Lab Fraction	Nuclide	Sample Desc	Client Identification	Activity Units	Results	Error Estimate	MDA	LCS Known	LCS %R	LCS Flag	RPD Flag	MDA Flag	Blank Flag
01	RA-228	LCS	LCS	pCi/l	9.42E+00	7.60E-01	8.78E-01	9.03E+00	104.37	OK		OK	
02	RA-228	MBL	BLANK	pCi/l	1.83E-01	3.95E-01	8.23E-01					OK	OK
03	RA-228	DUP	H-10 35-40	pCi/l	1.19E+00	4.38E-01	8.05E-01				NA	OK	
04	RA-228	TRG	H-12 50-60	pCi/l	1.40E+00	7.62E-01	1.47E+00					OK	
05	RA-228	TRG	H-9 50-55	pCi/l	3.93E-01	5.69E-01	1.17E+00					OK	
06	RA-228	DO	H-10 35-40	pCi/l	2.02E+00	6.18E-01	1.10E+00					OK	
07	RA-228	TRG	H-2 30-35	pCi/l	4.16E-01	5.26E-01	1.08E+00					OK	
08	RA-228	TRG	H-16 35-40	pCi/l	1.04E-01	3.90E-01	8.25E-01					OK	
09	RA-228	TRG	H-18 35-40	pCi/l	4.81E-01	6.46E-01	1.33E+00					OK	
10	RA-228	TRG	H-3 22-27	pCi/l	4.48E-01	5.10E-01	1.04E+00					OK	
11	RA-228	TRG	H-1 35-40	pCi/l	1.92E+00	5.32E-01	9.25E-01					OK	

Client: ERM
Eberline Services Work Order: 20-03062
Analysis Code: Ra228
Run: 1
0121

Lab Fraction	Nuclide	Sample Desc	Sample Date	Sample Aliquot	Radiometric % Rec	Grav % Rec	Mean % Rec	SAF	Sep t0 Date/Time	Sep t1 Date/Time
01	RA-228	LCS	03/12/20 00:00	1.00E+00	113.74	85.97	94.56	1.00	3/18/2020 10:37	3/23/2020 10:37
02	RA-228	MBL	03/12/20 00:00	1.00E+00	108.73	98.44	107.03	1.00	3/18/2020 10:37	3/23/2020 10:37
03	RA-228	DUP	03/05/20 15:30	1.00E+00	98.65	99.02	97.68	1.00	3/18/2020 10:37	3/23/2020 10:37
04	RA-228	TRG	03/05/20 11:05	1.00E+00	64.27	84.06	54.03	1.00	3/18/2020 12:12	3/23/2020 10:37
05	RA-228	TRG	03/05/20 13:35	1.00E+00	88.75	85.97	76.30	1.00	3/18/2020 12:12	3/23/2020 10:37
06	RA-228	DO	03/05/20 15:30	1.00E+00	79.87	92.86	74.17	1.00	3/18/2020 10:37	3/23/2020 10:37
07	RA-228	TRG	03/05/20 16:55	1.00E+00	90.96	90.95	82.73	1.00	3/18/2020 10:37	3/23/2020 10:37
08	RA-228	TRG	03/06/20 08:15	1.00E+00	100.98	94.18	95.11	1.00	3/18/2020 12:12	3/23/2020 10:37
09	RA-228	TRG	03/06/20 09:50	1.00E+00	64.99	93.30	60.63	1.00	3/18/2020 10:37	3/23/2020 10:37
10	RA-228	TRG	03/06/20 13:15	1.00E+00	97.41	95.06	92.60	1.00	3/18/2020 10:37	3/23/2020 10:37
11	RA-228	TRG	03/06/20 11:10	1.00E+00	84.17	97.56	82.11	1.00	3/18/2020 10:37	3/23/2020 10:37

Client: ERM
Eberline Services Work Order: 20-03062
Analysis Code: Ra228
Run: 1

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Halflife (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	RA-228	LCS	03/23/20 12:22		LB4110A	A1	120	1006	1.433333333	0.4803
02	RA-228	MBL	03/23/20 12:22		LB4110A	A2	120	206	1.566666667	0.4724
03	RA-228	DUP	03/23/20 12:22		LB4110A	A3	120	255	1.233333333	0.4719
04	RA-228	TRG	03/23/20 12:22		LB4110A	A4	120	207	1.166666667	0.4548
05	RA-228	TRG	03/23/20 12:22		LB4110A	B1	120	213	1.55	0.4626
06	RA-228	DO	03/23/20 12:22		LB4110A	B3	120	275	1.2	0.449
07	RA-228	TRG	03/23/20 12:22		LB4110A	B4	120	215	1.533333333	0.4619
08	RA-228	TRG	03/23/20 12:22		LB4110A	C1	120	153	1.2	0.4667
09	RA-228	TRG	03/23/20 12:22		LB4110A	C2	120	172	1.216666667	0.4578
10	RA-228	TRG	03/23/20 12:22		LB4110A	C3	120	262	1.866666667	0.4699
11	RA-228	TRG	03/23/20 12:22		LB4110A	C4	120	280	1.133333333	0.4692

Count Room Report
Client: ERM

20-03062-Ra228-1 (pCi/l) in WA
Tracer ID: Ba-6a

Internal Fraction	Sample Desc	Client ID	Sample Date	Sample Aliquot	Tracer Aliquot (g)	Tracer ACT (dpm)	Radiometric Tracer (pCi)	Radiometric % Rec	SAF 1*	SAF 2*
01	LCS	LCS	03/12/20 00:00	1.0000	2.2057	946.5982	485.0000	113.74	1.00	1.00
02	MBL	BLANK	03/12/20 00:00	1.0000	2.1933	941.2766	461.0000	108.73	1.00	1.00
03	DUP	H-10 35-40	03/05/20 15:30	1.0000	2.1919	940.6758	418.0000	98.65	1.00	1.00
04	TRG	H-12 50-60	03/05/20 11:05	1.0000	2.1892	939.5171	272.0000	64.27	1.00	1.00
05	TRG	H-9 50-55	03/05/20 13:35	1.0000	2.1798	935.4830	374.0000	88.75	1.00	1.00
06	DO	H-10 35-40	03/05/20 15:30	1.0000	2.1827	936.7275	337.0000	79.87	1.00	1.00
07	TRG	H-2 30-35	03/05/20 16:55	1.0000	2.1781	934.7534	383.0000	90.96	1.00	1.00
08	TRG	H-16 35-40	03/06/20 08:15	1.0000	2.1771	934.3242	425.0000	100.98	1.00	1.00
09	TRG	H-18 35-40	03/06/20 09:50	1.0000	2.1731	932.6076	273.0000	64.99	1.00	1.00
10	TRG	H-3 22-27	03/06/20 13:15	1.0000	2.1720	932.1355	409.0000	97.41	1.00	1.00
11	TRG	H-1 35-40	03/06/20 11:10	1.0000	2.1633	928.4018	352.0000	84.17	1.00	1.00

Spike and Tracer Worksheet

Internal Work Order	Run	Analysis Code	Date	Technician	Technician Initials	Witness Initials
20-03062	1	Ra228	3/23/2020 10:24	DBUSH	DB	

LCS & Matrix Spikes					LCS	MS	LCSD	MSD	LCS		MS		LCSD		MSD	
Isotope	Sol #	Activity dpm/g	Solution Date	Approx Addition	Volume Used (g)	Volume Used (g)	Volume Used (g)	Volume Used (g)	Known pCi	Error Estimate	Added pCi	Error Estimate	Known pCi	Error Estimate	Added pCi	Error Estimate
Ra-228	Ra-12	44.430	3/23/2020	0.450	0.4511				9.03	0.460	0.00	0.000	0.00	0.000	0.00	0.000

Tracers

fraction	Isotope	Sol #	Activity dpm/g	Solution Date	Volume Used (g)	Approx Addition
01	Ba-133	Ba-6a	429.160	3/23/2020	2.2057	2.3600
02	Ba-133	Ba-6a	429.160	3/23/2020	2.1933	2.3600
03	Ba-133	Ba-6a	429.160	3/23/2020	2.1919	2.3600
04	Ba-133	Ba-6a	429.160	3/23/2020	2.1892	2.3600
05	Ba-133	Ba-6a	429.160	3/23/2020	2.1798	2.3600
06	Ba-133	Ba-6a	429.160	3/23/2020	2.1827	2.3600
07	Ba-133	Ba-6a	429.160	3/23/2020	2.1781	2.3600
08	Ba-133	Ba-6a	429.160	3/23/2020	2.1771	2.3600
09	Ba-133	Ba-6a	429.160	3/23/2020	2.1731	2.3600
10	Ba-133	Ba-6a	429.160	3/23/2020	2.1720	2.3600
11	Ba-133	Ba-6a	429.160	3/23/2020	2.1633	2.3600

Balance Printer Tapes

Tracer

LCS

Matrix Spike

0124

Eberline Analytical
Oak Ridge Laboratory

Aliquot Worksheet

Printed: 3/16/2020 11:19 AM

Work Order	Run	Analysis Code	Rpt Units	Lab Deadline	Technician
20-03062	1	Ra228	liters	3/27/2020	JHARVEY

Lab Fraction	ERM Client ID	Sample Type	Muffle Data Ratio Post/Pre	Dilution Data No of Dils	Dil Factor	Ratio	Aliquot Data Aliquot	Net Equiv	MS Aliquot Data Aliquot	Net Equiv	H-3 Solids Only Water Added (ml)	H3 Dist Aliq
01	LCS	LCS					1.0000E+00	1.0000E+00				
02	BLANK	MBL					1.0000E+00	1.0000E+00				
03	H-10 35-40	DUP					1.0000E+00	1.0000E+00				
04	H-12 50-60	TRG					1.0000E+00	1.0000E+00				
05	H-9 50-55	TRG					1.0000E+00	1.0000E+00				
06	H-10 35-40	DO					1.0000E+00	1.0000E+00				
07	H-2 30-35	TRG					1.0000E+00	1.0000E+00				
08	H-16 35-40	TRG					1.0000E+00	1.0000E+00				
09	H-18 35-40	TRG					1.0000E+00	1.0000E+00				
10	H-3 22-27	TRG					1.0000E+00	1.0000E+00				
11	H-1 35-40	TRG					1.0000E+00	1.0000E+00				

Comments	

0125

Technician: _____ Date: 3/16/2020

Gravimetric Worksheet

Work Order	Run	Analysis Code	Gravimetric Carrier	Carrier Conc (mg/ml)	Technician
20-03062	1	Ra228	Yttrium	34.0830	DBUSH

TRetec Fraction	ERM Client ID	Sample Type	Carrier Data	Filter Data			Gravimetric
			Carrier Added (ml)	Filter Tare (g)	Filter Final (g)	Filter Net (g)	% Recovery
01	LCS	LCS	2.0000	0.0713	0.1299	**0.0586**	**85.97**
02	BLANK	MBL	2.0000	0.0711	0.1382	**0.0671**	**98.44**
03	DUP	DUP	2.0000	0.0704	0.1379	**0.0675**	**99.02**
04	H-12 50-60	TRG	2.0000	0.0705	0.1278	**0.0573**	**84.06**
05	H-9 50-55	TRG	2.0000	0.0713	0.1299	**0.0586**	**85.97**
06	H-10 35-40	DO	2.0000	0.0704	0.1337	**0.0633**	**92.86**
07	H-2 30-35	TRG	2.0000	0.0711	0.1331	**0.0620**	**90.95**
08	H-16 35-40	TRG	2.0000	0.0702	0.1344	**0.0642**	**94.18**
09	H-18 35-40	TRG	2.0000	0.0696	0.1332	**0.0636**	**93.30**
10	H-3 22-27	TRG	2.0000	0.0686	0.1334	**0.0648**	**95.06**
11	H-1 35-40	TRG	2.0000	0.0683	0.1348	**0.0665**	**97.56**

0126

Technician: Dylan Bush Date: 3 / 23 / 20

Detector ID	Sample ID	Alpha	Beta	Count Time	Voltage	TOD
A1	2003062-01	46	1006	120	1410	3/23/2020 12:22:47 PM
A2	2003062-02	29	206	120	1410	3/23/2020 12:22:47 PM
A3	2003062-03	15	255	120	1410	3/23/2020 12:22:48 PM
A4	2003062-04	36	207	120	1410	3/23/2020 12:22:48 PM
B1	2003062-05	24	213	120	1410	3/23/2020 12:22:48 PM
B3	2003062-06	24	275	120	1410	3/23/2020 12:22:48 PM
B4	2003062-07	22	215	120	1410	3/23/2020 12:22:49 PM
C1	2003062-08	25	153	120	1410	3/23/2020 12:22:49 PM
C2	2003062-09	20	172	120	1410	3/23/2020 12:22:49 PM
C3	2003062-10	16	262	120	1410	3/23/2020 12:22:49 PM
C4	2003062-11	24	280	120	1410	3/23/2020 12:22:49 PM

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3/23/20

GPC Detector Report
(ALL Backgrounds)

Detector	Alpha/Beta	Calibration Date	Count Date	Bkg CPM	PFW	LCL	Mean	UCL
LB4110A - A1	Alpha	11/2/2017	3/23/2020	1.83E-01	P	-3.98E-02	1.15E-01	2.70E-01
LB4110A - A2	Alpha	11/2/2017	3/23/2020	1.33E-01	P	-2.89E-02	1.23E-01	2.74E-01
LB4110A - A3	Alpha	11/2/2017	3/23/2020	5.00E-02	P	-3.45E-02	1.22E-01	2.79E-01
LB4110A - A4	Alpha	11/2/2017	3/23/2020	1.50E-01	P	-3.53E-02	1.23E-01	2.81E-01
LB4110A - B1	Alpha	11/2/2017	3/23/2020	1.67E-01	P	-3.65E-02	1.39E-01	3.14E-01
LB4110A - B2	Alpha	11/2/2017	3/23/2020	1.50E-01	P	-2.06E-02	1.67E-01	3.54E-01
LB4110A - B3	Alpha	11/2/2017	3/23/2020	1.50E-01	P	-4.54E-02	1.02E-01	2.50E-01
LB4110A - B4	Alpha	11/2/2017	3/23/2020	8.33E-02	P	-3.92E-02	1.00E-01	2.40E-01
LB4110A - C1	Alpha	11/2/2017	3/23/2020	8.33E-02	P	-5.23E-02	9.51E-02	2.43E-01
LB4110A - C2	Alpha	11/2/2017	3/23/2020	6.67E-02	P	-1.33E-01	1.00E-01	3.34E-01
LB4110A - C3	Alpha	11/2/2017	3/23/2020	1.67E-02	P	-4.98E-02	7.01E-02	1.90E-01
LB4110A - C4	Alpha	11/2/2017	3/23/2020	1.17E-01	P	-5.36E-02	1.29E-01	3.12E-01
LB4110A - D1	Alpha	11/2/2017	3/23/2020	1.00E-01	P	-5.70E-02	1.47E-01	3.51E-01
LB4110A - D2	Alpha	11/2/2017	3/23/2020	3.33E-02	P	-3.97E-02	1.04E-01	2.48E-01
LB4110A - D3	Alpha	11/2/2017	3/23/2020	1.33E-01	P	-4.71E-02	1.18E-01	2.83E-01
LB4110A - D4	Alpha	11/2/2017	3/23/2020	8.33E-02	P	-2.90E-03	1.65E-01	3.32E-01
LB4110A - E1	Alpha	11/2/2017	3/23/2018	0.00E+00	P	-4.29E-02	1.10E-01	2.62E-01
LB4110A - E2	Alpha	11/2/2017	3/23/2018	0.00E+00	P	-3.09E-02	6.37E-02	1.58E-01
LB4110A - E3	Alpha	11/2/2017	3/23/2018	0.00E+00	P	-8.81E-02	9.11E-02	2.70E-01
LB4110A - E4	Alpha	11/2/2017	3/23/2018	0.00E+00	P	-4.55E-02	7.04E-02	1.86E-01
LB4110A - F1	Alpha	11/2/2017	3/23/2020	5.00E-02	P	-4.48E-02	8.06E-02	2.06E-01
LB4110A - F2	Alpha	11/2/2017	3/23/2020	6.67E-02	P	-4.40E-02	5.47E-02	1.53E-01
LB4110A - F3	Alpha	11/2/2017	3/23/2020	1.00E-01	P	-4.80E-02	7.30E-02	1.94E-01
LB4110A - F4	Alpha	11/2/2017	3/23/2020	1.67E-01	P	-4.05E-02	6.81E-02	1.77E-01
LB4110A - G1	Alpha	11/2/2017	3/23/2020	1.33E-01	P	-4.32E-02	7.06E-02	1.84E-01
LB4110A - G2	Alpha	11/2/2017	3/23/2020	6.67E-02	P	-3.91E-02	8.08E-02	2.01E-01
LB4110A - G3	Alpha	11/2/2017	3/23/2020	1.17E-01	P	-3.99E-02	8.75E-02	2.15E-01
LB4110A - G4	Alpha	11/2/2017	3/23/2020	6.67E-02	P	-3.78E-02	8.64E-02	2.11E-01

ICP
3/23/20

Eberline Analytical
Oak Ridge Laboratory

GPC Detector Report
(ALL Backgrounds)

Printed: 3/23/2020 7:05 AM

KP
3/23/20

Detector	Alpha/Beta	Calibration Date	Count Date	Bkg CPM	PFW	LCL	Mean	UCL
LB4110A - A1	Beta	11/2/2017	3/23/2020	1.43E+00	P	8.81E-01	1.36E+00	1.83E+00
LB4110A - A2	Beta	11/2/2017	3/23/2020	1.57E+00	P	1.01E+00	1.58E+00	2.14E+00
LB4110A - A3	Beta	11/2/2017	3/23/2020	1.23E+00	P	9.99E-01	1.46E+00	1.93E+00
LB4110A - A4	Beta	11/2/2017	3/23/2020	1.17E+00	P	9.75E-01	1.44E+00	1.91E+00
LB4110A - B1	Beta	11/2/2017	3/23/2020	1.55E+00	P	1.01E+00	1.49E+00	1.97E+00
LB4110A - B2	Beta	11/2/2017	3/23/2020	1.20E+00	P	7.34E-01	1.43E+00	2.13E+00
LB4110A - B3	Beta	11/2/2017	3/23/2020	1.20E+00	P	9.14E-01	1.36E+00	1.80E+00
LB4110A - B4	Beta	11/2/2017	3/23/2020	1.53E+00	P	7.85E-01	1.34E+00	1.89E+00
LB4110A - C1	Beta	11/2/2017	3/23/2020	1.20E+00	P	-1.49E+00	1.60E+00	4.70E+00
LB4110A - C2	Beta	11/2/2017	3/23/2020	1.22E+00	P	-4.73E+00	1.91E+00	8.55E+00
LB4110A - C3	Beta	11/2/2017	3/23/2020	1.87E+00	P	3.24E-01	1.68E+00	3.03E+00
LB4110A - C4	Beta	11/2/2017	3/23/2020	1.13E+00	P	8.22E-01	1.27E+00	1.72E+00
LB4110A - D1	Beta	11/2/2017	3/23/2020	1.15E+00	P	1.01E-01	1.42E+00	2.73E+00
LB4110A - D2	Beta	11/2/2017	3/23/2020	1.83E+00	P	-1.93E+01	2.82E+00	2.50E+01
LB4110A - D3	Beta	11/2/2017	3/23/2020	1.07E+00	P	-2.04E+00	1.67E+00	5.38E+00
LB4110A - D4	Beta	11/2/2017	3/23/2020	1.33E+00	P	9.74E-01	1.47E+00	1.96E+00
LB4110A - E1	Beta	11/2/2017	3/23/2018	3.33E-02	P	7.66E-01	1.32E+00	1.88E+00
LB4110A - E2	Beta	11/2/2017	3/23/2018	1.67E-02	P	5.45E-01	9.58E-01	1.37E+00
LB4110A - E3	Beta	11/2/2017	3/23/2018	6.67E-02	P	4.98E-01	1.20E+00	1.91E+00
LB4110A - E4	Beta	11/2/2017	3/23/2018	0.00E+00	P	5.67E-01	1.04E+00	1.50E+00
LB4110A - F1	Beta	11/2/2017	3/23/2020	1.22E+00	P	7.86E-01	1.29E+00	1.78E+00
LB4110A - F2	Beta	11/2/2017	3/23/2020	9.67E-01	P	4.39E-01	9.20E-01	1.40E+00
LB4110A - F3	Beta	11/2/2017	3/23/2020	1.12E+00	P	4.24E-01	1.17E+00	1.92E+00
LB4110A - F4	Beta	11/2/2017	3/23/2020	9.83E-01	P	1.77E-01	1.18E+00	2.18E+00
LB4110A - G1	Beta	11/2/2017	3/23/2020	1.32E+00	P	6.15E-01	1.23E+00	1.84E+00
LB4110A - G2	Beta	11/2/2017	3/23/2020	1.37E+00	P	1.04E+00	1.70E+00	2.36E+00
LB4110A - G3	Beta	11/2/2017	3/23/2020	1.20E+00	P	6.37E-01	1.31E+00	1.99E+00
LB4110A - G4	Beta	11/2/2017	3/23/2020	1.70E+00	P	-1.09E+00	1.39E+00	3.88E+00

GPC Detector Report
(ALL Efficiencies)

KP
3/23/20

Detector	Alpha/Beta	Calibration Date	Count Date	Eff	PFW	LCL	Mean	UCL
LB4110A - A1	Alpha	11/2/2017	3/23/2020	0.2346	P	0.2137	0.2286	0.2434
LB4110A - A2	Alpha	11/2/2017	3/23/2020	0.2027	P	0.1883	0.2068	0.2253
LB4110A - A3	Alpha	11/2/2017	3/23/2020	0.1967	P	0.1836	0.1981	0.2127
LB4110A - A4	Alpha	11/2/2017	3/23/2020	0.2295	P	0.2072	0.2259	0.2445
LB4110A - B1	Alpha	11/2/2017	3/23/2020	0.2063	P	0.1986	0.2204	0.2423
LB4110A - B2	Alpha	11/2/2017	3/23/2020	0.1851	F	0.1864	0.1994	0.2125
LB4110A - B3	Alpha	11/2/2017	3/23/2020	0.2351	P	0.2207	0.2348	0.2489
LB4110A - B4	Alpha	11/2/2017	3/23/2020	0.2168	P	0.2084	0.2236	0.2389
LB4110A - C1	Alpha	11/2/2017	3/23/2020	0.2008	P	0.1929	0.2058	0.2187
LB4110A - C2	Alpha	11/2/2017	3/23/2020	0.2055	P	0.0166	0.2170	0.4175
LB4110A - C3	Alpha	11/2/2017	3/23/2020	0.2286	P	0.2184	0.2376	0.2568
LB4110A - C4	Alpha	11/2/2017	3/23/2020	0.2200	P	0.2007	0.2158	0.2310
LB4110A - D1	Alpha	11/2/2017	3/23/2020	0.1994	P	0.1863	0.2154	0.2446
LB4110A - D2	Alpha	11/2/2017	3/23/2020	0.2269	P	0.2133	0.2411	0.2689
LB4110A - D3	Alpha	11/2/2017	3/23/2020	0.2403	P	0.2302	0.2483	0.2665
LB4110A - D4	Alpha	11/2/2017	3/23/2020	0.1858	P	0.1699	0.1913	0.2127
LB4110A - E1	Alpha	11/2/2017	3/23/2018	0.0000	F	0.1687	0.2258	0.2830
LB4110A - E2	Alpha	11/2/2017	3/23/2018	0.0000	F	0.1518	0.2051	0.2584
LB4110A - E3	Alpha	11/2/2017	3/23/2018	0.0000	F	0.1547	0.2075	0.2603
LB4110A - E4	Alpha	11/2/2017	3/23/2018	0.0000	F	0.1747	0.2355	0.2963
LB4110A - F1	Alpha	11/2/2017	3/23/2020	0.2155	P	0.1717	0.2134	0.2550
LB4110A - F2	Alpha	11/2/2017	3/23/2020	0.1799	P	0.1521	0.1813	0.2106
LB4110A - F3	Alpha	11/2/2017	3/23/2020	0.2252	P	0.1850	0.2273	0.2696
LB4110A - F4	Alpha	11/2/2017	3/23/2020	0.2136	P	0.1755	0.2125	0.2495
LB4110A - G1	Alpha	11/2/2017	3/23/2020	0.1878	P	0.1747	0.1919	0.2092
LB4110A - G2	Alpha	11/2/2017	3/23/2020	0.1844	P	0.1698	0.1930	0.2161
LB4110A - G3	Alpha	11/2/2017	3/23/2020	0.2119	P	0.2020	0.2188	0.2355
LB4110A - G4	Alpha	11/2/2017	3/23/2020	0.0401	F	0.1621	0.1891	0.2162

GPC Detector Report
(ALL Efficiencies)

KP
3/23/20

Detector	Alpha/Beta	Calibration Date	Count Date	Eff	PFW	LCL	Mean	UCL
LB4110A - A1	Beta	11/2/2017	3/23/2020	0.5664	P	0.5085	0.5492	0.5898
LB4110A - A2	Beta	11/2/2017	3/23/2020	0.4411	P	0.3998	0.4533	0.5069
LB4110A - A3	Beta	11/2/2017	3/23/2020	0.4729	P	0.4396	0.4779	0.5161
LB4110A - A4	Beta	11/2/2017	3/23/2020	0.5526	P	0.5056	0.5457	0.5857
LB4110A - B1	Beta	11/2/2017	3/23/2020	0.4859	P	0.4654	0.5296	0.5937
LB4110A - B2	Beta	11/2/2017	3/23/2020	0.4666	F	0.4680	0.4977	0.5273
LB4110A - B3	Beta	11/2/2017	3/23/2020	0.5894	P	0.5537	0.5845	0.6152
LB4110A - B4	Beta	11/2/2017	3/23/2020	0.5479	P	0.5139	0.5500	0.5861
LB4110A - C1	Beta	11/2/2017	3/23/2020	0.4835	P	0.4506	0.4791	0.5076
LB4110A - C2	Beta	11/2/2017	3/23/2020	0.4897	P	0.4655	0.5116	0.5577
LB4110A - C3	Beta	11/2/2017	3/23/2020	0.5932	P	0.5398	0.5885	0.6372
LB4110A - C4	Beta	11/2/2017	3/23/2020	0.5273	P	0.4879	0.5237	0.5595
LB4110A - D1	Beta	11/2/2017	3/23/2020	0.5798	P	0.5542	0.6247	0.6951
LB4110A - D2	Beta	11/2/2017	3/23/2020	0.5839	P	0.5205	0.6106	0.7007
LB4110A - D3	Beta	11/2/2017	3/23/2020	0.5980	P	0.5710	0.6338	0.6965
LB4110A - D4	Beta	11/2/2017	3/23/2020	0.4841	P	0.4495	0.4946	0.5397
LB4110A - E1	Beta	11/2/2017	3/23/2018	0.0436	F	0.4162	0.5409	0.6655
LB4110A - E2	Beta	11/2/2017	3/23/2018	0.0428	F	0.3730	0.4913	0.6097
LB4110A - E3	Beta	11/2/2017	3/23/2018	0.0551	F	0.3852	0.4994	0.6137
LB4110A - E4	Beta	11/2/2017	3/23/2018	0.0569	F	0.4534	0.5890	0.7247
LB4110A - F1	Beta	11/2/2017	3/23/2020	0.5237	P	0.4612	0.5332	0.6051
LB4110A - F2	Beta	11/2/2017	3/23/2020	0.4486	P	0.4175	0.4548	0.4922
LB4110A - F3	Beta	11/2/2017	3/23/2020	0.5766	P	0.4902	0.5868	0.6834
LB4110A - F4	Beta	11/2/2017	3/23/2020	0.5491	P	0.4671	0.5405	0.6140
LB4110A - G1	Beta	11/2/2017	3/23/2020	0.4516	P	0.4246	0.4512	0.4778
LB4110A - G2	Beta	11/2/2017	3/23/2020	0.4261	P	0.4019	0.4611	0.5203
LB4110A - G3	Beta	11/2/2017	3/23/2020	0.5231	P	0.4845	0.5274	0.5702
LB4110A - G4	Beta	11/2/2017	3/23/2020	0.1130	F	0.3880	0.4578	0.5276

SECTION X

BARIUM-133 ANALYTICAL TRACER DATA

KP 3/18/20

Apex-Gamma

Analysis Report for 2003062-01

SPIKE

GAMMA SPECTRUM ANALYSIS

Sample Identification	: 2003062-01
Sample Description	: SPIKE
Sample Type	: RA RECOVERY
Sample Size	: 1.000E+00 units
Facility	: Countroom
Sample Taken On	: 3/18/2020 10:32:04AM
Acquisition Started	: 3/18/2020 12:39:40PM
Procedure	: BAFIL
Operator	: Administrator
Detector Name	: GE2
Geometry	: BAFIL
Live Time	: 900.0 seconds
Real Time	: 900.2 seconds
Dead Time	: 0.02 %
Peak Locate Threshold	: 2.50
Peak Locate Range (in channels)	: 1 - 4096
Peak Area Range (in channels)	: 29 - 4096
Identification Energy Tolerance	: 2.500 keV
Energy Calibration Used Done On	: 10/19/2019
Efficiency Calibration Used Done On	: 9/14/2019
Efficiency Calibration Description	:
Sample Number	: 95608

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 3/18/2020 12:54:43PM

Peak Analysis From Channel : 1

Peak Analysis To Channel : 4096

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)

Analysis Report for 2003062-01

SPIKE

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
	1	35.33	35 -	38	35.67	3.84E+02	57.58	3.35E+02	2.55
	2	52.60	49 -	57	52.91	6.77E+01	35.22	1.51E+02	2.12
M	3	61.85	58 -	73	62.16	1.68E+02	34.06	1.06E+02	1.78
m	4	65.91	58 -	73	66.21	7.72E+01	35.38	1.53E+02	1.93
	5	81.11	77 -	86	81.39	8.57E+02	70.89	2.23E+02	1.85
	6	92.78	90 -	96	93.05	3.45E+01	26.06	9.91E+01	1.96
	7	111.63	108 -	114	111.87	1.62E+02	39.13	1.61E+02	1.26
	8	160.88	159 -	164	161.07	3.02E+01	24.84	9.96E+01	2.11
	9	243.72	242 -	246	243.82	1.55E+01	13.21	2.50E+01	2.68
	10	276.37	275 -	280	276.44	6.06E+01	21.79	4.87E+01	1.74
M	11	302.99	299 -	315	303.03	1.38E+02	28.07	4.00E+01	1.58
m	12	306.96	299 -	315	307.00	1.22E+01	14.42	3.20E+01	1.44
m	13	312.08	299 -	315	312.11	1.06E+01	14.42	4.00E+01	1.59
	14	333.15	328 -	336	333.16	6.49E+01	24.39	4.63E+01	1.72
	15	355.96	352 -	359	355.94	5.63E+02	50.16	4.39E+01	1.38
M	16	383.91	380 -	397	383.86	9.20E+01	22.16	1.73E+01	1.67
m	17	387.09	380 -	397	387.05	1.52E+02	27.04	9.69E+00	1.67
m	18	391.90	380 -	397	391.85	1.75E+01	13.39	5.95E+00	1.68
M	19	414.79	410 -	423	414.72	2.25E+01	15.14	2.07E+01	2.26
m	20	418.91	410 -	423	418.83	1.31E+01	15.14	1.19E+01	2.27
	21	436.71	433 -	439	436.61	6.70E+01	18.02	1.01E+01	1.81
	22	502.29	499 -	505	502.13	6.50E+00	8.03	7.00E+00	1.28
	23	539.73	535 -	543	539.53	8.50E+00	9.62	9.00E+00	1.75

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

BACKGROUND SUBTRACT REPORT

Peak Analysis Performed on : 3/18/2020 12:54:43PM

Env. Background File : \\OR-GAMMA1\ApexRoot\Countroom\Data\0000095493.CNF

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
	1	35.33	3.84E+02	57.58			3.84E+02	5.76E+01
	2	52.60	6.77E+01	35.22			6.77E+01	3.52E+01
M	3	61.85	1.68E+02	34.06	5.90E+00	2.40E+00	1.62E+02	3.41E+01
m	4	65.91	7.72E+01	35.38	1.33E+00	5.66E-01	7.59E+01	3.54E+01
	5	81.11	8.57E+02	70.89			8.57E+02	7.09E+01
	6	92.78	3.45E+01	26.06	1.27E+01	1.31E+00	2.17E+01	2.61E+01

Analysis Report for 2003062-01

SPIKE

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
	7	111.63	1.62E+02	39.13			1.62E+02	3.91E+01
	8	160.88	3.02E+01	24.84			3.02E+01	2.48E+01
	9	243.72	1.55E+01	13.21			1.55E+01	1.32E+01
	10	276.37	6.06E+01	21.79	0.00E+00	0.00E+00	6.06E+01	2.18E+01
M	11	302.99	1.38E+02	28.07			1.38E+02	2.81E+01
m	12	306.96	1.22E+01	14.42			1.22E+01	1.44E+01
m	13	312.08	1.06E+01	14.42			1.06E+01	1.44E+01
	14	333.15	6.49E+01	24.39			6.49E+01	2.44E+01
	15	355.96	5.63E+02	50.16			5.63E+02	5.02E+01
M	16	383.91	9.20E+01	22.16			9.20E+01	2.22E+01
m	17	387.09	1.52E+02	27.04			1.52E+02	2.70E+01
m	18	391.90	1.75E+01	13.39			1.75E+01	1.34E+01
M	19	414.79	2.25E+01	15.14			2.25E+01	1.51E+01
m	20	418.91	1.31E+01	15.14			1.31E+01	1.51E+01
	21	436.71	6.70E+01	18.02			6.70E+01	1.80E+01
	22	502.29	6.50E+00	8.03			6.50E+00	8.03E+00
	23	539.73	8.50E+00	9.62			8.50E+00	9.62E+00

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : \\OR-GAMMA1\ApexRoot\Countroom\Library\WSRC.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/units)	Activity Uncertainty
SN-113	0.96	255.12		1.93		
		391.69	*	61.90	1.15E+01	8.83E+00
BA-133	1.00	81.00	*	34.06	5.23E+02	6.87E+01
		302.84	*	18.33	4.91E+02	1.80E+02
		356.01	*	62.05	4.51E+02	6.44E+01
TH-234	0.94	63.29	*	3.80	3.35E+02	7.16E+01
AM-241	0.87	59.54	*	35.90	3.55E+01	7.58E+00

Analysis Report for 2003062-01

SPIKE

* = Energy line found in the spectrum.
\- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 2.500 keV
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma

INTERFERENCE CORRECTED REPORT

	Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/units)	Wt mean Activity Uncertainty	Comments
	SN-113	0.964	1.15E+01	8.83E+00	
	BA-133	1.000	4.85E+02	4.54E+01	
?	TH-234	0.949	3.35E+02	7.16E+01	
?	AM-241	0.872	3.55E+01	7.58E+00	

? = nuclide is part of an undetermined solution
X = nuclide rejected by the interference analysis
@ = nuclide contains energy lines not used in Weighted Mean Activity

Errors quoted at 2.000sigma

Analysis Report for 2003062-01

SPIKE

UNIDENTIFIED PEAKS

Peak Locate Performed on : 3/18/2020 12:54:43PM
Peak Locate From Channel : 1
Peak Locate To Channel : 4096

	Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
	1	35.33	4.27197E-01	7.49	Tol.	I-129
	2	52.60	7.52137E-02	26.01		
m	4	65.91	8.43094E-02	23.32		
	6	92.78	2.41453E-02	60.03		
	7	111.63	1.79550E-01	12.11	Tol.	U-237
	8	160.88	3.35764E-02	41.10	Sum	
	9	243.72	1.72222E-02	42.61		
	10	276.37	6.73660E-02	17.97		
m	12	306.96	1.35534E-02	59.12		
m	13	312.08	1.17840E-02	67.99		
	14	333.15	7.20707E-02	18.80		
M	16	383.91	1.02175E-01	12.05	Sum	
m	17	387.09	1.68639E-01	8.91		
M	19	414.79	2.49995E-02	33.65		
m	20	418.91	1.46111E-02	57.57	Sum	
	21	436.71	7.43982E-02	13.46	Sum	
	22	502.29	7.22222E-03	61.78		
	23	539.73	9.44444E-03	56.57		

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE MDA REPORT

Nuclide Library Used : \\OR-GAMMA1\ApexRoot\Countroom\Library\WSRC.NLB

Analysis Report for 2003062-01

SPIKE

	Nuclide Name	Energy (keV)		Yield(%)	Line MDA (pCi/units)	Nuclide MDA (pCi/units)	Activity (pCi/units)	Dec. Level (pCi/units)
	FE-55	5.89		24.50	4.58E-09	4.58E-09	0.00E+00	0.00E+00
	CO-57	122.06		85.51	2.18E+01	2.18E+01	-1.81E+01	1.00E+01
		136.48		10.60	2.06E+02		2.39E+01	9.47E+01
	NI-59	6.92		29.80	2.55E-08	2.55E-08	0.00E+00	0.00E+00
	MO-93	16.59		52.90	9.74E-05	9.74E-05	0.00E+00	0.00E+00
		18.60		10.00	1.34E-03		0.00E+00	0.00E+00
	NB-93M	16.57		9.43	5.41E-04	5.41E-04	0.00E+00	0.00E+00
	CD-109	88.03		3.72	2.32E+02	2.32E+02	2.97E+01	1.06E+02
+	SN-113	255.12		1.93	1.12E+03	2.38E+01	-1.54E+02	5.02E+02
		391.69	*	61.90	2.38E+01		1.15E+01	1.10E+01
	SN-119M	23.87		16.10	5.80E-03	5.80E-03	0.00E+00	0.00E+00
		25.10		22.70	5.92E-03		0.00E+00	0.00E+00
	I-129	29.78		57.00	4.86E-01	4.86E-01	1.34E+00	2.39E-01
		33.60		13.20	4.53E+00		7.79E-01	2.23E+00
		39.58		7.52	4.45E+00		-7.16E-01	2.06E+00
+	BA-133	81.00	*	34.06	4.18E+01	2.36E+01	5.23E+02	2.01E+01
		302.84	*	18.33	2.15E+02		4.91E+02	1.03E+02
		356.01	*	62.05	2.36E+01		4.51E+02	1.07E+01
	CE-139	165.85		80.35	3.53E+01	3.53E+01	-4.38E+00	1.63E+01
	CE-144	133.54		10.80	2.15E+02	2.15E+02	3.87E+00	9.94E+01
	HG-203	279.19		77.30	3.33E+01	3.33E+01	-2.39E+00	1.54E+01
	PB-210	46.50		4.25	1.79E+01	1.79E+01	2.67E+00	8.28E+00
	TH-231	25.64		14.70	1.06E-02	1.06E-02	0.00E+00	0.00E+00
		84.21		6.40	3.47E+02		6.92E+02	1.69E+02
	PA-234M	9.89		89.00	4.30E-07	4.30E-07	0.00E+00	0.00E+00
		21.72		64.90	7.08E-04		0.00E+00	0.00E+00
		37.93		23.75	2.63E+00		1.39E-01	1.27E+00
		131.42		20.40	1.18E+02		4.64E+01	5.48E+01
+	TH-234	63.29	*	3.80	2.01E+02	2.01E+02	3.35E+02	9.77E+01
	NP-237	29.37		14.00	1.81E+00	1.81E+00	4.98E+00	8.89E-01
		86.50		12.60	7.14E+01		8.32E+00	3.30E+01
	U-237	97.08		16.30	6.95E+01	5.53E+01	2.12E+01	3.19E+01
		101.07		26.30	5.53E+01		4.68E+01	2.57E+01
		114.00		12.30	2.80E+02		-2.74E+00	1.35E+02
		208.01		22.00	1.36E+02		1.09E+01	6.26E+01
+	AM-241	59.54	*	35.90	2.13E+01	2.13E+01	3.55E+01	1.03E+01
	AM-243	74.67		66.00	1.00E+01	1.00E+01	2.67E+00	4.68E+00

\+ = Nuclide identified during the nuclide identification
* = Energy line found in the spectrum
\> = MDA value not calculated
@ = Half-life too short to be able to perform the decay correction

LP 3/18/20

Apex-Gamma

Analysis Report for 2003062-02

BLANK

GAMMA SPECTRUM ANALYSIS

Sample Identification	: 2003062-02
Sample Description	: BLANK
Sample Type	: RA RECOVERY
Sample Size	: 1.000E+00 units
Facility	: Countroom
Sample Taken On	: 3/18/2020 10:32:13AM
Acquisition Started	: 3/18/2020 12:39:48PM
Procedure	: BAFIL
Operator	: Administrator
Detector Name	: GE3
Geometry	: BAFIL
Live Time	: 900.0 seconds
Real Time	: 901.8 seconds
Dead Time	: 0.20 %
Peak Locate Threshold	: 2.50
Peak Locate Range (in channels)	: 1 - 4096
Peak Area Range (in channels)	: 10 - 4096
Identification Energy Tolerance	: 2.500 keV
Energy Calibration Used Done On	: 10/19/2019
Efficiency Calibration Used Done On	: 10/19/2019
Efficiency Calibration Description	:
Sample Number	: 95609

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 3/18/2020 12:54:56PM

Peak Analysis From Channel : 1

Peak Analysis To Channel : 4096

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)

Analysis Report for 2003062-02

BLANK

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
	1	20.51	17 -	24	20.93	1.02E+02	45.74	2.82E+02	2.56
M	2	30.94	27 -	39	31.36	2.32E+03	102.86	2.71E+02	2.11
m	3	35.20	27 -	39	35.61	5.42E+02	85.66	1.67E+02	2.15
	4	52.41	49 -	56	52.81	5.30E+01	39.50	2.26E+02	1.35
M	5	61.86	58 -	70	62.26	2.50E+02	50.75	2.63E+02	2.30
m	6	66.14	58 -	70	66.53	1.04E+02	45.48	2.65E+02	2.16
	7	81.17	76 -	87	81.55	9.23E+02	82.27	3.86E+02	2.34
M	8	111.96	108 -	123	112.32	2.31E+02	46.04	1.83E+02	2.52
m	9	115.88	108 -	123	116.24	4.95E+01	44.45	1.63E+02	2.52
	10	161.25	158 -	165	161.58	3.87E+01	29.87	1.21E+02	2.02
	11	169.34	166 -	174	169.67	4.70E+01	28.16	8.99E+01	6.97
	12	276.63	272 -	281	276.89	5.78E+01	26.87	7.05E+01	2.58
M	13	303.14	293 -	317	303.39	1.56E+02	29.03	4.20E+01	2.22
m	14	308.06	293 -	317	308.30	2.85E+01	20.17	4.20E+01	2.50
	15	335.40	329 -	343	335.62	8.49E+01	34.45	8.61E+01	2.93
	16	356.41	351 -	363	356.62	5.08E+02	49.82	5.66E+01	2.28
M	17	373.80	373 -	398	374.00	1.53E+01	6.24	5.93E+00	1.92
m	18	384.31	373 -	398	384.50	1.08E+02	28.65	1.55E+01	2.24
m	19	387.31	373 -	398	387.50	1.87E+02	34.42	9.00E+00	2.18
m	20	391.45	373 -	398	391.64	6.54E+01	26.40	2.21E+00	2.46
	21	416.64	412 -	422	416.81	6.30E+01	23.32	4.00E+01	4.67
	22	437.35	431 -	444	437.51	9.14E+01	29.53	5.71E+01	2.27
	23	444.88	444 -	447	445.04	6.25E+00	6.93	3.50E+00	3.38
	24	493.40	491 -	496	493.53	6.31E+00	6.40	3.38E+00	1.59
	25	510.68	505 -	517	510.79	2.55E+01	12.58	6.97E+00	2.98
	26	678.78	674 -	682	678.80	6.72E+00	7.50	4.56E+00	6.55

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

BACKGROUND SUBTRACT REPORT

Peak Analysis Performed on : 3/18/2020 12:54:56PM

Env. Background File : \\OR-GAMMA1\ApexRoot\Countroom\Data\0000095494.CNF

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
	1	20.51	1.02E+02	45.74			1.02E+02	4.57E+01
M	2	30.94	2.32E+03	102.86			2.32E+03	1.03E+02
m	3	35.20	5.42E+02	85.66			5.42E+02	8.57E+01

Analysis Report for 2003062-02

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	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
	4	52.41	5.30E+01	39.50			5.30E+01	3.95E+01
M	5	61.86	2.50E+02	50.75	1.39E+01	2.81E+00	2.36E+02	5.08E+01
m	6	66.14	1.04E+02	45.48			1.04E+02	4.55E+01
	7	81.17	9.23E+02	82.27			9.23E+02	8.23E+01
M	8	111.96	2.31E+02	46.04			2.31E+02	4.60E+01
m	9	115.88	4.95E+01	44.45			4.95E+01	4.45E+01
	10	161.25	3.87E+01	29.87			3.87E+01	2.99E+01
	11	169.34	4.70E+01	28.16			4.70E+01	2.82E+01
	12	276.63	5.78E+01	26.87			5.78E+01	2.69E+01
M	13	303.14	1.56E+02	29.03			1.56E+02	2.90E+01
m	14	308.06	2.85E+01	20.17			2.85E+01	2.02E+01
	15	335.40	8.49E+01	34.45			8.49E+01	3.45E+01
	16	356.41	5.08E+02	49.82			5.08E+02	4.98E+01
M	17	373.80	1.53E+01	6.24			1.53E+01	6.24E+00
m	18	384.31	1.08E+02	28.65			1.08E+02	2.86E+01
m	19	387.31	1.87E+02	34.42			1.87E+02	3.44E+01
m	20	391.45	6.54E+01	26.40			6.54E+01	2.64E+01
	21	416.64	6.30E+01	23.32			6.30E+01	2.33E+01
	22	437.35	9.14E+01	29.53			9.14E+01	2.95E+01
	23	444.88	6.25E+00	6.93			6.25E+00	6.93E+00
	24	493.40	6.31E+00	6.40			6.31E+00	6.40E+00
	25	510.68	2.55E+01	12.58	1.39E+01	1.20E+00	1.16E+01	1.26E+01
	26	678.78	6.72E+00	7.50			6.72E+00	7.50E+00

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : \\OR-GAMMA1\ApexRoot\Countroom\Library\WSRC.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/units)	Activity Uncertainty
SN-113	0.95	255.12		1.93		
		391.69	*	61.90	5.52E+01	2.32E+01
I-129	0.86	29.78	*	57.00	3.15E+01	1.40E+00
		33.60	*	13.20	5.32E+01	8.41E+00
		39.58		7.52		
BA-133	0.99	81.00	*	34.06	4.57E+02	6.05E+01

Analysis Report for 2003062-02

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Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/units)	Activity Uncertainty
BA-133	0.99	302.84	*	18.33	5.16E+02	1.77E+02
		356.01	*	62.05	4.58E+02	7.25E+01
TH-234	0.94	63.29	*	3.80	5.28E+02	1.17E+02
AM-241	0.87	59.54	*	35.90	5.59E+01	1.24E+01

* = Energy line found in the spectrum.
\- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 2.500 keV
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma

INTERFERENCE CORRECTED REPORT

	Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/units)	Wt mean Activity Uncertainty	Comments
	SN-113	0.954	5.52E+01	2.32E+01	
	I-129	0.868	3.21E+01	1.38E+00	
	BA-133	0.997	4.61E+02	4.49E+01	
?	TH-234	0.949	5.28E+02	1.17E+02	
X	NP-237	0.745			
?	AM-241	0.871	5.59E+01	1.24E+01	

? = nuclide is part of an undetermined solution
X = nuclide rejected by the interference analysis
@ = nuclide contains energy lines not used in Weighted Mean Activity

Errors quoted at 2.000sigma

Analysis Report for 2003062-02

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UNIDENTIFIED PEAKS

Peak Locate Performed on : 3/18/2020 12:54:56PM
Peak Locate From Channel : 1
Peak Locate To Channel : 4096

	Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
	1	20.51	1.13530E-01	22.38	Tol.	MO-93
	4	52.41	5.88487E-02	37.29		
m	6	66.14	1.15401E-01	21.89	Sum	
M	8	111.96	2.56223E-01	9.98	Sum	
m	9	115.88	5.49586E-02	44.94	Sum	
	10	161.25	4.29910E-02	38.60	Sum	
	11	169.34	5.22585E-02	29.94		
	12	276.63	6.41936E-02	23.25		
m	14	308.06	3.16173E-02	35.45		
	15	335.40	9.43750E-02	20.28	Sum	
M	17	373.80	1.70069E-02	20.40		
m	18	384.31	1.19749E-01	13.29	Sum	
m	19	387.31	2.07870E-01	9.20	Sum	
	21	416.64	6.99799E-02	18.51	Sum	
	22	437.35	1.01611E-01	16.15	Sum	
	23	444.88	6.94444E-03	55.43		
	24	493.40	7.01389E-03	50.72		
	25	510.68	1.28617E-02	54.58		
	26	678.78	7.46914E-03	55.79		

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE MDA REPORT

Nuclide Library Used : \\OR-GAMMA1\ApexRoot\Countroom\Library\WSRC.NLB

Analysis Report for 2003062-02

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	Nuclide Name	Energy (keV)		Yield(%)	Line MDA (pCi/units)	Nuclide MDA (pCi/units)	Activity (pCi/units)	Dec. Level (pCi/units)
	FE-55	5.89		24.50	6.04E-06	6.04E-06	0.00E+00	0.00E+00
	CO-57	122.06		85.51	1.81E+01	1.81E+01	1.67E+00	8.48E+00
		136.48		10.60	1.84E+02		-4.49E+01	8.66E+01
	NI-59	6.92		29.80	1.59E-05	1.59E-05	0.00E+00	0.00E+00
	MO-93	16.59		52.90	3.67E-02	3.67E-02	3.57E-03	1.73E-02
		18.60		10.00	4.38E-01		9.15E-02	2.09E-01
	NB-93M	16.57		9.43	2.05E-01	2.05E-01	1.99E-02	9.66E-02
	CD-109	88.03		3.72	2.98E+02	2.98E+02	-4.47E+01	1.42E+02
+	SN-113	255.12		1.93	1.05E+03	3.37E+01	-2.85E+02	4.79E+02
		391.69	*	61.90	3.37E+01		5.52E+01	1.57E+01
	SN-119M	23.87		16.10	8.98E-01	7.64E-01	-4.05E-03	4.28E-01
		25.10		22.70	7.64E-01		-3.62E-03	3.63E-01
+	I-129	29.78	*	57.00	1.44E+00	1.44E+00	3.15E+01	7.01E-01
		33.60	*	13.20	1.02E+01		5.32E+01	4.95E+00
		39.58		7.52	1.15E+01		2.24E+00	5.40E+00
+	BA-133	81.00	*	34.06	4.65E+01	3.40E+01	4.57E+02	2.26E+01
		302.84	*	18.33	2.49E+02		5.16E+02	1.20E+02
		356.01	*	62.05	3.40E+01		4.58E+02	1.58E+01
	CE-139	165.85		80.35	2.75E+01	2.75E+01	-1.62E+01	1.29E+01
	CE-144	133.54		10.80	1.75E+02	1.75E+02	-1.12E+01	8.23E+01
	HG-203	279.19		77.30	3.60E+01	3.60E+01	4.31E+01	1.69E+01
	PB-210	46.50		4.25	3.67E+01	3.67E+01	-1.85E+00	1.72E+01
	TH-231	25.64		14.70	1.30E+00	1.30E+00	-6.15E-03	6.18E-01
		84.21		6.40	3.36E+02		8.67E+02	1.64E+02
	PA-234M	9.89		89.00	1.07E-03	1.07E-03	1.16E-03	5.04E-04
		21.72		64.90	1.61E-01		1.54E-01	7.74E-02
		37.93		23.75	6.65E+00		1.44E+01	3.23E+00
		131.42		20.40	9.20E+01		3.50E+01	4.34E+01
+	TH-234	63.29	*	3.80	2.38E+02	2.38E+02	5.28E+02	1.16E+02
	NP-237	29.37	*	14.00	5.86E+00	5.86E+00	1.28E+02	2.86E+00
		86.50		12.60	8.73E+01		1.70E+01	4.16E+01
	U-237	97.08		16.30	7.91E+01	5.46E+01	-4.64E+00	3.75E+01
		101.07		26.30	5.46E+01		1.56E+01	2.59E+01
		114.00		12.30	2.35E+02		6.18E+02	1.14E+02
		208.01		22.00	1.09E+02		-2.95E+01	5.07E+01
+	AM-241	59.54	*	35.90	2.52E+01	2.52E+01	5.59E+01	1.23E+01
	AM-243	74.67		66.00	1.08E+01	1.08E+01	-2.76E+00	5.11E+00

\+ = Nuclide identified during the nuclide identification
* = Energy line found in the spectrum
\> = MDA value not calculated
@ = Half-life too short to be able to perform the decay correction

KP
3/18/20

Apex-Gamma

Analysis Report for 2003062-03
H-10 35-40

GAMMA SPECTRUM ANALYSIS

Sample Identification	: 2003062-03
Sample Description	: H-10 35-40
Sample Type	: RA RECOVERY
Sample Size	: 1.000E+00 units
Facility	: Countroom
Sample Taken On	: 3/18/2020 10:32:23AM
Acquisition Started	: 3/18/2020 12:39:54PM
Procedure	: BAFIL
Operator	: Administrator
Detector Name	: GE4
Geometry	: BAFIL
Live Time	: 900.0 seconds
Real Time	: 900.4 seconds
Dead Time	: 0.05 %
Peak Locate Threshold	: 2.50
Peak Locate Range (in channels)	: 1 - 4096
Peak Area Range (in channels)	: 9 - 4096
Identification Energy Tolerance	: 2.500 keV
Energy Calibration Used Done On	: 10/12/2019
Efficiency Calibration Used Done On	: 10/12/2019
Efficiency Calibration Description	:
Sample Number	: 95610

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 3/18/2020 12:55:07PM

Peak Analysis From Channel : 1
Peak Analysis To Channel : 4096

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)

Analysis Report for 2003062-03

H-10 35-40

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
	1	21.77	15 -	24	20.82	9.73E+01	54.23	3.63E+02	2.91
M	2	32.03	25 -	40	31.08	1.72E+03	92.60	1.50E+02	2.27
m	3	36.15	25 -	40	35.21	4.61E+02	70.07	9.75E+01	2.28
	4	54.33	50 -	57	53.39	8.79E+01	30.79	9.82E+01	2.71
M	5	62.96	58 -	69	62.03	2.20E+02	42.76	1.28E+02	2.81
m	6	66.62	58 -	69	65.69	6.46E+01	44.18	1.63E+02	2.82
M	7	77.63	75 -	87	76.70	2.77E+01	15.67	4.85E+01	2.83
m	8	82.18	75 -	87	81.26	7.58E+02	61.92	1.35E+02	2.29
M	9	112.63	107 -	123	111.72	1.84E+02	43.19	1.89E+02	2.89
m	10	117.19	107 -	123	116.28	3.64E+01	41.20	1.47E+02	2.89
	11	129.79	126 -	131	128.89	1.53E+01	20.17	6.94E+01	1.58
	12	222.34	217 -	226	221.49	4.27E+01	24.92	6.26E+01	6.71
	13	278.20	272 -	285	277.37	3.91E+01	33.94	1.06E+02	3.04
	14	304.58	297 -	309	303.76	1.36E+02	32.25	5.86E+01	2.56
M	15	334.57	329 -	341	333.77	4.94E+01	21.31	3.99E+01	3.10
m	16	339.10	329 -	341	338.31	1.77E+01	16.06	1.77E+01	2.93
	17	356.78	351 -	360	356.00	3.43E+02	37.97	9.94E+00	2.37
M	18	384.21	379 -	394	383.44	6.75E+01	24.49	2.73E+01	2.80
m	19	387.27	379 -	394	386.50	1.18E+02	28.64	2.00E+01	2.70
m	20	391.97	379 -	394	391.20	2.43E+01	16.65	8.27E+00	2.94
M	21	415.62	410 -	423	414.87	3.58E+01	14.76	1.00E+01	4.53
m	22	421.18	410 -	423	420.42	1.70E+01	12.81	8.00E+00	2.79
	23	437.84	433 -	441	437.10	4.67E+01	18.15	2.06E+01	2.71
	24	672.95	668 -	675	672.33	6.94E+00	7.21	4.11E+00	2.63
	25	743.18	740 -	744	742.60	5.00E+00	4.47	0.00E+00	1.00

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

BACKGROUND SUBTRACT REPORT

Peak Analysis Performed on : 3/18/2020 12:55:07PM

Env. Background File : \\OR-GAMMA1\ApexRoot\Countroom\Data\0000095495.CNF

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
	1	21.77	9.73E+01	54.23	1.41E+01	4.78E-01	8.32E+01	5.42E+01
M	2	32.03	1.72E+03	92.60			1.72E+03	9.26E+01
m	3	36.15	4.61E+02	70.07			4.61E+02	7.01E+01
	4	54.33	8.79E+01	30.79			8.79E+01	3.08E+01

Analysis Report for 2003062-03

H-10 35-40

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
M	5	62.96	2.20E+02	42.76	1.23E+01	2.15E+00	2.08E+02	4.28E+01
m	6	66.62	6.46E+01	44.18	1.23E+01	2.15E+00	5.24E+01	4.42E+01
M	7	77.63	2.77E+01	15.67			2.77E+01	1.57E+01
m	8	82.18	7.58E+02	61.92			7.58E+02	6.19E+01
M	9	112.63	1.84E+02	43.19			1.84E+02	4.32E+01
m	10	117.19	3.64E+01	41.20			3.64E+01	4.12E+01
	11	129.79	1.53E+01	20.17			1.53E+01	2.02E+01
	12	222.34	4.27E+01	24.92			4.27E+01	2.49E+01
	13	278.20	3.91E+01	33.94			3.91E+01	3.39E+01
	14	304.58	1.36E+02	32.25			1.36E+02	3.23E+01
M	15	334.57	4.94E+01	21.31			4.94E+01	2.13E+01
m	16	339.10	1.77E+01	16.06			1.77E+01	1.61E+01
	17	356.78	3.43E+02	37.97			3.43E+02	3.80E+01
M	18	384.21	6.75E+01	24.49			6.75E+01	2.45E+01
m	19	387.27	1.18E+02	28.64			1.18E+02	2.86E+01
m	20	391.97	2.43E+01	16.65			2.43E+01	1.67E+01
M	21	415.62	3.58E+01	14.76			3.58E+01	1.48E+01
m	22	421.18	1.70E+01	12.81			1.70E+01	1.28E+01
	23	437.84	4.67E+01	18.15			4.67E+01	1.81E+01
	24	672.95	6.94E+00	7.21			6.94E+00	7.21E+00
	25	743.18	5.00E+00	4.47			5.00E+00	4.47E+00

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : \\OR-GAMMA1\ApexRoot\Countroom\Library\WSRC.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/units)	Activity Uncertainty
SN-113	0.93	255.12		1.93		
		391.69	*	61.90	3.91E+01	2.77E+01
BA-133	0.96	81.00	*	34.06	3.97E+02	5.08E+01
		302.84	*	18.33	4.86E+02	1.98E+02
		356.01	*	62.05	4.68E+02	8.97E+01
HG-203	0.97	279.19	*	77.30	2.90E+01	2.66E+01
PA-234M	0.41	9.89		89.00		
		21.72	*	64.90	2.63E+01	1.74E+01

Analysis Report for 2003062-03

H-10 35-40

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/units)	Activity Uncertainty
PA-234M	0.41	37.93	*	23.75	3.18E+02	5.62E+01
		131.42	*	20.40	1.79E+01	2.37E+01
TH-234	0.99	63.29	*	3.80	8.91E+02	2.01E+02

* = Energy line found in the spectrum.
\- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 2.500 keV
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma

INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/units)	Wt mean Activity Uncertainty	Comments
SN-113	0.931	3.91E+01	2.77E+01	
BA-133	0.969	4.18E+02	4.32E+01	
HG-203	0.975	2.90E+01	2.66E+01	
PA-234M	0.419	4.07E+01	1.36E+01	
TH-234	0.997	8.91E+02	2.01E+02	

? = nuclide is part of an undetermined solution
X = nuclide rejected by the interference analysis
@ = nuclide contains energy lines not used in Weighted Mean Activity

Errors quoted at 2.000sigma

Analysis Report for 2003062-03

H-10 35-40

UNIDENTIFIED PEAKS

Peak Locate Performed on : 3/18/2020 12:55:07PM
Peak Locate From Channel : 1
Peak Locate To Channel : 4096

	Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
M	2	32.03	1.91302E+00	2.69	Tol.	I-129
						I-129
	4	54.33	9.76886E-02	17.51		
m	6	66.62	5.81826E-02	42.24		
M	7	77.63	3.08100E-02	28.25		
M	9	112.63	2.04980E-01	11.71	Tol.	U-237
m	10	117.19	4.04961E-02	56.53	Sum	
	12	222.34	4.74174E-02	29.20		
M	15	334.57	5.48614E-02	21.58		
m	16	339.10	1.96430E-02	45.43	Sum	
M	18	384.21	7.50518E-02	18.13		
m	19	387.27	1.31370E-01	12.11	Sum	
M	21	415.62	3.98136E-02	20.60	Sum	
m	22	421.18	1.88444E-02	37.75	Sum	
	23	437.84	5.19006E-02	19.42	Sum	
	24	672.95	7.71605E-03	51.92		
	25	743.18	5.55556E-03	44.72		

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE MDA REPORT

Nuclide Library Used : \\OR-GAMMA1\ApexRoot\Countroom\Library\WSRC.NLB

Analysis Report for 2003062-03

H-10 35-40

	Nuclide Name	Energy (keV)		Yield(%)	Line MDA (pCi/units)	Nuclide MDA (pCi/units)	Activity (pCi/units)	Dec. Level (pCi/units)
	FE-55	5.89		24.50	1.10E+01	1.10E+01	0.00E+00	0.00E+00
	CO-57	122.06		85.51	9.98E+00	9.98E+00	-8.04E+00	4.63E+00
		136.48		10.60	8.22E+01		-1.97E+01	3.79E+01
	NI-59	6.92		29.80	4.62E+01	4.62E+01	-3.05E+01	1.96E+01
	MO-93	16.59		52.90	2.85E+01	2.85E+01	4.20E+00	1.36E+01
		18.60		10.00	1.58E+02		1.13E+01	7.60E+01
	NB-93M	16.57		9.43	1.60E+02	1.60E+02	2.36E+01	7.65E+01
	CD-109	88.03		3.72	2.30E+02	2.30E+02	-8.99E+00	1.08E+02
+	SN-113	255.12		1.93	6.69E+02	5.29E+01	-2.73E+02	2.99E+02
		391.69	*	61.90	5.29E+01		3.91E+01	2.43E+01
	SN-119M	23.87		16.10	8.57E+01	5.75E+01	-1.43E+01	4.12E+01
		25.10		22.70	5.75E+01		-1.79E+02	2.76E+01
	I-129	29.78		57.00	6.22E+01	6.22E+01	4.78E+02	3.07E+01
		33.60		13.20	2.80E+02		2.41E+03	1.39E+02
		39.58		7.52	1.63E+02		2.54E+00	7.85E+01
+	BA-133	81.00	*	34.06	3.87E+01	2.25E+01	3.97E+02	1.87E+01
		302.84	*	18.33	1.41E+02		4.86E+02	6.57E+01
		356.01	*	62.05	2.25E+01		4.68E+02	9.38E+00
	CE-139	165.85		80.35	1.65E+01	1.65E+01	1.50E+00	7.73E+00
	CE-144	133.54		10.80	8.14E+01	8.14E+01	1.58E+01	3.77E+01
+	HG-203	279.19	*	77.30	4.05E+01	4.05E+01	2.90E+01	1.93E+01
	PB-210	46.50		4.25	1.75E+02	1.75E+02	1.17E+02	8.22E+01
	TH-231	25.64		14.70	8.53E+01	8.53E+01	-1.21E+03	4.09E+01
		84.21		6.40	3.84E+02		2.04E+03	1.88E+02
+	PA-234M	9.89		89.00	2.22E+01	2.22E+01	1.21E+01	1.04E+01
		21.72	*	64.90	2.75E+01		2.63E+01	1.33E+01
		37.93	*	23.75	6.27E+01		3.18E+02	3.04E+01
		131.42	*	20.40	3.90E+01		1.79E+01	1.79E+01
+	TH-234	63.29	*	3.80	2.92E+02	2.92E+02	8.91E+02	1.40E+02
	NP-237	29.37		14.00	2.21E+02	8.77E+01	9.89E+02	1.09E+02
		86.50		12.60	8.77E+01		6.94E+00	4.19E+01
	U-237	97.08		16.30	6.02E+01	3.55E+01	2.33E+01	2.84E+01
		101.07		26.30	3.55E+01		8.69E+00	1.67E+01
		114.00		12.30	1.37E+02		2.67E+02	6.59E+01
		208.01		22.00	6.22E+01		7.78E+00	2.87E+01
	AM-241	59.54		35.90	3.18E+01	3.18E+01	5.61E+00	1.53E+01
	AM-243	74.67		66.00	1.25E+01	1.25E+01	1.49E+00	5.90E+00

\+ = Nuclide identified during the nuclide identification
* = Energy line found in the spectrum
\> = MDA value not calculated
@ = Half-life too short to be able to perform the decay correction

KP 3/18/20

Apex-Gamma

Analysis Report for 2003062-04
H-12 50-60

GAMMA SPECTRUM ANALYSIS

Sample Identification	: 2003062-04
Sample Description	: H-12 50-60
Sample Type	: RA RECOVERY
Sample Size	: 1.000E+00 units
Facility	: Countroom
Sample Taken On	: 3/18/2020 10:32:40AM
Acquisition Started	: 3/18/2020 12:50:24PM
Procedure	: BAFIL
Operator	: Administrator
Detector Name	: GE1
Geometry	: BAFIL
Live Time	: 900.0 seconds
Real Time	: 900.2 seconds
Dead Time	: 0.03 %
Peak Locate Threshold	: 2.50
Peak Locate Range (in channels)	: 1 - 4096
Peak Area Range (in channels)	: 19 - 4096
Identification Energy Tolerance	: 2.500 keV
Energy Calibration Used Done On	: 10/12/2019
Efficiency Calibration Used Done On	: 10/12/2019
Efficiency Calibration Description	:
Sample Number	: 95611

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 3/18/2020 1:05:27PM

Peak Analysis From Channel : 1
Peak Analysis To Channel : 4096

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)

Analysis Report for 2003062-04

H-12 50-60

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
M	1	30.78	27 -	39	31.27	1.39E+03	84.18	2.50E+02	2.18
m	2	35.09	27 -	39	35.57	3.28E+02	69.21	2.41E+02	2.29
M	3	61.94	58 -	71	62.40	1.55E+02	43.03	2.13E+02	2.40
m	4	66.25	58 -	71	66.71	6.16E+01	35.82	2.01E+02	1.99
	5	81.00	77 -	86	81.44	5.09E+02	63.57	2.89E+02	2.00
M	6	112.15	105 -	120	112.57	1.18E+02	34.35	1.15E+02	2.48
m	7	116.01	105 -	120	116.43	2.23E+01	31.12	1.18E+02	2.48
	8	210.29	200 -	220	210.64	8.74E+01	49.48	1.67E+02	16.56
	9	276.63	273 -	282	276.92	4.39E+01	26.44	7.41E+01	2.19
	10	302.30	287 -	311	302.58	1.19E+02	56.32	1.76E+02	2.48
	11	334.73	329 -	341	334.98	8.24E+01	31.42	7.51E+01	2.78
	12	356.18	350 -	362	356.41	3.51E+02	47.26	9.79E+01	2.26
M	13	384.51	379 -	397	384.71	1.04E+02	33.64	6.54E+01	2.97
m	14	387.54	379 -	397	387.75	9.44E+01	27.38	3.78E+01	1.81
m	15	390.96	379 -	397	391.16	2.96E+01	34.84	8.60E+01	3.63
	16	417.43	411 -	425	417.62	5.49E+01	24.03	3.83E+01	3.98
M	17	433.46	432 -	441	433.63	7.44E+00	7.48	1.20E+01	2.65
m	18	437.31	432 -	441	437.48	6.27E+01	20.59	2.40E+01	2.61
	19	467.79	463 -	471	467.94	1.30E+01	13.00	1.80E+01	2.10
	20	500.30	496 -	503	500.42	7.46E+00	10.00	1.11E+01	1.82
	21	614.01	612 -	616	614.05	7.00E+00	6.18	2.00E+00	1.89
	22	706.41	703 -	709	706.38	8.00E+00	5.66	0.00E+00	3.32
	23	935.20	932 -	937	935.00	5.00E+00	4.47	0.00E+00	2.98
	24	1101.52	1098 -	1103	1101.20	5.00E+00	4.47	0.00E+00	2.31

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

BACKGROUND SUBTRACT REPORT

Peak Analysis Performed on : 3/18/2020 1:05:27PM

Env. Background File : \\OR-GAMMA1\ApexRoot\Countroom\Data\0000095492.CNF

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
M	1	30.78	1.39E+03	84.18			1.39E+03	8.42E+01
m	2	35.09	3.28E+02	69.21			3.28E+02	6.92E+01
M	3	61.94	1.55E+02	43.03	2.65E+01	2.53E+00	1.28E+02	4.31E+01
m	4	66.25	6.16E+01	35.82			6.16E+01	3.58E+01
	5	81.00	5.09E+02	63.57			5.09E+02	6.36E+01

Analysis Report for 2003062-04

H-12 50-60

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
M	6	112.15	1.18E+02	34.35			1.18E+02	3.44E+01
m	7	116.01	2.23E+01	31.12			2.23E+01	3.11E+01
	8	210.29	8.74E+01	49.48			8.74E+01	4.95E+01
	9	276.63	4.39E+01	26.44			4.39E+01	2.64E+01
	10	302.30	1.19E+02	56.32			1.19E+02	5.63E+01
	11	334.73	8.24E+01	31.42			8.24E+01	3.14E+01
	12	356.18	3.51E+02	47.26			3.51E+02	4.73E+01
M	13	384.51	1.04E+02	33.64			1.04E+02	3.36E+01
m	14	387.54	9.44E+01	27.38			9.44E+01	2.74E+01
m	15	390.96	2.96E+01	34.84			2.96E+01	3.48E+01
	16	417.43	5.49E+01	24.03			5.49E+01	2.40E+01
M	17	433.46	7.44E+00	7.48			7.44E+00	7.48E+00
m	18	437.31	6.27E+01	20.59			6.27E+01	2.06E+01
	19	467.79	1.30E+01	13.00			1.30E+01	1.30E+01
	20	500.30	7.46E+00	10.00			7.46E+00	1.00E+01
	21	614.01	7.00E+00	6.18			7.00E+00	6.18E+00
	22	706.41	8.00E+00	5.66			8.00E+00	5.66E+00
	23	935.20	5.00E+00	4.47			5.00E+00	4.47E+00
	24	1101.52	5.00E+00	4.47			5.00E+00	4.47E+00

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : \\OR-GAMMA1\ApexRoot\Countroom\Library\WSRC.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/units)	Activity Uncertainty
SN-113	0.94	255.12		1.93		
		391.69	*	61.90	2.30E+01	2.71E+01
I-129	0.86	29.78	*	57.00	4.02E+01	2.47E+00
		33.60	*	13.20	6.10E+01	1.29E+01
		39.58		7.52		
BA-133	0.99	81.00	*	34.06	2.62E+02	4.19E+01
		302.84	*	18.33	3.36E+02	1.85E+02
		356.01	*	62.05	2.82E+02	4.97E+01
TH-234	0.95	63.29	*	3.80	3.51E+02	1.20E+02
AM-241	0.86	59.54	*	35.90	3.72E+01	1.27E+01

Analysis Report for 2003062-04

H-12 50-60

* = Energy line found in the spectrum.
\- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 2.500 keV
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma

INTERFERENCE CORRECTED REPORT

	Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/units)	Wt mean Activity Uncertainty	Comments
	SN-113	0.940	2.30E+01	2.71E+01	
	I-129	0.864	4.09E+01	2.43E+00	
	BA-133	0.998	2.72E+02	3.16E+01	
?	TH-234	0.954	3.51E+02	1.20E+02	
X	NP-237	0.661			
?	AM-241	0.863	3.72E+01	1.27E+01	

? = nuclide is part of an undetermined solution
X = nuclide rejected by the interference analysis
@ = nuclide contains energy lines not used in Weighted Mean Activity

Errors quoted at 2.000sigma

Analysis Report for 2003062-04

H-12 50-60

UNIDENTIFIED PEAKS

Peak Locate Performed on : 3/18/2020 1:05:27PM
Peak Locate From Channel : 1
Peak Locate To Channel : 4096

	Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
m	4	66.25	6.83894E-02	29.10	Sum	
M	6	112.15	1.30814E-01	14.59	Sum	
m	7	116.01	2.47235E-02	69.92	Sum	
	8	210.29	9.71053E-02	28.31	Tol.	U-237
	9	276.63	4.88272E-02	30.08		
	11	334.73	9.16111E-02	19.05	Sum	
M	13	384.51	1.15616E-01	16.17	Sum	
m	14	387.54	1.04860E-01	14.51	Sum	
	16	417.43	6.09459E-02	21.90	Sum	
M	17	433.46	8.27175E-03	50.26		
m	18	437.31	6.97024E-02	16.41	Sum	
	19	467.79	1.44444E-02	50.00		
	20	500.30	8.29060E-03	67.01		
	21	614.01	7.77778E-03	44.18		
	22	706.41	8.88889E-03	35.36		
	23	935.20	5.55556E-03	44.72		
	24	1101.52	5.55556E-03	44.72		

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE MDA REPORT

Nuclide Library Used : \\OR-GAMMA1\ApexRoot\Countroom\Library\WSRC.NLB

Analysis Report for 2003062-04

H-12 50-60

	Nuclide Name	Energy (keV)		Yield(%)	Line MDA (pCi/units)	Nuclide MDA (pCi/units)	Activity (pCi/units)	Dec. Level (pCi/units)
	FE-55	5.89		24.50	1.49E-04	1.49E-04	0.00E+00	0.00E+00
	CO-57	122.06		85.51	1.41E+01	1.41E+01	-1.50E+00	6.56E+00
		136.48		10.60	1.38E+02		2.17E+00	6.44E+01
	NI-59	6.92		29.80	2.91E-04	2.91E-04	0.00E+00	0.00E+00
	MO-93	16.59		52.90	1.33E-01	1.33E-01	-1.20E-01	6.16E-02
		18.60		10.00	1.93E+00		-7.67E-01	9.26E-01
	NB-93M	16.57		9.43	7.40E-01	7.40E-01	-6.70E-01	3.44E-01
	CD-109	88.03		3.72	2.67E+02	2.67E+02	-3.95E+02	1.26E+02
+	SN-113	255.12		1.93	8.41E+02	5.19E+01	5.29E+01	3.84E+02
		391.69	*	61.90	5.19E+01		2.30E+01	2.49E+01
	SN-119M	23.87		16.10	4.25E+00	3.42E+00	1.04E+01	2.07E+00
		25.10		22.70	3.42E+00		4.92E+00	1.66E+00
+	I-129	29.78	*	57.00	2.90E+00	2.90E+00	4.02E+01	1.41E+00
		33.60	*	13.20	1.86E+01		6.10E+01	9.03E+00
		39.58		7.52	3.05E+01		1.31E+01	1.46E+01
+	BA-133	81.00	*	34.06	3.93E+01	3.93E+01	2.62E+02	1.89E+01
		302.84	*	18.33	2.49E+02		3.36E+02	1.21E+02
		356.01	*	62.05	4.02E+01		2.82E+02	1.90E+01
	CE-139	165.85		80.35	1.99E+01	1.99E+01	-1.48E+01	9.20E+00
	CE-144	133.54		10.80	1.29E+02	1.29E+02	1.13E+01	5.99E+01
	HG-203	279.19		77.30	2.71E+01	2.71E+01	2.25E+01	1.26E+01
	PB-210	46.50		4.25	6.10E+01	6.10E+01	-4.85E+01	2.88E+01
	TH-231	25.64		14.70	5.67E+00	5.67E+00	8.17E+00	2.75E+00
		84.21		6.40	2.74E+02		1.25E+01	1.33E+02
	PA-234M	9.89		89.00	5.79E-04	5.79E-04	0.00E+00	0.00E+00
		21.72		64.90	7.74E-01		2.79E+00	3.77E-01
		37.93		23.75	1.25E+01		7.15E-01	6.10E+00
		131.42		20.40	6.44E+01		7.99E+00	2.99E+01
+	TH-234	63.29	*	3.80	2.78E+02	2.78E+02	3.51E+02	1.36E+02
	NP-237	29.37	*	14.00	1.18E+01	1.18E+01	1.64E+02	5.74E+00
		86.50		12.60	8.15E+01		-1.25E+01	3.86E+01
	U-237	97.08		16.30	5.95E+01	3.88E+01	-9.46E+01	2.78E+01
		101.07		26.30	3.88E+01		1.54E+00	1.81E+01
		114.00		12.30	1.65E+02		2.67E+02	7.90E+01
		208.01		22.00	8.42E+01		-2.77E+01	3.91E+01
+	AM-241	59.54	*	35.90	2.95E+01	2.95E+01	3.72E+01	1.43E+01
	AM-243	74.67		66.00	1.21E+01	1.21E+01	2.39E+00	5.76E+00

\+ = Nuclide identified during the nuclide identification
* = Energy line found in the spectrum
\> = MDA value not calculated
@ = Half-life too short to be able to perform the decay correction

KP
3/18/20

Apex-Gamma

Analysis Report for 2003062-05
H-9 50-55

GAMMA SPECTRUM ANALYSIS

Sample Identification	: 2003062-05
Sample Description	: H-9 50-55
Sample Type	: RA RECOVERY
Sample Size	: 1.000E+00 units
Facility	: Countroom
Sample Taken On	: 3/18/2020 10:32:51AM
Acquisition Started	: 3/18/2020 12:55:23PM
Procedure	: BAFIL
Operator	: Administrator
Detector Name	: GE2
Geometry	: BAFIL
Live Time	: 900.0 seconds
Real Time	: 900.2 seconds
Dead Time	: 0.02 %
Peak Locate Threshold	: 2.50
Peak Locate Range (in channels)	: 1 - 4096
Peak Area Range (in channels)	: 29 - 4096
Identification Energy Tolerance	: 2.500 keV
Energy Calibration Used Done On	: 10/19/2019
Efficiency Calibration Used Done On	: 9/14/2019
Efficiency Calibration Description	:
Sample Number	: 95613

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 3/18/2020 1:10:27PM

Peak Analysis From Channel : 1
Peak Analysis To Channel : 4096

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)

Analysis Report for 2003062-05

H-9 50-55

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
	1	35.43	35 -	40	35.77	3.09E+02	58.54	2.54E+02	2.58
	2	52.63	49 -	57	52.95	5.45E+01	35.22	1.57E+02	1.96
M	3	61.75	58 -	71	62.06	1.52E+02	33.20	9.62E+01	1.58
m	4	65.81	58 -	71	66.11	6.65E+01	28.81	1.08E+02	1.59
	5	81.01	77 -	85	81.29	6.56E+02	62.47	1.95E+02	1.84
	6	111.60	108 -	114	111.85	1.05E+02	33.06	1.22E+02	1.27
	7	116.81	116 -	120	117.05	2.47E+01	22.39	8.26E+01	1.10
	8	161.61	156 -	168	161.80	3.81E+01	43.06	1.96E+02	3.03
	9	186.42	183 -	190	186.59	3.15E+01	24.82	7.69E+01	3.02
	10	276.30	271 -	281	276.37	7.43E+01	21.47	2.14E+01	2.14
	11	285.78	282 -	290	285.84	2.31E+01	10.97	3.76E+00	3.36
m	12	302.82	291 -	311	302.86	1.18E+02	24.79	2.19E+01	1.58
m	13	306.94	291 -	311	306.98	1.42E+01	14.78	4.52E+01	1.58
	14	334.24	330 -	339	334.24	5.79E+01	24.88	5.62E+01	2.21
	15	355.98	352 -	359	355.96	4.33E+02	44.90	4.68E+01	1.42
	16	365.03	361 -	369	365.00	1.61E+01	14.47	2.17E+01	3.64
	17	374.61	370 -	378	374.57	1.64E+01	12.36	1.32E+01	3.32
M	18	384.26	380 -	394	384.22	8.72E+01	23.19	9.20E+00	1.84
m	19	387.03	380 -	394	386.98	1.20E+02	27.75	4.46E+00	1.84
m	20	391.37	380 -	394	391.32	3.00E+01	13.19	6.67E-01	1.84
	21	417.62	410 -	426	417.55	4.27E+01	20.90	2.45E+01	5.60
	22	436.76	433 -	439	436.66	6.83E+01	17.10	3.33E+00	1.51
M	23	507.29	506 -	515	507.12	4.87E+00	4.27	2.80E-01	2.38
	24	610.72	607 -	613	610.45	9.50E+00	8.75	7.00E+00	3.45
	25	1060.26	1056 -	1061	1059.60	5.00E+00	4.47	0.00E+00	1.00

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

BACKGROUND SUBTRACT REPORT

Peak Analysis Performed on : 3/18/2020 1:10:27PM

Env. Background File : \\OR-GAMMA1\ApexRoot\Countroom\Data\0000095493.CNF

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
	1	35.43	3.09E+02	58.54			3.09E+02	5.85E+01
	2	52.63	5.45E+01	35.22			5.45E+01	3.52E+01
M	3	61.75	1.52E+02	33.20	5.90E+00	2.40E+00	1.46E+02	3.33E+01
m	4	65.81	6.65E+01	28.81	1.33E+00	5.66E-01	6.52E+01	2.88E+01

Analysis Report for 2003062-05

H-9 50-55

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
	5	81.01	6.56E+02	62.47			6.56E+02	6.25E+01
	6	111.60	1.05E+02	33.06			1.05E+02	3.31E+01
	7	116.81	2.47E+01	22.39			2.47E+01	2.24E+01
	8	161.61	3.81E+01	43.06			3.81E+01	4.31E+01
	9	186.42	3.15E+01	24.82	6.38E+00	1.86E+00	2.52E+01	2.49E+01
	10	276.30	7.43E+01	21.47	0.00E+00	0.00E+00	7.43E+01	2.15E+01
	11	285.78	2.31E+01	10.97			2.31E+01	1.10E+01
m	12	302.82	1.18E+02	24.79			1.18E+02	2.48E+01
m	13	306.94	1.42E+01	14.78			1.42E+01	1.48E+01
	14	334.24	5.79E+01	24.88			5.79E+01	2.49E+01
	15	355.98	4.33E+02	44.90			4.33E+02	4.49E+01
	16	365.03	1.61E+01	14.47			1.61E+01	1.45E+01
	17	374.61	1.64E+01	12.36			1.64E+01	1.24E+01
M	18	384.26	8.72E+01	23.19			8.72E+01	2.32E+01
m	19	387.03	1.20E+02	27.75			1.20E+02	2.77E+01
m	20	391.37	3.00E+01	13.19			3.00E+01	1.32E+01
	21	417.62	4.27E+01	20.90			4.27E+01	2.09E+01
	22	436.76	6.83E+01	17.10			6.83E+01	1.71E+01
M	23	507.29	4.87E+00	4.27			4.87E+00	4.27E+00
	24	610.72	9.50E+00	8.75	2.59E+00	9.64E-01	6.91E+00	8.80E+00
	25	1060.26	5.00E+00	4.47			5.00E+00	4.47E+00

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : \\OR-GAMMA1\ApexRoot\Countroom\Library\WSRC.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/units)	Activity Uncertainty
SN-113	0.96	255.12		1.93		
		391.69	*	61.90	1.97E+01	8.86E+00
BA-133	1.00	81.00	*	34.06	3.99E+02	5.55E+01
		302.84	*	18.33	4.20E+02	1.55E+02
		356.01	*	62.05	3.46E+02	5.28E+01
PA-234M	0.98	9.89		89.00		
		21.72		64.90		
		37.93	*	23.75	6.22E+00	1.18E+00

Analysis Report for 2003062-05

H-9 50-55

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/units)	Activity Uncertainty
PA-234M	0.98	131.42		20.40		
TH-234	0.94	63.29	*	3.80	3.00E+02	6.92E+01
AM-241	0.88	59.54	*	35.90	3.17E+01	7.32E+00

* = Energy line found in the spectrum.
\- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 2.500 keV
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma

INTERFERENCE CORRECTED REPORT

	Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/units)	Wt mean Activity Uncertainty	Comments
	SN-113	0.962	1.97E+01	8.86E+00	
	BA-133	1.000	3.74E+02	3.71E+01	
	PA-234M	0.981	6.22E+00	1.18E+00	
?	TH-234	0.941	3.00E+02	6.92E+01	
?	AM-241	0.882	3.17E+01	7.32E+00	

? = nuclide is part of an undetermined solution
X = nuclide rejected by the interference analysis
@ = nuclide contains energy lines not used in Weighted Mean Activity

Errors quoted at 2.000sigma

Analysis Report for 2003062-05

H-9 50-55

UNIDENTIFIED PEAKS

Peak Locate Performed on : 3/18/2020 1:10:27PM
Peak Locate From Channel : 1
Peak Locate To Channel : 4096

	Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
	2	52.63	6.06057E-02	32.29		
m	4	65.81	7.24152E-02	22.11		
	6	111.60	1.16416E-01	15.78	Tol.	U-237
	7	116.81	2.74242E-02	45.37	Sum	
	8	161.61	4.23407E-02	56.49	Sum	
	9	186.42	2.79499E-02	49.47		
	10	276.30	8.25556E-02	14.45		
	11	285.78	2.56889E-02	23.72		
m	13	306.94	1.57972E-02	51.98		
	14	334.24	6.43411E-02	21.48		
	16	365.03	1.79424E-02	44.79	Sum	
	17	374.61	1.82367E-02	37.65		
M	18	384.26	9.68494E-02	13.31	Sum	
m	19	387.03	1.32926E-01	11.60		
	21	417.62	4.74950E-02	24.45	Sum	
	22	436.76	7.59286E-02	12.51	Sum	
M	23	507.29	5.40559E-03	43.91		
	24	610.72	7.67583E-03	63.69		
	25	1060.26	5.55556E-03	44.72		

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE MDA REPORT

Nuclide Library Used : \\OR-GAMMA1\ApexRoot\Countroom\Library\WSRC.NLB

Analysis Report for 2003062-05

H-9 50-55

	Nuclide Name	Energy (keV)		Yield(%)	Line MDA (pCi/units)	Nuclide MDA (pCi/units)	Activity (pCi/units)	Dec. Level (pCi/units)
	FE-55	5.89		24.50	4.58E-09	4.58E-09	0.00E+00	0.00E+00
	CO-57	122.06		85.51	2.01E+01	2.01E+01	-3.82E+00	9.16E+00
		136.48		10.60	1.85E+02		-5.26E+01	8.40E+01
	NI-59	6.92		29.80	2.55E-08	2.55E-08	0.00E+00	0.00E+00
	MO-93	16.59		52.90	9.74E-05	9.74E-05	0.00E+00	0.00E+00
		18.60		10.00	1.34E-03		0.00E+00	0.00E+00
	NB-93M	16.57		9.43	5.41E-04	5.41E-04	0.00E+00	0.00E+00
	CD-109	88.03		3.72	2.40E+02	2.40E+02	-8.44E+01	1.10E+02
+	SN-113	255.12		1.93	1.08E+03	1.33E+01	-2.83E+01	4.84E+02
		391.69	*	61.90	1.33E+01		1.97E+01	5.77E+00
	SN-119M	23.87		16.10	5.80E-03	5.80E-03	0.00E+00	0.00E+00
		25.10		22.70	5.92E-03		0.00E+00	0.00E+00
	I-129	29.78		57.00	4.24E-01	4.24E-01	8.72E-01	2.08E-01
		33.60		13.20	4.02E+00		4.18E+00	1.97E+00
		39.58		7.52	4.30E+00		-1.01E+00	1.99E+00
+	BA-133	81.00	*	34.06	3.74E+01	2.44E+01	3.99E+02	1.79E+01
		302.84	*	18.33	2.08E+02		4.20E+02	9.90E+01
		356.01	*	62.05	2.44E+01		3.46E+02	1.11E+01
	CE-139	165.85		80.35	3.28E+01	3.28E+01	6.15E-01	1.50E+01
	CE-144	133.54		10.80	1.94E+02	1.94E+02	8.44E+01	8.91E+01
	HG-203	279.19		77.30	2.93E+01	2.93E+01	1.70E+01	1.34E+01
	PB-210	46.50		4.25	1.72E+01	1.72E+01	-2.01E+00	7.94E+00
	TH-231	25.64		14.70	1.06E-02	1.06E-02	0.00E+00	0.00E+00
		84.21		6.40	3.04E+02		5.21E+02	1.47E+02
+	PA-234M	9.89		89.00	4.30E-07	4.30E-07	0.00E+00	0.00E+00
		21.72		64.90	7.08E-04		0.00E+00	0.00E+00
		37.93	*	23.75	1.61E+00		6.22E+00	7.75E-01
		131.42		20.40	1.04E+02		2.46E+00	4.78E+01
+	TH-234	63.29	*	3.80	1.63E+02	1.63E+02	3.00E+02	7.88E+01
	NP-237	29.37		14.00	1.58E+00	1.58E+00	3.24E+00	7.73E-01
		86.50		12.60	6.73E+01		2.81E+01	3.09E+01
	U-237	97.08		16.30	7.55E+01	5.12E+01	1.53E+01	3.49E+01
		101.07		26.30	5.12E+01		2.04E+01	2.36E+01
		114.00		12.30	2.32E+02		-4.69E+00	1.10E+02
		208.01		22.00	1.28E+02		-1.28E+01	5.84E+01
+	AM-241	59.54	*	35.90	1.73E+01	1.73E+01	3.17E+01	8.34E+00
	AM-243	74.67		66.00	9.73E+00	9.73E+00	-9.61E-01	4.54E+00

\+ = Nuclide identified during the nuclide identification
* = Energy line found in the spectrum
\> = MDA value not calculated
@ = Half-life too short to be able to perform the decay correction

KP 3/18/20

Apex-Gamma

Analysis Report for 2003062-06
H-10 35-40

GAMMA SPECTRUM ANALYSIS

Sample Identification	: 2003062-06
Sample Description	: H-10 35-40
Sample Type	: RA RECOVERY
Sample Size	: 1.000E+00 units
Facility	: Countroom
Sample Taken On	: 3/18/2020 10:33:01AM
Acquisition Started	: 3/18/2020 12:55:31PM
Procedure	: BAFIL
Operator	: Administrator
Detector Name	: GE3
Geometry	: BAFIL
Live Time	: 900.0 seconds
Real Time	: 901.8 seconds
Dead Time	: 0.20 %
Peak Locate Threshold	: 2.50
Peak Locate Range (in channels)	: 1 - 4096
Peak Area Range (in channels)	: 10 - 4096
Identification Energy Tolerance	: 2.500 keV
Energy Calibration Used Done On	: 10/19/2019
Efficiency Calibration Used Done On	: 10/19/2019
Efficiency Calibration Description	:
Sample Number	: 95614

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 3/18/2020 1:10:40PM

Peak Analysis From Channel : 1
Peak Analysis To Channel : 4096

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)

Analysis Report for 2003062-06

H-10 35-40

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
	1	20.24	17 -	24	20.66	4.78E+01	46.04	3.24E+02	3.10
M	2	30.94	26 -	41	31.35	1.52E+03	85.50	2.52E+02	2.13
m	3	35.30	26 -	41	35.71	3.81E+02	74.59	2.18E+02	2.24
M	4	61.92	58 -	69	62.32	2.02E+02	41.38	1.93E+02	1.95
m	5	66.26	58 -	69	66.65	9.76E+01	36.11	1.51E+02	2.01
	6	81.21	76 -	88	81.60	7.06E+02	76.58	3.58E+02	2.24
M	7	112.03	109 -	129	112.40	2.02E+02	39.40	1.18E+02	2.52
m	8	116.96	109 -	129	117.32	3.52E+01	29.93	7.38E+01	2.52
	9	209.22	204 -	217	209.52	3.90E+01	39.22	1.52E+02	5.42
M	10	277.22	273 -	284	277.49	3.55E+01	22.18	5.44E+01	2.72
m	11	281.58	273 -	284	281.84	1.19E+01	16.03	3.22E+01	2.66
M	12	303.15	299 -	310	303.40	9.35E+01	26.17	6.95E+01	2.07
m	13	307.38	299 -	310	307.62	2.35E+01	25.16	5.05E+01	2.36
	14	335.80	330 -	343	336.03	9.30E+01	29.53	5.41E+01	7.15
	15	356.48	353 -	362	356.69	3.63E+02	41.87	3.84E+01	2.21
M	16	383.88	381 -	392	384.08	5.85E+01	28.86	4.12E+01	2.23
m	17	387.21	381 -	392	387.40	1.19E+02	33.06	7.43E+01	2.33
M	18	414.68	409 -	424	414.85	2.23E+01	17.09	1.57E+01	2.58
m	19	417.81	409 -	424	417.98	1.93E+01	17.24	1.84E+01	2.35
	20	437.42	432 -	443	437.58	4.48E+01	24.74	5.45E+01	2.06
	21	467.99	464 -	471	468.14	1.84E+01	10.95	7.27E+00	2.23
	22	474.04	472 -	479	474.18	1.29E+01	10.95	1.03E+01	1.11
	23	609.17	605 -	612	609.22	9.00E+00	6.00	0.00E+00	2.98
	24	766.90	763 -	769	766.86	7.00E+00	5.29	0.00E+00	1.98
	25	889.72	885 -	891	889.60	5.00E+00	4.47	0.00E+00	1.00

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

BACKGROUND SUBTRACT REPORT

Peak Analysis Performed on : 3/18/2020 1:10:40PM

Env. Background File : \\OR-GAMMA1\ApexRoot\Countroom\Data\0000095494.CNF

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
	1	20.24	4.78E+01	46.04			4.78E+01	4.60E+01
M	2	30.94	1.52E+03	85.50			1.52E+03	8.55E+01
m	3	35.30	3.81E+02	74.59			3.81E+02	7.46E+01
M	4	61.92	2.02E+02	41.38	1.39E+01	2.81E+00	1.88E+02	4.15E+01

Analysis Report for 2003062-06

H-10 35-40

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
m	5	66.26	9.76E+01	36.11			9.76E+01	3.61E+01
	6	81.21	7.06E+02	76.58			7.06E+02	7.66E+01
M	7	112.03	2.02E+02	39.40			2.02E+02	3.94E+01
m	8	116.96	3.52E+01	29.93			3.52E+01	2.99E+01
	9	209.22	3.90E+01	39.22			3.90E+01	3.92E+01
M	10	277.22	3.55E+01	22.18			3.55E+01	2.22E+01
m	11	281.58	1.19E+01	16.03			1.19E+01	1.60E+01
M	12	303.15	9.35E+01	26.17			9.35E+01	2.62E+01
m	13	307.38	2.35E+01	25.16			2.35E+01	2.52E+01
	14	335.80	9.30E+01	29.53			9.30E+01	2.95E+01
	15	356.48	3.63E+02	41.87			3.63E+02	4.19E+01
M	16	383.88	5.85E+01	28.86			5.85E+01	2.89E+01
m	17	387.21	1.19E+02	33.06			1.19E+02	3.31E+01
M	18	414.68	2.23E+01	17.09			2.23E+01	1.71E+01
m	19	417.81	1.93E+01	17.24			1.93E+01	1.72E+01
	20	437.42	4.48E+01	24.74			4.48E+01	2.47E+01
	21	467.99	1.84E+01	10.95			1.84E+01	1.10E+01
	22	474.04	1.29E+01	10.95			1.29E+01	1.10E+01
	23	609.17	9.00E+00	6.00	1.39E+00	8.91E-01	7.61E+00	6.07E+00
	24	766.90	7.00E+00	5.29			7.00E+00	5.29E+00
	25	889.72	5.00E+00	4.47			5.00E+00	4.47E+00

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : \\OR-GAMMA1\ApexRoot\Countroom\Library\WSRC.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/units)	Activity Uncertainty
I-129	0.86	29.78	*	57.00	2.06E+01	1.16E+00
		33.60	*	13.20	3.78E+01	7.41E+00
		39.58		7.52		
BA-133	0.99	81.00	*	34.06	3.50E+02	5.11E+01
		302.84	*	18.33	3.08E+02	1.24E+02
		356.01	*	62.05	3.27E+02	5.55E+01
HG-203	0.90	279.19	*	77.30	2.84E+01	1.97E+01
TH-234	0.95	63.29	*	3.80	4.23E+02	9.54E+01

Analysis Report for 2003062-06

H-10 35-40

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/units)	Activity Uncertainty
AM-241	0.86	59.54	*	35.90	4.48E+01	1.01E+01

* = Energy line found in the spectrum.
\- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 2.500 keV
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma

INTERFERENCE CORRECTED REPORT

	Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/units)	Wt mean Activity Uncertainty	Comments
	I-129	0.867	2.10E+01	1.15E+00	
	BA-133	0.996	3.37E+02	3.60E+01	
	HG-203	0.906	2.84E+01	1.97E+01	
?	TH-234	0.953	4.23E+02	9.54E+01	
X	NP-237	0.746			
?	AM-241	0.865	4.48E+01	1.01E+01	

? = nuclide is part of an undetermined solution
X = nuclide rejected by the interference analysis
@ = nuclide contains energy lines not used in Weighted Mean Activity

Errors quoted at 2.000sigma

Analysis Report for 2003062-06

H-10 35-40

UNIDENTIFIED PEAKS

Peak Locate Performed on : 3/18/2020 1:10:40PM
Peak Locate From Channel : 1
Peak Locate To Channel : 4096

	Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
	1	20.24	5.31111E-02	48.16	Tol.	PA-234M
m	5	66.26	1.08428E-01	18.50	Sum	
M	7	112.03	2.24973E-01	9.73	Sum	
m	8	116.96	3.90920E-02	42.54	Sum	
	9	209.22	4.33043E-02	50.31	Tol.	U-237
m	11	281.58	1.31888E-02	67.53	Tol.	HG-203
m	13	307.38	2.61336E-02	53.50	Sum	
	14	335.80	1.03287E-01	15.88	Sum	
M	16	383.88	6.50000E-02	24.66	Sum	
m	17	387.21	1.31686E-01	13.95	Sum	
M	18	414.68	2.47390E-02	38.37		
m	19	417.81	2.14259E-02	44.70	Sum	
	20	437.42	4.97454E-02	27.63	Sum	
	21	467.99	2.04040E-02	29.83		
	22	474.04	1.42901E-02	42.59		
	23	609.17	8.45747E-03	39.85		
	24	766.90	7.77778E-03	37.80		
	25	889.72	5.55556E-03	44.72		

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE MDA REPORT

Nuclide Library Used : \\OR-GAMMA1\ApexRoot\Countroom\Library\WSRC.NLB

Analysis Report for 2003062-06

H-10 35-40

	Nuclide Name	Energy (keV)		Yield(%)	Line MDA (pCi/units)	Nuclide MDA (pCi/units)	Activity (pCi/units)	Dec. Level (pCi/units)
	FE-55	5.89		24.50	6.04E-06	6.04E-06	0.00E+00	0.00E+00
	CO-57	122.06		85.51	1.48E+01	1.48E+01	-1.05E+01	6.85E+00
		136.48		10.60	1.54E+02		-3.79E+01	7.17E+01
	NI-59	6.92		29.80	1.59E-05	1.59E-05	0.00E+00	0.00E+00
	MO-93	16.59		52.90	3.45E-02	3.45E-02	-2.56E-03	1.62E-02
		18.60		10.00	3.99E-01		4.10E-02	1.90E-01
	NB-93M	16.57		9.43	1.92E-01	1.92E-01	-1.43E-02	9.04E-02
	CD-109	88.03		3.72	2.71E+02	2.71E+02	-1.17E+02	1.28E+02
	SN-113	255.12		1.93	9.20E+02	3.25E+01	2.53E+02	4.17E+02
		391.69		61.90	3.25E+01		4.68E+00	1.51E+01
	SN-119M	23.87		16.10	8.71E-01	7.50E-01	-2.38E-01	4.15E-01
		25.10		22.70	7.50E-01		-4.93E+00	3.56E-01
+	I-129	29.78	*	57.00	1.69E+00	1.69E+00	2.06E+01	8.25E-01
		33.60	*	13.20	1.23E+01		3.78E+01	6.01E+00
		39.58		7.52	1.22E+01		-4.32E+01	5.75E+00
+	BA-133	81.00	*	34.06	4.63E+01	2.82E+01	3.50E+02	2.25E+01
		302.84	*	18.33	1.71E+02		3.08E+02	8.11E+01
		356.01	*	62.05	2.82E+01		3.27E+02	1.29E+01
	CE-139	165.85		80.35	2.36E+01	2.36E+01	-1.66E+01	1.09E+01
	CE-144	133.54		10.80	1.45E+02	1.45E+02	4.65E+01	6.74E+01
+	HG-203	279.19	*	77.30	3.38E+01	3.38E+01	2.84E+01	1.58E+01
	PB-210	46.50		4.25	3.45E+01	3.45E+01	2.18E+00	1.61E+01
	TH-231	25.64		14.70	1.27E+00	1.27E+00	-8.38E+00	6.06E-01
		84.21		6.40	2.97E+02		6.82E+02	1.44E+02
	PA-234M	9.89		89.00	1.01E-03	1.01E-03	8.89E-04	4.75E-04
		21.72		64.90	1.47E-01		1.01E-01	7.04E-02
		37.93		23.75	6.04E+00		1.21E+01	2.92E+00
		131.42		20.40	6.49E+01		-1.79E+01	2.98E+01
+	TH-234	63.29	*	3.80	1.95E+02	1.95E+02	4.23E+02	9.43E+01
	NP-237	29.37	*	14.00	6.87E+00	6.87E+00	8.38E+01	3.36E+00
		86.50		12.60	8.39E+01		-2.94E+00	3.99E+01
	U-237	97.08		16.30	8.18E+01	4.80E+01	2.20E+01	3.88E+01
		101.07		26.30	4.80E+01		-1.40E+01	2.26E+01
		114.00		12.30	2.12E+02		4.91E+02	1.02E+02
		208.01		22.00	1.10E+02		3.36E+01	5.15E+01
+	AM-241	59.54	*	35.90	2.06E+01	2.06E+01	4.48E+01	9.98E+00
	AM-243	74.67		66.00	1.06E+01	1.06E+01	-3.67E-01	5.01E+00

\+ = Nuclide identified during the nuclide identification
* = Energy line found in the spectrum
\> = MDA value not calculated
@ = Half-life too short to be able to perform the decay correction

KP 3/18/20

Analysis Report for 2003062-07
H-2 30-35

GAMMA SPECTRUM ANALYSIS

Sample Identification	: 2003062-07
Sample Description	: H-2 30-35
Sample Type	: RA RECOVERY
Sample Size	: 1.000E+00 units
Facility	: Countroom
Sample Taken On	: 3/18/2020 10:33:14AM
Acquisition Started	: 3/18/2020 12:55:37PM
Procedure	: BAFIL
Operator	: Administrator
Detector Name	: GE4
Geometry	: BAFIL
Live Time	: 900.0 seconds
Real Time	: 900.4 seconds
Dead Time	: 0.04 %
Peak Locate Threshold	: 2.50
Peak Locate Range (in channels)	: 1 - 4096
Peak Area Range (in channels)	: 9 - 4096
Identification Energy Tolerance	: 2.500 keV
Energy Calibration Used Done On	: 10/12/2019
Efficiency Calibration Used Done On	: 10/12/2019
Efficiency Calibration Description	:
Sample Number	: 95615

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 3/18/2020 1:10:51PM

Peak Analysis From Channel : 1
Peak Analysis To Channel : 4096

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)

Analysis Report for 2003062-07

H-2 30-35

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
	1	21.76	17 -	24	20.80	6.78E+01	43.50	2.66E+02	1.49
M	2	32.00	25 -	39	31.05	1.75E+03	89.20	1.83E+02	2.40
m	3	36.24	25 -	39	35.30	4.29E+02	68.97	1.53E+02	2.49
	4	52.79	47 -	56	51.85	5.80E+01	38.63	1.80E+02	3.01
M	5	62.78	57 -	71	61.85	1.71E+02	40.89	1.44E+02	2.81
m	6	66.63	57 -	71	65.70	1.04E+02	41.09	1.44E+02	2.76
M	7	82.14	76 -	91	81.21	6.81E+02	58.11	1.21E+02	2.35
	8	102.14	99 -	104	101.23	2.04E+01	20.37	6.32E+01	1.53
	9	112.78	105 -	118	111.87	2.23E+02	52.09	2.01E+02	2.52
	10	276.48	270 -	279	275.65	3.41E+01	25.02	6.99E+01	2.65
M	11	303.63	299 -	309	302.81	1.18E+02	25.50	2.80E+01	2.91
m	12	308.10	299 -	309	307.28	2.15E+01	13.78	2.00E+01	2.30
M	13	334.57	329 -	343	333.77	4.12E+01	20.00	3.81E+01	2.57
m	14	339.93	329 -	343	339.14	2.29E+01	17.44	2.80E+01	2.57
	15	356.83	351 -	360	356.04	3.47E+02	37.70	4.95E+00	2.16
M	16	386.27	380 -	395	385.50	1.12E+02	28.31	3.30E+01	3.79
m	17	391.39	380 -	395	390.62	2.63E+01	26.71	3.30E+01	4.19
	18	417.93	412 -	425	417.17	4.36E+01	17.49	1.68E+01	4.80
	19	437.67	433 -	440	436.92	5.80E+01	16.73	8.00E+00	2.49
	20	468.31	463 -	470	467.58	5.88E+00	6.93	4.25E+00	2.71
	21	531.38	528 -	533	530.69	4.67E+00	5.74	2.67E+00	2.48
	22	583.06	579 -	584	582.40	5.13E+00	7.07	5.75E+00	1.88
	23	617.75	613 -	621	617.11	1.11E+01	8.50	3.85E+00	1.86

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

BACKGROUND SUBTRACT REPORT

Peak Analysis Performed on : 3/18/2020 1:10:51PM

Env. Background File : \\OR-GAMMA1\ApexRoot\Countroom\Data\0000095495.CNF

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
	1	21.76	6.78E+01	43.50	1.41E+01	4.78E-01	5.37E+01	4.35E+01
M	2	32.00	1.75E+03	89.20			1.75E+03	8.92E+01
m	3	36.24	4.29E+02	68.97			4.29E+02	6.90E+01
	4	52.79	5.80E+01	38.63			5.80E+01	3.86E+01
M	5	62.78	1.71E+02	40.89	1.23E+01	2.15E+00	1.59E+02	4.09E+01
m	6	66.63	1.04E+02	41.09	1.23E+01	2.15E+00	9.19E+01	4.11E+01

Analysis Report for 2003062-07

H-2 30-35

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
M	7	82.14	6.81E+02	58.11			6.81E+02	5.81E+01
	8	102.14	2.04E+01	20.37			2.04E+01	2.04E+01
	9	112.78	2.23E+02	52.09			2.23E+02	5.21E+01
	10	276.48	3.41E+01	25.02			3.41E+01	2.50E+01
M	11	303.63	1.18E+02	25.50			1.18E+02	2.55E+01
m	12	308.10	2.15E+01	13.78			2.15E+01	1.38E+01
M	13	334.57	4.12E+01	20.00			4.12E+01	2.00E+01
m	14	339.93	2.29E+01	17.44			2.29E+01	1.74E+01
	15	356.83	3.47E+02	37.70			3.47E+02	3.77E+01
M	16	386.27	1.12E+02	28.31			1.12E+02	2.83E+01
m	17	391.39	2.63E+01	26.71			2.63E+01	2.67E+01
	18	417.93	4.36E+01	17.49	6.84E-01	1.02E+00	4.29E+01	1.75E+01
	19	437.67	5.80E+01	16.73			5.80E+01	1.67E+01
	20	468.31	5.88E+00	6.93			5.88E+00	6.93E+00
	21	531.38	4.67E+00	5.74			4.67E+00	5.74E+00
	22	583.06	5.13E+00	7.07			5.13E+00	7.07E+00
	23	617.75	1.11E+01	8.50			1.11E+01	8.50E+00

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : \\OR-GAMMA1\ApexRoot\Countroom\Library\WSRC.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/units)	Activity Uncertainty
SN-113	0.93	255.12		1.93		
		391.69	*	61.90	4.21E+01	4.35E+01
BA-133	0.97	81.00	*	34.06	3.57E+02	4.65E+01
		302.84	*	18.33	4.19E+02	1.66E+02
		356.01	*	62.05	4.73E+02	9.01E+01
TH-234	0.99	63.29	*	3.80	6.82E+02	1.86E+02

Analysis Report for 2003062-07

H-2 30-35

* = Energy line found in the spectrum.
\- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 2.500 keV
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma

INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/units)	Wt mean Activity Uncertainty	Comments
SN-113	0.931	4.21E+01	4.35E+01	
BA-133	0.978	3.83E+02	4.01E+01	
TH-234	0.993	6.82E+02	1.86E+02	

? = nuclide is part of an undetermined solution
X = nuclide rejected by the interference analysis
@ = nuclide contains energy lines not used in Weighted Mean Activity

Errors quoted at 2.000sigma

Analysis Report for 2003062-07

H-2 30-35

UNIDENTIFIED PEAKS

Peak Locate Performed on : 3/18/2020 1:10:51PM
Peak Locate From Channel : 1
Peak Locate To Channel : 4096

	Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
	1	21.76	5.96714E-02	40.50	Tol.	SN-119M
						PA-234M
M	2	32.00	1.94582E+00	2.55	Tol.	I-129
						I-129
m	3	36.24	4.76723E-01	8.04	Tol.	PA-234M
	4	52.79	6.44444E-02	33.30		
m	6	66.63	1.02114E-01	22.38		
	8	102.14	2.26603E-02	49.94	Tol.	U-237
	9	112.78	2.47251E-01	11.70	Tol.	U-237
	10	276.48	3.78583E-02	36.72		
m	12	308.10	2.38546E-02	32.10		
M	13	334.57	4.58107E-02	24.25		
m	14	339.93	2.54887E-02	38.00		
M	16	386.27	1.24328E-01	12.65	Sum	
	18	417.93	4.76803E-02	20.42	Sum	
	19	437.67	6.44444E-02	14.43	Sum	
	20	468.31	6.52778E-03	58.96		
	21	531.38	5.18519E-03	61.55		
	22	583.06	5.69444E-03	68.99		
	23	617.75	1.23077E-02	38.37		

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE MDA REPORT

Nuclide Library Used : \\OR-GAMMA1\ApexRoot\Countroom\Library\WSRC.NLB

Analysis Report for 2003062-07

H-2 30-35

	Nuclide Name	Energy (keV)		Yield(%)	Line MDA (pCi/units)	Nuclide MDA (pCi/units)	Activity (pCi/units)	Dec. Level (pCi/units)
	FE-55	5.89		24.50	1.10E+01	1.10E+01	0.00E+00	0.00E+00
	CO-57	122.06		85.51	1.02E+01	1.02E+01	-5.22E+00	4.75E+00
		136.48		10.60	9.73E+01		6.66E+01	4.55E+01
	NI-59	6.92		29.80	3.59E+01	3.59E+01	-4.07E+01	1.45E+01
	MO-93	16.59		52.90	2.78E+01	2.78E+01	7.69E-01	1.32E+01
		18.60		10.00	1.54E+02		9.22E+00	7.41E+01
	NB-93M	16.57		9.43	1.56E+02	1.56E+02	4.32E+00	7.44E+01
	CD-109	88.03		3.72	1.94E+02	1.94E+02	-1.48E+03	9.01E+01
+	SN-113	255.12		1.93	6.94E+02	6.03E+01	-1.24E+02	3.11E+02
		391.69	*	61.90	6.03E+01		4.21E+01	2.80E+01
	SN-119M	23.87		16.10	7.71E+01	5.15E+01	-5.36E+00	3.69E+01
		25.10		22.70	5.15E+01		-1.69E+02	2.46E+01
	I-129	29.78		57.00	6.01E+01	6.01E+01	4.40E+02	2.97E+01
		33.60		13.20	2.73E+02		2.26E+03	1.35E+02
		39.58		7.52	1.66E+02		9.83E+00	8.03E+01
+	BA-133	81.00	*	34.06	4.49E+01	1.70E+01	3.57E+02	2.17E+01
		302.84	*	18.33	1.11E+02		4.19E+02	5.06E+01
		356.01	*	62.05	1.70E+01		4.73E+02	6.63E+00
	CE-139	165.85		80.35	1.63E+01	1.63E+01	7.39E+00	7.63E+00
	CE-144	133.54		10.80	8.85E+01	8.85E+01	-4.81E+00	4.12E+01
	HG-203	279.19		77.30	2.82E+01	2.82E+01	8.29E-02	1.31E+01
	PB-210	46.50		4.25	1.66E+02	1.66E+02	-1.30E+01	7.80E+01
	TH-231	25.64		14.70	7.31E+01	7.31E+01	-1.18E+03	3.48E+01
		84.21		6.40	3.56E+02		1.76E+03	1.74E+02
	PA-234M	9.89		89.00	2.07E+01	2.07E+01	1.26E+01	9.68E+00
		21.72		64.90	2.08E+01		2.01E+01	9.98E+00
		37.93		23.75	7.28E+01		-1.15E+01	3.55E+01
		131.42		20.40	4.40E+01		-1.41E+01	2.04E+01
+	TH-234	63.29	*	3.80	3.55E+02	3.55E+02	6.82E+02	1.72E+02
	NP-237	29.37		14.00	2.14E+02	6.90E+01	9.37E+02	1.05E+02
		86.50		12.60	6.90E+01		-5.74E+02	3.25E+01
	U-237	97.08		16.30	5.02E+01	3.10E+01	2.22E+01	2.35E+01
		101.07		26.30	3.10E+01		-5.96E-01	1.45E+01
		114.00		12.30	1.33E+02		2.44E+02	6.40E+01
		208.01		22.00	6.68E+01		7.16E+00	3.10E+01
	AM-241	59.54		35.90	3.05E+01	3.05E+01	2.51E+01	1.46E+01
	AM-243	74.67		66.00	1.20E+01	1.20E+01	9.57E-01	5.64E+00

\+ = Nuclide identified during the nuclide identification
* = Energy line found in the spectrum
\> = MDA value not calculated
@ = Half-life too short to be able to perform the decay correction

Apex-Gamma

Analysis Report for 2003062-08
H-16 35-40

GAMMA SPECTRUM ANALYSIS

Sample Identification	: 2003062-08
Sample Description	: H-16 35-40
Sample Type	: RA RECOVERY
Sample Size	: 1.000E+00 units
Facility	: Countroom
Sample Taken On	: 3/18/2020 1:24:10PM
Acquisition Started	: 3/18/2020 1:27:05PM
Procedure	: BAFIL
Operator	: Administrator
Detector Name	: GE3
Geometry	: BAFIL
Live Time	: 900.0 seconds
Real Time	: 901.7 seconds
Dead Time	: 0.19 %
Peak Locate Threshold	: 2.50
Peak Locate Range (in channels)	: 1 - 4096
Peak Area Range (in channels)	: 9 - 4096
Identification Energy Tolerance	: 2.500 keV
Energy Calibration Used Done On	: 10/19/2019
Efficiency Calibration Used Done On	: 10/19/2019
Efficiency Calibration Description	:
Sample Number	: 95626

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 3/18/2020 1:42:09PM

Peak Analysis From Channel : 1
Peak Analysis To Channel : 4096

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)

Analysis Report for 2003062-08

H-16 35-40

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
1	37.79	35 -	42	38.20	2.69E+01	25.30	9.02E+01	4.74
2	105.58	101 -	113	105.95	3.45E+01	26.28	6.50E+01	8.66
3	153.12	151 -	156	153.46	9.77E+00	8.89	6.46E+00	3.40
4	229.54	227 -	233	229.83	1.15E+01	9.19	7.00E+00	1.38
5	418.45	414 -	422	418.63	6.50E+00	9.19	9.00E+00	4.23
6	534.28	532 -	537	534.38	4.63E+00	7.07	6.75E+00	1.63
7	712.90	708 -	716	712.89	9.00E+00	6.00	0.00E+00	2.84
8	946.58	943 -	949	946.43	7.00E+00	5.29	0.00E+00	2.22

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

BACKGROUND SUBTRACT REPORT

Peak Analysis Performed on : 3/18/2020 1:42:09PM

Env. Background File : \\OR-GAMMA1\ApexRoot\Countroom\Data\0000095494.CNF

Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
1	37.79	2.69E+01	25.30			2.69E+01	2.53E+01
2	105.58	3.45E+01	26.28			3.45E+01	2.63E+01
3	153.12	9.77E+00	8.89			9.77E+00	8.89E+00
4	229.54	1.15E+01	9.19			1.15E+01	9.19E+00
5	418.45	6.50E+00	9.19			6.50E+00	9.19E+00
6	534.28	4.63E+00	7.07			4.63E+00	7.07E+00
7	712.90	9.00E+00	6.00			9.00E+00	6.00E+00
8	946.58	7.00E+00	5.29			7.00E+00	5.29E+00

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

Analysis Report for 2003062-08

H-16 35-40

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : \\OR-GAMMA1\ApexRoot\Countroom\Library\WSRC.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/units)	Activity Uncertainty

* = Energy line found in the spectrum.
\- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 2.500 keV
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma

INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/units)	Wt mean Activity Uncertainty	Comments

? = nuclide is part of an undetermined solution
X = nuclide rejected by the interference analysis
@ = nuclide contains energy lines not used in Weighted Mean Activity

Errors quoted at 2.000sigma

Analysis Report for 2003062-08

H-16 35-40

UNIDENTIFIED PEAKS

Peak Locate Performed on : 3/18/2020 1:42:09PM
Peak Locate From Channel : 1
Peak Locate To Channel : 4096

Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
1	37.79	2.98765E-02	47.04	Tol.	I-129 PA-234M
2	105.58	3.83333E-02	38.08		
3	153.12	1.08547E-02	45.49		
4	229.54	1.27778E-02	39.97		
5	418.45	7.22222E-03	70.71		
6	534.28	5.13889E-03	76.44		
7	712.90	1.00000E-02	33.33		
8	946.58	7.77778E-03	37.80		

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE MDA REPORT

Nuclide Library Used : \\OR-GAMMA1\ApexRoot\Countroom\Library\WSRC.NLB

Nuclide Name	Energy (keV)	Yield(%)	Line MDA (pCi/units)	Nuclide MDA (pCi/units)	Activity (pCi/units)	Dec. Level (pCi/units)
FE-55	5.89	24.50	6.04E-06	6.04E-06	0.00E+00	0.00E+00
CO-57	122.06	85.51	8.97E+00	8.97E+00	1.42E+00	3.92E+00
	136.48	10.60	8.41E+01		9.37E+00	3.67E+01
NI-59	6.92	29.80	4.33E-05	4.33E-05	-1.41E-04	1.37E-05
MO-93	16.59	52.90	2.40E-02	2.40E-02	-1.33E-02	1.10E-02
	18.60	10.00	2.34E-01		-5.28E-03	1.07E-01
NB-93M	16.57	9.43	1.34E-01	1.34E-01	-7.40E-02	6.12E-02
CD-109	88.03	3.72	1.85E+02	1.85E+02	-2.14E+02	8.53E+01

Analysis Report for 2003062-08

H-16 35-40

Nuclide Name	Energy (keV)	Yield(%)	Line MDA (pCi/units)	Nuclide MDA (pCi/units)	Activity (pCi/units)	Dec. Level (pCi/units)
SN-113	255.12	1.93	6.47E+02	1.19E+01	1.74E+02	2.80E+02
	391.69	61.90	1.19E+01		-1.90E+00	4.81E+00
SN-119M	23.87	16.10	4.81E-01	4.45E-01	-1.31E-01	2.20E-01
	25.10	22.70	4.45E-01		-6.20E-02	2.04E-01
I-129	29.78	57.00	3.71E-01	3.71E-01	5.31E-02	1.70E-01
	33.60	13.20	2.37E+00		-3.22E-01	1.08E+00
	39.58	7.52	9.28E+00		6.10E-01	4.28E+00
BA-133	81.00	34.06	1.82E+01	1.70E+01	4.02E-01	8.42E+00
	302.84	18.33	5.50E+01		-1.69E+01	2.30E+01
	356.01	62.05	1.70E+01		5.98E+00	7.27E+00
CE-139	165.85	80.35	1.06E+01	1.06E+01	-9.80E+00	4.46E+00
CE-144	133.54	10.80	8.66E+01	8.66E+01	3.36E+01	3.82E+01
HG-203	279.19	77.30	1.50E+01	1.50E+01	6.65E-01	6.43E+00
PB-210	46.50	4.25	2.89E+01	2.89E+01	1.38E+01	1.33E+01
TH-231	25.64	14.70	7.57E-01	7.57E-01	-1.05E-01	3.47E-01
	84.21	6.40	1.05E+02		3.43E+01	4.89E+01
PA-234M	9.89	89.00	8.96E-04	8.96E-04	7.49E-04	4.19E-04
	21.72	64.90	8.16E-02		4.11E-02	3.75E-02
	37.93	23.75	2.79E+00		2.54E+00	1.30E+00
	131.42	20.40	4.59E+01		1.58E+01	2.03E+01
TH-234	63.29	3.80	8.41E+01	8.41E+01	5.29E+01	3.88E+01
NP-237	29.37	14.00	1.42E+00	1.42E+00	2.04E-01	6.52E-01
	86.50	12.60	5.43E+01		-1.94E+01	2.51E+01
U-237	97.08	16.30	5.20E+01	3.26E+01	-1.51E+01	2.40E+01
	101.07	26.30	3.26E+01		6.87E+00	1.50E+01
	114.00	12.30	6.20E+01		1.05E+00	2.74E+01
	208.01	22.00	6.20E+01		2.71E+01	2.74E+01
AM-241	59.54	35.90	6.67E+00	6.67E+00	-3.02E+00	3.05E+00
AM-243	74.67	66.00	7.95E+00	7.95E+00	-3.96E-01	3.69E+00

\+ = Nuclide identified during the nuclide identification
* = Energy line found in the spectrum
\> = MDA value not calculated
@ = Half-life too short to be able to perform the decay correction

KP 3/18/20

Apex-Gamma

Analysis Report for 2003062-09
H-18 35-40

GAMMA SPECTRUM ANALYSIS

Sample Identification	: 2003062-09
Sample Description	: H-18 35-40
Sample Type	: RA RECOVERY
Sample Size	: 1.000E+00 units
Facility	: Countroom
Sample Taken On	: 3/18/2020 10:33:35AM
Acquisition Started	: 3/18/2020 1:11:22PM
Procedure	: BAFIL
Operator	: Administrator
Detector Name	: GE2
Geometry	: BAFIL
Live Time	: 900.0 seconds
Real Time	: 900.2 seconds
Dead Time	: 0.02 %
Peak Locate Threshold	: 2.50
Peak Locate Range (in channels)	: 1 - 4096
Peak Area Range (in channels)	: 29 - 4096
Identification Energy Tolerance	: 2.500 keV
Energy Calibration Used Done On	: 10/19/2019
Efficiency Calibration Used Done On	: 9/14/2019
Efficiency Calibration Description	:
Sample Number	: 95618

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 3/18/2020 1:26:25PM

Peak Analysis From Channel : 1
Peak Analysis To Channel : 4096

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)

Analysis Report for 2003062-09

H-18 35-40

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
	1	35.43	35 -	39	35.77	2.15E+02	44.43	1.31E+02	2.60
	2	53.50	50 -	57	53.81	3.16E+01	29.05	1.19E+02	2.63
M	3	61.71	58 -	69	62.01	1.01E+02	26.76	5.34E+01	1.44
m	4	65.83	58 -	69	66.13	3.03E+01	21.35	5.51E+01	1.45
	5	71.06	70 -	74	71.35	1.72E+01	20.54	7.96E+01	1.27
	6	81.01	77 -	86	81.29	4.73E+02	52.23	1.17E+02	1.84
	7	92.33	89 -	94	92.60	3.83E+01	20.95	5.73E+01	1.24
M	8	111.81	108 -	121	112.06	9.51E+01	26.21	6.92E+01	1.57
m	9	115.82	108 -	121	116.06	1.66E+01	19.47	7.29E+01	1.58
	10	255.18	251 -	260	255.27	1.86E+01	22.27	6.09E+01	3.20
	11	275.48	271 -	280	275.55	4.13E+01	21.93	4.54E+01	2.03
M	12	302.81	299 -	311	302.85	1.07E+02	22.80	1.97E+01	1.81
m	13	306.98	299 -	311	307.02	2.11E+01	15.97	1.42E+01	2.11
	14	324.69	321 -	329	324.71	1.65E+01	10.98	7.10E+00	1.66
M	15	331.14	330 -	345	331.15	9.28E+00	6.04	2.99E-01	1.61
m	16	338.85	330 -	345	338.85	1.42E+01	10.79	7.31E+00	1.62
	17	355.93	353 -	360	355.91	3.13E+02	38.88	4.29E+01	1.43
M	18	375.82	373 -	396	375.78	7.68E+00	9.90	2.00E+01	2.21
m	19	384.09	373 -	396	384.05	6.52E+01	28.11	2.80E+01	2.22
m	20	386.94	373 -	396	386.90	8.90E+01	26.12	2.00E+01	1.63
m	21	391.48	373 -	396	391.42	2.02E+01	16.19	2.80E+01	2.23
	22	415.27	409 -	420	415.20	2.30E+01	19.49	3.60E+01	4.14
	23	436.83	433 -	439	436.73	4.07E+01	16.66	2.06E+01	1.89
	24	467.79	463 -	470	467.66	1.18E+01	10.95	1.25E+01	1.64
	25	481.94	479 -	484	481.80	6.69E+00	6.40	2.63E+00	2.89
	26	703.96	701 -	706	703.60	5.00E+00	4.47	0.00E+00	1.24
	27	1002.82	999 -	1004	1002.20	5.00E+00	4.47	0.00E+00	2.32

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

BACKGROUND SUBTRACT REPORT

Peak Analysis Performed on : 3/18/2020 1:26:25PM

Env. Background File : \\OR-GAMMA1\ApexRoot\Countroom\Data\0000095493.CNF

Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
1	35.43	2.15E+02	44.43			2.15E+02	4.44E+01
2	53.50	3.16E+01	29.05			3.16E+01	2.91E+01

Analysis Report for 2003062-09

H-18 35-40

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
M	3	61.71	1.01E+02	26.76	5.90E+00	2.40E+00	9.56E+01	2.69E+01
m	4	65.83	3.03E+01	21.35	1.33E+00	5.66E-01	2.89E+01	2.14E+01
	5	71.06	1.72E+01	20.54			1.72E+01	2.05E+01
	6	81.01	4.73E+02	52.23			4.73E+02	5.22E+01
	7	92.33	3.83E+01	20.95	1.27E+01	1.31E+00	2.56E+01	2.10E+01
M	8	111.81	9.51E+01	26.21			9.51E+01	2.62E+01
m	9	115.82	1.66E+01	19.47			1.66E+01	1.95E+01
	10	255.18	1.86E+01	22.27			1.86E+01	2.23E+01
	11	275.48	4.13E+01	21.93	0.00E+00	0.00E+00	4.13E+01	2.19E+01
M	12	302.81	1.07E+02	22.80			1.07E+02	2.28E+01
m	13	306.98	2.11E+01	15.97			2.11E+01	1.60E+01
	14	324.69	1.65E+01	10.98			1.65E+01	1.10E+01
M	15	331.14	9.28E+00	6.04			9.28E+00	6.04E+00
m	16	338.85	1.42E+01	10.79			1.42E+01	1.08E+01
	17	355.93	3.13E+02	38.88			3.13E+02	3.89E+01
M	18	375.82	7.68E+00	9.90			7.68E+00	9.90E+00
m	19	384.09	6.52E+01	28.11			6.52E+01	2.81E+01
m	20	386.94	8.90E+01	26.12			8.90E+01	2.61E+01
m	21	391.48	2.02E+01	16.19			2.02E+01	1.62E+01
	22	415.27	2.30E+01	19.49			2.30E+01	1.95E+01
	23	436.83	4.07E+01	16.66			4.07E+01	1.67E+01
	24	467.79	1.18E+01	10.95	3.98E-01	9.97E-01	1.14E+01	1.10E+01
	25	481.94	6.69E+00	6.40			6.69E+00	6.40E+00
	26	703.96	5.00E+00	4.47			5.00E+00	4.47E+00
	27	1002.82	5.00E+00	4.47			5.00E+00	4.47E+00

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : \\OR-GAMMA1\ApexRoot\Countroom\Library\WSRC.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/units)	Activity Uncertainty
SN-113	0.99	255.12	*	1.93	7.57E+02	9.51E+02
		391.69	*	61.90	1.32E+01	1.07E+01
BA-133	1.00	81.00	*	34.06	2.88E+02	4.32E+01
		302.84	*	18.33	3.81E+02	1.41E+02

Analysis Report for 2003062-09

H-18 35-40

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/units)	Activity Uncertainty
BA-133	1.00	356.01	*	62.05	2.50E+02	4.18E+01
PA-234M	0.98	9.89		89.00		
		21.72		64.90		
		37.93	*	23.75	4.34E+00	8.95E-01
		131.42		20.40		
TH-234	0.93	63.29	*	3.80	1.95E+02	5.54E+01
AM-241	0.88	59.54	*	35.90	2.07E+01	5.87E+00

* = Energy line found in the spectrum.
\- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 2.500 keV
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma

INTERFERENCE CORRECTED REPORT

	Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/units)	Wt mean Activity Uncertainty	Comments
	SN-113	0.999	1.33E+01	1.07E+01	
	BA-133	1.000	2.73E+02	2.94E+01	
	PA-234M	0.981	4.34E+00	8.95E-01	
?	TH-234	0.938	1.95E+02	5.54E+01	
?	AM-241	0.886	2.07E+01	5.87E+00	

? = nuclide is part of an undetermined solution
X = nuclide rejected by the interference analysis
@ = nuclide contains energy lines not used in Weighted Mean Activity

Errors quoted at 2.000sigma

Analysis Report for 2003062-09

H-18 35-40

UNIDENTIFIED PEAKS

Peak Locate Performed on : 3/18/2020 1:26:25PM
Peak Locate From Channel : 1
Peak Locate To Channel : 4096

	Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
	2	53.50	3.51038E-02	45.98		
m	4	65.83	3.21476E-02	36.92		
	5	71.06	1.90936E-02	59.75	Sum	
	7	92.33	2.84686E-02	40.97		
M	8	111.81	1.05613E-01	13.79	Tol.	U-237
m	9	115.82	1.84584E-02	58.59	Sum	
	11	275.48	4.58854E-02	26.55		
m	13	306.98	2.34303E-02	37.86		
	14	324.69	1.82778E-02	33.37		
M	15	331.14	1.03091E-02	32.56		
m	16	338.85	1.57605E-02	38.05	Sum	
M	18	375.82	8.53288E-03	64.45		
m	19	384.09	7.24018E-02	21.57	Sum	
m	20	386.94	9.89387E-02	14.66		
	22	415.27	2.55556E-02	42.38	Sum	
	23	436.83	4.52397E-02	20.46	Sum	
	24	467.79	1.26139E-02	48.45		
	25	481.94	7.43056E-03	47.87		
	26	703.96	5.55556E-03	44.72		
	27	1002.82	5.55556E-03	44.72		

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE MDA REPORT

Nuclide Library Used : \\OR-GAMMA1\ApexRoot\Countroom\Library\WSRC.NLB

Analysis Report for 2003062-09

H-18 35-40

	Nuclide Name	Energy (keV)		Yield(%)	Line MDA (pCi/units)	Nuclide MDA (pCi/units)	Activity (pCi/units)	Dec. Level (pCi/units)
	FE-55	5.89		24.50	4.58E-09	4.58E-09	0.00E+00	0.00E+00
	CO-57	122.06		85.51	2.01E+01	2.01E+01	1.81E+00	9.16E+00
		136.48		10.60	1.77E+02		-9.22E+00	8.01E+01
	NI-59	6.92		29.80	2.55E-08	2.55E-08	0.00E+00	0.00E+00
	MO-93	16.59		52.90	9.74E-05	9.74E-05	0.00E+00	0.00E+00
		18.60		10.00	1.34E-03		0.00E+00	0.00E+00
	NB-93M	16.57		9.43	5.41E-04	5.41E-04	0.00E+00	0.00E+00
	CD-109	88.03		3.72	1.95E+02	1.95E+02	2.14E+01	8.79E+01
+	SN-113	255.12	*	1.93	1.49E+03	3.93E+01	7.57E+02	6.89E+02
		391.69	*	61.90	3.93E+01		1.32E+01	1.88E+01
	SN-119M	23.87		16.10	5.80E-03	5.80E-03	0.00E+00	0.00E+00
		25.10		22.70	5.92E-03		0.00E+00	0.00E+00
	I-129	29.78		57.00	3.63E-01	3.63E-01	6.06E-01	1.78E-01
		33.60		13.20	3.44E+00		2.87E+00	1.68E+00
		39.58		7.52	3.08E+00		-1.27E+00	1.38E+00
+	BA-133	81.00	*	34.06	3.05E+01	2.35E+01	2.88E+02	1.44E+01
		302.84	*	18.33	1.17E+02		3.81E+02	5.35E+01
		356.01	*	62.05	2.35E+01		2.50E+02	1.07E+01
	CE-139	165.85		80.35	3.59E+01	3.59E+01	2.43E+01	1.66E+01
	CE-144	133.54		10.80	1.61E+02	1.61E+02	-1.55E+02	7.23E+01
	HG-203	279.19		77.30	2.34E+01	2.34E+01	-4.11E+00	1.04E+01
	PB-210	46.50		4.25	1.79E+01	1.79E+01	1.42E+01	8.28E+00
	TH-231	25.64		14.70	1.06E-02	1.06E-02	0.00E+00	0.00E+00
		84.21		6.40	2.56E+02		3.66E+02	1.23E+02
+	PA-234M	9.89		89.00	4.30E-07	4.30E-07	0.00E+00	0.00E+00
		21.72		64.90	7.08E-04		0.00E+00	0.00E+00
		37.93	*	23.75	1.16E+00		4.34E+00	5.53E-01
		131.42		20.40	9.60E+01		5.76E+01	4.38E+01
+	TH-234	63.29	*	3.80	1.17E+02	1.17E+02	1.95E+02	5.60E+01
	NP-237	29.37		14.00	1.35E+00	1.35E+00	2.25E+00	6.61E-01
		86.50		12.60	5.73E+01		6.01E+00	2.60E+01
	U-237	97.08		16.30	6.81E+01	4.60E+01	3.53E+01	3.11E+01
		101.07		26.30	4.60E+01		-3.51E+01	2.10E+01
		114.00		12.30	2.27E+02		2.64E+02	1.08E+02
		208.01		22.00	1.12E+02		2.38E+00	5.06E+01
+	AM-241	59.54	*	35.90	1.24E+01	1.24E+01	2.07E+01	5.92E+00
	AM-243	74.67		66.00	7.81E+00	7.81E+00	-5.61E-01	3.58E+00

\+ = Nuclide identified during the nuclide identification
* = Energy line found in the spectrum
\> = MDA value not calculated
@ = Half-life too short to be able to perform the decay correction

XP 3/18/20

Apex-Gamma

Analysis Report for 2003062-10
H-3 22-27

GAMMA SPECTRUM ANALYSIS

Sample Identification	: 2003062-10
Sample Description	: H-3 22-27
Sample Type	: RA RECOVERY
Sample Size	: 1.000E+00 units
Facility	: Countroom
Sample Taken On	: 3/18/2020 10:33:47AM
Acquisition Started	: 3/18/2020 1:11:30PM
Procedure	: BAFIL
Operator	: Administrator
Detector Name	: GE3
Geometry	: BAFIL
Live Time	: 900.0 seconds
Real Time	: 901.9 seconds
Dead Time	: 0.21 %
Peak Locate Threshold	: 2.50
Peak Locate Range (in channels)	: 1 - 4096
Peak Area Range (in channels)	: 10 - 4096
Identification Energy Tolerance	: 2.500 keV
Energy Calibration Used Done On	: 10/19/2019
Efficiency Calibration Used Done On	: 10/19/2019
Efficiency Calibration Description	:
Sample Number	: 95619

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 3/18/2020 1:26:38PM

Peak Analysis From Channel : 1
Peak Analysis To Channel : 4096

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)

Analysis Report for 2003062-10

H-3 22-27

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
M	1	20.86	17 -	40	21.28	9.11E+01	38.32	2.20E+02	2.32
m	2	30.94	17 -	40	31.36	1.84E+03	91.08	1.59E+02	2.07
m	3	34.46	17 -	40	34.87	3.36E+02	76.62	1.24E+02	1.95
	4	52.69	50 -	56	53.09	4.64E+01	39.26	2.49E+02	2.39
M	5	61.85	57 -	71	62.24	2.44E+02	46.69	2.36E+02	2.10
m	6	66.12	57 -	71	66.51	9.29E+01	46.29	2.46E+02	2.21
	7	81.25	76 -	86	81.63	8.00E+02	74.49	3.13E+02	2.40
	8	101.78	100 -	104	102.15	2.48E+01	24.73	1.12E+02	2.13
M	9	112.07	106 -	122	112.44	2.25E+02	45.83	1.76E+02	2.52
m	10	116.53	106 -	122	116.89	6.00E+01	41.13	1.33E+02	2.52
	11	276.85	273 -	280	277.11	3.93E+01	27.78	9.94E+01	1.85
	12	303.51	300 -	309	303.75	1.44E+02	32.71	7.21E+01	2.07
M	13	334.23	330 -	350	334.45	7.19E+01	21.40	2.60E+01	2.21
m	14	338.40	330 -	350	338.63	2.69E+01	21.17	2.67E+01	2.52
	15	356.46	351 -	363	356.67	4.63E+02	49.69	7.53E+01	2.40
M	16	386.47	380 -	402	386.67	2.66E+02	37.74	2.21E+01	4.12
m	17	391.32	380 -	402	391.51	6.51E+01	33.39	6.35E+00	3.42
	18	416.15	412 -	421	416.33	4.56E+01	20.76	3.69E+01	4.90
	19	437.63	434 -	441	437.79	9.10E+01	19.08	0.00E+00	2.53
	20	458.35	455 -	460	458.50	8.00E+00	5.66	0.00E+00	1.32
	21	528.29	525 -	531	528.40	5.00E+00	4.47	0.00E+00	1.00

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

BACKGROUND SUBTRACT REPORT

Peak Analysis Performed on : 3/18/2020 1:26:38PM

Env. Background File : \\OR-GAMMA1\ApexRoot\Countroom\Data\0000095494.CNF

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
M	1	20.86	9.11E+01	38.32			9.11E+01	3.83E+01
m	2	30.94	1.84E+03	91.08			1.84E+03	9.11E+01
m	3	34.46	3.36E+02	76.62			3.36E+02	7.66E+01
	4	52.69	4.64E+01	39.26			4.64E+01	3.93E+01
M	5	61.85	2.44E+02	46.69	1.39E+01	2.81E+00	2.30E+02	4.68E+01
m	6	66.12	9.29E+01	46.29			9.29E+01	4.63E+01
	7	81.25	8.00E+02	74.49			8.00E+02	7.45E+01
	8	101.78	2.48E+01	24.73			2.48E+01	2.47E+01

Analysis Report for 2003062-10

H-3 22-27

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
M	9	112.07	2.25E+02	45.83			2.25E+02	4.58E+01
m	10	116.53	6.00E+01	41.13			6.00E+01	4.11E+01
	11	276.85	3.93E+01	27.78			3.93E+01	2.78E+01
	12	303.51	1.44E+02	32.71			1.44E+02	3.27E+01
M	13	334.23	7.19E+01	21.40			7.19E+01	2.14E+01
m	14	338.40	2.69E+01	21.17			2.69E+01	2.12E+01
	15	356.46	4.63E+02	49.69			4.63E+02	4.97E+01
M	16	386.47	2.66E+02	37.74			2.66E+02	3.77E+01
m	17	391.32	6.51E+01	33.39			6.51E+01	3.34E+01
	18	416.15	4.56E+01	20.76			4.56E+01	2.08E+01
	19	437.63	9.10E+01	19.08			9.10E+01	1.91E+01
	20	458.35	8.00E+00	5.66			8.00E+00	5.66E+00
	21	528.29	5.00E+00	4.47			5.00E+00	4.47E+00

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : \\OR-GAMMA1\ApexRoot\Countroom\Library\WSRC.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/units)	Activity Uncertainty
SN-113	0.95	255.12		1.93		
		391.69	*	61.90	5.51E+01	2.89E+01
I-129	0.87	29.78	*	57.00	2.49E+01	1.24E+00
		33.60	*	13.20	3.04E+01	6.92E+00
		39.58		7.52		
BA-133	0.99	81.00	*	34.06	3.97E+02	5.37E+01
		302.84	*	18.33	4.75E+02	1.74E+02
		356.01	*	62.05	4.18E+02	6.85E+01
HG-203	0.86	279.19	*	77.30	3.14E+01	2.42E+01
TH-234	0.94	63.29	*	3.80	5.15E+02	1.08E+02
AM-241	0.87	59.54	*	35.90	5.45E+01	1.14E+01

Analysis Report for 2003062-10

H-3 22-27

* = Energy line found in the spectrum.
\- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 2.500 keV
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma

INTERFERENCE CORRECTED REPORT

	Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/units)	Wt mean Activity Uncertainty	Comments
	SN-113	0.952	5.51E+01	2.89E+01	
	I-129	0.876	2.51E+01	1.22E+00	
	BA-133	0.995	4.09E+02	4.11E+01	
	HG-203	0.869	3.14E+01	2.42E+01	
?	TH-234	0.948	5.15E+02	1.08E+02	
X	NP-237	0.745			
?	AM-241	0.872	5.45E+01	1.14E+01	

? = nuclide is part of an undetermined solution
X = nuclide rejected by the interference analysis
@ = nuclide contains energy lines not used in Weighted Mean Activity

Errors quoted at 2.000sigma

Analysis Report for 2003062-10

H-3 22-27

UNIDENTIFIED PEAKS

Peak Locate Performed on : 3/18/2020 1:26:38PM
Peak Locate From Channel : 1
Peak Locate To Channel : 4096

	Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
M	1	20.86	1.01233E-01	21.03	Tol.	MO-93 PA-234M
	4	52.69	5.15757E-02	42.29		
m	6	66.12	1.03270E-01	24.90	Sum	
	8	101.78	2.75240E-02	49.91	Tol.	U-237
M	9	112.07	2.49487E-01	10.20	Sum	
m	10	116.53	6.66362E-02	34.29	Sum	
M	13	334.23	7.98663E-02	14.88	Sum	
m	14	338.40	2.98631E-02	39.38	Sum	
M	16	386.47	2.95516E-01	7.09	Sum	
	18	416.15	5.06250E-02	22.78	Sum	
	19	437.63	1.01111E-01	10.48	Sum	
	20	458.35	8.88889E-03	35.36		
	21	528.29	5.55556E-03	44.72		

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE MDA REPORT

Nuclide Library Used : \\OR-GAMMA1\ApexRoot\Countroom\Library\WSRC.NLB

Nuclide Name	Energy (keV)	Yield(%)	Line MDA (pCi/units)	Nuclide MDA (pCi/units)	Activity (pCi/units)	Dec. Level (pCi/units)
FE-55	5.89	24.50	6.04E-06	6.04E-06	0.00E+00	0.00E+00
CO-57	122.06	85.51	1.73E+01	1.73E+01	1.47E+00	8.07E+00

Analysis Report for 2003062-10

H-3 22-27

	Nuclide Name	Energy (keV)		Yield(%)	Line MDA (pCi/units)	Nuclide MDA (pCi/units)	Activity (pCi/units)	Dec. Level (pCi/units)
	CO-57	136.48		10.60	1.44E+02	1.73E+01	-1.02E+02	6.69E+01
	NI-59	6.92		29.80	1.59E-05	1.59E-05	0.00E+00	0.00E+00
	MO-93	16.59		52.90	3.67E-02	3.67E-02	4.38E-03	1.73E-02
		18.60		10.00	4.18E-01		-2.41E-02	1.99E-01
	NB-93M	16.57		9.43	2.05E-01	2.05E-01	2.44E-02	9.66E-02
	CD-109	88.03		3.72	2.48E+02	2.48E+02	-1.07E+02	1.17E+02
+	SN-113	255.12		1.93	9.20E+02	3.04E+01	-1.79E+02	4.17E+02
		391.69	*	61.90	3.04E+01		5.51E+01	1.41E+01
	SN-119M	23.87		16.10	8.46E-01	7.09E-01	-5.21E-01	4.02E-01
		25.10		22.70	7.09E-01		-5.67E+00	3.36E-01
+	I-129	29.78	*	57.00	1.99E+00	1.99E+00	2.49E+01	9.75E-01
		33.60	*	13.20	1.32E+01		3.04E+01	6.47E+00
		39.58		7.52	1.16E+01		-4.21E-01	5.44E+00
+	BA-133	81.00	*	34.06	4.09E+01	3.92E+01	3.97E+02	1.98E+01
		302.84	*	18.33	1.29E+02		4.75E+02	6.03E+01
		356.01	*	62.05	3.92E+01		4.18E+02	1.84E+01
	CE-139	165.85		80.35	2.59E+01	2.59E+01	-8.47E+00	1.21E+01
	CE-144	133.54		10.80	1.46E+02	1.46E+02	-1.96E+01	6.79E+01
+	HG-203	279.19	*	77.30	3.48E+01	3.48E+01	3.14E+01	1.63E+01
	PB-210	46.50		4.25	3.82E+01	3.82E+01	3.74E+00	1.80E+01
	TH-231	25.64		14.70	1.21E+00	1.21E+00	-9.64E+00	5.71E-01
		84.21		6.40	3.15E+02		1.64E+01	1.53E+02
	PA-234M	9.89		89.00	1.04E-03	1.04E-03	1.22E-03	4.89E-04
		21.72		64.90	1.55E-01		1.77E-01	7.40E-02
		37.93		23.75	6.11E+00		1.19E+01	2.96E+00
		131.42		20.40	7.86E+01		2.10E+01	3.66E+01
+	TH-234	63.29	*	3.80	2.61E+02	2.61E+02	5.15E+02	1.28E+02
	NP-237	29.37	*	14.00	8.09E+00	8.09E+00	1.01E+02	3.97E+00
		86.50		12.60	7.47E+01		-1.72E+01	3.53E+01
	U-237	97.08		16.30	7.41E+01	5.25E+01	-4.04E+01	3.50E+01
		101.07		26.30	5.25E+01		0.00E+00	2.49E+01
		114.00		12.30	2.35E+02		5.50E+02	1.14E+02
		208.01		22.00	1.05E+02		7.93E+00	4.88E+01
+	AM-241	59.54	*	35.90	2.76E+01	2.76E+01	5.45E+01	1.35E+01
	AM-243	74.67		66.00	1.11E+01	1.11E+01	-1.27E+00	5.29E+00

\+ = Nuclide identified during the nuclide identification
* = Energy line found in the spectrum
\> = MDA value not calculated
@ = Half-life too short to be able to perform the decay correction

KP 3/18/20

Apex-Gamma

Analysis Report for 2003062-11
H-1 35-40

GAMMA SPECTRUM ANALYSIS

Sample Identification	: 2003062-11
Sample Description	: H-1 35-40
Sample Type	: RA RECOVERY
Sample Size	: 1.000E+00 units
Facility	: Countroom
Sample Taken On	: 3/18/2020 10:33:56AM
Acquisition Started	: 3/18/2020 1:11:38PM
Procedure	: BAFIL
Operator	: Administrator
Detector Name	: GE4
Geometry	: BAFIL
Live Time	: 900.0 seconds
Real Time	: 900.4 seconds
Dead Time	: 0.04 %
Peak Locate Threshold	: 2.50
Peak Locate Range (in channels)	: 1 - 4096
Peak Area Range (in channels)	: 9 - 4096
Identification Energy Tolerance	: 2.500 keV
Energy Calibration Used Done On	: 10/12/2019
Efficiency Calibration Used Done On	: 10/12/2019
Efficiency Calibration Description	:
Sample Number	: 95620

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 3/18/2020 1:26:49PM

Peak Analysis From Channel : 1
Peak Analysis To Channel : 4096

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)

Analysis Report for 2003062-11

H-1 35-40

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
	1	21.99	18 -	24	21.04	4.91E+01	38.80	2.32E+02	1.96
M	2	32.03	25 -	39	31.08	1.62E+03	88.99	1.55E+02	2.27
m	3	36.15	25 -	39	35.21	3.71E+02	66.60	1.32E+02	2.28
M	4	53.85	49 -	74	52.91	4.19E+01	30.02	1.15E+02	3.07
m	5	63.04	49 -	74	62.11	1.91E+02	42.05	1.46E+02	2.61
m	6	67.09	49 -	74	66.16	9.75E+01	45.49	1.78E+02	2.97
	7	82.14	77 -	87	81.22	6.53E+02	65.11	2.24E+02	2.27
	8	112.67	107 -	116	111.76	1.45E+02	47.93	2.46E+02	1.74
	9	151.29	147 -	154	150.40	2.14E+01	24.82	8.92E+01	1.55
	10	162.93	158 -	167	162.04	3.46E+01	34.32	1.45E+02	5.04
	11	222.43	219 -	225	221.58	1.65E+01	20.90	6.90E+01	3.06
	12	277.07	272 -	281	276.24	4.09E+01	24.84	6.42E+01	2.02
	13	303.78	299 -	309	302.97	8.21E+01	32.93	1.06E+02	2.20
	14	334.45	329 -	338	333.65	4.49E+01	26.51	7.42E+01	1.65
	15	356.80	351 -	363	356.01	2.97E+02	42.88	7.21E+01	2.80
M	16	384.60	381 -	395	383.82	6.69E+01	22.93	1.47E+01	2.53
m	17	387.36	381 -	395	386.59	9.90E+01	27.74	2.13E+01	2.22
m	18	392.14	381 -	395	391.37	2.72E+01	22.75	3.41E+01	3.73
M	19	413.76	412 -	423	413.00	8.92E+00	0.50	1.00E+00	2.38
m	20	417.73	412 -	423	416.98	2.18E+01	14.01	4.02E+00	2.88
	21	437.98	432 -	440	437.23	5.45E+01	18.36	1.91E+01	2.40
	22	467.61	462 -	471	466.88	1.26E+01	13.71	1.87E+01	4.84

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

BACKGROUND SUBTRACT REPORT

Peak Analysis Performed on : 3/18/2020 1:26:49PM

Env. Background File : \\OR-GAMMA1\ApexRoot\Countroom\Data\0000095495.CNF

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
	1	21.99	4.91E+01	38.80	1.41E+01	4.78E-01	3.50E+01	3.88E+01
M	2	32.03	1.62E+03	88.99			1.62E+03	8.90E+01
m	3	36.15	3.71E+02	66.60			3.71E+02	6.66E+01
M	4	53.85	4.19E+01	30.02			4.19E+01	3.00E+01
m	5	63.04	1.91E+02	42.05	1.23E+01	2.15E+00	1.79E+02	4.21E+01
m	6	67.09	9.75E+01	45.49			9.75E+01	4.55E+01
	7	82.14	6.53E+02	65.11			6.53E+02	6.51E+01

Analysis Report for 2003062-11

H-1 35-40

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
	8	112.67	1.45E+02	47.93			1.45E+02	4.79E+01
	9	151.29	2.14E+01	24.82			2.14E+01	2.48E+01
	10	162.93	3.46E+01	34.32			3.46E+01	3.43E+01
	11	222.43	1.65E+01	20.90			1.65E+01	2.09E+01
	12	277.07	4.09E+01	24.84			4.09E+01	2.48E+01
	13	303.78	8.21E+01	32.93			8.21E+01	3.29E+01
	14	334.45	4.49E+01	26.51			4.49E+01	2.65E+01
	15	356.80	2.97E+02	42.88			2.97E+02	4.29E+01
M	16	384.60	6.69E+01	22.93			6.69E+01	2.29E+01
m	17	387.36	9.90E+01	27.74			9.90E+01	2.77E+01
m	18	392.14	2.72E+01	22.75			2.72E+01	2.27E+01
M	19	413.76	8.92E+00	0.50			8.92E+00	5.00E-01
m	20	417.73	2.18E+01	14.01	6.84E-01	1.02E+00	2.11E+01	1.40E+01
	21	437.98	5.45E+01	18.36			5.45E+01	1.84E+01
	22	467.61	1.26E+01	13.71			1.26E+01	1.37E+01

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : \\OR-GAMMA1\ApexRoot\Countroom\Library\WSRC.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/units)	Activity Uncertainty
SN-113	0.92	255.12		1.93		
		391.69	*	61.90	4.38E+01	3.75E+01
BA-133	0.97	81.00	*	34.06	3.42E+02	4.79E+01
		302.84	*	18.33	2.93E+02	1.53E+02
		356.01	*	62.05	4.05E+02	8.63E+01
HG-203	0.89	279.19	*	77.30	3.02E+01	2.04E+01
TH-234	0.99	63.29	*	3.80	7.68E+02	1.94E+02

Analysis Report for 2003062-11

H-1 35-40

* = Energy line found in the spectrum.
\- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 2.500 keV
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma

INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/units)	Wt mean Activity Uncertainty	Comments
SN-113	0.928	4.38E+01	3.75E+01	
BA-133	0.978	3.52E+02	4.04E+01	
HG-203	0.891	3.02E+01	2.04E+01	
TH-234	0.998	7.68E+02	1.94E+02	

? = nuclide is part of an undetermined solution
X = nuclide rejected by the interference analysis
@ = nuclide contains energy lines not used in Weighted Mean Activity

Errors quoted at 2.000sigma

Analysis Report for 2003062-11

H-1 35-40

UNIDENTIFIED PEAKS

Peak Locate Performed on : 3/18/2020 1:26:49PM
Peak Locate From Channel : 1
Peak Locate To Channel : 4096

	Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
	1	21.99	3.88740E-02	55.45	Tol.	SN-119M
						PA-234M
M	2	32.03	1.79578E+00	2.75	Tol.	I-129
						I-129
m	3	36.15	4.12471E-01	8.97	Tol.	PA-234M
M	4	53.85	4.65325E-02	35.84		
m	6	67.09	1.08346E-01	23.33		
	8	112.67	1.61045E-01	16.53	Tol.	U-237
	9	151.29	2.37542E-02	58.05		
	10	162.93	3.84216E-02	49.63	Sum	
	11	222.43	1.83115E-02	63.40		
	14	334.45	4.98713E-02	29.54		
M	16	384.60	7.43565E-02	17.14	Sum	
m	17	387.36	1.10021E-01	14.01	Sum	
M	19	413.76	9.91240E-03	2.80		
m	20	417.73	2.34381E-02	33.29	Sum	
	21	437.98	6.05208E-02	16.85	Sum	
	22	467.61	1.40404E-02	54.25		

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE MDA REPORT

Nuclide Library Used : \\OR-GAMMA1\ApexRoot\Countroom\Library\WSRC.NLB

Analysis Report for 2003062-11

H-1 35-40

	Nuclide Name	Energy (keV)		Yield(%)	Line MDA (pCi/units)	Nuclide MDA (pCi/units)	Activity (pCi/units)	Dec. Level (pCi/units)
	FE-55	5.89		24.50	1.10E+01	1.10E+01	0.00E+00	0.00E+00
	CO-57	122.06		85.51	1.03E+01	1.03E+01	-5.61E+00	4.79E+00
		136.48		10.60	8.90E+01		3.68E+01	4.13E+01
	NI-59	6.92		29.80	4.43E+01	4.43E+01	-8.91E+00	1.87E+01
	MO-93	16.59		52.90	2.73E+01	2.73E+01	1.16E+01	1.30E+01
		18.60		10.00	1.49E+02		3.85E+01	7.11E+01
	NB-93M	16.57		9.43	1.53E+02	1.53E+02	6.53E+01	7.31E+01
	CD-109	88.03		3.72	2.18E+02	2.18E+02	-7.56E+01	1.03E+02
+	SN-113	255.12		1.93	6.69E+02	5.77E+01	-6.62E+01	2.99E+02
		391.69	*	61.90	5.77E+01		4.38E+01	2.67E+01
	SN-119M	23.87		16.10	7.64E+01	5.15E+01	-4.09E+00	3.66E+01
		25.10		22.70	5.15E+01		-1.48E+02	2.46E+01
	I-129	29.78		57.00	5.99E+01	5.99E+01	4.50E+02	2.95E+01
		33.60		13.20	2.67E+02		2.20E+03	1.32E+02
		39.58		7.52	1.59E+02		3.40E+00	7.64E+01
+	BA-133	81.00	*	34.06	3.62E+01	3.62E+01	3.42E+02	1.74E+01
		302.84	*	18.33	1.71E+02		2.93E+02	8.07E+01
		356.01	*	62.05	6.10E+01		4.05E+02	2.86E+01
	CE-139	165.85		80.35	1.48E+01	1.48E+01	-4.68E+00	6.90E+00
	CE-144	133.54		10.80	8.36E+01	8.36E+01	2.14E+00	3.87E+01
+	HG-203	279.19	*	77.30	2.79E+01	2.79E+01	3.02E+01	1.29E+01
	PB-210	46.50		4.25	1.51E+02	1.51E+02	2.49E+01	7.04E+01
	TH-231	25.64		14.70	7.60E+01	7.60E+01	-1.09E+03	3.63E+01
		84.21		6.40	3.54E+02		1.67E+03	1.73E+02
	PA-234M	9.89		89.00	1.91E+01	1.91E+01	7.40E+00	8.86E+00
		21.72		64.90	1.98E+01		8.19E+00	9.48E+00
		37.93		23.75	6.91E+01		-3.21E+01	3.36E+01
		131.42		20.40	4.14E+01		-2.55E+01	1.91E+01
+	TH-234	63.29	*	3.80	5.86E+02	5.86E+02	7.68E+02	2.87E+02
	NP-237	29.37		14.00	2.12E+02	7.91E+01	9.10E+02	1.04E+02
		86.50		12.60	7.91E+01		-9.07E+00	3.76E+01
	U-237	97.08		16.30	5.13E+01	3.21E+01	-1.99E+01	2.40E+01
		101.07		26.30	3.21E+01		1.21E+01	1.50E+01
		114.00		12.30	1.31E+02		2.40E+02	6.33E+01
		208.01		22.00	6.85E+01		1.96E+01	3.19E+01
	AM-241	59.54		35.90	2.98E+01	2.98E+01	-8.22E+00	1.43E+01
	AM-243	74.67		66.00	1.13E+01	1.13E+01	9.16E-01	5.31E+00

\+ = Nuclide identified during the nuclide identification
* = Energy line found in the spectrum
\> = MDA value not calculated
@ = Half-life too short to be able to perform the decay correction

SECTION XI

ANALYTICAL DATA (TOTAL DISSOLVED SOLIDS)

TDS / TSS Worksheet

Work Order	Run	Analysis Code	Technician
20-03062	**1**	**TDS**	**MHIGHTOWER**

TRetec Fraction	ERM Client ID	Aliquot ml	Filter Data Filter Tare (g)	Filter Final (g)	Filter Net (g)	TDS/TSS (mg/L)	Maximum Aliq (mL)
04	**H-12 50-60**	100.0000	101.2917	107.7903	**6.4986**	**64986.0000**	**1.54**
05	**H-9 50-55**	100.0000	107.0480	110.8866	**3.8386**	**38386.0000**	**2.61**
06	**H-10 35-40**	100.0000	105.3374	105.5609	**0.2235**	**2235.0000**	**44.74**
07	**H-2 30-35**	100.0000	106.2133	106.4900	**0.2767**	**2767.0000**	**36.14**
08	**H-16 35-40**	100.0000	102.4814	104.8403	**2.3589**	**23589.0000**	**4.24**
09	**H-18 35-40**	100.0000	103.4156	104.0583	**0.6427**	**6427.0000**	**15.56**
10	**H-3 22-27**	100.0000	104.6343	104.6582	**0.0239**	**239.0000**	**418.41**
11	**H-1 35-40**	100.0000	105.3695	105.5672	**0.1977**	**1977.0000**	**50.58**

0199

Technician: MH Date: 3/16/20

Eberline Analytical
Oak Ridge Laboratory

Aliquot Worksheet

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Work Order	Run	Analysis Code	Rpt Units	Lab Deadline	Technician
20-03062	1	TDS	liters	3/27/2020	JPACHELLA

Lab Fraction	ERM Client ID	Sample Type	Muffle Data	Dilution Data			Aliquot Data		MS Aliquot Data		H-3 Solids Only	
			Ratio Post/Pre	No of Dils	Dil Factor	Ratio	Aliquot	Net Equiv	Aliquot	Net Equiv	Water Added (ml)	H3 Dist Aliq
01	LCS	LCS					1.0000E+00	1.0000E+00				
02	BLANK	MBL					1.0000E+00	1.0000E+00				
03	DUP	DUP					1.0000E-01	1.0000E-01				
04	H-12 50-60	TRG					1.0000E-01	1.0000E-01				
05	H-9 50-55	TRG					1.0000E-01	1.0000E-01				
06	H-10 35-40	TRG					1.0000E-01	1.0000E-01				
07	H-2 30-35	TRG					1.0000E-01	1.0000E-01				
08	H-16 35-40	TRG					1.0000E-01	1.0000E-01				
09	H-18 35-40	TRG					1.0000E-01	1.0000E-01				
10	H-3 22-27	TRG					1.0000E-01	1.0000E-01				
11	H-1 35-40	TRG					1.0000E-01	1.0000E-01				

Comments	

0200

Technician: Jpachella Date: 3/13/20

ERM

0526033

STANDARD LEVEL IV
REPORT OF ANALYSIS

WORK ORDER #21-04092-OR

May 25, 2021

EBERLINE ANALYTICAL/OAK RIDGE LABORATORY
OAK RIDGE, TN

TABLE OF CONTENTS

Eberline Services – Oak Ridge Laboratory

LABORATORY DATA SUPPORT CHECKLIST

MP-001-3

Eberline Services Work Order # 21-04092

The checklist items listed below are to be initialed by appropriate staff upon completion/verification.

Date for Partial	Initials	Date	Initials	Checklist Items
		4/27/21	YB	Sample Log-In
		5/10/21		Data Compilation
		5-17-21	MH	First Technical Data Review
		5/18/21	MM	Second Technical Data Review
		5/21/21	CW	Data Entry/Electronic Deliverable
		5/21/21	CW	Case Narrative
		5/24/21		Electronic Deliverable Proof
		5/24/21	MM	Samples Analyzed within Holding Time Yes? ✓ No?
		5/24/21	MM	QA/QC Review
				Client in Possession of Data Electronic or Hard Copy
				Invoiced by Laboratory

Technical/Clerical Corrections, Signatures Needed, Problems, Etc	Date/Initials

Date package approved by: _____ 5/25/21

Laboratory Manager — Date

Copy No. _____

SECTION I

CHAIN OF CUSTODY
& pH CHECK

EBERLINE SERVICES
~~element~~

REC'D APR 27 2021

Chain of Custody

Laboratory Number: 21-04092

Page 1 of 1

	Client Information:	Billing Information:	PO Number:	Project Name/Number:
Company Name:	ERM	SAME	0526033	HENNING - 0526033
Contact Name:	LANCE COOPER		Quote Number:	
Address:	3638 N. CAUSEWAY BLVD.			Sampler's Signature
	SUITE 3000		Required QC Level	
City, State Zip:	METAIRIE, LA 70002			
Phone Number:	315-246-4494 Ext:	Ext:	Bill Monthly	Shipping Method:
Fax Number:	~~KURT.BOEHRINGER@ERM.COM~~		☐Yes	UPS / (FedEx) / Airborne
E-mail Address:	LANCE.COOPER@ERM.COM		☐No	DHL / Element / Hand / Mail

Matrix Code

DW = Drinking Water
WW = Waste Water
GW = Ground Water
AQ = Aqueous
OT = Other
SL = Sludge SOL = Solid
O = Oil SO = Soil
F = Food SW = Swab
NG = Natural Gas
NGL = Natural Gas Liquid
PW = Produced Water
CF = Completion Fluid

Which Regulations Apply:
☐RCRA ☐Drinking Water
☐POTW ☐Distribution
☐NPDES ☐Special
☐USDA/FDA ☐State
☐RECAP/RISC ☐Other

Turn Time
☑Standard
RUSH
☐1 Day
☐2 Day
☐Other
(Rush turn times will incur a surcharge and must be pre-approved by lab.)

	Sample ID/Description	Collection Information: Date	Time	Grab / Composite	Matrix	Container: Quantity	Container: Type P=Plastic, G=Glass, V=Vial	Pres. HCl, HNO_3, H_2SO_4, NaOH, $Na_2S_2O_3$	Requested Tests: Ra 226	Ra 228	TDS	Comments
4	H-20	4/19/21	1000	GRAB	GW	1	P	NONE	X	X	X	
5	H-22	4/19/21	1110	GRAB	GW	1	P	NONE	X	X	X	
6	H-23	4/19/21	1335	GRAB	GW	1	P	NONE	X	X	X	
7	H-24	4/19/21	1500	GRAB	GW	1	P	NONE	X	X	X	

	Relinquished by	Date/Time	Received by	Date/Time
1		0900 / 4-22-2021	Randolph Spencer	4/27/21 / 0915
2				
3				

Field Notes:

Received at lab on ice?
☐Yes ☐No Temp:

9000

All samples submitted to Element Materials Technology for analysis are accepted on a custodial basis only. Ownership of the material remains with the client submitting the samples. Element Materials Technology reserves the right to return unused sample portions.

9301 Innovation Drive, Suite 115
Daleville, IN
47334-0569 USA
P 765-378-4103
F 765-378-4109

629 Washington St. Suite 300
Columbus, IN
47201-6231 USA
P 812-375-0531
F 812-375-0731

2121 East Washington Boulevard
Fort Wayne, IN
46803-1328 USA
P 260-471-7000
F 260-471-7777

560 South Zimmer Road
Warsaw, IN
46580-2368 USA
P 574-267-3305
F 574-269-6569

3371 Cleveland Road, Suite 100A
South Bend, IN
46628-9780 USA
P 574-277-0707
F 574-273-5699

2417 W. Pinhook Rd
Lafayette, LA
70508-3344 USA
P 337-235-0483
F 337-233-6540

EBERLINE SERVICES Oak Ridge Laboratory	Internal Chain of Custody	Work Order #	21-04092
		Lab Deadline	5/11/2021
		Analysis	Ra226 - Level 4
		Sample Matrix	Water

Comments	Sample Fraction	HP 210 / 270 Detector Activity	Storage Location
	04	40	MM1.2
	05	30	MM1.2
	06	40	MM1.2
	07	50	MM1.2

	Location (circle one)					Initials	Date
Received by	(Sample Storage)	Rough Prep	Prep	Separations	Count Room	[handwritten initials]	4/28/21 0940
Relinquished by	Sample Storage	Rough Prep	(Prep)	Separations	Count Room	[handwritten initials]	4/29/21 0745
Received by	Sample Storage	Rough Prep	Prep	(Separations)	Count Room	AY	4/29/21 0800
Relinquished by	Sample Storage	Rough Prep	Prep	(Separations)	Count Room	AY	5/3/21 1035
Received by	Sample Storage	Rough Prep	Prep	Separations	(Count Room)	KB	5/3/21 1037
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	(Count Room)	KB	5/3/21 1415
Received by	(Sample Storage)	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		

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EBERLINE SERVICES
Oak Ridge Laboratory

Internal Chain of Custody

Work Order #	21-04092
Lab Deadline	5/11/2021
Analysis	Ra228 - Level 4
Sample Matrix	Water

Comments	Sample Fraction	HP 210 / 270 Detector Activity	Storage Location
	04	40	MM1.2
	05	30	MM1.2
	06	40	MM1.2
	07	50	MM1.2

	Location (circle one)					Initials	Date
Received by	(Sample Storage)	Rough Prep	Prep	Separations	Count Room	[illegible]	4/28/21 0745
Relinquished by	Sample Storage	Rough Prep	(Prep)	Separations	Count Room	[illegible]	4/28/21 0745
Received by	Sample Storage	Rough Prep	Prep	(Separations)	Count Room	AY	4/29/21 0800
Relinquished by	Sample Storage	Rough Prep	Prep	(Separations)	Count Room	AY	5/3/21 1037
Received by	Sample Storage	Rough Prep	Prep	Separations	(Count Room)	KB	5/3/21 1037
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	(Count Room)	KB	5/3/21 1445
Received by	Sample Storage	Rough Prep	Prep	(Separations)	Count Room	AY	5/3/21 1500
Relinquished by	Sample Storage	Rough Prep	Prep	(Separations)	Count Room	AY	5/4/21 1214
Received by	Sample Storage	Rough Prep	Prep	Separations	(Count Room)	KB	5/4/21 1216
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	(Count Room)	KB	5/4/21 1419
Received by	(Sample Storage)	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		

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EBERLINE SERVICES
Oak Ridge Laboratory

Internal Chain of Custody

Work Order #	21-04092
Lab Deadline	4/27/2021
Analysis	TDS - Level 4
Sample Matrix	Water

Comments

Sample Fraction	HP 210 / 270 Detector Activity	Storage Location
04	40	MM1.2
05	30	MM1.2
06	40	MM1.2
07	50	MM1.2

	Location (circle one)					Initials	Date
Received by	(Sample Storage)	Rough Prep	Prep	Separations	Count Room	Mu	27APR21
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	Mu	28APR21 0130
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		

EBERLINE SERVICES

Sample Receiving Report
(Volumes, pH, & CPM)

Internal Work Order
21-04092
Received By
RSPENCER

FR	ClientID	# Btls	Comments	Matrix	Storage	Rec Vol Ttl	CPM Max
01	LCS	0		WA	MM1.2		
02	BLANK	0		WA	MM1.2		
03	DUP	0		WA	MM1.2		
04	H-20	1		WA	MM1.2	3.76	40
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	7	7	3.7600	40
05	H-22	1		WA	MM1.2	3.76	30
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	7	7	3.7600	30
06	H-23	1		WA	MM1.2	3.76	40
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	7	7	3.7600	40
07	H-24	1		WA	MM1.2	3.76	50
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	7	7	3.7600	50

Received by: Randolph Spencer Date: 4-27-21

SECTION II

SAMPLE ACKNOWLEDGEMENT

Client Name	Contract/PO	Project Type	Date Received	Required Turnaround Days	Eberline Services Work Order
ERM	0526033	Environmental	04/27/2021	21	21-04092
Project Name	**Client WO**	**Sample Disp**	**Lab Deadline**	**Internal Deadline**	**Client Deadline**
526033	HENNING	W	05/11/2021	05/17/2021	05/18/2021

Internal ID	Client ID	Sample Date	Matrix	Storage	Ra226	Ra228	TDS																						Ttl
01	LCS	04/27/21	WA	MM1.2	X	X	X																						3
02	BLANK	04/27/21	WA	MM1.2	X	X	X																						3
03	DUP	04/27/21	WA	MM1.2	X	X	X																						3
04	H-20	04/19/21 10:00	WA	MM1.2	X	X	X																						3
05	H-22	04/19/21 11:10	WA	MM1.2	X	X	X																						3
06	H-23	04/19/21 13:35	WA	MM1.2	X	X	X																						3
07	H-24	04/19/21 15:00	WA	MM1.2	X	X	X																						3
																													0
																													0
																													0
																													0
																													0
																													0
																													0
																													0
																													0
																													0
																													0
																													0
																													0
Totals Per Analysis (non QA samples)					4	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

EBERLINE SERVICES

Sample Log In Report

Oak Ridge Laboratory
601 Scarboro Rd.
Oak Ridge, TN 37830

Voice: (865) 481-0683
Fax: (865) 483-4621

Invoice
Accounts Payable
ERM
3838 N Causeway Blvd, Suite 3000
Metairie, LA 70002
Voice 504-582-2468
Fax 504-407-2098

Contact
Lance Cooper
Voice 315-246-4494
Fax

Report Data
Lance Cooper
ERM
3838 N Causeway Blvd Suite 3000
Metairie, LA 70002
Voice 315-246-4494
Fax

0011

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Eberline Services – Oak Ridge Laboratory

SAMPLE RECEIPT CHECKLIST
MP-001-2

WORK ORDER # 21-04092

SAMPLE MATRIX/MATRICES: (CIRCLE ONE OR BOTH)

(AQUEOUS) NON-AQUEOUS

(CIRCLE EITHER YES, NO, OR N/A)

WERE SAMPLES:

Received in good condition?	(Y)	N	
If aqueous, properly preserved	(Y)	N	N/A

WERE CHAIN OF CUSTODY SEALS:

Present on outside of package?	(Y)	N
Unbroken on outside of package?	(Y)	N
Present on samples?	(Y)	N
Unbroken on samples?	(Y)	N
Was chain of custody present upon sample receipt?	(Y)	N

IF THE RESPONSE TO ANY OF THE ABOVE IS **NO**, A DISCREPANT SAMPLE RECEIPT REPORT (DSR) HAS BEEN ISSUED.

REMARKS: _____

SIGNATURE: Randolph Spencer DATE: 4-27-21

SECTION III

CASE NARRATIVE

EBERLINE ANALYTICAL

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

EBS-OR-48518

May 25, 2021

Lance Cooper
ERM
3838 N Causeway Blvd #3000
Metairie, LA 70002

CASE NARRATIVE
Work Order # 21-04092-OR

SAMPLE RECEIPT

This work order contains four water samples received 04/27/2021. Samples were analyzed for Radium-226/228 and Total Dissolved Solids.

CLIENT ID	LAB ID	CLIENT ID	LAB ID
H-20	21-04092-04	H-23	21-04092-06
H-22	21-04092-05	H-24	21-04092-07

ANALYTICAL METHODS

Radium-226 was analyzed using EPA Method 903.0 Modified. Radium-228 was analyzed using EPA Method 904.0. Total Dissolved Solids were performed using Standard Methods 2540C.

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.

RADIUM-226

Samples were prepared by removing representative aliquots followed by mixed acid digestions as appropriate. This was followed by precipitations of Radium/Barium Sulfate. Precipitates were dissolved in alkaline EDTA. Radium was selectively precipitated and mounted on micro-porous filter media. Samples were counted by alpha spectroscopy using an energy specific region of interest for Radium-226. Inherent self-absorption from elemental Barium was corrected for in the final result. Chemical recovery was calculated using a Barium-133 tracer, which was determined by HPGe gamma spectroscopy.

Samples demonstrated acceptable results for all Radium-226 analyses. Chemical recovery was acceptable for all analyses. The Radium-226 method blank demonstrated an acceptable result. Results for the Radium-226 duplicate demonstrated a high relative percent difference; however, normalized difference is

ANALYTICAL RESULTS CONTINUED

RADIUM-226 CONTINUED

within acceptable limits for the analytical technique. Results for the Radium-226 laboratory control sample demonstrated an acceptable percent recovery.

RADIUM-228

Following alpha spectroscopy analysis of Radium-226, Barium/Radium Sulfate precipitates were redissolved and allowed for sufficient ingrowth of the Actinium-228 daughter. After ingrowth, Actinium-228 was selectively precipitated. Precipitates were filtered and beta emissions for Actinium-228 were counted on a gas proportional counter. Chemical recovery was determined using a Barium-133 tracer, the activity of which was determined by HPGe gamma spectroscopy and an elemental Yttrium carrier by gravimetric measurements. The product of these two recoveries was used to calculate chemical yield.

Samples demonstrated acceptable results for all Radium-228 analyses. Chemical recovery was acceptable for all analyses. The Radium-228 method blank demonstrated an acceptable result. Results for the Radium-228 duplicate demonstrated an acceptable relative percent difference and normalized difference. Results for the Radium-228 laboratory control sample demonstrated an acceptable percent recovery.

TOTAL DISSOLVED SOLIDS

A volumetric aliquot of each sample was taken and filtered through 0.45µm filter media into a tared 250 ml beaker. Samples were dried on a hot plate and allowed to cool. The TDS content was determined by reweighing tared beakers.

Samples demonstrated results for Total Dissolved Solids content that ranged from 1,724.0 to 2,147.0 mg/L.

CERTIFICATION OF ACCURACY

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

M.R. McDougall
Laboratory Manager

Date: 5/25/2021

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.

SECTION IV

ANALYTICAL RESULTS SUMMARY

Eberline Analytical
Final Report of Analysis

Report To:	Work Order Details:	
Lance Cooper	SDG:	21-04092
ERM	Purchase Order:	0526033
3838 N Causeway Blvd Suite 3000	Analysis Category:	ENVIRONMENTAL
Metairie, LA 70002	Sample Matrix:	WA

Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Report Units
21-04092-01	LCS	KNOWN	04/27/21 00:00	4/27/2021	5/3/2021	21-04092	Radium-226	EPA 903.0 Modified	1.01E+01	4.63E-01			pCi/l
21-04092-01	LCS	SPIKE	04/27/21 00:00	4/27/2021	5/3/2021	21-04092	Radium-226	EPA 903.0 Modified	1.09E+01	1.59E+00	2.80E+00	4.39E-01	pCi/l
21-04092-02	MBL	BLANK	04/27/21 00:00	4/27/2021	5/3/2021	21-04092	Radium-226	EPA 903.0 Modified	-8.70E-03	1.02E-01	1.02E-01	2.13E-01	pCi/l
21-04092-03	DUP	H-20	04/19/21 10:00	4/27/2021	5/3/2021	21-04092	Radium-226	EPA 903.0 Modified	4.12E-01	2.75E-01	2.88E-01	2.93E-01	pCi/l
21-04092-04	DO	H-20	04/19/21 10:00	4/27/2021	5/3/2021	21-04092	Radium-226	EPA 903.0 Modified	2.31E-01	2.77E-01	2.81E-01	3.92E-01	pCi/l
21-04092-05	TRG	H-22	04/19/21 11:10	4/27/2021	5/3/2021	21-04092	Radium-226	EPA 903.0 Modified	2.05E-01	2.10E-01	2.15E-01	2.23E-01	pCi/l
21-04092-06	TRG	H-23	04/19/21 13:35	4/27/2021	5/3/2021	21-04092	Radium-226	EPA 903.0 Modified	5.27E-01	3.39E-01	3.57E-01	3.59E-01	pCi/l
21-04092-07	TRG	H-24	04/19/21 15:00	4/27/2021	5/3/2021	21-04092	Radium-226	EPA 903.0 Modified	2.01E-01	2.39E-01	2.43E-01	3.68E-01	pCi/l
21-04092-01	LCS	KNOWN	04/27/21 00:00	4/27/2021	5/4/2021	21-04092	Radium-228	EPA 904.0	8.96E+00	4.57E-01			pCi/l
21-04092-01	LCS	SPIKE	04/27/21 00:00	4/27/2021	5/4/2021	21-04092	Radium-228	EPA 904.0	7.97E+00	7.60E-01	1.96E+00	9.47E-01	pCi/l
21-04092-02	MBL	BLANK	04/27/21 00:00	4/27/2021	5/4/2021	21-04092	Radium-228	EPA 904.0	5.89E-02	3.95E-01	3.96E-01	8.41E-01	pCi/l
21-04092-03	DUP	H-20	04/19/21 10:00	4/27/2021	5/4/2021	21-04092	Radium-228	EPA 904.0	8.00E-01	4.96E-01	5.28E-01	9.68E-01	pCi/l
21-04092-04	DO	H-20	04/19/21 10:00	4/27/2021	5/4/2021	21-04092	Radium-228	EPA 904.0	1.00E+00	5.99E-01	6.40E-01	1.17E+00	pCi/l
21-04092-05	TRG	H-22	04/19/21 11:10	4/27/2021	5/4/2021	21-04092	Radium-228	EPA 904.0	4.53E-01	4.25E-01	4.38E-01	8.60E-01	pCi/l
21-04092-06	TRG	H-23	04/19/21 13:35	4/27/2021	5/4/2021	21-04092	Radium-228	EPA 904.0	6.72E-01	5.00E-01	5.23E-01	9.99E-01	pCi/l
21-04092-07	TRG	H-24	04/19/21 15:00	4/27/2021	5/4/2021	21-04092	Radium-228	EPA 904.0	-5.80E-02	4.40E-01	4.41E-01	9.46E-01	pCi/l
21-04092-04	TRG	H-20	04/19/21 10:00	4/27/2021	4/28/2021	21-04092	TDS	SM2540C	2.15E+03				mg/L
21-04092-05	TRG	H-22	04/19/21 11:10	4/27/2021	4/28/2021	21-04092	TDS	SM2540C	1.72E+03				mg/L
21-04092-06	TRG	H-23	04/19/21 13:35	4/27/2021	4/28/2021	21-04092	TDS	SM2540C	1.96E+03				mg/L
21-04092-07	TRG	H-24	04/19/21 15:00	4/27/2021	4/28/2021	21-04092	TDS	SM2540C	1.99E+03				mg/L

0017

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

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

SECTION V

ANALYTICAL STANDARD

CERTIFICATE OF CALIBRATION
ALPHA STANDARD SOLUTION

Ra-5
QA/QC REVIEWED
Date 2/8/94 Initials WT

Radionuclide:	Ra-226	Customer:	TMA EBERLINE
Half Life:	1600 ± 7 years	P.O.No.:	VH1888
Catalog No.:	7226	Reference Date:	February 1 1994 12:00 PST.
Source No.:	453-26	Contained Radioactivity: (Ra-226)	1.001 μCi.
		Contained Radioactivity: (Ra-226)	37.0 kBq.

Description of Solution

a. Mass of solution: 5.1864 g (in a 5 ml Flame Sealed Ampoule)

b. Chemical form: Ra(NO3)2 in 1 N HNO3

c. Carrier content: None added

d. Density: 1.0318 g/ml @ 20°C.

Radioimpurities: None detected(other than daughters)

Radioactive Daughters

Rn-222, Po-218, At-218, Pb-214, Bi-214, Po-214, Tl-210, Pb-210, Bi-210, Po-210 and Tl-206.

Radionuclide Concentration

(Ra-226) 0.1929 μCi/g.

Method of Calibration

Weighed aliquots of the solution were assayed using gamma spectrometry:
Energy peak(s) integrated under: 186 keV.
Branching ratio(s) used: 0.0351 gamma rays per decay.

Uncertainty of Measurement

a. Systematic uncertainty in instrument calibration:	±3.4%
b. Random uncertainty in assay:	±3.1%
c. Random uncertainty in weighing(s):	±0.2%
d. Total uncertainty at the 99% confidence level:	±4.6%

NIST Traceability

This calibration is implicitly traceable to the National Institute of Standards and Technology.

Leak Test(s)

See reverse side for Leak Test(s) applied to this source.

Notes

1. Nuclear data were taken from "Table of Radioactive Isotopes", edited by Virginia S. Shirley, 1986.
2. IPL participates in an NIST measurement assurance program to establish and maintain implicit traceability for a number of nuclides, based on the blind assay (and later NIST certification) of Standard Reference Materials (As in NRC Regulatory Guide 4.15).

Ana U. Kuen
QUALITY CONTROL

Feb. 3, 1994
Date Signed

ISOTOPE PRODUCTS LABORATORIES
1800 North Keystone Street
Burbank, California 91504
(818) 843 - 7000

EBERLINE SERVICES

QUALITY CONTROL PROGRAM

MP 009

Rev.8; 11/01/03
Title: Radioactive Reference Standards Solutions & Records

EBERLINE SERVICES - OAK RIDGE LABORATORY
RADIOACTIVE REFERENCE SOLUTIONS
PRIMARY DILUTION RECERTIFICATION
MP 009

		CURRENT DATE	8/28/2020 0:00
SOLUTION REFERENCE #	IPL 453-26	**SOLUTION #**	Ra-5

Principal Radionuclide	**Half Life, Years**	**Half Life, Days**
^{226}Radium	1.600E+03	5.844E+05

Radionuclide	^{226}Radium	**Reference Date**	2/1/1994 0:00
Certified Activity	1.001E+00 µCi		
Certified Concentration		µCi per gram	

Ampoule /Solution Gross		**Weight, Grams**
Empty Ampoule		**Weight, Grams**
Solution Net		**Weight, Grams**
Total Activity in Ampoule	1.0010	µCi

Chemical Composition of Standard Solution

$^{226}Ra(NO_3)_2$ in 1M HNO_3

Dilution Instructions: **Dilution Solvent Used** 1M HNO_3

Dilute to a volume of 1000.00 **milliliters**

Certified Total Activity of 1.0010 µCi **Which Equals** 2.222E+06 **dpm at the date listed above**

And after dilution the activity of this solution is **2.222E+03** **dpm/ml**

This activity concentration is based on the original reference date listed above. All activities are corrected to the date and time of analysis by the laboratory data processing software.

Expiration Date: August 28, 2021

Verified & Approved By _____ Date: 8/28/2020

QC Approval _____ Date: 8/28/20

EBERLINE SERVICES

QUALITY CONTROL PROGRAM
MP 009

Rev.8; 11/01/03
Title: **Radioactive Reference Standards Solutions & Records**

EBERLINE SERVICES - OAK RIDGE LABORATORY
RADIOACTIVE REFERENCE STANDARD SOLUTIONS
SECONDARY DILUTION RECERTIFICATION

	MP 009	Date	8/28/2020 0:00
Solution Reference #	IPL-453-26	Solution #	Ra-5b

Principal Radionuclide	Half Life, Years	Half Life, Days
^{226}Radium	1.600E+03	5.844E+05

Radionuclide of Interest	^{226}Radium	Reference Date	2/1/1994 0:00
Parent Solution Conc.	2.22E+03 dpm/ml		

Chemical Composition of Standard Solution
$^{226}Ra(NO_3)_2$ in 1M HNO_3

Dilution Instructions: **Dilution Solvent Used** 1M HNO_3

SECONDARY VOLUMETRIC DILUTION

Vol. Parent Solution:	20.0000 ml	Final Activity Concentration:	4.4440E+01 dpm/ml
Total Activity:	4.4440E+04 dpm		
Final Volume:	1000.00 ml		

This activity concentration is based on the original reference date listed above. All activities are corrected to the date and time of analysis by the laboratory data processing software.

NOTES:

Expiration Date: 28-Aug-21

Verified & Approved By _____ Date: 8/28/2020 0:00

QC Approval _____ Date: 8/28/20

ANALYTICS #411 Rec'd 2/15/06 R Brenton

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318 • U.S.A.

Phone (404) 352-8677
Fax (404) 352-2837

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

Ra^{228}

72325-207

Ra-228 5 mL Liquid in Flame Sealed Vial

This standard radionuclide source was prepared gravimetrically from a calibrated master solution. The master solution was calibrated using a germanium gamma spectrometer system.

Radionuclide purity and calibration were checked using a germanium gamma spectrometer system. The nuclear decay rate and assay date for this source are given below.

ANALYTICS maintains traceability to the National Institute of Standards and Technology through Measurements Assurance Programs as described in USNRC Reg. Guide 4.15, Revision 1.

ISOTOPE:	Ra-228
ACTIVITY (dps):	4.022 E3
HALF-LIFE:	5.75 years
CALIBRATION DATE:	February 10, 2006 12:00 EST
RELATIIVE EXPANDED UNCERTAINTY (k=2):	4.0%

Impurities: γ-impurities <0.1%

5.10721 grams 0.1M HCl solution with 50 µg/g Ba carrier.

P O NUMBER 00003181, Item 1

SOURCE PREPARED BY: M Taskaeva
M. Taskaeva, Radiochemist

Q A APPROVED: M. Mitchell 2-13-06

EBERLINE SERVICES

QUALITY CONTROL PROGRAM

MP-009

Rev.8; 1/10/03
Title: Radioactive Reference Standards Solutions & Records

EBERLINE SERVICES - OAK RIDGE LABORATORY
RADIOACTIVE REFERENCE SOLUTIONS
RECERTIFICATION
MP 009

CURRENT DATE 1/11/2021 0:00

SOLUTION REFERENCE # Analytics 7235-207 **SOLUTION #** Ra-12

Principal Radionuclide	Half Life, Years	Half Life, Days
^{228}Ra	5.750E+00	2.100E+03

Radionuclide ^{228}Ra
Certified Activity 1.087E-01 µCi
Certified Concentration µCi per gram

Reference Date 2/10/2006 0:00

Ampoule /Solution Gross	9.0741	Weight, Grams
Empty Ampoule	3.9858	Weight, Grams
Solution Net	5.0883	Weight, Grams
Total Activity in Ampoule	0.1087	µCi

Chemical Composition of Standard Solution

$^{228}Ra(NO_3)_2$ in 0.5 M HCl

Dilution Instructions: **Dilution Solvent Used** 0.5 M HCl

Dilute to a volume of 991.00 **Kg**

Certified Total Activity of 0.1087 µCi **Which Equals** 2.413E+05 **dpm at the date listed above**

And after dilution the activity of this solution is **2.435E+02** **dpm/ml**

This activity concentration is based on the original reference date listed above. All activities are corrected to the date and time of analysis by the laboratory data processing software.

Expiration Date: January 11, 2022

Recertified By _____ Date: 1/11/21

QC Approval _____ Date: 1/11/21

13a-6
(f 6a)

National Institute of Standards & Technology

Certificate

Standard Reference Material 4251C
Barium-133 Radioactivity Standard

ORIGINAL

ORIGINAL

This Standard Reference Material (SRM) consists of radioactive barium-133 chloride, non-radioactive barium chloride, and hydrochloric acid dissolved in 5 mL of distilled water. The solution is contained in a flame-sealed NIST borosilicate-glass ampoule. The SRM is intended for the calibration of ionization chambers and solid-state gamma-ray spectrometry systems.

Radiological Hazard

The SRM ampoule contains barium-133 with a total activity of approximately 2.5 MBq. Barium-133 decays by electron capture and during the decay process X-rays and gamma rays with energies from 4 to 400 keV are emitted. Most of these photons escape from the SRM ampoule and can represent a radiation hazard. Approximate unshielded dose rates at several distances (as of the reference time) are given in note [a]*. Appropriate shielding and/or distance should be used to minimize personnel exposure. The SRM should be used only by persons qualified to handle radioactive material.

Chemical Hazard

The SRM ampoule contains hydrochloric acid (HCl) with a concentration of 1 mole per liter of water. The solution is corrosive and represents a health hazard if it comes in contact with eyes or skin. If the ampoule is to be opened to transfer the solution, the recommended procedure is given on page 2. The ampoule should be opened only by persons qualified to handle both radioactive material and strong acid solution.

Storage and Handling

The SRM should be stored and used at a temperature between 5 and 65 °C. The solution in an unopened ampoule should remain stable and homogeneous until at least June 2004.

The ampoule (or any subsequent container) should always be clearly marked as containing radioactive material. If the ampoule is transported it should be packed, marked, labeled, and shipped in accordance with the applicable national, international, and carrier regulations. The solution in the ampoule is a dangerous good (hazardous material) both because of the radioactivity and because of the strong acid.

Preparation

This Standard Reference Material was prepared in the Physics Laboratory, Ionizing Radiation Division, Radioactivity Group, J.M.R. Hutchinson, Group Leader. The overall technical direction and physical measurements leading to certification were provided by L.L. Lucas of the Radioactivity Group and D.B. Golas, Nuclear Energy Institute Research Associate.

The support aspects involved in the preparation, certification, and issuance of this SRM were coordinated through the Standard Reference Materials Program by N.M. Trahey.

Gaithersburg, Maryland 20899
October 1994

Thomas E. Gills, Chief
Standard Reference Materials Program

*Notes and references are on pages 5 and 6.

EBERLINE SERVICES

QUALITY CONTROL PROGRAM
QCP-009

Rev.8; 11/10/03
Title: Radioactive Reference Standards Solutions & Records

EBERLINE SERVICES - OAK RIDGE LABORATORY
RADIOACTIVE REFERENCE STANDARD SOLUTIONS

	QCP-009-1-A	Date	4/23/21
Solution Reference #	NIST SRM4251C	Solution #	Ba-6a

Principal Radionuclide	Half Life, Years	Half Life, Days
^{133}Ba	1.048E+01	3.828E+03

Radionuclide of Interest	^{133}Ba	Reference Date	9/1/1993 0:00
Parent Solution Conc.	1.48E+05 dpm/ml		

Chemical Composition of Standard Solution
$^{133}BaCl_2$ in 1M HCl

Dilution Instructions: **Dilution Solvent Used** 1M HCl

SECONDARY VOLUMETRIC DILUTION

Vol. Parent Solution:	25.0000	ml
Total Activity:	3.6950E+06	dpm
Final Volume:	1000.00	ml

Final Activity Concentration: 3.6950E+03 dpm/ml

NOTES:

This activity concentration is based on the original reference date listed above. All activities are corrected to the date and time of analysis by the laboratory data processing software.

Expiration Date: April 20, 2022

Verified & Approved By _____ Date: 4/23/21

QC Approval Marianne Mac Date: 4/26/21

SECTION VI

QUALITY CONTROL SAMPLE RESULTS SUMMARY

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
21-04092	Ra226	1	pCi	l	ERM

Laboratory Control Sample

Analyte		LCS Measured	CSU Measured	LCS Expected	Uncert. Expected	Known	Known Error	Result	CSU	Standard ID	Standard ACT (dpm)	Standard Error	Standard Added (g)
RA-226		107.99%	25.71%	100.00%	4.60%	1.01E+01	4.63E-01	1.09E+01	2.80E+00	Ra-5b	4.39E+01	4.60E+00	5.09E-01

Matrix Spike

Analyte	*Normalized Difference*	*MS Actual % Rec*	*Expected MS Result*	*Expected MS Uncert*	*Actual MS Result*	*Actual MS CSU*	*Sample Result*	*Sample CSU*	*Sample Aliquot*	*Standard ID*	*Standard ACT (dpm)*	*Standard Error %*	*Standard Added (g)*

Replicate Sample

Analyte	*Normalized Difference*	*RPD*	*Original Result*	*Original CSU*	*Replicate Result*	*Replicate CSU*
RA-226	0.88	56.23	2.31E-01	2.81E-01	4.12E-01	2.88E-01

QC Summary

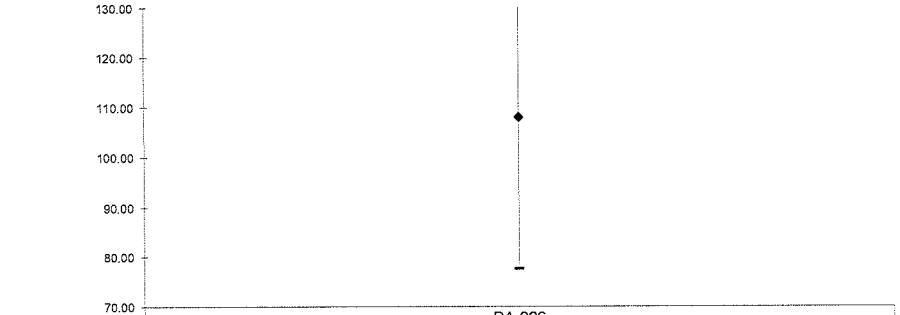
LCS Relative Bias	*LCS % R*		*MS % R*	*MS ND*	*Rep RPD*	*Rep ND*
1.08	OK				NA	OK

0027

Version

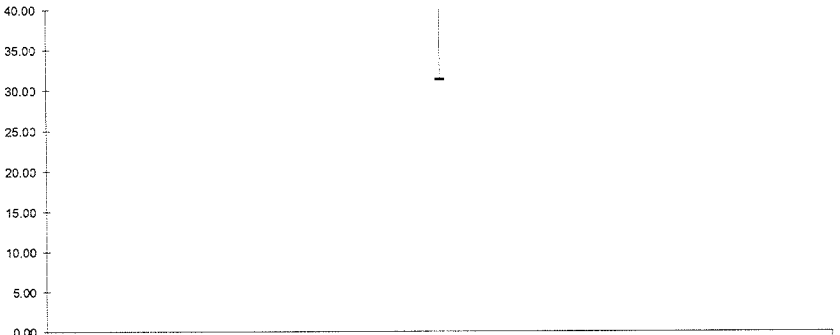
WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
21-04092	Ra226	1	pCi	l	ERM

LCS % Recovery



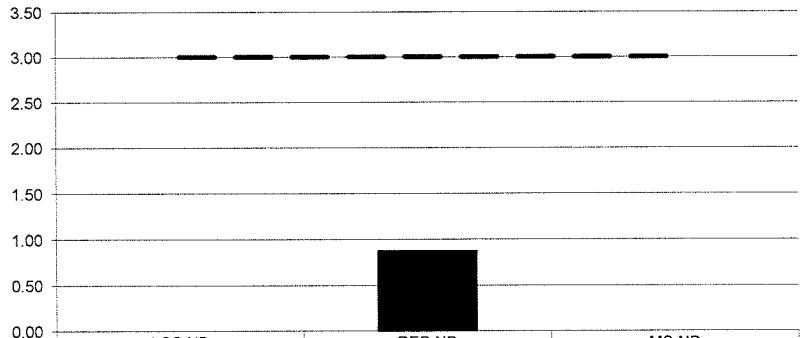
	RA-226
Lower Error	77.68
Upper Error	138.30
%R	107.99
LCL	75
Mean	100
UCL	125

Replicate Sample RPD



	RA-226
Lower Error	81.14
Upper Error	31.32
RPD	56.23
CL	35

Normalized Difference



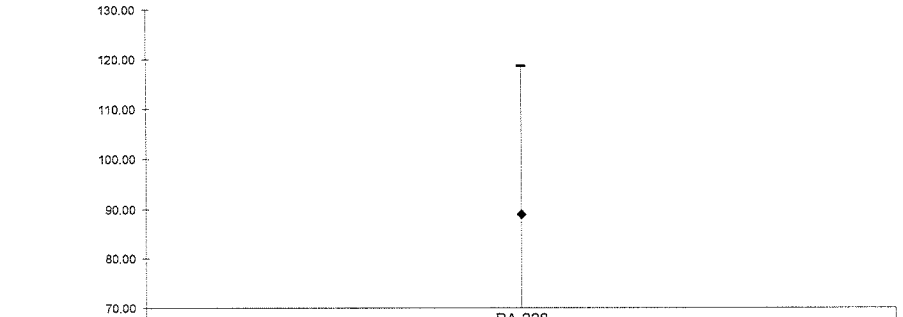
	LCS ND	REP ND	MS ND
RA-226	0.00	0.68	0.00
UCL	3	3	3

No Matrix Spike

0028

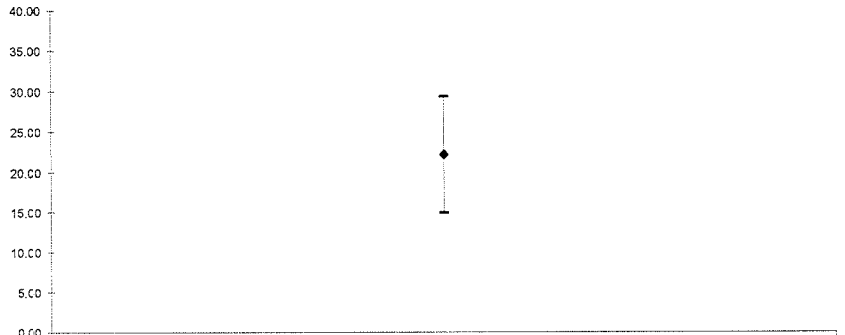
WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
21-04092	Ra228	1	pCi	l	ERM

LCS % Recovery



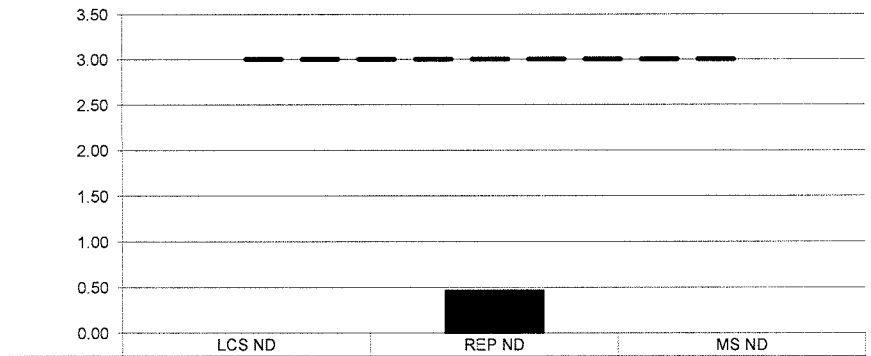
	RA-228
Lower Error	59.29
Upper Error	118.63
%R	88.96
LCL	75
Mean	100
UCL	125

Replicate Sample RPD



	RA-228
Lower Error	29.40
Upper Error	14.99
RPD	22.19
CL	35

Normalized Difference



	LCS ND	REP ND	MS ND
RA-228	0.00	0.47	0.00
UCL	3	3	3

No Matrix Spike

0029

Version

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
21-04092	Ra228	1	pCi	l	ERM

Laboratory Control Sample

Analyte		LCS Measured	CSU Measured	LCS Expected	Uncert. Expected	Known	Known Error	Result	CSU	Standard ID	Standard ACT (dpm)	Standard Error	Standard Added (g)
RA-228		88.96%	24.57%	100.00%	5.10%	8.96E+00	4.57E-01	7.97E+00	1.96E+00	Ra-12	3.88E+01	5.10E+00	5.12E-01

Matrix Spike

Analyte	*Normalized Difference*	*MS Actual % Rec*	*Expected MS Result*	*Expected MS Uncert*	*Actual MS Result*	*Actual MS CSU*	*Sample Result*	*Sample CSU*	*Sample Aliquot*	*Standard ID*	*Standard ACT (dpm)*	*Standard Error %*	*Standard Added (g)*

Replicate Sample

Analyte	*Normalized Difference*	*RPD*	*Original Result*	*Original CSU*	*Replicate Result*	*Replicate CSU*
RA-228	0.47	22.19	1.00E+00	6.40E-01	8.00E-01	5.28E-01

QC Summary

LCS Relative Bias	*LCS % R*		*MS % R*	*MS ND*	*Rep RPD*	*Rep ND*
0.89	OK				NA	OK

0030

Version

TDS / TSS Worksheet

Work Order	Run	Analysis Code	Technician
21-04092	1	TDS	MHIGHTOWER

TRetec Fraction	ERM Client ID	Aliquot ml	Filter Data: Filter Tare (g)	Filter Data: Filter Final (g)	Filter Data: Filter Net (g)	TDS/TSS (mg/L)	Maximum Aliq (mL)
04	H-20	100.0000	102.8804	103.0951	0.2147	2147.0000	46.58
05	H-22	100.0000	94.1327	94.3051	0.1724	1724.0000	58.00
06	H-23	100.0000	97.0135	97.2098	0.1963	1963.0000	50.94
07	H-24	100.0000	102.9400	103.1394	0.1994	1994.0000	50.15

0031

Technician: MH Date: 4/28/21

SECTION VII

LABORATORY TECHNICIAN'S NOTES

RA-226 NOTES

EBERLINE SERVICES

Work Order Analysis Notes

Oak Ridge Laboratory
601 Scarboro Rd.
Oak Ridge, TN 37830
Voice: 865.481.0683
www.eberlineservices.com

Internal Work Order	21-04092
Analysis Code	Ra226
Run Number	1

#	Date	Dept	User	Notes
1	04/29/21 07:05	PREP	JHARVEY	ALIQUOTED AND ADDED SPIKE AND TRACER- PH'D SAMPLES- PRECIPITATED WITH BA AND PB CARRIERS AND AMMONIUM SULFATE- DECANTED SAMPLES- AND CENTRIUGED- SUBMITTED RADIUM PRECIP TO SEPARATIONS

JHarvey
4/29/21

EBERLINE SERVICES

Work Order Analysis Notes

Oak Ridge Laboratory
601 Scarboro Rd.
Oak Ridge, TN 37830
Voice: 865.481.0683
www.eberlineservices.com

Internal Work Order	21-04092
Analysis Code	Ra226
Run Number	1

#	Date	Dept	User	Notes
1	04/29/21 07:05	PREP	JHARVEY	ALIQUOTED AND ADDED SPIKE AND TRACER- PH'D SAMPLES- PRECIPITATED WITH BA AND PB CARRIERS AND AMMONIUM SULFATE- DECANTED SAMPLES- AND CENTRIUGED- SUBMITTED RADIUM PRECIP TO SEPARATIONS
2	05/03/21 10:32	CHEM	AYARBER	ADDED EDTA TO SAMPLES AND LET SIT. ADDED AMMONIUM SULFATE AND ACETIC ACID TO SAMPLES. FILTERED ONTO TARED FILTER PAPERS, LET DRY UNDER HEAT LAMP, REWEIGHED, AND SUBMITTED TO COUNT.

5/3/21

EBERLINE SERVICES

Reagents Used in an Analysis

Internal Work Order	
21-04092	
Analysis Code	Run
Ra226	1

Reagent ID	Reagent Name	Reagent Concentration	Analyst ID	Date Recorded
022612P	Ammonium Hydroxide	Reagent Grade	JHARVEY	4/29/2021
022487D02	Ammonium Sulfate	200 mg/ml	JHARVEY	4/29/2021
022147D09	Barium Carrier	1 mg/ml	JHARVEY	4/29/2021
022385D02	Lead Carrier	166 mg/ml	JHARVEY	4/29/2021
022879P	Nitric Acid	Reagent Grade	JHARVEY	4/29/2021
023012P	Acetic Acid	Reagent Grade	AYARBER	5/3/2021
022142D03	Ammonium Sulfate	200 mg/ml	AYARBER	5/3/2021
022266S	EDTA	0.25M	AYARBER	5/3/2021

Alpha Bank 3

Date	Sample #	Client	Load time	Count time	Analysis	Tech
~~4/30/21~~	~~2104095A (B-48m)~~			~~2hr50min~~	~~Pu241~~	~~KB~~
4/30/21	2104074A (1-4,7)	UCOR	0948	2hr50min	Pu	KB
4/30/21	System Bkgd	Lab	1344	16.40 hrs	NA	KB
5/3/21	Daily Pulser	Lab	0607	10min	NA	KP
5/3/21	2104096A (1-4)	UCOR	0754	2h 50min	Pu	KP
5/3/21	2104096A (1-4)	UCOR	0802	2h 50min	Np	KP
5/3/21	2104074A (1-4)	UCOR	0954	2hr50min	Ra226	KB
5/3/21	2104092A (1-7)	ERM	1117	2hr50min	Ra226	KB

RA-228 NOTES

EBERLINE SERVICES

Work Order Analysis Notes

Oak Ridge Laboratory
601 Scarboro Rd.
Oak Ridge, TN 37830
Voice: 865.481.0683
www.eberlineservices.com

Internal Work Order	21-04092
Analysis Code	Ra228
Run Number	1

#	Date	Dept	User	Notes
1	04/29/21 07:05	PREP	JHARVEY	ALIQUOTED AND ADDED SPIKE AND TRACER- PH'D SAMPLES- PRECIPITATED WITH BA AND PB CARRIERS AND AMMONIUM SULFATE- DECANTED SAMPLES- AND CENTRIUGED- SUBMITTED RADIUM PRECIP TO SEPARATIONS

EBERLINE SERVICES

Work Order Analysis Notes

Oak Ridge Laboratory
601 Scarboro Rd.
Oak Ridge, TN 37830
Voice: 865.481.0683
www.eberlineservices.com

Internal Work Order	21-04092
Analysis Code	Ra228
Run Number	1

#	Date	Dept	User	Notes
1	04/29/21 07:05	PREP	JHARVEY	ALIQUOTED AND ADDED SPIKE AND TRACER- PH'D SAMPLES- PRECIPITATED WITH BA AND PB CARRIERS AND AMMONIUM SULFATE- DECANTED SAMPLES- AND CENTRIUGED- SUBMITTED RADIUM PRECIP TO SEPARATIONS
2	05/04/21 12:07	CHEM	AYARBER	ADDED FILTER PAPERS FROM COUNT ROOM TO LABELED C-TUBES, FILLED WITH EDTA SOLUTION AND LET SIT OVERNIGHT. REMOVED FILTER FROM EDTA-ADDED 2MLS YTTRIUM 9MG/ML CARRIER ADDED 18N NAOH TO SAMPLES AND RECORDED T1. HOT BATHED FOR 15 MIN, CENTRIFUGED AND DISCARDED SUPERNANT. ADDED 6N HNO3, DI WATER, AND 10N NAOH. HOT BATHED FOR 15 MIN, CENTRIFUGED AND DISCARDED SUPERNANT. ADDED 1N HNO3, DI WATER, AND AMMONIUM OXALATE. FILTERED ONTO TARED FILTER PAPERS. LET DRY UNDER HEAT LAMP, REWEIGHED AND SUBMITTED TO COUNT.

5/4/21

EBERLINE SERVICES

Reagents Used in an Analysis

Internal Work Order: 21-04092

Analysis Code: Ra228

Run: 1

Reagent ID	Reagent Name	Reagent Concentration	Analyst ID	Date Recorded
022612P	Ammonium Hydroxide	Reagent Grade	JHARVEY	4/29/2021
022487D02	Ammonium Sulfate	200 mg/ml	JHARVEY	4/29/2021
022147D09	Barium Carrier	1 mg/ml	JHARVEY	4/29/2021
022385D02	Lead Carrier	166 mg/ml	JHARVEY	4/29/2021
022879P	Nitric Acid	Reagent Grade	JHARVEY	4/29/2021
022277D01	Ammonium Oxalate	5%	AYARBER	5/4/2021
022128D01	EDTA	0.25M	AYARBER	5/4/2021
021951D10	Nitric Acid	1N	AYARBER	5/4/2021
022345D14	Nitric Acid	6N	AYARBER	5/4/2021
022254D02	Sodium Hydroxide	10M	AYARBER	5/4/2021
022254D01	Sodium Hydroxide	18M	AYARBER	5/4/2021
022255D01	Yttrium Carrier	9 mg/ml	AYARBER	5/4/2021

Red LB411C

Date	Sample #	Client	Loadtime	Counttime	Analysis	Tech
4/30/21	2104056RA(4,7,9,10,)	USA	1229	2 hrs	Ra^8	KB
5/1/21	Wkly BKgd	Lab	1229	12 hrs	αB	KP
5/3/21	Daily BKgd/QC	Lab	0818/1054	1 hr/30 min	αB	KP
5/3/21	Cross Talk	Lab	0720	5 min	αB	KP
5/3/21	Cross Talk	Lab	0730	5 min	αB	KP
5/3/21	2104087AB (4-11)	APTIM	0745	2 hrs	αB	KP
5/3/21	2104096Np (1-4)	UCOR	0746	10 min	Np	KP
5/3/21	2104087AB (4-14)	APTIM	0950	2 hrs	αβ	KB
5/3/21	2105001AB (1-4)	UCOR	1454	1 hr	αβ	KB
5/3/21	2104069AB (12-14)	Hudson Ranch	1502	2 hrs	αβ	KB
5/4/21	Daily BKgd/QC	Lab	0537/0444	1 hr/30 min	αB	KP
5/4/21	Cross Talk	Lab	0634	5 min	αB	KP
5/4/21	Cross Talk	Lab	0643	5 min	αB	KP
5/4/21	2104054AB (1-4)	Waypoint	0651	2 hrs	αB	KP
5/4/21	2104074SK (2-4 C)	UCOR	0652	2 hrs	Sr^{90}	KP
5/4/21	2104088MB (1-7)	APTIM	0856	1 hr	αβ	KB
5/4/21	2104068AB (7-14)	Hudson Ranch	0859	2 hrs	αβ	KB
5/4/21	2104092RA (1-7)	ERM	1218	2 hrs	Ra^8	KB

TDS NOTES

EBERLINE SERVICES

Work Order Analysis Notes

Oak Ridge Laboratory
601 Scarboro Rd.
Oak Ridge, TN 37830
Voice: 865.481.0683
www.eberlineservices.com

Internal Work Order	21-04092
Analysis Code	TDS
Run Number	1

#	Date	Dept	User	Notes
1	04/27/21 22:56	PREP	MHIGHTOWER	Filtered sample into tared beaker, dried, re-weighed

MH 27APR21

SECTION VIII

ANALYTICAL DATA (RADIUM-226)

21-04092
Ra226
Run 1

Work Order	21-04092
Analysis Code	Ra226
Run	1
Date Received	4/27/2021
Lab Deadline	5/11/2021
Client	ERM
Project	526033
Report Level	4
Activity Units	pCi
Aliquot Units	l
Matrix	WA
Method	EPA 903.0 Modified
Instrument Type	Alpha Spectroscopy
Radiometric Tracer	Ba-133
Radiometric Sol#	Ba-6a
Tracer Act (dpm/g)	399.1
Carrier	
Carrier Conc (mg/ml)	

Internal Fraction	Sample Desc	Client ID	Login CPM	Sample Date	Sample Aliquot
01	LCS	LCS		04/27/21 00:00	1.0000E+00
02	MBL	BLANK		04/27/21 00:00	1.0000E+00
03	DUP	H-20	40	04/19/21 10:00	1.0000E+00
04	DO	H-20	40	04/19/21 10:00	1.0000E+00
05	TRG	H-22	30	04/19/21 11:10	1.0000E+00
06	TRG	H-23	40	04/19/21 13:35	1.0000E+00
07	TRG	H-24	50	04/19/21 15:00	1.0000E+00

0046

* SAF1 is used for Gross Alpha and all other radionuclides. SAF2 is used for Gross Beta only. ^ Indicates estimated SAF value.
** Actual mass exceeded the calibration curve range. Results should be qualified as appropriate.

21-04092
Ra226
Run 1

Internal Fraction	Sample Desc	Tracer Aliquot (g)	Tracer Total ACT (dpm)	Radiometric Tracer (pCi)	Radiometric % Rec	Grav Carrier Added (ml)	Grav Filter Tare (g)	Grav Filter Final (g)	Grav Filter Net (g)	Grav % Rec	Mean % Rec	SAF 1*	SAF 2*
01	LCS	2.1937	875.5	399.0	101.17		0.0201	0.0313	0.0112		101.17	3.00^	1.00
02	MBL	2.2050	880.0	465.0	117.30		0.0207	0.0312	0.0105		110.00	3.00^	1.00
03	DUP	2.2057	880.3	347.0	87.51		0.0206	0.0269	0.0063		87.51	2.27	1.00
04	DO	2.2006	878.3	305.0	77.10		0.0206	0.0292	0.0086		77.10	2.91	1.00
05	TRG	2.1982	877.3	430.0	108.81		0.0207	0.0299	0.0092		108.81	3.00^	1.00
06	TRG	2.1927	875.1	418.0	106.04		0.0205	0.0283	0.0078		106.04	2.72	1.00
07	TRG	2.1920	874.8	427.0	108.36		0.0205	0.0283	0.0078		108.36	2.72	1.00

0047

* SAF1 is used for Gross Alpha and all other radionuclides. SAF2 is used for Gross Beta only. ^ Indicates estimated SAF value.
** Actual mass exceeded the calibration curve range. Results should be qualified as appropriate.

21-04092
Ra226
Run 1

Internal Fraction	Sample Desc	Rough Prep Date	Rough Prep By	Prep Date	Prep By	Sep t0 Date/Time	Sep t0 By	Sep t1 Date/Time	Sep t1 By
01	LCS			04/28/21 07:10	JHARVEY	05/03/21 10:06	AYARBER		
02	MBL			04/28/21 07:10	JHARVEY	05/03/21 10:06	AYARBER		
03	DUP			04/28/21 07:10	JHARVEY	05/03/21 10:06	AYARBER		
04	DO			04/28/21 07:10	JHARVEY	05/03/21 10:06	AYARBER		
05	TRG			04/28/21 07:10	JHARVEY	05/03/21 10:06	AYARBER		
06	TRG			04/28/21 07:10	JHARVEY	05/03/21 10:06	AYARBER		
07	TRG			04/28/21 07:10	JHARVEY	05/03/21 10:06	AYARBER		

* SAF1 is used for Gross Alpha and all other radionuclides. SAF2 is used for Gross Beta only. ^ Indicates estimated SAF value.
** Actual mass exceeded the calibration curve range. Results should be qualified as appropriate.

Preliminary Data Report & Analytical Calculations

Work Order: 21-04092-Ra226-1

Client: ERM
Eberline Services Work Order: 21-04092
Analysis Code: Ra226
Run: 1

Lab Fraction	Nuclide	Sample Desc	Client Identification	Activity Units	Results	Error Estimate	MDA	LCS Known	LCS %R	LCS Flag	RPD Flag	MDA Flag	Blank Flag
01	RA-226	LCS	LCS	pCi/l	1.09E+01	1.59E+00	4.39E-01	1.01E+01	107.99	OK		OK	
02	RA-226	MBL	BLANK	pCi/l	-8.70E-03	1.02E-01	2.13E-01					OK	OK
03	RA-226	DUP	H-20	pCi/l	4.12E-01	2.75E-01	2.93E-01				NA	OK	
04	RA-226	DO	H-20	pCi/l	2.31E-01	2.77E-01	3.92E-01					OK	
05	RA-226	TRG	H-22	pCi/l	2.05E-01	2.10E-01	2.23E-01					OK	
06	RA-226	TRG	H-23	pCi/l	5.27E-01	3.39E-01	3.59E-01					OK	
07	RA-226	TRG	H-24	pCi/l	2.01E-01	2.39E-01	3.68E-01					OK	

Work Order: 21-04092-Ra226-1

Run: 1
Analysis Code: Ra226
Eberline Services Work Order: 21-04092
Client: ERM
0050

Lab Fraction	Nuclide	Sample Desc	Sample Date	Sample Aliquot	Radiometric % Rec	Grav % Rec	Mean % Rec	SAF	Sep t0 Date/Time	Sep t1 Date/Time
01	RA-226	LCS	04/27/21 00:00	1.00E+00	100.00	0.00	101.17		5/3/2021 10:06	
02	RA-226	MBL	04/27/21 00:00	1.00E+00	100.00	0.00	110.00		5/3/2021 10:06	
03	RA-226	DUP	04/19/21 10:00	1.00E+00	87.51	0.00	87.51		5/3/2021 10:06	
04	RA-226	DO	04/19/21 10:00	1.00E+00	77.10	0.00	77.10		5/3/2021 10:06	
05	RA-226	TRG	04/19/21 11:10	1.00E+00	100.00	0.00	108.81		5/3/2021 10:06	
06	RA-226	TRG	04/19/21 13:35	1.00E+00	100.00	0.00	106.04		5/3/2021 10:06	
07	RA-226	TRG	04/19/21 15:00	1.00E+00	100.00	0.00	108.36		5/3/2021 10:06	

Run: 1
Analysis Code: Ra226
Eberline Services Work Order: 21-04092
Client: ERM
0051

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Halflife (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff	A to B, Cor
01	RA-226	LCS	05/03/21 11:16		A_Spec	Alpha_033	170	1.93 E+02	1.20 E-02	14.1	
02	RA-226	MBL	05/03/21 11:16		A_Spec	Alpha_034	170	-1.70 E-01	1.00 E-03	15.5	
03	RA-226	DUP	05/03/21 11:16		A_Spec	Alpha_036	170	1.03 E+01	1.00 E-02	17.2	
04	RA-226	DO	05/03/21 11:16		A_Spec	Alpha_037	170	3.32 E+00	4.00 E-03	14.4	
05	RA-226	TRG	05/03/21 11:16		A_Spec	Alpha_038	170	3.83 E+00	1.00 E-03	14.9	
06	RA-226	TRG	05/03/21 11:16		A_Spec	Alpha_039	170	1.11 E+01	1.10 E-02	15.2	
07	RA-226	TRG	05/03/21 11:16		A_Spec	Alpha_040	170	4.13 E+00	1.10 E-02	14.8	

21-04092-Ra226-1 (pCi/l) in WA
Tracer ID: Ba-6a

Internal Fraction	Sample Desc	Client ID	Sample Date	Sample Aliquot	Tracer Aliquot (g)	Tracer ACT (dpm)	Radiometric Tracer (pCi)	Radiometric % Rec	SAF 1*	SAF 2*
01	LCS	LCS	04/27/21 00:00	1.0000	2.1937	875.5057	399.0000	101.17	3.00^	1.00
02	MBL	BLANK	04/27/21 00:00	1.0000	2.2050	880.0155	465.0000	117.30	3.00^	1.00
03	DUP	H-20	04/19/21 10:00	1.0000	2.2057	880.2949	347.0000	87.51	2.27	1.00
04	DO	H-20	04/19/21 10:00	1.0000	2.2006	878.2595	305.0000	77.10	2.91	1.00
05	TRG	H-22	04/19/21 11:10	1.0000	2.1982	877.3016	430.0000	108.81	3.00^	1.00
06	TRG	H-23	04/19/21 13:35	1.0000	2.1927	875.1066	418.0000	106.04	2.72	1.00
07	TRG	H-24	04/19/21 15:00	1.0000	2.1920	874.8272	427.0000	108.36	2.72	1.00

Spike and Tracer Worksheet

Internal Work Order	Run	Analysis Code	Date	Technician	Technician Initials	Witness Initials
21-04092	1	Ra226	4/28/2021 07:06	JHARVEY		

LCS & Matrix Spikes					LCS	MS	LCSD	MSD	LCS		MS		LCSD		MSD	
Isotope	*Sol #*	*Activity dpm/g*	*Solution Date*	*Approx Addition*	*Volume Used (g)*	*Volume Used (g)*	*Volume Used (g)*	*Volume Used (g)*	*Known pCi*	*Error Estimate*	*Added pCi*	*Error Estimate*	*Known pCi*	*Error Estimate*	*Added pCi*	*Error Estimate*
Ra-226	Ra-5b	43.920	4/28/2021	**0.500**	**0.5089**				10.07	0.463	0.00	0.000	0.00	0.000	0.00	0.000

Tracers						
fraction	*Isotope*	*Sol #*	*Activity dpm/g*	*Solution Date*	*Volume Used (g)*	*Approx Addition*
01	**Ba-133**	Ba-6a	399.100	4/28/2021	**2.1937**	**2.5400**
02	**Ba-133**	Ba-6a	399.100	4/28/2021	**2.2050**	**2.5400**
03	**Ba-133**	Ba-6a	399.100	4/28/2021	**2.2057**	**2.5400**
04	**Ba-133**	Ba-6a	399.100	4/28/2021	**2.2006**	**2.5400**
05	**Ba-133**	Ba-6a	399.100	4/28/2021	**2.1982**	**2.5400**
06	**Ba-133**	Ba-6a	399.100	4/28/2021	**2.1927**	**2.5400**
07	**Ba-133**	Ba-6a	399.100	4/28/2021	**2.1920**	**2.5400**

Balance Printer Tapes

Tracer

LCS

Matrix Spike

0053

Eberline Analytical
Oak Ridge Laboratory

Aliquot Worksheet

Printed: 4/29/2021 07:00

Work Order	Run	Analysis Code	Rpt Units	Lab Deadline	Technician
21-04092	1	Ra226	liters	5/11/2021	JHARVEY

Lab Fraction	ERM Client ID	Sample Type	Muffle Data Ratio Post/Pre	Dilution Data No of Dils	Dil Factor	Ratio	Aliquot Data Aliquot	Net Equiv	MS Aliquot Data Aliquot	Net Equiv	H-3 Solids Only Water Added (ml)	H3 Dist Aliq
01	LCS	LCS					1.0000E+00	1.0000E+00				
02	BLANK	MBL					1.0000E+00	1.0000E+00				
03	H-20	DUP					1.0000E+00	1.0000E+00				
04	H-20	DO					1.0000E+00	1.0000E+00				
05	H-22	TRG					1.0000E+00	1.0000E+00				
06	H-23	TRG					1.0000E+00	1.0000E+00				
07	H-24	TRG					1.0000E+00	1.0000E+00				

Comments	

0054

Technician: JHarvey Date: 4/29/21

Eberline Services - Oak Ridge
Version 1.0 9/1999

Gravimetric Worksheet

Printed: 5/3/2021 10:32 AM

Work Order	Run	Analysis Code	Gravimetric Carrier	Carrier Conc (mg/ml)	Technician
21-04092	1	Ra226			AYARBER

TRetec Fraction	ERM Client ID	Sample Type	Carrier Data Carrier Added (ml)	Filter Data Filter Tare (g)	Filter Final (g)	Filter Net (g)	Gravimetric % Recovery
01	LCS	LCS		0.0201	0.0313	**0.0112**	
02	BLANK	MBL		0.0207	0.0312	**0.0105**	
03	DUP	DUP		0.0206	0.0269	**0.0063**	
04	H-20	DO		0.0206	0.0292	**0.0086**	
05	H-22	TRG		0.0207	0.0299	**0.0092**	
06	H-23	TRG		0.0205	0.0283	**0.0078**	
07	H-24	TRG		0.0205	0.0283	**0.0078**	

0055

Technician: _____ Date: 5/3/21

KB 5/3/21

Apex-Alpha™

Sample Description: SPIKE
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00002913
Batch Identification: 2104092A-RA
Sample Identification: 01
Sample Geometry: Shelf 2
Procedure Description: Ra

Detector Name: Alpha_033
Chamber Serial Number: 04026479A
Detector Serial Number: 91132
Env. Background: System Bkgd 297005
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Generic Mult. Factor: 3.000E+000 Generic Div. Factor: 1.000E+000
Sample Date/Time: 5/3/2021 10:40:37 AM
Acquisition Date/Time: 5/3/2021 11:16:38 AM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 1.0000 +/- 0.0000
Counting Efficiency: 0.1411 +/- 0.0026 on 9/25/2020 1:35:53 PM
Effective Efficiency: 0.1411 +/- 0.0026

Control Certificate Name: Ra226_Ra-5b
Chem. Recov. of Control: RA-226 0.359963 +/- 0.028974
Peak Match Tolerance: 0.350 MeV

PEAK AREA REPORT

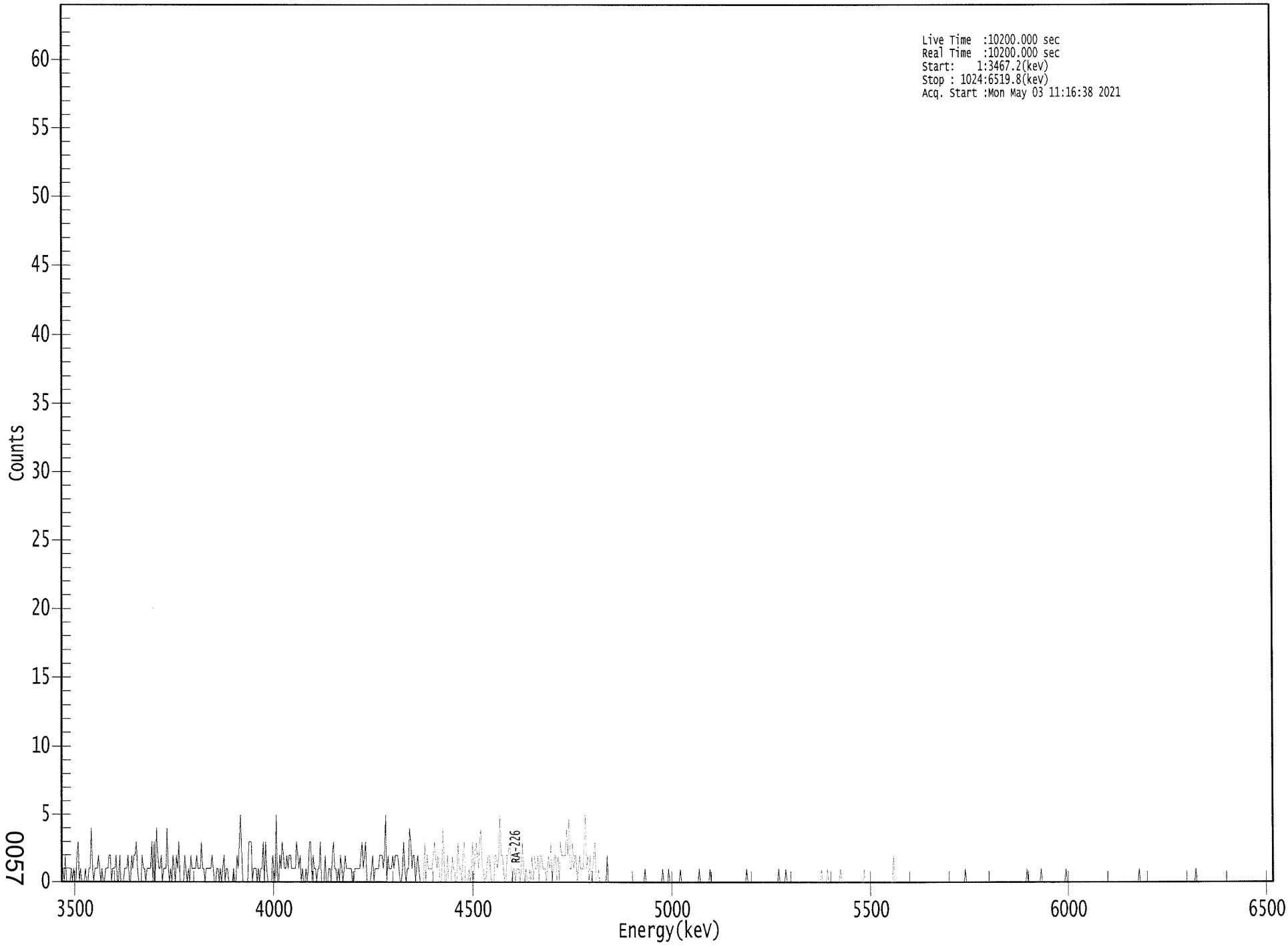
Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.466	4.30	114.31	1.70	0.00E+000	3.0
RA-226	4.609	192.96	14.20	2.04	0.00E+000	5.0

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.939	5685.50*	2.55E-001 +/- 2.91E-001	4.35E-001 +/- 1.56E-002
RA-226	0.960	4785.00*	1.09E+001 +/- 1.59E+000	4.39E-001 +/- 1.57E-002

AG 5/3/21

0000291385.CNF



****
***** S P E C T R A L D A T A R E P O R T *****
****

Sample Title: 01

Elapsed Live time: 10200
Elapsed Real Time: 10200

Channel							
1:	0	1	0	2	0	0	0	0
9:	1	0	1	0	0	2	3	0
17:	1	0	0	0	1	0	0	1
25:	1	4	1	0	1	1	1	2
33:	1	0	1	0	0	1	1	1
41:	2	2	0	1	1	1	2	0
49:	0	2	0	0	0	1	1	1
57:	2	0	0	2	1	2	2	3
65:	1	0	0	0	2	1	1	0
73:	1	1	1	1	3	0	3	0
81:	4	2	1	1	2	0	1	1
89:	1	4	1	0	1	0	2	1
97:	0	2	1	3	0	0	0	0
105:	2	1	0	1	0	2	1	1
113:	1	1	2	1	1	1	3	1
121:	1	0	1	1	1	1	1	2
129:	1	0	0	1	1	0	1	0
137:	1	2	0	1	1	0	0	0
145:	0	1	0	0	2	1	3	5
153:	2	0	0	0	0	0	3	3
161:	3	0	1	1	1	0	1	0
169:	1	1	3	0	3	1	0	0
177:	0	0	2	1	0	5	0	0
185:	2	1	3	2	1	1	2	1
193:	2	2	1	1	1	1	3	2
201:	1	2	0	1	0	0	1	0
209:	1	3	3	0	2	1	1	0
217:	1	1	3	0	0	0	2	0
225:	0	1	1	0	2	3	1	1
233:	0	1	0	2	1	0	1	2
241:	1	1	1	1	1	0	0	1
249:	1	1	1	1	2	3	1	2
257:	3	0	0	0	0	1	2	0
265:	1	1	1	1	2	2	2	1
273:	2	5	0	2	1	1	1	2
281:	1	2	2	2	1	0	0	1
289:	3	1	0	1	1	4	3	1
297:	2	2	0	1	2	1	0	0
305:	0	0	3	0	2	1	1	1
313:	1	2	3	2	1	2	1	0
321:	0	4	2	0	0	2	0	0
329:	0	2	1	1	0	0	3	1
337:	1	0	2	3	0	0	0	1
345:	0	1	3	0	2	3	2	1
353:	3	4	1	1	0	0	1	2
361:	2	1	0	0	0	2	2	1

369:	2	5	2	2	1	0	0	2

Sample Title: 01

Channel								
377:	2	3	2	0	1	1	0	1
385:	1	1	0	1	3	1	0	1
393:	0	0	1	0	2	0	2	1
401:	1	2	0	2	2	1	1	1
409:	0	1	2	1	3	0	1	2
417:	2	0	2	0	3	2	2	2
425:	2	4	2	5	1	1	3	1
433:	2	2	0	1	2	1	1	1
441:	3	5	1	2	0	2	0	1
449:	2	3	0	0	1	0	0	0
457:	0	0	0	2	0	0	0	0
465:	0	0	0	0	0	0	0	0
473:	0	0	0	0	0	0	0	0
481:	0	0	0	0	0	0	0	0
489:	0	0	0	1	0	0	0	0
497:	0	0	0	0	0	0	0	0
505:	0	0	1	0	0	0	0	1
513:	0	0	0	0	0	0	0	0
521:	0	1	0	0	0	0	0	0
529:	0	0	0	0	0	0	0	0
537:	0	1	0	0	0	0	0	0
545:	0	0	1	0	0	0	0	0
553:	0	0	0	0	0	0	0	0
561:	0	0	0	0	0	0	0	0
569:	0	0	0	0	0	0	0	0
577:	0	1	0	0	0	0	0	0
585:	0	0	0	0	0	0	0	0
593:	0	0	0	0	0	0	0	0
601:	0	0	0	0	1	0	0	0
609:	0	0	1	0	0	0	0	0
617:	0	0	0	0	0	0	0	0
625:	0	0	0	0	0	0	0	0
633:	0	0	0	0	0	0	0	0
641:	1	0	0	0	0	1	0	0
649:	0	0	0	0	0	0	0	0
657:	1	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	1	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	2	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	0	0	1	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801:	0	0	0	0	0	0	0	0

Sample Title: 01

Channel								
809:	0	0	0	0	0	0	1	0
817:	0	0	0	0	0	0	0	0
825:	0	0	1	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	1
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	1	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	1	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0

Apex-Alpha™

KB 5/3/21

Sample Description: BLANK
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00002913
Batch Identification: 2104092A-RA
Sample Identification: 02
Sample Geometry: Shelf 2
Procedure Description: Ra

Detector Name: Alpha_034
Chamber Serial Number: 04026479B
Detector Serial Number: 91136
Env. Background: System Bkgd 297006
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Generic Mult. Factor: 3.000E+000 Generic Div. Factor: 1.000E+000
Sample Date/Time: 5/3/2021 10:40:37 AM
Acquisition Date/Time: 5/3/2021 11:16:40 AM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 1.0000 +/- 0.0000
Counting Efficiency: 0.1554 +/- 0.0028 on 9/25/2020 10:10:36 AM
Effective Efficiency: 0.1554 +/- 0.0028

Peak Match Tolerance: 0.350 MeV

PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.520	7.32	76.28	0.68	0.00E+000	3.0
RA-226	4.601	-0.17	1169.4	0.17	0.00E+000	0.0

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.965	5685.50*	3.94E-001 +/- 3.01E-001	3.03E-001 +/- 1.06E-002
RA-226	0.957	4785.00*	-8.70E-003 +/- 1.02E-001	2.13E-001 +/- 7.47E-003

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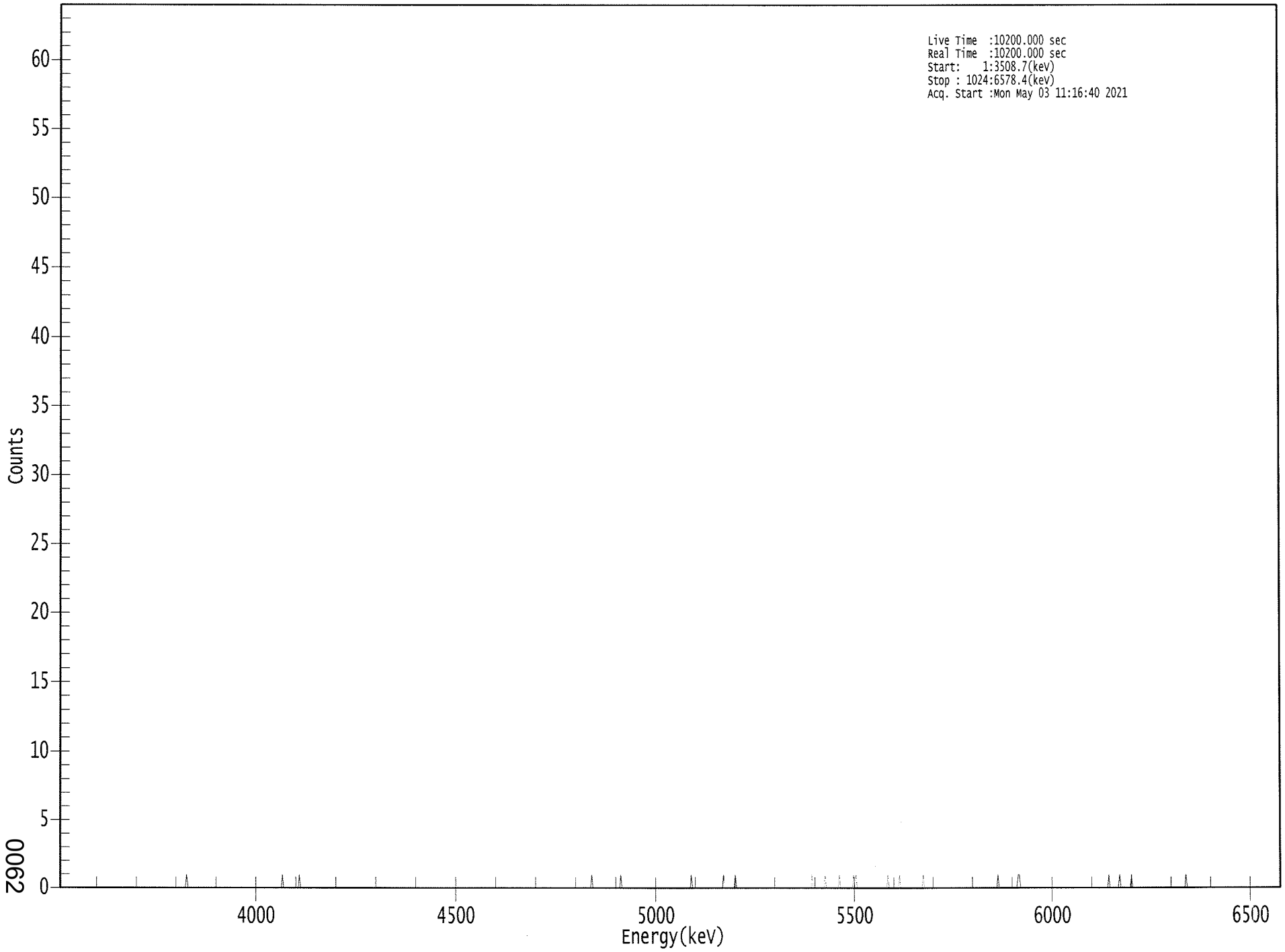
0000291388.CNF



2900

****
***** S P E C T R A L D A T A R E P O R T *****
****

Sample Title: 02

Elapsed Live time: 10200
Elapsed Real Time: 10200

Channel								
1:	0	0	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	1	0	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0	0
137:	0	0	0	0	0	0	0	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	0	0
161:	0	0	0	0	0	0	0	0
169:	0	0	0	0	0	0	0	0
177:	0	0	0	0	0	0	0	0
185:	0	0	1	0	0	0	0	0
193:	0	0	0	0	0	0	0	0
201:	1	0	0	0	0	0	0	0
209:	0	0	0	0	0	0	0	0
217:	0	0	0	0	0	0	0	0
225:	0	0	0	0	0	0	0	0
233:	0	0	0	0	0	0	0	0
241:	0	0	0	0	0	0	0	0
249:	0	0	0	0	0	0	0	0
257:	0	0	0	0	0	0	0	0
265:	0	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	0	0
321:	0	0	0	0	0	0	0	0
329:	0	0	0	0	0	0	0	0
337:	0	0	0	0	0	0	0	0
345:	0	0	0	0	0	0	0	0
353:	0	0	0	0	0	0	0	0
361:	0	0	0	0	0	0	0	0

369:	0	0	0	0	0	0	0	0

Sample Title: 02

Channel								
377:	0	0	0	0	0	0	0	0
385:	0	0	0	0	0	0	0	0
393:	0	0	0	0	0	0	0	0
401:	0	0	0	0	0	0	0	0
409:	0	0	0	0	0	0	0	0
417:	0	0	0	0	0	0	0	0
425:	0	0	0	0	0	0	0	0
433:	0	0	0	0	0	0	0	0
441:	0	0	0	0	1	0	0	0
449:	0	0	0	0	0	0	0	0
457:	0	0	0	0	0	0	0	0
465:	0	0	0	0	1	0	0	0
473:	0	0	0	0	0	0	0	0
481:	0	0	0	0	0	0	0	0
489:	0	0	0	0	0	0	0	0
497:	0	0	0	0	0	0	0	0
505:	0	0	0	0	0	0	0	0
513:	0	0	0	0	0	0	0	0
521:	0	0	0	0	0	0	0	1
529:	0	0	0	0	0	0	0	0
537:	0	0	0	0	0	0	0	0
545:	0	0	0	0	0	0	0	0
553:	0	0	1	0	0	0	0	0
561:	0	0	0	0	1	0	0	0
569:	0	0	0	0	0	0	0	0
577:	0	0	0	0	0	0	0	0
585:	0	0	0	0	0	0	0	0
593:	0	0	0	0	0	0	0	0
601:	0	0	0	0	0	0	0	0
609:	0	0	0	0	0	0	0	0
617:	0	0	0	0	0	0	0	0
625:	0	0	0	0	1	0	0	0
633:	0	0	0	0	0	0	0	1
641:	0	0	0	0	0	0	0	0
649:	0	0	0	1	0	0	0	0
657:	0	0	0	0	0	0	0	1
665:	0	1	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	1	0	0	0
697:	0	0	0	0	0	0	1	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	1	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	1	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801:	0	0	1	1	0	0	0	0

Sample Title: 02

Channel								
809:	0	0	0	0	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	1	0
881:	0	0	0	0	0	0	0	1
889:	0	0	0	0	0	0	0	0
897:	0	1	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	1
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0

Apex-Alpha™

KB 5/3/21

Sample Description: H-20 DUP
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00002913
Batch Identification: 2104092A-RA
Sample Identification: 03
Sample Geometry: Shelf 2
Procedure Description: Ra

Detector Name: Alpha_036
Chamber Serial Number: 04026477B
Detector Serial Number: 84167
Env. Background: System Bkgd 297007
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Generic Mult. Factor: 2.270E+000 Generic Div. Factor: 1.000E+000
Sample Date/Time: 4/19/2021 10:40:37 AM
Acquisition Date/Time: 5/3/2021 11:16:42 AM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.8751 +/- 0.0000
Counting Efficiency: 0.1720 +/- 0.0030 on 4/28/2021 10:01:32 AM
Effective Efficiency: 0.1506 +/- 0.0027

Peak Match Tolerance: 0.350 MeV

PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.436	1.30	273.43	1.70	0.00E+000	3.0
RA-226	4.555	10.30	66.71	1.70	0.00E+000	3.0

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.922	5685.50*	5.49E-002 +/- 1.50E-001	3.10E-001 +/- 1.07E-002
RA-226	0.933	4785.00*	4.12E-001 +/- 2.75E-001	2.93E-001 +/- 1.01E-002

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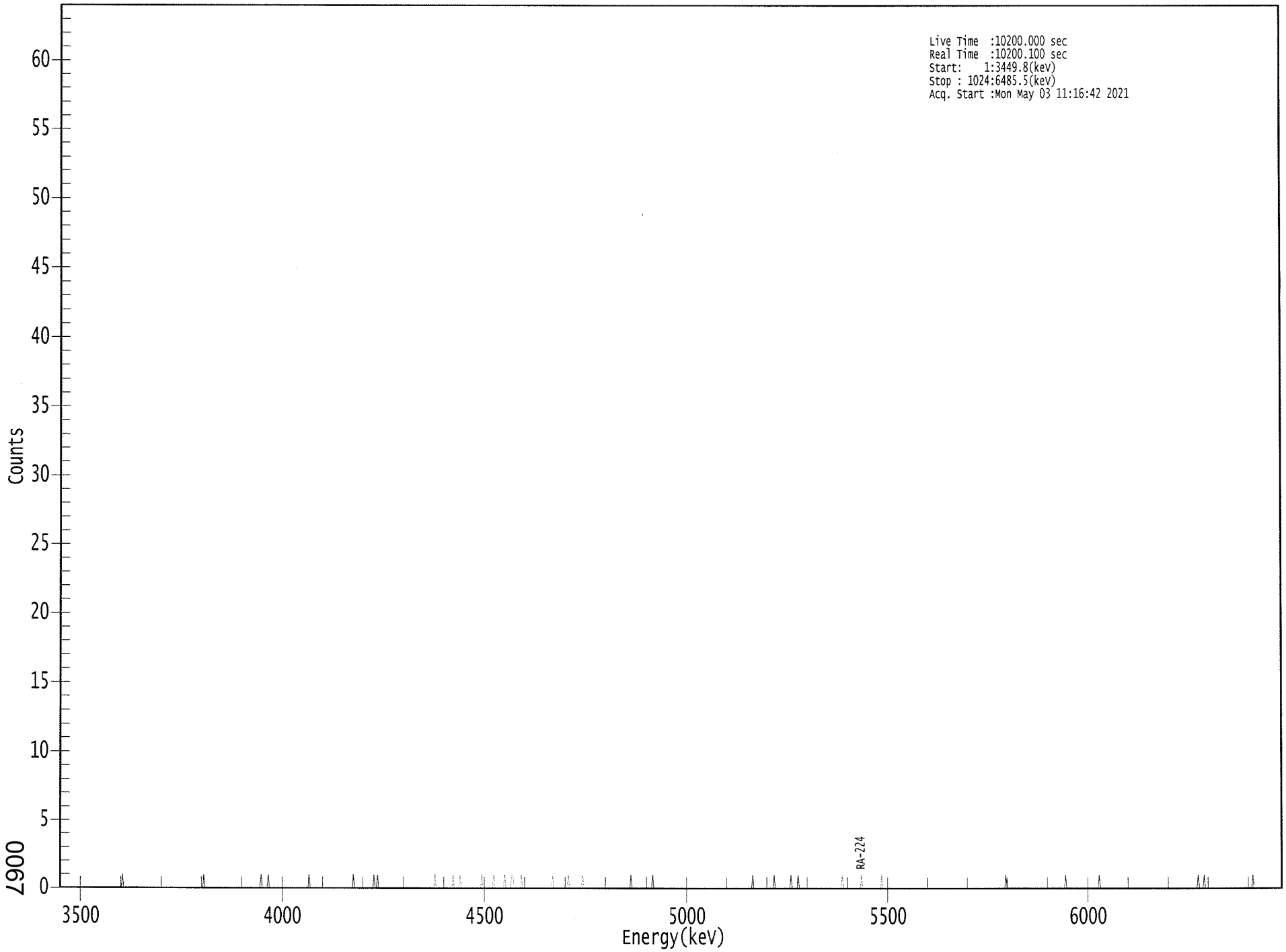
0000291389.CNF



****
***** S P E C T R A L D A T A R E P O R T *****
****

Sample Title: 03

Elapsed Live time: 10200
Elapsed Real Time: 10200

Channel								
1:	0	0	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	1	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	1	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0	0
137:	0	0	0	0	0	0	0	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	0	0
161:	0	0	0	0	0	0	0	0
169:	1	0	0	0	0	0	1	0
177:	0	0	0	0	0	0	0	0
185:	0	0	0	0	0	0	0	0
193:	0	0	0	0	0	0	0	0
201:	0	0	0	0	0	0	0	0
209:	1	0	0	0	0	0	0	0
217:	0	0	0	0	0	0	0	0
225:	0	0	0	0	0	0	0	0
233:	0	0	0	0	0	0	0	0
241:	0	0	0	0	0	1	0	0
249:	0	0	0	0	0	0	0	0
257:	0	0	0	0	0	0	1	0
265:	0	1	0	0	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	0	0
313:	0	1	0	0	0	0	0	0
321:	0	0	0	0	0	0	0	0
329:	1	0	0	0	0	0	1	0
337:	0	0	0	0	0	0	0	0
345:	0	0	0	0	0	0	0	0
353:	1	0	0	0	0	0	0	0
361:	0	0	1	0	0	0	0	0

369:	0	0	0	1	0	0	0	0

Sample Title: 03

Channel								
377:	0	1	1	0	0	0	0	0
385:	0	1	0	0	0	0	0	0
393:	0	0	0	0	0	0	0	0
401:	0	0	0	0	0	0	0	0
409:	0	0	0	1	0	0	0	0
417:	0	0	0	0	0	0	0	0
425:	1	0	0	0	0	0	0	0
433:	0	0	0	0	1	0	0	0
441:	0	0	0	0	0	0	0	0
449:	0	0	0	0	0	0	0	0
457:	0	0	0	0	0	0	0	0
465:	0	0	0	0	0	0	0	0
473:	0	0	0	0	1	0	0	0
481:	0	0	0	0	0	0	0	0
489:	0	0	0	0	0	0	1	0
497:	0	0	0	0	0	0	0	0
505:	0	0	0	0	0	0	0	0
513:	0	0	0	0	0	0	0	0
521:	0	0	0	0	0	0	0	0
529:	0	0	0	0	0	0	0	0
537:	0	0	0	0	0	0	0	0
545:	0	0	0	0	0	0	0	0
553:	0	0	0	0	0	0	0	0
561:	0	0	0	0	0	0	0	0
569:	0	0	0	0	0	0	0	0
577:	0	0	1	0	0	0	0	0
585:	0	0	0	0	0	0	0	0
593:	0	0	0	0	1	0	0	0
601:	0	0	0	0	0	0	0	0
609:	0	0	1	0	0	0	0	0
617:	1	0	0	0	0	0	0	0
625:	0	0	0	0	0	0	0	0
633:	0	0	0	0	0	0	0	0
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	1	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	1	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	1	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	1
793:	0	0	0	0	0	0	0	0

801:	0	0	0	0	0	0	0	0

Sample Title: 03

Channel								
809:	0	0	0	0	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	1	0	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	1	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	1	0	0	0	0	1	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	1	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0

MD 5/3/21

Apex-Alpha™

Sample Description: H-20
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00002913
Batch Identification: 2104092A-RA
Sample Identification: 04
Sample Geometry: Shelf 2
Procedure Description: Ra

Detector Name: Alpha_037
Chamber Serial Number: 04026478A
Detector Serial Number: 91133
Env. Background: System Bkgd 297008
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Generic Mult. Factor: 2.910E+000 Generic Div. Factor: 1.000E+000
Sample Date/Time: 4/19/2021 10:40:37 AM
Acquisition Date/Time: 5/3/2021 11:16:44 AM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.7710 +/- 0.0000
Counting Efficiency: 0.1438 +/- 0.0025 on 2/28/2020 7:44:10 AM
Effective Efficiency: 0.1109 +/- 0.0020

Peak Match Tolerance: 0.350 MeV

PEAK AREA REPORT

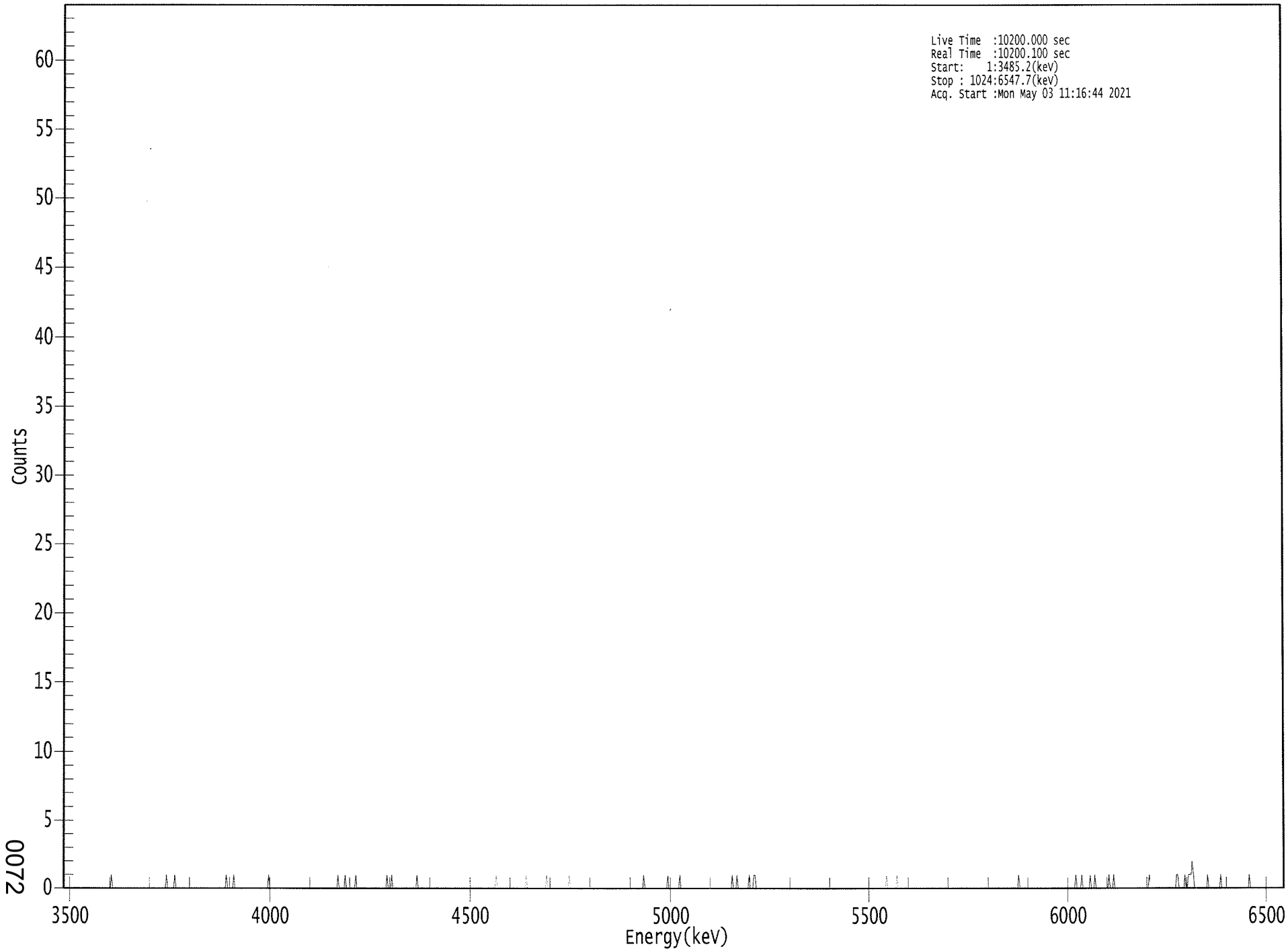
Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.558	1.15	249.59	0.85	0.00E+000	3.0
RA-226	4.662	3.32	119.77	0.68	0.00E+000	3.0

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.979	5685.50*	8.45E-002 +/- 2.11E-001	4.40E-001 +/- 1.53E-002
RA-226	0.980	4785.00*	2.31E-001 +/- 2.77E-001	3.92E-001 +/- 1.36E-002

AG 5/3/21

0000291390.CNF



0072

****
***** S P E C T R A L D A T A R E P O R T *****
****

Sample Title: 04

Elapsed Live time: 10200
Elapsed Real Time: 10200

Channel								
1:	0	0	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	1	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	1	0
89:	0	0	0	0	0	1	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0	0
137:	1	0	0	0	0	0	1	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	0	0
161:	0	0	0	0	0	0	0	0
169:	0	0	0	1	0	0	0	0
177:	0	0	0	0	0	0	0	0
185:	0	0	0	0	0	0	0	0
193:	0	0	0	0	0	0	0	0
201:	0	0	0	0	0	0	0	0
209:	0	0	0	0	0	0	0	0
217:	0	0	0	0	0	0	0	0
225:	0	0	0	0	0	1	0	0
233:	0	0	0	1	0	0	0	0
241:	0	0	0	0	1	0	0	0
249:	0	0	0	0	0	0	0	0
257:	0	0	0	0	0	0	0	0
265:	0	0	0	0	0	0	1	0
273:	0	0	1	0	0	0	0	0
281:	0	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	0	1
297:	0	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	0	0
321:	0	0	0	0	0	0	0	0
329:	0	0	0	0	0	0	0	0
337:	0	0	0	0	0	0	0	0
345:	0	0	0	0	0	0	0	0
353:	0	0	0	0	0	0	0	0
361:	0	1	0	0	0	0	0	0

369:	0	0	0	0	0	0	0	0

Sample Title: 04

Channel								
377:	0	0	0	0	0	0	0	0
385:	0	0	1	0	0	0	0	0
393:	0	0	0	0	0	0	0	0
401:	0	0	0	1	0	0	0	0
409:	0	0	0	0	0	0	0	0
417:	0	0	0	0	0	0	1	0
425:	0	0	0	0	0	0	0	0
433:	0	0	0	0	0	0	0	0
441:	0	0	0	0	0	0	0	0
449:	0	0	0	0	0	0	0	0
457:	0	0	0	0	0	0	0	0
465:	0	0	0	0	0	0	0	0
473:	0	0	0	0	0	0	0	0
481:	0	0	0	0	1	0	0	0
489:	0	0	0	0	0	0	0	0
497:	0	0	0	0	0	0	0	0
505:	1	0	0	0	0	0	0	0
513:	0	0	1	0	0	0	0	0
521:	0	0	0	0	0	0	0	0
529:	0	0	0	0	0	0	0	0
537:	0	0	0	0	0	0	0	0
545:	0	0	0	0	0	0	0	0
553:	0	0	0	0	0	0	1	0
561:	0	0	1	0	0	0	0	0
569:	0	0	0	0	1	0	0	0
577:	1	1	0	0	0	0	0	0
585:	0	0	0	0	0	0	0	0
593:	0	0	0	0	0	0	0	0
601:	0	0	0	0	0	0	0	0
609:	0	0	0	0	0	0	0	0
617:	0	0	0	0	0	0	0	0
625:	0	0	0	0	0	0	0	0
633:	0	0	0	0	0	0	0	0
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	1	0	0	0	0	0	0	0
697:	0	1	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	1

801:	0	0	0	0	0	0	0	0

Sample Title: 04

Channel								
809:	0	0	0	0	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	1
849:	0	0	0	0	1	0	0	0
857:	0	0	0	1	0	0	0	1
865:	0	0	0	0	0	0	0	0
873:	0	0	0	1	0	0	0	1
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	1	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	1	1	0	0
937:	0	0	0	1	0	0	1	1
945:	1	2	1	0	0	0	0	0
953:	0	0	0	0	0	0	1	0
961:	0	0	0	0	0	0	0	0
969:	0	1	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	1	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0

Apex-Alpha™

KB 5B/21

Sample Description: H-22
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00002913
Batch Identification: 2104092A-RA
Sample Identification: 05
Sample Geometry: Shelf 2
Procedure Description: Ra

Detector Name: Alpha_038
Chamber Serial Number: 04026478B
Detector Serial Number: 91134
Env. Background: System Bkgd 297009
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Generic Mult. Factor: 3.000E+000 Generic Div. Factor: 1.000E+000
Sample Date/Time: 4/19/2021 10:40:37 AM
Acquisition Date/Time: 5/3/2021 11:16:46 AM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 1.0000 +/- 0.0000
Counting Efficiency: 0.1487 +/- 0.0026 on 2/28/2020 7:44:11 AM
Effective Efficiency: 0.1487 +/- 0.0026

Peak Match Tolerance: 0.350 MeV

PEAK AREA REPORT

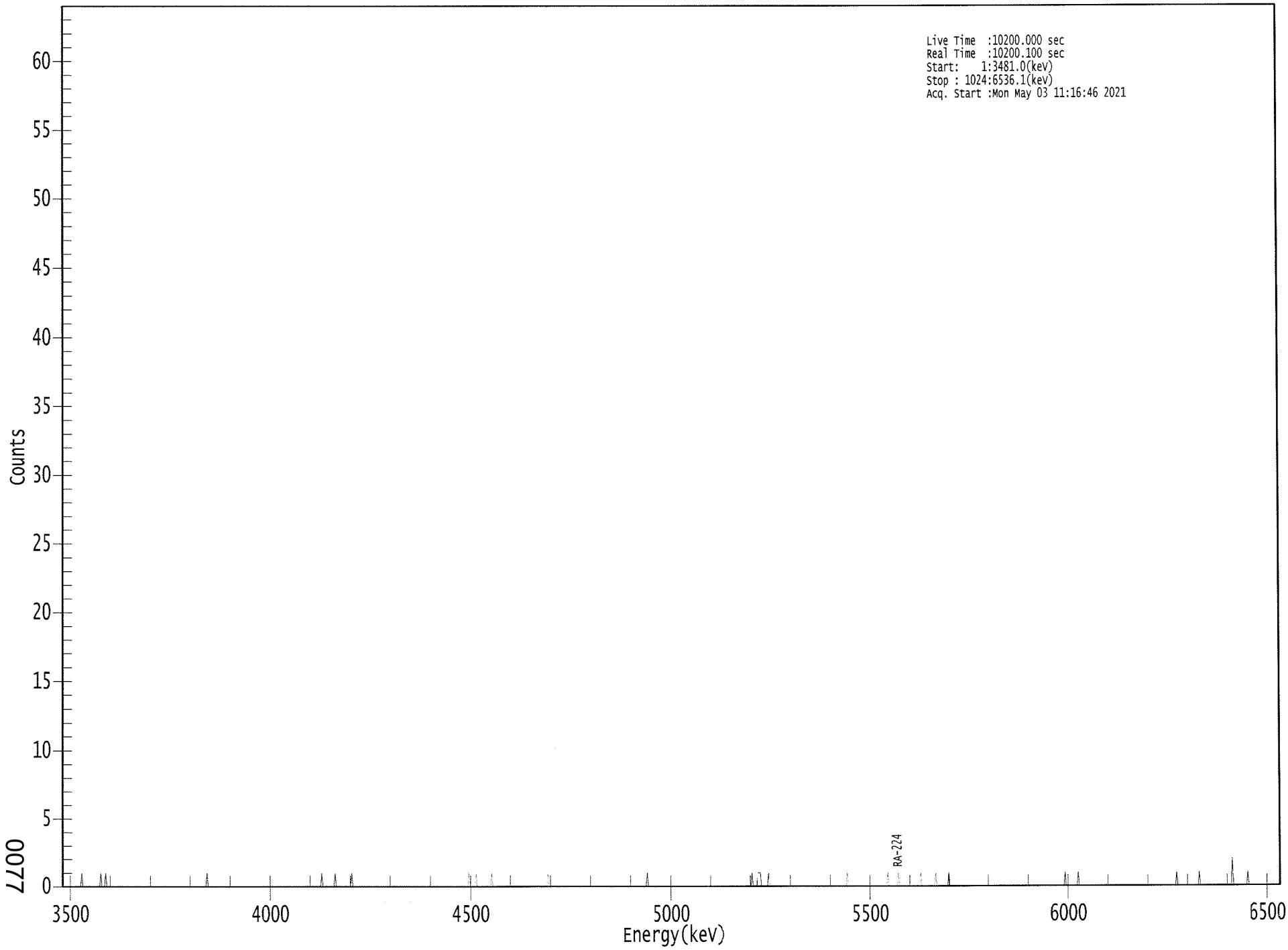
Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.571	4.83	91.00	0.17	0.00E+000	3.0
RA-226	4.564	3.83	102.72	0.17	0.00E+000	3.0

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.983	5685.50*	2.73E-001 +/- 2.48E-001	2.36E-001 +/- 8.13E-003
RA-226	0.938	4785.00*	2.05E-001 +/- 2.10E-001	2.23E-001 +/- 7.69E-003

AG 5/3/21

0000291391.CNF



****
***** S P E C T R A L D A T A R E P O R T *****
****

Sample Title: 05

Elapsed Live time: 10200
Elapsed Real Time: 10200

Channel								
1:	0	0	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	1	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	1	0	0	0	1	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	0	1	0	0	0	0	0	0
129:	0	0	0	0	0	0	0	0
137:	0	0	0	0	0	0	0	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	0	0
161:	0	0	0	0	0	0	0	0
169:	0	0	0	0	0	0	0	0
177:	0	0	0	0	0	0	0	0
185:	0	0	0	0	0	0	0	0
193:	0	0	0	0	0	0	0	0
201:	0	0	0	0	0	0	0	0
209:	0	0	0	0	0	0	0	0
217:	0	1	0	0	0	0	0	0
225:	0	0	0	0	1	0	0	0
233:	0	0	0	0	0	0	0	0
241:	0	0	1	0	0	0	0	0
249:	0	0	0	0	0	0	0	0
257:	0	0	0	0	0	0	0	0
265:	0	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	0	0
321:	0	0	0	0	0	0	0	0
329:	0	0	0	0	0	0	0	0
337:	0	0	0	0	1	0	0	0
345:	0	0	1	0	0	0	0	0
353:	0	0	0	0	0	0	0	1
361:	0	0	0	0	0	0	0	0

369:	0	0	0	0	0	0	0	0

Sample Title: 05

Channel								
377:	0	0	0	0	0	0	0	0
385:	0	0	0	0	0	0	0	0
393:	0	0	0	0	0	0	0	0
401:	0	0	0	0	0	0	1	0
409:	0	0	0	0	0	0	0	0
417:	0	0	0	0	0	0	0	0
425:	0	0	0	0	0	0	0	0
433:	0	0	0	0	0	0	0	0
441:	0	0	0	0	0	0	0	0
449:	0	0	0	0	0	0	0	0
457:	0	0	0	0	0	0	0	0
465:	0	0	0	0	0	0	0	0
473:	0	0	0	0	0	0	0	0
481:	0	0	0	0	0	0	0	0
489:	0	1	0	0	0	0	0	0
497:	0	0	0	0	0	0	0	0
505:	0	0	0	0	0	0	0	0
513:	0	0	0	0	0	0	0	0
521:	0	0	0	0	0	0	0	0
529:	0	0	0	0	0	0	0	0
537:	0	0	0	0	0	0	0	0
545:	0	0	0	0	0	0	0	0
553:	0	0	0	0	0	0	0	0
561:	0	0	0	0	0	0	0	0
569:	0	0	0	0	0	0	0	0
577:	0	1	0	0	0	0	1	1
585:	1	0	0	0	0	0	0	1
593:	0	0	0	0	0	0	0	0
601:	0	0	0	0	0	0	0	0
609:	0	0	0	0	0	0	0	0
617:	0	0	0	0	0	0	0	0
625:	0	0	0	0	0	0	0	0
633:	0	0	0	0	0	0	0	0
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	1	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	1	0	0	0	0
697:	0	0	0	0	1	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	1
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	1	0	0	0
737:	0	0	0	0	0	0	0	1
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801:	0	0	0	0	0	0	0	0

Sample Title: 05

Channel								
809:	0	0	0	0	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	1	0	0	0	0	0	0
849:	0	0	0	0	1	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	1
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	1	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	2	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	1	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0

RDB 5/3/21

Apex-Alpha™

Sample Description: H-23
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00002913
Batch Identification: 2104092A-RA
Sample Identification: 06
Sample Geometry: Shelf 2
Procedure Description: Ra

Detector Name: Alpha_039
Chamber Serial Number: 06027396A
Detector Serial Number: 83109
Env. Background: System Bkgd 297010
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Generic Mult. Factor: 2.720E+000 Generic Div. Factor: 1.000E+000
Sample Date/Time: 4/19/2021 10:40:37 AM
Acquisition Date/Time: 5/3/2021 11:16:48 AM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 1.0000 +/- 0.0000
Counting Efficiency: 0.1521 +/- 0.0027 on 6/23/2020 1:54:45 PM
Effective Efficiency: 0.1521 +/- 0.0027

Peak Match Tolerance: 0.350 MeV

PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.543	5.13	103.36	1.87	0.00E+000	3.0
RA-226	4.654	11.13	64.27	1.87	0.00E+000	3.0

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.974	5685.50*	2.57E-001 +/- 2.66E-001	3.79E-001 +/- 1.33E-002
RA-226	0.978	4785.00*	5.27E-001 +/- 3.39E-001	3.59E-001 +/- 1.26E-002

AG 5/3/21

Apex-Alpha™

Sample Description: H-23
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00002913
Batch Identification: 2104092A-RA
Sample Identification: 06
Sample Geometry: Shelf 2
Procedure Description: Ra

Detector Name: Alpha_039
Chamber Serial Number: 06027396A
Detector Serial Number: 83109
Env. Background: System Bkgd 297010
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Generic Mult. Factor: 2.720E+000 Generic Div. Factor: 1.000E+000
Sample Date/Time: 4/19/2021 10:40:37 AM
Acquisition Date/Time: 5/3/2021 11:16:48 AM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 1.0000 +/- 0.0000
Counting Efficiency: 0.1521 +/- 0.0027 on 6/23/2020 1:54:45 PM
Effective Efficiency: 0.1521 +/- 0.0027

Peak Match Tolerance: 0.350 MeV

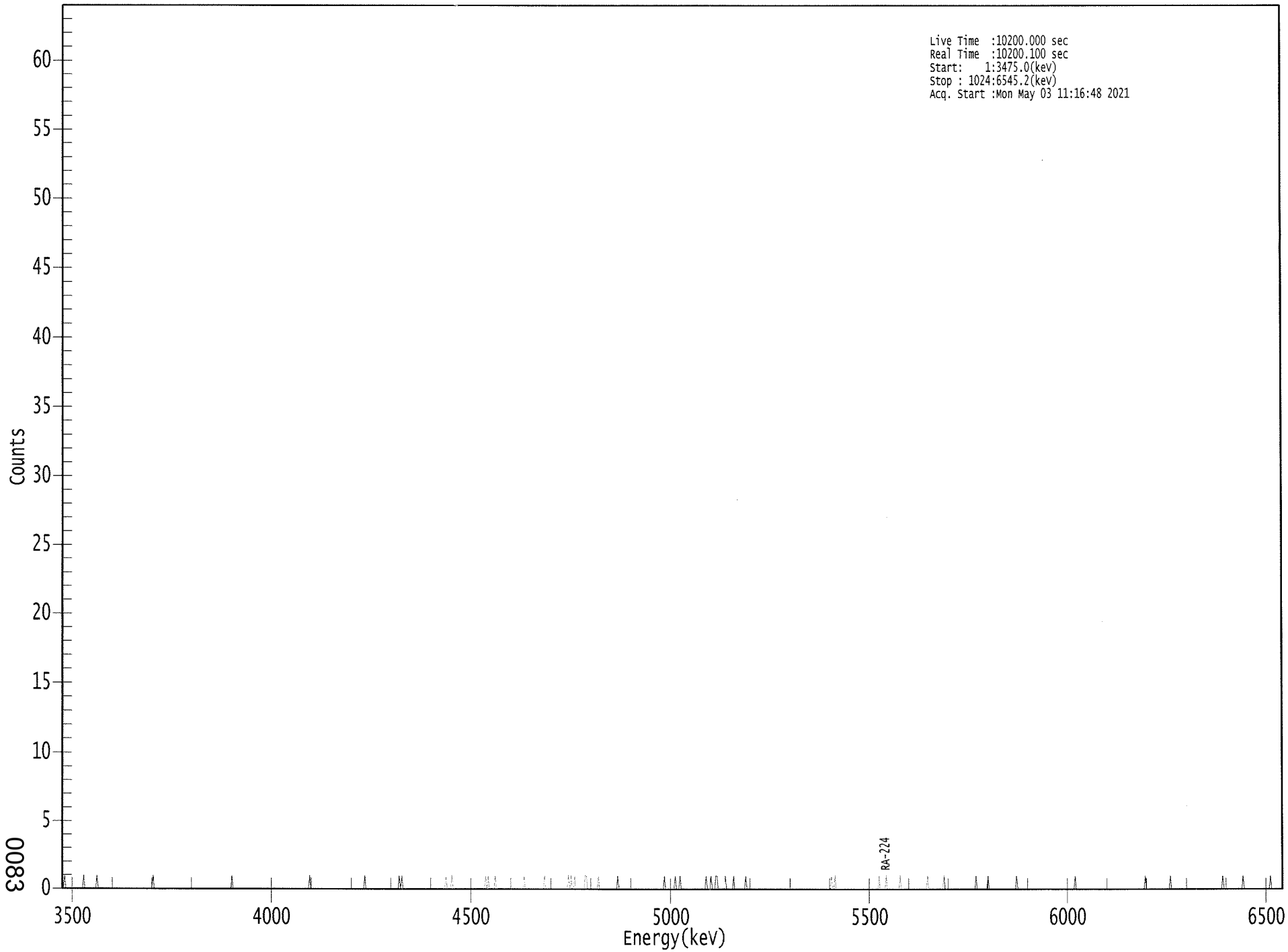
PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.543	5.13	103.36	1.87	0.00E+000	3.0
RA-226	4.654	11.13	64.27	1.87	0.00E+000	3.0

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.974	5685.50*	2.57E-001 +/- 2.66E-001	3.79E-001 +/- 1.33E-002
RA-226	0.978	4785.00*	5.27E-001 +/- 3.39E-001	3.59E-001 +/- 1.26E-002

0000291387.CNF



****
***** S P E C T R A L D A T A R E P O R T *****
****

Sample Title: 06

Elapsed Live time: 10200
Elapsed Real Time: 10200

Channel								
1:	0	0	1	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	1	0	0	0	0	0
25:	0	0	0	0	0	1	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	1	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0	0
137:	0	0	0	0	0	0	1	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	0	0
161:	0	0	0	0	0	0	0	0
169:	0	0	0	0	0	0	0	0
177:	0	0	0	0	0	0	0	0
185:	0	0	0	0	0	0	0	0
193:	0	0	0	0	0	0	0	0
201:	0	0	0	0	0	0	0	1
209:	0	0	0	0	0	0	0	0
217:	0	0	0	0	0	0	0	0
225:	0	0	0	0	0	0	0	0
233:	0	0	0	0	0	0	0	0
241:	0	0	0	0	0	0	0	0
249:	0	0	0	0	0	1	0	0
257:	0	0	0	0	0	0	0	0
265:	0	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	0	1	0	1	0	0	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	0	0
321:	0	1	0	0	0	0	1	0
329:	0	0	0	0	0	0	0	0
337:	0	0	0	0	0	0	0	0
345:	0	0	0	0	0	0	0	0
353:	0	0	1	0	1	0	0	0
361:	0	0	1	0	0	0	0	0

369:	0	0	0	0	0	0	0	0

Sample Title: 06

Channel								
377:	0	0	0	0	0	0	0	0
385:	0	0	1	0	0	0	0	0
393:	0	0	0	0	0	0	0	0
401:	0	0	0	1	0	0	0	0
409:	0	0	0	0	0	0	0	0
417:	0	0	0	0	0	0	0	1
425:	0	1	0	0	1	0	0	0
433:	0	0	0	0	0	1	1	0
441:	0	0	0	0	0	0	0	0
449:	1	0	0	0	0	0	0	0
457:	0	0	0	0	0	0	0	0
465:	1	0	0	0	0	0	0	0
473:	0	0	0	0	0	0	0	0
481:	0	0	0	0	0	0	0	0
489:	0	0	0	0	0	0	0	0
497:	0	0	0	0	0	0	0	1
505:	0	0	0	0	0	0	0	0
513:	1	0	0	0	1	0	0	0
521:	0	0	0	0	0	0	0	0
529:	0	0	0	0	0	0	0	0
537:	0	0	1	0	0	0	1	0
545:	0	0	1	1	0	0	0	0
553:	0	0	1	0	0	0	0	0
561:	0	1	0	0	0	0	0	0
569:	0	0	0	1	0	0	0	0
577:	0	0	0	0	0	0	0	0
585:	0	0	0	0	0	0	0	0
593:	0	0	0	0	0	0	0	0
601:	0	0	0	0	0	0	0	0
609:	0	0	0	0	0	0	0	0
617:	0	0	0	0	0	0	0	0
625:	0	0	0	0	0	0	0	0
633:	0	0	0	0	0	0	0	0
641:	0	0	0	1	0	0	1	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	1	0	0	0	0
689:	0	1	0	0	0	0	0	0
697:	0	0	0	0	0	1	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	1	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	1	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	1	0	0
769:	0	0	0	0	0	0	0	1
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	1

801:	0	0	0	0	0	0	0	0

Sample Title: 06

Channel								
809:	0	0	0	0	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	1	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	1	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	1	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	1	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	1	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	1	0	0	0
1017:	0	0	0	0	0	0	0	1

MD 5/3/21

Apex-Alpha™

Sample Description: H-24
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00002913
Batch Identification: 2104092A-RA
Sample Identification: 07
Sample Geometry: Shelf 2
Procedure Description: Ra

Detector Name: Alpha_040
Chamber Serial Number: 06027396B
Detector Serial Number: 91135
Env. Background: System Bkgd 297011
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Generic Mult. Factor: 2.720E+000 Generic Div. Factor: 1.000E+000
Sample Date/Time: 4/19/2021 10:40:37 AM
Acquisition Date/Time: 5/3/2021 11:16:51 AM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 1.0000 +/- 0.0000
Counting Efficiency: 0.1484 +/- 0.0027 on 6/23/2020 1:54:46 PM
Effective Efficiency: 0.1484 +/- 0.0027

Peak Match Tolerance: 0.350 MeV

PEAK AREA REPORT

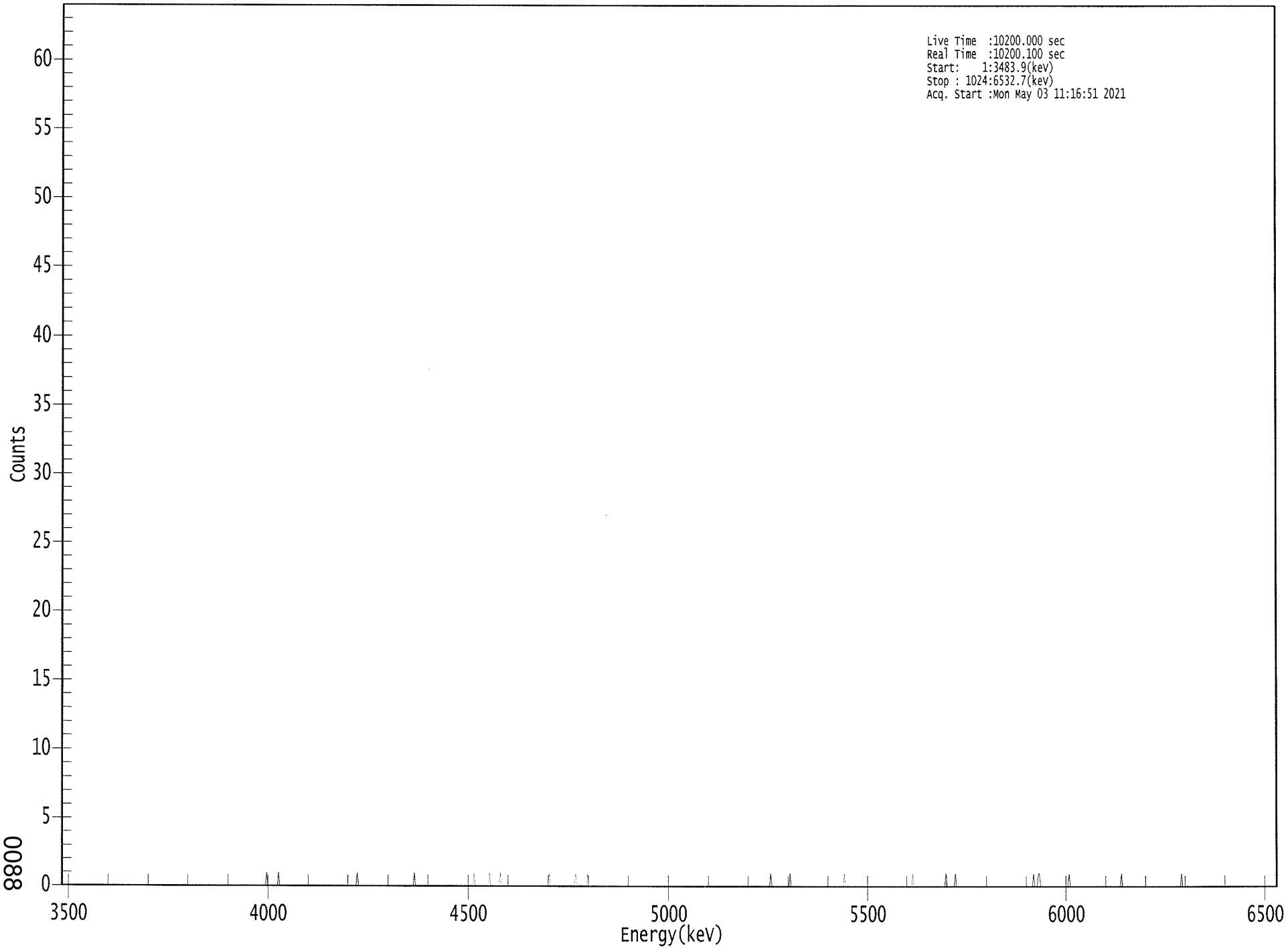
Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.528	0.81	359.09	1.19	0.00E+000	3.0
RA-226	4.653	4.13	119.29	1.87	0.00E+000	3.0

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.968	5685.50*	4.16E-002 +/- 1.49E-001	3.38E-001 +/- 1.19E-002
RA-226	0.978	4785.00*	2.01E-001 +/- 2.39E-001	3.68E-001 +/- 1.29E-002

AG
5/3/21

0000291386.CNF



****
***** S P E C T R A L D A T A R E P O R T *****
****

Sample Title: 07

Elapsed Live time: 10200
Elapsed Real Time: 10200

Channel								
1:	0	0	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0	0
137:	0	0	0	0	0	0	0	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	0	0
161:	0	0	0	0	0	0	0	0
169:	0	0	0	0	1	0	0	0
177:	0	0	0	0	0	0	1	0
185:	0	0	0	0	0	0	0	0
193:	0	0	0	0	0	0	0	0
201:	0	0	0	0	0	0	0	0
209:	0	0	0	0	0	0	0	0
217:	0	0	0	0	0	0	0	0
225:	0	0	0	0	0	0	0	0
233:	0	0	0	0	0	0	0	0
241:	0	0	0	0	0	0	0	0
249:	1	0	0	0	0	0	0	0
257:	0	0	0	0	0	0	0	0
265:	0	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	0	0
297:	1	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	0	0
321:	0	0	0	0	0	0	0	0
329:	0	0	0	0	0	0	0	0
337:	0	0	0	0	0	0	0	0
345:	0	0	1	0	0	0	0	0
353:	0	0	0	0	0	0	0	1
361:	0	0	0	0	0	0	0	0

369:	1	0	0	0	0	0	0	0

Sample Title: 07

Channel								
377:	0	0	0	0	0	0	0	0
385:	0	0	0	0	0	0	0	0
393:	0	0	0	0	0	0	0	0
401:	0	0	0	0	0	0	0	0
409:	0	1	0	0	0	0	0	0
417:	0	0	0	0	0	0	0	0
425:	0	0	0	0	0	0	0	1
433:	0	0	0	0	0	0	0	0
441:	0	1	0	0	0	0	0	0
449:	0	0	0	0	0	0	0	0
457:	0	0	0	0	0	0	0	0
465:	0	0	0	0	0	0	0	0
473:	0	0	0	0	0	0	0	0
481:	0	0	0	0	0	0	0	0
489:	0	0	0	0	0	0	0	0
497:	0	0	0	0	0	0	0	0
505:	0	0	0	0	0	0	0	0
513:	0	0	0	0	0	0	0	0
521:	0	0	0	0	0	0	0	0
529:	0	0	0	0	0	0	0	0
537:	0	0	0	0	0	0	0	0
545:	0	0	0	0	0	0	0	0
553:	0	0	0	0	0	0	0	0
561:	0	0	0	0	0	0	0	0
569:	0	0	0	0	0	0	0	0
577:	0	0	0	0	0	0	0	0
585:	0	0	0	0	0	0	0	0
593:	0	0	0	1	0	0	0	0
601:	0	0	0	0	0	0	0	0
609:	0	0	0	1	0	0	0	0
617:	0	0	0	0	0	0	0	0
625:	0	0	0	0	0	0	0	0
633:	0	0	0	0	0	0	0	0
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	1	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	1	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	1
745:	0	0	0	0	0	0	0	1
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801:	0	0	0	0	0	0	0	0

Sample Title: 07

Channel								
809:	0	0	0	0	0	0	0	0
817:	0	1	0	0	0	1	1	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	1
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	1	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	1	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0

5/3/2021 6:20:32 AM

Apex-Alpha™

QA SUMMARY REPORT
Review Of QA Results - Pulser Check

Date : 5/3/2021
Time : 6:20:32 AM

CHAMBER	DEVICE	PARAMETER	FLAG	DATE
Alpha_001	21f	ALL	Not Done	
Alpha_002	21f	ALL	Not Done	
Alpha_003	21f	ALL	Not Done	
Alpha_004	21f	ALL	Not Done	
Alpha_005	21f	ALL	Not Done	
Alpha_006	21f	ALL	Not Done	
Alpha_007	21f	ALL	Not Done	
Alpha_008	21f	ALL	Not Done	
Alpha_009	21f	ALL	Not Done	
Alpha_010	21f	ALL	Passed	5/3/2021 6:05:22 AM
Alpha_011	21f	ALL	Passed	5/3/2021 6:05:23 AM
Alpha_012	21f	ALL	Passed	5/3/2021 6:05:23 AM
Alpha_013	21f	ALL	Not Done	
Alpha_014	21f	ALL	Not Done	
Alpha_015	21f	ALL	Not Done	
Alpha_016	21f	ALL	Not Done	
Alpha_033	Alpha Analyst100DC	ALL	Passed	5/3/2021 6:05:25 AM
Alpha_034	Alpha Analyst100DC	ALL	Passed	5/3/2021 6:05:26 AM
Alpha_035	Alpha Analyst100DC	ALL	Not Done	
Alpha_036	Alpha Analyst100DC	ALL	Passed	5/3/2021 6:05:28 AM
Alpha_037	Alpha Analyst100DC	ALL	Passed	5/3/2021 6:05:29 AM
Alpha_038	Alpha Analyst100DC	ALL	Passed	5/3/2021 6:05:31 AM
Alpha_039	Alpha Analyst100DC	ALL	Passed	5/3/2021 6:05:33 AM
Alpha_040	Alpha Analyst100DC	ALL	Passed	5/3/2021 6:05:34 AM
Alpha_041	Alpha Analyst100DC	ALL	Passed	5/3/2021 6:05:36 AM
Alpha_042	Alpha Analyst100DC	ALL	Passed	5/3/2021 6:05:38 AM
Alpha_043	Alpha Analyst100DC	ALL	Not Done	
Alpha_044	Alpha Analyst100DC	ALL	Not Done	
Alpha_045	Alpha Analyst100DC	ALL	Passed	5/3/2021 6:05:39 AM
Alpha_046	Alpha Analyst100DC	ALL	Passed	5/3/2021 6:05:41 AM
Alpha_047	Alpha Analyst100DC	Peak FWHM	Action	5/3/2021 6:05:43 AM
Alpha_048	Alpha Analyst100DC	ALL	Passed	5/3/2021 6:05:45 AM
Alpha_049	Alpha Analyst100DC	ALL	Passed	5/3/2021 6:05:46 AM
Alpha_050	Alpha Analyst100DC	ALL	Passed	5/3/2021 6:05:48 AM
Alpha_051	Alpha Analyst100DC	ALL	Passed	5/3/2021 6:05:50 AM
Alpha_052	Alpha Analyst100DC	ALL	Passed	5/3/2021 6:05:51 AM
Alpha_053	Alpha Analyst100DC	ALL	Not Done	
Alpha_054	Alpha Analyst100DC	ALL	Passed	5/3/2021 6:05:53 AM
Alpha_055	Alpha Analyst100DC	ALL	Not Done	
Alpha_056	Alpha Analyst100DC	ALL	Not Done	
Alpha_057	Alpha Analyst100DC	ALL	Passed	5/3/2021 6:05:55 AM
Alpha_058	Alpha Analyst100DC	ALL	Passed	5/3/2021 6:05:57 AM

Review of QA Results - Pulser Check

5/3/2021 6:20:32 AM

CHAMBER	DEVICE	PARAMETER	FLAG	DATE
Alpha_059	Alpha Analyst100DC	ALL	Passed	5/3/2021 6:05:59 AM
Alpha_060	Alpha Analyst100DC	ALL	Passed	5/3/2021 6:06:01 AM

APPROVED BY: KP

APPROVAL DATE: 5/3/21

****
***** L I B R A R Y L I S T I N G R E P O R T *****
****

Nuclide Library Title: Radium

Nuclide Library Description: Ra-226, Po-218, Rn-222

Nuclide Name	Half-Life (Seconds)	Energy (keV)	Energy Uncert. (keV)	Yield (%)	Yield Uncert.(Abs.+-)
PO-218	5.049E+010	6003.000*	0.000	99.9800	0.0000
RN-222	5.049E+010	5490.000*	0.000	99.9200	0.0000
RA-226	5.049E+010	4785.000*	0.000	100.0000	0.0000

* = key line

TOTALS: 3 Nuclides 3 Energy Lines

SECTION IX

ANALYTICAL DATA (RADIUM-228)

Work Order	21-04092
Analysis Code	Ra228
Run	1
Date Received	4/27/2021
Lab Deadline	5/11/2021
Client	ERM
Project	526033
Report Level	4
Activity Units	pCi
Aliquot Units	l
Matrix	WA
Method	EPA 904.0
Instrument Type	Alpha/Beta GPC
Radiometric Tracer	Ba-133
Radiometric Sol#	Ba-6a
Tracer Act (dpm/g)	398.67
Carrier	Yttrium
Carrier Conc (mg/ml)	34.65

Internal Fraction	Sample Desc	Client ID	Login CPM	Sample Date	Sample Aliquot
01	LCS	LCS		04/27/21 00:00	1.0000E+00
02	MBL	BLANK		04/27/21 00:00	1.0000E+00
03	DUP	H-20	40	04/19/21 10:00	1.0000E+00
04	DO	H-20	40	04/19/21 10:00	1.0000E+00
05	TRG	H-22	30	04/19/21 11:10	1.0000E+00
06	TRG	H-23	40	04/19/21 13:35	1.0000E+00
07	TRG	H-24	50	04/19/21 15:00	1.0000E+00

0600

* SAF1 is used for Gross Alpha and all other radionuclides. SAF2 is used for Gross Beta only. ^ Indicates estimated SAF value.
** Actual mass exceeded the calibration curve range. Results should be qualified as appropriate.

Internal Fraction	Sample Desc	Tracer Aliquot (g)	Tracer Total ACT (dpm)	Radiometric Tracer (pCi)	Radiometric % Rec	Grav Carrier Added (ml)	Grav Filter Tare (g)	Grav Filter Final (g)	Grav Filter Net (g)	Grav % Rec	Mean % Rec	SAF 1*	SAF 2*
01	LCS	2.1937	874.6	399.0	101.28	2.000	0.0878	0.1546	0.0668	96.39	97.63	1.00	1.00
02	MBL	2.2050	879.1	465.0	117.43	2.000	0.0882	0.1546	0.0664	95.82	105.40	1.00	1.00
03	DUP	2.2057	879.3	347.0	87.60	2.000	0.0884	0.1576	0.0692	99.86	87.48	1.00	1.00
04	DO	2.2006	877.3	305.0	77.18	2.000	0.0880	0.1566	0.0686	98.99	76.40	1.00	1.00
05	TRG	2.1982	876.4	430.0	108.93	2.010	0.0871	0.1566	0.0695	99.79	108.70	1.00	1.00
06	TRG	2.1927	874.2	418.0	106.15	2.000	0.0876	0.1549	0.0673	97.11	103.09	1.00	1.00
07	TRG	2.1920	873.9	427.0	108.47	2.010	0.0883	0.1577	0.0694	99.65	108.09	1.00	1.00

0097

* SAF1 is used for Gross Alpha and all other radionuclides. SAF2 is used for Gross Beta only. ^ Indicates estimated SAF value.
** Actual mass exceeded the calibration curve range. Results should be qualified as appropriate.

21-04092
Ra228
Run 1

Internal Fraction	Sample Desc	Rough Prep Date	Rough Prep By	Prep Date	Prep By	Sep t0 Date/Time	Sep t0 By	Sep t1 Date/Time	Sep t1 By
01	LCS			05/04/21 09:58	AYARBER	05/03/21 10:06	AYARBER	05/04/21 10:05	AYARBER
02	MBL			05/04/21 09:58	AYARBER	05/03/21 10:06	AYARBER	05/04/21 10:05	AYARBER
03	DUP			05/04/21 09:58	AYARBER	05/03/21 10:06	AYARBER	05/04/21 10:05	AYARBER
04	DO			05/04/21 09:58	AYARBER	05/03/21 10:06	AYARBER	05/04/21 10:05	AYARBER
05	TRG			05/04/21 09:58	AYARBER	05/03/21 10:06	AYARBER	05/04/21 10:05	AYARBER
06	TRG			05/04/21 09:58	AYARBER	05/03/21 10:06	AYARBER	05/04/21 10:05	AYARBER
07	TRG			05/04/21 09:58	AYARBER	05/03/21 10:06	AYARBER	05/04/21 10:05	AYARBER

8600

* SAF1 is used for Gross Alpha and all other radionuclides. SAF2 is used for Gross Beta only. ^ Indicates estimated SAF value.
** Actual mass exceeded the calibration curve range. Results should be qualified as appropriate.

Work Order: 21-04092-Ra228-1

Client: ERM
Eberline Services Work Order: 21-04092
Analysis Code: Ra228
Run: 1
6600

Lab Fraction	Nuclide	Sample Desc	Client Identification	Activity Units	Results	Error Estimate	MDA	LCS Known	LCS %R	LCS Flag	RPD Flag	MDA Flag	Blank Flag
01	RA-228	LCS	LCS	pCi/l	7.97E+00	7.60E-01	9.47E-01	8.96E+00	88.96	OK		OK	
02	RA-228	MBL	BLANK	pCi/l	5.89E-02	3.95E-01	8.41E-01					OK	OK
03	RA-228	DUP	H-20	pCi/l	8.00E-01	4.96E-01	9.68E-01				NA	OK	
04	RA-228	DO	H-20	pCi/l	1.00E+00	5.99E-01	1.17E+00					OK	
05	RA-228	TRG	H-22	pCi/l	4.53E-01	4.25E-01	8.60E-01					OK	
06	RA-228	TRG	H-23	pCi/l	6.72E-01	5.00E-01	9.99E-01					OK	
07	RA-228	TRG	H-24	pCi/l	-5.80E-02	4.40E-01	9.46E-01					OK	

Run: 1
Analysis Code: Ra228
Eberline Services Work Order: 21-04092
Client: ERM
0100

Lab Fraction	Nuclide	Sample Desc	Sample Date	Sample Aliquot	Radiometric % Rec	Grav % Rec	Mean % Rec	SAF	Sep t0 Date/Time	Sep t1 Date/Time
01	RA-228	LCS	04/27/21 00:00	1.00E+00	101.28	96.39	97.63	1.00	5/3/2021 10:06	5/4/2021 10:05
02	RA-228	MBL	04/27/21 00:00	1.00E+00	117.43	95.82	105.40	1.00	5/3/2021 10:06	5/4/2021 10:05
03	RA-228	DUP	04/19/21 10:00	1.00E+00	87.60	99.86	87.48	1.00	5/3/2021 10:06	5/4/2021 10:05
04	RA-228	DO	04/19/21 10:00	1.00E+00	77.18	98.99	76.40	1.00	5/3/2021 10:06	5/4/2021 10:05
05	RA-228	TRG	04/19/21 11:10	1.00E+00	108.93	99.79	108.70	1.00	5/3/2021 10:06	5/4/2021 10:05
06	RA-228	TRG	04/19/21 13:35	1.00E+00	106.15	97.11	103.09	1.00	5/3/2021 10:06	5/4/2021 10:05
07	RA-228	TRG	04/19/21 15:00	1.00E+00	108.47	99.65	108.09	1.00	5/3/2021 10:06	5/4/2021 10:05

Client: ERM
Eberline Services Work Order: 21-04092
Analysis Code: Ra228
Run: 1
0107

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Halflife (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	RA-228	LCS	05/04/21 12:18		LB4110A	F1	120	803	1.366666667	0.4754
02	RA-228	MBL	05/04/21 12:18		LB4110A	F2	120	149	1.2	0.4658
03	RA-228	DUP	05/04/21 12:18		LB4110A	F3	120	191	1.116666667	0.4713
04	RA-228	DO	05/04/21 12:18		LB4110A	F4	120	217	1.283333333	0.4773
05	RA-228	TRG	05/04/21 12:18		LB4110A	G1	120	204	1.366666667	0.4705
06	RA-228	TRG	05/04/21 12:18		LB4110A	G2	120	254	1.65	0.4676
07	RA-228	TRG	05/04/21 12:18		LB4110A	G3	120	185	1.583333333	0.4614

Count Room Report
Client: ERM

21-04092-Ra228-1 (pCi/l) in WA
Tracer ID: Ba-6a

Internal Fraction	Sample Desc	Client ID	Sample Date	Sample Aliquot	Tracer Aliquot (g)	Tracer ACT (dpm)	Radiometric Tracer (pCi)	Radiometric % Rec	SAF 1*	SAF 2*
01	LCS	LCS	04/27/21 00:00	1.0000	2.1937	874.5624	399.0000	101.28	1.00	1.00
02	MBL	BLANK	04/27/21 00:00	1.0000	2.2050	879.0674	465.0000	117.43	1.00	1.00
03	DUP	H-20	04/19/21 10:00	1.0000	2.2057	879.3464	347.0000	87.60	1.00	1.00
04	DO	H-20	04/19/21 10:00	1.0000	2.2006	877.3132	305.0000	77.18	1.00	1.00
05	TRG	H-22	04/19/21 11:10	1.0000	2.1982	876.3564	430.0000	108.93	1.00	1.00
06	TRG	H-23	04/19/21 13:35	1.0000	2.1927	874.1637	418.0000	106.15	1.00	1.00
07	TRG	H-24	04/19/21 15:00	1.0000	2.1920	873.8846	427.0000	108.47	1.00	1.00

Spike and Tracer Worksheet

Internal Work Order	Run	Analysis Code	Date	Technician	Technician Initials	Witness Initials
21-04092	1	Ra228	5/4/2021 9:58	AYARBER	AY	

LCS & Matrix Spikes					LCS	MS	LCSD	MSD	LCS		MS		LCSD		MSD	
Isotope	Sol #	Activity dpm/g	Solution Date	Approx Addition	Volume Used (g)	Volume Used (g)	Volume Used (g)	Volume Used (g)	Known pCi	Error Estimate	Added pCi	Error Estimate	Known pCi	Error Estimate	Added pCi	Error Estimate
Ra-228	Ra-12	38.840	5/4/2021	0.510	0.5119				8.96	0.457	0.00	0.000	0.00	0.000	0.00	0.000

Tracers

fraction	Isotope	Sol #	Activity dpm/g	Solution Date	Volume Used (g)	Approx Addition
01	Ba-133	Ba-6a	398.670	5/4/2021	2.1937	2.5400
02	Ba-133	Ba-6a	398.670	5/4/2021	2.2050	2.5400
03	Ba-133	Ba-6a	398.670	5/4/2021	2.2057	2.5400
04	Ba-133	Ba-6a	398.670	5/4/2021	2.2006	2.5400
05	Ba-133	Ba-6a	398.670	5/4/2021	2.1982	2.5400
06	Ba-133	Ba-6a	398.670	5/4/2021	2.1927	2.5400
07	Ba-133	Ba-6a	398.670	5/4/2021	2.1920	2.5400

Balance Printer Tapes

Tracer

LCS

Matrix Spike

0103

Eberline Analytical
Oak Ridge Laboratory

Aliquot Worksheet

Printed: 4/29/2021 07:01

Work Order	Run	Analysis Code	Rpt Units	Lab Deadline	Technician
21-04092	1	Ra228	liters	5/11/2021	JHARVEY

Lab Fraction	ERM Client ID	Sample Type	Muffle Data Ratio Post/Pre	Dilution Data No of Dils	Dil Factor	Ratio	Aliquot Data Aliquot	Net Equiv	MS Aliquot Data Aliquot	Net Equiv	H-3 Solids Only Water Added (ml)	H3 Dist Aliq
01	LCS	LCS					1.0000E+00	1.0000E+00				
02	BLANK	MBL					1.0000E+00	1.0000E+00				
03	H-20	DUP					1.0000E+00	1.0000E+00				
04	H-20	DO					1.0000E+00	1.0000E+00				
05	H-22	TRG					1.0000E+00	1.0000E+00				
06	H-23	TRG					1.0000E+00	1.0000E+00				
07	H-24	TRG					1.0000E+00	1.0000E+00				

Comments	

0104

Technician: JHarvey Date: 4/29/21

Eberline Services - Oak Ridge
Version 1.0 9/1999

Gravimetric Worksheet

Printed: 5/4/2021 12:06 PM

Work Order	Run	Analysis Code	Gravimetric Carrier	Carrier Conc (mg/ml)	Technician
21-04092	1	Ra228	Yttrium	34.6500	AYARBER

TRetec Fraction	ERM Client ID	Sample Type	Carrier Data Carrier Added (ml)	Filter Data Filter Tare (g)	Filter Final (g)	Filter Net (g)	Gravimetric % Recovery
01	LCS	LCS	2.0000	0.0878	0.1546	**0.0668**	**96.39**
02	BLANK	MBL	2.0000	0.0882	0.1546	**0.0664**	**95.82**
03	DUP	DUP	2.0000	0.0884	0.1576	**0.0692**	**99.86**
04	H-20	DO	2.0000	0.0880	0.1566	**0.0686**	**98.99**
05	H-22	TRG	2.0100	0.0871	0.1566	**0.0695**	**99.79**
06	H-23	TRG	2.0000	0.0876	0.1549	**0.0673**	**97.11**
07	H-24	TRG	2.0100	0.0883	0.1577	**0.0694**	**99.65**

0105

AY

Technician: Amy Ayarber Date: 5/4/21

Detector ID	Sample ID	Alpha	Beta	Count Time	Voltage	TOD
F1	2104092-01	34	803	120	1410	5/4/2021 12:18:25 PM
F2	2104092-02	17	149	120	1410	5/4/2021 12:18:25 PM
F3	2104092-03	17	191	120	1410	5/4/2021 12:18:25 PM
F4	2104092-04	15	217	120	1410	5/4/2021 12:18:25 PM
G1	2104092-05	16	204	120	1410	5/4/2021 12:18:26 PM
G2	2104092-06	15	254	120	1410	5/4/2021 12:18:26 PM
G3	2104092-07	31	185	120	1410	5/4/2021 12:18:26 PM

KB 5/4/21

GPC Detector Report
(ALL Backgrounds)

KP
5/4/21

Detector	Alpha/Beta	Calibration Date	Count Date	Bkg CPM	PFW	LCL	Mean	UCL
LB4110A - A1	Alpha	11/2/2019	5/4/2021	2.17E-01	P	-4.28E-03	1.53E-01	3.11E-01
LB4110A - A2	Alpha	11/2/2019	5/4/2021	1.83E-01	P	1.04E-02	1.39E-01	2.67E-01
LB4110A - A3	Alpha	11/2/2019	5/4/2021	1.83E-01	P	7.99E-03	1.49E-01	2.90E-01
LB4110A - A4	Alpha	11/2/2019	5/4/2021	1.33E-01	P	1.06E-02	1.50E-01	2.90E-01
LB4110A - B1	Alpha	11/2/2019	5/4/2021	2.33E-01	P	-1.53E-02	1.31E-01	2.77E-01
LB4110A - B2	Alpha	11/2/2019	5/4/2021	2.33E-01	P	4.56E-02	2.02E-01	3.58E-01
LB4110A - B3	Alpha	11/2/2019	5/4/2021	2.33E-01	P	1.31E-02	1.63E-01	3.13E-01
LB4110A - B4	Alpha	11/2/2019	5/4/2021	6.67E-02	P	-1.24E-02	1.10E-01	2.32E-01
LB4110A - C1	Alpha	11/2/2019	5/4/2021	1.17E-01	P	-2.36E-02	1.04E-01	2.31E-01
LB4110A - C2	Alpha	11/2/2019	5/4/2021	2.00E-01	P	-2.14E-02	1.02E-01	2.25E-01
LB4110A - C3	Alpha	11/2/2019	5/4/2021	8.33E-02	P	-2.57E-02	8.44E-02	1.94E-01
LB4110A - C4	Alpha	11/2/2019	5/4/2021	1.83E-01	P	2.56E-02	2.07E-01	3.88E-01
LB4110A - D1	Alpha	11/2/2019	5/4/2021	6.67E-02	P	-2.53E-02	7.45E-02	1.74E-01
LB4110A - D2	Alpha	11/2/2019	5/4/2021	6.67E-02	P	-7.74E-03	1.02E-01	2.11E-01
LB4110A - D3	Alpha	11/2/2019	5/4/2021	1.50E-01	P	-6.91E-03	1.21E-01	2.50E-01
LB4110A - D4	Alpha	11/2/2019	5/4/2021	1.00E-01	P	2.54E-02	1.70E-01	3.15E-01
LB4110A - E1	Alpha	11/2/2017	5/19/2020	1.00E+05	F	-2.35E+04	8.93E+02	2.53E+04
LB4110A - E2	Alpha	11/2/2017	5/19/2020	1.00E+05	F	-2.35E+04	8.93E+02	2.53E+04
LB4110A - E3	Alpha	11/2/2017	5/19/2020	1.00E+05	F	-2.35E+04	8.93E+02	2.53E+04
LB4110A - E4	Alpha	11/2/2017	5/19/2020	1.00E+05	F	-2.35E+04	8.93E+02	2.53E+04
LB4110A - F1	Alpha	11/2/2019	5/4/2021	1.00E-01	P	-1.93E-02	1.15E-01	2.49E-01
LB4110A - F2	Alpha	11/2/2019	5/4/2021	1.50E-01	P	-3.22E-02	1.02E-01	2.36E-01
LB4110A - F3	Alpha	11/2/2019	5/4/2021	1.17E-01	P	-1.80E-02	9.98E-02	2.18E-01
LB4110A - F4	Alpha	11/2/2019	5/4/2021	1.33E-01	P	-3.82E-02	6.64E-02	1.71E-01
LB4110A - G1	Alpha	11/2/2019	5/4/2021	8.33E-02	P	-2.30E-02	8.52E-02	1.93E-01
LB4110A - G2	Alpha	11/2/2019	5/4/2021	5.00E-02	P	-2.03E-02	8.43E-02	1.89E-01
LB4110A - G3	Alpha	11/2/2019	5/4/2021	1.00E-01	P	-1.16E-02	1.27E-01	2.65E-01
LB4110A - G4	Alpha	11/2/2019	5/4/2021	6.67E-02	P	-2.96E-02	9.70E-02	2.24E-01

GPC Detector Report
(ALL Backgrounds)

KP
5/4/21

Detector	Alpha/Beta	Calibration Date	Count Date	Bkg CPM	PFW	LCL	Mean	UCL
LB4110A - A1	Beta	11/2/2019	5/4/2021	1.30E+00	P	-2.06E+00	1.41E+00	4.88E+00
LB4110A - A2	Beta	11/2/2019	5/4/2021	1.75E+00	P	-1.91E+00	1.69E+00	5.29E+00
LB4110A - A3	Beta	11/2/2019	5/4/2021	1.62E+00	P	-1.85E+00	1.49E+00	4.83E+00
LB4110A - A4	Beta	11/2/2019	5/4/2021	1.40E+00	P	-1.99E+00	1.53E+00	5.05E+00
LB4110A - B1	Beta	11/2/2019	5/4/2021	1.32E+00	P	1.02E+00	1.40E+00	1.78E+00
LB4110A - B2	Beta	11/2/2019	5/4/2021	1.83E+00	P	8.07E-01	1.42E+00	2.03E+00
LB4110A - B3	Beta	11/2/2019	5/4/2021	1.38E+00	P	9.34E-01	1.32E+00	1.71E+00
LB4110A - B4	Beta	11/2/2019	5/4/2021	2.08E+00	F	6.28E-01	1.51E+00	2.39E+00
LB4110A - C1	Beta	11/2/2019	5/4/2021	1.10E+00	P	8.00E-01	1.17E+00	1.55E+00
LB4110A - C2	Beta	11/2/2019	5/4/2021	9.83E-01	P	6.66E-01	1.02E+00	1.38E+00
LB4110A - C3	Beta	11/2/2019	5/4/2021	1.17E+00	P	7.81E-01	1.37E+00	1.95E+00
LB4110A - C4	Beta	11/2/2019	5/4/2021	1.50E+00	P	8.66E-01	1.30E+00	1.73E+00
LB4110A - D1	Beta	11/2/2019	5/4/2021	1.13E+00	P	6.67E-01	1.09E+00	1.51E+00
LB4110A - D2	Beta	11/2/2019	5/4/2021	3.00E+00	F	-1.23E+00	2.66E+00	6.55E+00
LB4110A - D3	Beta	11/2/2019	5/4/2021	1.15E+00	P	7.39E-01	1.13E+00	1.51E+00
LB4110A - D4	Beta	11/2/2019	5/4/2021	1.37E+00	P	1.04E+00	1.48E+00	1.92E+00
LB4110A - E1	Beta	11/2/2017	5/19/2020	1.00E+05	F	-2.35E+04	8.94E+02	2.53E+04
LB4110A - E2	Beta	11/2/2017	5/19/2020	1.00E+05	F	-2.35E+04	8.94E+02	2.53E+04
LB4110A - E3	Beta	11/2/2017	5/19/2020	1.00E+05	F	-2.35E+04	8.94E+02	2.53E+04
LB4110A - E4	Beta	11/2/2017	5/19/2020	1.00E+05	F	-2.35E+04	8.94E+02	2.53E+04
LB4110A - F1	Beta	11/2/2019	5/4/2021	1.37E+00	P	5.15E-01	1.27E+00	2.03E+00
LB4110A - F2	Beta	11/2/2019	5/4/2021	1.20E+00	P	-2.42E-01	1.14E+00	2.51E+00
LB4110A - F3	Beta	11/2/2019	5/4/2021	1.12E+00	P	1.13E-01	1.17E+00	2.23E+00
LB4110A - F4	Beta	11/2/2019	5/4/2021	1.28E+00	P	-1.20E+00	1.54E+00	4.28E+00
LB4110A - G1	Beta	11/2/2019	5/4/2021	1.37E+00	P	7.39E-01	1.17E+00	1.60E+00
LB4110A - G2	Beta	11/2/2019	5/4/2021	1.65E+00	P	1.13E+00	1.59E+00	2.05E+00
LB4110A - G3	Beta	11/2/2019	5/4/2021	1.58E+00	P	7.52E-01	1.18E+00	1.61E+00
LB4110A - G4	Beta	11/2/2019	5/4/2021	8.33E-01	P	6.94E-01	1.25E+00	1.81E+00

GPC Detector Report
(ALL Efficiencies)

KP 5/4/21

Detector	Alpha/Beta	Calibration Date	Count Date	Eff	PFW	LCL	Mean	UCL
LB4110A - A1	Alpha	11/2/2019	5/4/2021	0.2358	P	0.2254	0.2334	0.2414
LB4110A - A2	Alpha	11/2/2019	5/4/2021	0.2047	P	0.1936	0.2024	0.2111
LB4110A - A3	Alpha	11/2/2019	5/4/2021	0.2050	W	0.1874	0.1970	0.2067
LB4110A - A4	Alpha	11/2/2019	5/4/2021	0.2266	P	0.2155	0.2265	0.2375
LB4110A - B1	Alpha	11/2/2019	5/4/2021	0.2119	P	0.1956	0.2103	0.2251
LB4110A - B2	Alpha	11/2/2019	5/4/2021	0.2008	P	0.1853	0.1984	0.2115
LB4110A - B3	Alpha	11/2/2019	5/4/2021	0.2292	P	0.2192	0.2345	0.2498
LB4110A - B4	Alpha	11/2/2019	5/4/2021	0.2252	P	0.2100	0.2272	0.2444
LB4110A - C1	Alpha	11/2/2019	5/4/2021	0.1998	P	0.1896	0.1999	0.2101
LB4110A - C2	Alpha	11/2/2019	5/4/2021	0.2001	P	0.1908	0.2020	0.2133
LB4110A - C3	Alpha	11/2/2019	5/4/2021	0.2280	P	0.2100	0.2275	0.2450
LB4110A - C4	Alpha	11/2/2019	5/4/2021	0.2151	P	0.1931	0.2123	0.2316
LB4110A - D1	Alpha	11/2/2019	5/4/2021	0.1950	P	0.1866	0.1983	0.2101
LB4110A - D2	Alpha	11/2/2019	5/4/2021	0.2326	P	0.2244	0.2362	0.2480
LB4110A - D3	Alpha	11/2/2019	5/4/2021	0.2365	P	0.2319	0.2426	0.2532
LB4110A - D4	Alpha	11/2/2019	5/4/2021	0.1822	P	0.1755	0.1858	0.1960
LB4110A - E1	Alpha	11/2/2017	5/19/2020	0.2075	P	0.1686	0.2257	0.2828
LB4110A - E2	Alpha	11/2/2017	5/19/2020	0.1778	P	0.1514	0.2049	0.2583
LB4110A - E3	Alpha	11/2/2017	5/19/2020	0.2234	P	0.1549	0.2076	0.2604
LB4110A - E4	Alpha	11/2/2017	5/19/2020	0.2155	P	0.1746	0.2353	0.2961
LB4110A - F1	Alpha	11/2/2019	5/4/2021	0.2161	P	0.1990	0.2129	0.2268
LB4110A - F2	Alpha	11/2/2019	5/4/2021	0.1770	P	0.1653	0.1781	0.1909
LB4110A - F3	Alpha	11/2/2019	5/4/2021	0.2238	P	0.2065	0.2218	0.2372
LB4110A - F4	Alpha	11/2/2019	5/4/2021	0.2206	P	0.2009	0.2159	0.2310
LB4110A - G1	Alpha	11/2/2019	5/4/2021	0.1870	P	0.1747	0.1869	0.1990
LB4110A - G2	Alpha	11/2/2019	5/4/2021	0.1808	P	0.1707	0.1833	0.1960
LB4110A - G3	Alpha	11/2/2019	5/4/2021	0.2130	P	0.2018	0.2152	0.2286
LB4110A - G4	Alpha	11/2/2019	5/4/2021	0.1829	P	0.1600	0.1831	0.2062

KP 5/4/21 out of service

0109

GPC Detector Report
(ALL Efficiencies)

KP 5/4/21

Detector	Alpha/Beta	Calibration Date	Count Date	Eff	PFW	LCL	Mean	UCL
LB4110A - A1	Beta	11/2/2019	5/4/2021	0.5716	P	0.5446	0.5652	0.5857
LB4110A - A2	Beta	11/2/2019	5/4/2021	0.4429	P	0.4228	0.4438	0.4647
LB4110A - A3	Beta	11/2/2019	5/4/2021	0.4891	P	0.4562	0.4791	0.5021
LB4110A - A4	Beta	11/2/2019	5/4/2021	0.5627	P	0.5309	0.5536	0.5762
LB4110A - B1	Beta	11/2/2019	5/4/2021	0.4909	P	0.4572	0.4934	0.5295
LB4110A - B2	Beta	11/2/2019	5/4/2021	0.4994	P	0.4605	0.4944	0.5284
LB4110A - B3	Beta	11/2/2019	5/4/2021	0.5689	P	0.5494	0.5864	0.6233
LB4110A - B4	Beta	11/2/2019	5/4/2021	0.5528	P	0.5182	0.5617	0.6051
LB4110A - C1	Beta	11/2/2019	5/4/2021	0.4838	P	0.4581	0.4800	0.5019
LB4110A - C2	Beta	11/2/2019	5/4/2021	0.4884	P	0.4583	0.4833	0.5084
LB4110A - C3	Beta	11/2/2019	5/4/2021	0.5680	P	0.5271	0.5729	0.6188
LB4110A - C4	Beta	11/2/2019	5/4/2021	0.5230	P	0.4735	0.5175	0.5616
LB4110A - D1	Beta	11/2/2019	5/4/2021	0.5669	P	0.5499	0.5793	0.6087
LB4110A - D2	Beta	11/2/2019	5/4/2021	0.5972	P	0.5656	0.5948	0.6241
LB4110A - D3	Beta	11/2/2019	5/4/2021	0.6056	P	0.5791	0.6044	0.6298
LB4110A - D4	Beta	11/2/2019	5/4/2021	0.4822	P	0.4626	0.4846	0.5066
LB4110A - E1	Beta	11/2/2017	5/19/2020	0.5360	P	0.4167	0.5408	0.6649
LB4110A - E2	Beta	11/2/2017	5/19/2020	0.4520	P	0.3728	0.4910	0.6092
LB4110A - E3	Beta	11/2/2017	5/19/2020	0.5775	P	0.3848	0.5001	0.6154
LB4110A - E4	Beta	11/2/2017	5/19/2020	0.5466	P	0.4532	0.5887	0.7241
LB4110A - F1	Beta	11/2/2019	5/4/2021	0.5306	P	0.5129	0.5339	0.5549
LB4110A - F2	Beta	11/2/2019	5/4/2021	0.4411	P	0.4236	0.4467	0.4698
LB4110A - F3	Beta	11/2/2019	5/4/2021	0.5839	P	0.5445	0.5760	0.6074
LB4110A - F4	Beta	11/2/2019	5/4/2021	0.5588	P	0.5261	0.5529	0.5798
LB4110A - G1	Beta	11/2/2019	5/4/2021	0.4392	P	0.4161	0.4443	0.4724
LB4110A - G2	Beta	11/2/2019	5/4/2021	0.4378	P	0.4031	0.4344	0.4657
LB4110A - G3	Beta	11/2/2019	5/4/2021	0.5194	P	0.4887	0.5187	0.5487
LB4110A - G4	Beta	11/2/2019	5/4/2021	0.4414	P	0.3867	0.4395	0.4923

KP 5/4/21 out of service

SECTION X

BARIUM-133 ANALYTICAL TRACER DATA

Apex-Gamma

Analysis Report for 2104092-01
SPIKE

GAMMA SPECTRUM ANALYSIS

Sample Identification	: 2104092-01
Sample Description	: SPIKE
Sample Type	: RA RECOVERY
Sample Size	: 1.000E+00 units
Facility	: Countroom
Sample Taken On	: 5/3/2021 8:52:34AM
Acquisition Started	: 5/3/2021 10:39:18AM
Procedure	: BAFIL
Operator	: Administrator
Detector Name	: GE1
Geometry	: BAFIL
Live Time	: 900.0 seconds
Real Time	: 900.2 seconds
Dead Time	: 0.02 %
Peak Locate Threshold	: 2.50
Peak Locate Range (in channels)	: 1 - 4096
Peak Area Range (in channels)	: 32 - 4096
Identification Energy Tolerance	: 2.500 keV
Energy Calibration Used Done On	: 10/12/2019
Efficiency Calibration Used Done On	: 10/12/2019
Efficiency Calibration Description	:
Sample Number	: 110288

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 5/3/2021 10:54:21AM

Peak Analysis From Channel : 1
Peak Analysis To Channel : 4096

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)

Analysis Report for 2104092-01

SPIKE

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
	1	51.45	49 -	55	51.92	3.55E+01	36.82	2.21E+02	1.51
M	2	60.88	56 -	69	61.34	2.02E+02	51.30	2.73E+02	2.64
m	3	64.88	56 -	69	65.34	1.10E+02	51.96	2.91E+02	2.65
	4	79.65	74 -	85	80.10	7.61E+02	73.13	2.88E+02	2.56
	5	110.47	106 -	114	110.89	1.15E+02	53.18	3.65E+02	1.78
M	6	275.82	270 -	290	276.11	6.68E+01	25.51	5.57E+01	2.91
M	7	301.89	297 -	310	302.16	1.31E+02	31.52	7.76E+01	2.42
m	8	306.51	297 -	310	306.78	1.93E+01	26.26	6.68E+01	2.42
M	9	333.29	326 -	344	333.53	6.86E+01	26.91	5.18E+01	2.69
m	10	337.19	326 -	344	337.44	3.56E+01	26.23	5.40E+01	2.69
	11	355.07	348 -	361	355.30	5.43E+02	53.54	7.72E+01	2.45
M	12	376.40	372 -	397	376.62	2.06E+01	17.32	5.22E+01	2.72
m	13	383.10	372 -	397	383.31	1.01E+02	33.31	3.34E+01	2.25
m	14	385.83	372 -	397	386.04	2.06E+02	37.68	2.50E+01	2.65
m	15	390.39	372 -	397	390.59	7.68E+01	26.26	5.09E+00	2.41
	16	415.47	409 -	423	415.66	5.39E+01	29.30	6.81E+01	6.20
	17	435.98	431 -	442	436.15	9.50E+01	24.98	3.20E+01	2.60
M	18	467.28	463 -	476	467.42	1.59E+01	12.02	1.10E+01	3.06
m	19	470.34	463 -	476	470.48	8.81E+00	11.66	5.82E+00	2.78
	20	510.23	506 -	514	510.35	2.60E+01	10.20	0.00E+00	4.99
	21	577.44	574 -	580	577.51	5.36E+00	6.34	3.29E+00	2.72
	22	863.40	860 -	866	863.25	8.00E+00	5.66	0.00E+00	2.22

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

BACKGROUND SUBTRACT REPORT

Peak Analysis Performed on : 5/3/2021 10:54:21AM

Env. Background File : \\OR-GAMMA1\ApexRoot\Countroom\Data\0000110262.CNF

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
	1	51.45	3.55E+01	36.82			3.55E+01	3.68E+01
M	2	60.88	2.02E+02	51.30	2.30E+01	2.36E+00	1.79E+02	5.14E+01
m	3	64.88	1.10E+02	51.96			1.10E+02	5.20E+01
	4	79.65	7.61E+02	73.13			7.61E+02	7.31E+01
	5	110.47	1.15E+02	53.18			1.15E+02	5.32E+01
M	6	275.82	6.68E+01	25.51			6.68E+01	2.55E+01
M	7	301.89	1.31E+02	31.52			1.31E+02	3.15E+01

Analysis Report for 2104092-01

SPIKE

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
m	8	306.51	1.93E+01	26.26			1.93E+01	2.63E+01
M	9	333.29	6.86E+01	26.91			6.86E+01	2.69E+01
m	10	337.19	3.56E+01	26.23			3.56E+01	2.62E+01
	11	355.07	5.43E+02	53.54			5.43E+02	5.35E+01
M	12	376.40	2.06E+01	17.32			2.06E+01	1.73E+01
m	13	383.10	1.01E+02	33.31			1.01E+02	3.33E+01
m	14	385.83	2.06E+02	37.68			2.06E+02	3.77E+01
m	15	390.39	7.68E+01	26.26			7.68E+01	2.63E+01
	16	415.47	5.39E+01	29.30			5.39E+01	2.93E+01
	17	435.98	9.50E+01	24.98			9.50E+01	2.50E+01
M	18	467.28	1.59E+01	12.02			1.59E+01	1.20E+01
m	19	470.34	8.81E+00	11.66			8.81E+00	1.17E+01
	20	510.23	2.60E+01	10.20	1.77E+01	1.47E+00	8.29E+00	1.03E+01
	21	577.44	5.36E+00	6.34			5.36E+00	6.34E+00
	22	863.40	8.00E+00	5.66			8.00E+00	5.66E+00

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : \\OR-GAMMA1\ApexRoot\Countroom\Library\WSRC.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/units)	Activity Uncertainty
SN-113	0.91	255.12		1.93		
		391.69	*	61.90	5.96E+01	2.14E+01
BA-133	0.97	81.00	*	34.06	3.80E+02	5.19E+01
		302.84	*	18.33	3.69E+02	1.36E+02
		356.01	*	62.05	4.37E+02	6.67E+01
TH-234	0.93	63.29	*	3.80	3.32E+02	1.58E+02
AM-241	0.95	59.54	*	35.90	4.99E+01	1.46E+01

Analysis Report for 2104092-01

SPIKE

* = Energy line found in the spectrum.
\- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 2.500 keV
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma

INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/units)	Wt mean Activity Uncertainty	Comments
SN-113	0.912	5.96E+01	2.14E+01	
BA-133	0.971	3.99E+02	3.92E+01	
TH-234	0.937	3.32E+02	1.58E+02	
AM-241	0.955	4.99E+01	1.46E+01	

? = nuclide is part of an undetermined solution
X = nuclide rejected by the interference analysis
@ = nuclide contains energy lines not used in Weighted Mean Activity

Errors quoted at 2.000sigma

Analysis Report for 2104092-01
SPIKE

UNIDENTIFIED PEAKS

Peak Locate Performed on : 5/3/2021 10:54:21AM
Peak Locate From Channel : 1
Peak Locate To Channel : 4096

	Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
	1	51.45	3.94711E-02	51.82		
	5	110.47	1.27447E-01	23.18		
M	6	275.82	7.42256E-02	19.09		
m	8	306.51	2.14505E-02	68.01		
M	9	333.29	7.62144E-02	19.61		
m	10	337.19	3.95855E-02	36.81		
M	12	376.40	2.28426E-02	42.13		
m	13	383.10	1.11732E-01	16.56	Sum	
m	14	385.83	2.28487E-01	9.16		
	16	415.47	5.99179E-02	27.16	Sum	
	17	435.98	1.05571E-01	13.15	Sum	
M	18	467.28	1.76145E-02	37.91		
m	19	470.34	9.79024E-03	66.18	Sum	
	20	510.23	9.21075E-03	62.14		
	21	577.44	5.95238E-03	59.21		
	22	863.40	8.88889E-03	35.36		

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE MDA REPORT

Nuclide Library Used : \\OR-GAMMA1\ApexRoot\Countroom\Library\WSRC.NLB

Analysis Report for 2104092-01

SPIKE

	Nuclide Name	Energy (keV)		Yield(%)	Line MDA (pCi/units)	Nuclide MDA (pCi/units)	Activity (pCi/units)	Dec. Level (pCi/units)
	CA-41	3.00		77.00	8.60E-07	8.60E-07	0.00E+00	0.00E+00
		3.31		12.30	1.01E-05		0.00E+00	0.00E+00
	FE-55	5.89		24.50	1.49E-04	1.49E-04	0.00E+00	0.00E+00
	CO-57	122.06		85.51	1.71E+01	1.71E+01	-4.71E+00	8.06E+00
		136.48		10.60	1.54E+02		-1.63E+01	7.22E+01
	NI-59	6.92		29.80	2.91E-04	2.91E-04	0.00E+00	0.00E+00
	MO-93	16.59		52.90	9.33E-03	9.33E-03	0.00E+00	0.00E+00
		18.60		10.00	7.73E-02		0.00E+00	0.00E+00
	NB-93M	16.57		9.43	5.21E-02	5.21E-02	0.00E+00	0.00E+00
	CD-109	88.03		3.72	2.79E+02	2.79E+02	-1.23E+02	1.32E+02
+	SN-113	255.12		1.93	7.88E+02	4.62E+01	1.16E+02	3.58E+02
		391.69	*	61.90	4.62E+01		5.96E+01	2.21E+01
	SN-119M	23.87		16.10	1.20E-01	1.01E-01	0.00E+00	0.00E+00
		25.10		22.70	1.01E-01		0.00E+00	0.00E+00
	I-129	29.78		57.00	2.03E+00	2.03E+00	-9.77E-01	9.78E-01
		33.60		13.20	2.26E+01		1.22E+02	1.11E+01
		39.58		7.52	3.17E+01		-6.95E+01	1.52E+01
+	BA-133	81.00	*	34.06	4.08E+01	3.70E+01	3.80E+02	1.97E+01
		302.84	*	18.33	1.71E+02		3.69E+02	8.16E+01
		356.01	*	62.05	3.70E+01		4.37E+02	1.74E+01
	CE-139	165.85		80.35	2.56E+01	2.56E+01	4.83E+00	1.21E+01
	CE-144	133.54		10.80	1.47E+02	1.47E+02	8.65E+00	6.89E+01
	HG-203	279.19		77.30	3.07E+01	3.07E+01	2.84E+01	1.44E+01
	PB-210	46.50		4.25	6.22E+01	6.22E+01	-1.81E+01	2.94E+01
	TH-231	25.64		14.70	1.68E-01	1.68E-01	0.00E+00	0.00E+00
		84.21		6.40	1.90E+02		1.70E+01	9.09E+01
	PA-234M	9.89		89.00	5.79E-04	5.79E-04	0.00E+00	0.00E+00
		21.72		64.90	2.12E-02		0.00E+00	0.00E+00
		37.93		23.75	1.33E+01		1.60E+01	6.49E+00
+	TH-234	63.29	*	3.80	3.23E+02	3.23E+02	3.32E+02	1.57E+02
	NP-237	29.37		14.00	7.89E+00	7.89E+00	-3.81E+00	3.81E+00
		86.50		12.60	7.66E+01		-4.31E+01	3.62E+01
	U-237	97.08		16.30	6.78E+01	4.39E+01	-4.13E+01	3.19E+01
		101.07		26.30	4.39E+01		-3.39E+01	2.06E+01
		114.00		12.30	1.85E+02		8.15E+01	8.91E+01
		208.01		22.00	9.32E+01		2.49E+01	4.36E+01
+	AM-241	59.54	*	35.90	3.01E+01	3.01E+01	4.99E+01	1.47E+01
	AM-243	74.67		66.00	1.35E+01	1.35E+01	-1.01E+00	6.44E+00

\+ = Nuclide identified during the nuclide identification
* = Energy line found in the spectrum
\> = MDA value not calculated
@ = Half-life too short to be able to perform the decay correction

KB 5/13/21

Apex-Gamma

Analysis Report for 2104092-02
BLANK

GAMMA SPECTRUM ANALYSIS

Sample Identification	: 2104092-02
Sample Description	: BLANK
Sample Type	: RA RECOVERY
Sample Size	: 1.000E+00 units
Facility	: Countroom
Sample Taken On	: 5/3/2021 8:52:44AM
Acquisition Started	: 5/3/2021 10:39:24AM
Procedure	: BAFIL
Operator	: Administrator
Detector Name	: GE2
Geometry	: BAFIL
Live Time	: 900.0 seconds
Real Time	: 900.2 seconds
Dead Time	: 0.02 %
Peak Locate Threshold	: 2.50
Peak Locate Range (in channels)	: 1 - 4096
Peak Area Range (in channels)	: 29 - 4096
Identification Energy Tolerance	: 2.500 keV
Energy Calibration Used Done On	: 6/6/2020
Efficiency Calibration Used Done On	: 9/14/2019
Efficiency Calibration Description	:
Sample Number	: 110289

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 5/3/2021 10:54:33AM

Peak Analysis From Channel : 1
Peak Analysis To Channel : 4096

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)

Analysis Report for 2104092-02

BLANK

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
	1	35.58	36 -	39	36.26	2.75E+02	56.46	2.33E+02	1.72
	2	52.70	50 -	56	53.38	8.47E+01	32.76	1.35E+02	1.81
	3	61.58	59 -	65	62.24	1.51E+02	44.56	2.55E+02	1.82
	4	81.12	78 -	85	81.76	8.03E+02	66.24	1.96E+02	1.35
M	5	111.82	110 -	121	112.43	1.62E+02	31.57	9.36E+01	1.76
m	6	115.92	110 -	121	116.53	5.11E+01	33.23	9.45E+01	2.24
	7	160.69	158 -	165	161.25	4.30E+01	30.20	1.22E+02	3.88
	8	276.85	274 -	280	277.29	3.05E+01	23.36	7.70E+01	1.30
M	9	302.73	299 -	317	303.15	1.31E+02	24.76	1.00E+01	1.65
m	10	307.56	299 -	317	307.97	3.63E+01	13.45	1.00E+01	1.65
m	11	311.74	299 -	317	312.15	9.49E+00	10.25	1.00E+01	1.66
M	12	333.70	330 -	341	334.09	5.53E+01	19.20	2.88E+01	1.68
m	13	338.47	330 -	341	338.85	2.23E+01	14.59	1.53E+01	1.69
	14	356.04	351 -	361	356.40	5.49E+02	50.26	4.40E+01	1.90
M	15	383.75	382 -	390	384.09	6.74E+01	23.83	3.71E+01	1.69
m	16	386.82	382 -	390	387.16	1.42E+02	31.68	6.85E+01	1.74
M	17	414.81	410 -	429	415.12	3.41E+01	16.52	1.64E+01	2.35
m	18	418.44	410 -	429	418.75	2.07E+01	17.35	1.25E+01	2.35
	19	437.33	433 -	442	437.61	7.62E+01	24.76	4.15E+01	2.02
	20	451.32	450 -	454	451.59	7.33E+00	6.50	3.33E+00	1.25
	21	468.35	466 -	470	468.60	6.79E+00	8.90	1.04E+01	1.62

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

BACKGROUND SUBTRACT REPORT

Peak Analysis Performed on : 5/3/2021 10:54:33AM

Env. Background File : \\OR-GAMMA1\ApexRoot\Countroom\Data\0000110263.CNF

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
	1	35.58	2.75E+02	56.46			2.75E+02	5.65E+01
	2	52.70	8.47E+01	32.76			8.47E+01	3.28E+01
	3	61.58	1.51E+02	44.56	7.25E+00	7.41E-01	1.44E+02	4.46E+01
	4	81.12	8.03E+02	66.24			8.03E+02	6.62E+01
M	5	111.82	1.62E+02	31.57			1.62E+02	3.16E+01
m	6	115.92	5.11E+01	33.23			5.11E+01	3.32E+01
	7	160.69	4.30E+01	30.20			4.30E+01	3.02E+01
	8	276.85	3.05E+01	23.36			3.05E+01	2.34E+01

Analysis Report for 2104092-02

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	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
M	9	302.73	1.31E+02	24.76			1.31E+02	2.48E+01
m	10	307.56	3.63E+01	13.45			3.63E+01	1.35E+01
m	11	311.74	9.49E+00	10.25			9.49E+00	1.02E+01
M	12	333.70	5.53E+01	19.20			5.53E+01	1.92E+01
m	13	338.47	2.23E+01	14.59			2.23E+01	1.46E+01
	14	356.04	5.49E+02	50.26			5.49E+02	5.03E+01
M	15	383.75	6.74E+01	23.83			6.74E+01	2.38E+01
m	16	386.82	1.42E+02	31.68			1.42E+02	3.17E+01
M	17	414.81	3.41E+01	16.52			3.41E+01	1.65E+01
m	18	418.44	2.07E+01	17.35			2.07E+01	1.73E+01
	19	437.33	7.62E+01	24.76			7.62E+01	2.48E+01
	20	451.32	7.33E+00	6.50			7.33E+00	6.50E+00
	21	468.35	6.79E+00	8.90			6.79E+00	8.90E+00

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : \\OR-GAMMA1\ApexRoot\Countroom\Library\WSRC.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/units)	Activity Uncertainty
BA-133	1.00	81.00	*	34.06	4.90E+02	6.43E+01
		302.84	*	18.33	4.67E+02	1.67E+02
		356.01	*	62.05	4.40E+02	6.34E+01
HG-203	0.86	279.19	*	77.30	2.88E+01	2.41E+01
PA-234M	0.98	9.89		89.00		
		21.72		64.90		
		37.93	*	23.75	5.66E+00	1.16E+00
TH-234	0.92	63.29	*	3.80	2.92E+02	9.10E+01
AM-241	0.89	59.54	*	35.90	3.09E+01	9.63E+00

Analysis Report for 2104092-02

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* = Energy line found in the spectrum.
\- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 2.500 keV
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma

INTERFERENCE CORRECTED REPORT

	Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/units)	Wt mean Activity Uncertainty	Comments
	BA-133	1.000	4.65E+02	4.36E+01	
	HG-203	0.869	2.88E+01	2.41E+01	
	PA-234M	0.981	5.66E+00	1.16E+00	
?	TH-234	0.928	2.92E+02	9.10E+01	
?	AM-241	0.899	3.09E+01	9.63E+00	

? = nuclide is part of an undetermined solution
X = nuclide rejected by the interference analysis
@ = nuclide contains energy lines not used in Weighted Mean Activity

Errors quoted at 2.000sigma

Analysis Report for 2104092-02
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UNIDENTIFIED PEAKS

Peak Locate Performed on : 5/3/2021 10:54:33AM
Peak Locate From Channel : 1
Peak Locate To Channel : 4096

	Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
	2	52.70	9.41228E-02	19.34		
M	5	111.82	1.79691E-01	9.76	Tol.	U-237
m	6	115.92	5.68327E-02	32.49	Sum	
	7	160.69	4.77404E-02	35.14	Sum	
m	10	307.56	4.03036E-02	18.54		
m	11	311.74	1.05424E-02	54.00	Sum	
M	12	333.70	6.14291E-02	17.37		
m	13	338.47	2.47655E-02	32.72	Sum	
M	15	383.75	7.48606E-02	17.68	Sum	
m	16	386.82	1.58117E-01	11.13		
M	17	414.81	3.78844E-02	24.23		
m	18	418.44	2.29853E-02	41.93	Sum	
	19	437.33	8.46964E-02	16.24	Sum	
	20	451.32	8.14815E-03	44.32		
	21	468.35	7.54630E-03	65.54		

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE MDA REPORT

Nuclide Library Used : \\OR-GAMMA1\ApexRoot\Countroom\Library\WSRC.NLB

Nuclide Name	Energy (keV)	Yield(%)	Line MDA (pCi/units)	Nuclide MDA (pCi/units)	Activity (pCi/units)	Dec. Level (pCi/units)

Analysis Report for 2104092-02

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	Nuclide Name	Energy (keV)		Yield(%)	Line MDA (pCi/units)	Nuclide MDA (pCi/units)	Activity (pCi/units)	Dec. Level (pCi/units)
	CA-41	3.00		77.00	1.84E-13	1.84E-13	0.00E+00	0.00E+00
		3.31		12.30	4.70E-12		0.00E+00	0.00E+00
	FE-55	5.89		24.50	4.58E-09	4.58E-09	0.00E+00	0.00E+00
	CO-57	122.06		85.51	1.90E+01	1.90E+01	3.58E+00	8.64E+00
		136.48		10.60	2.26E+02		-3.89E+01	1.04E+02
	NI-59	6.92		29.80	2.55E-08	2.55E-08	0.00E+00	0.00E+00
	MO-93	16.59		52.90	9.74E-05	9.74E-05	0.00E+00	0.00E+00
		18.60		10.00	1.34E-03		0.00E+00	0.00E+00
	NB-93M	16.57		9.43	5.41E-04	5.41E-04	0.00E+00	0.00E+00
	CD-109	88.03		3.72	2.35E+02	2.35E+02	-9.76E+01	1.08E+02
	SN-113	255.12		1.93	1.10E+03	2.06E+01	-2.98E+02	4.93E+02
		391.69		61.90	2.06E+01		1.61E+01	9.41E+00
	SN-119M	23.87		16.10	5.80E-03	5.80E-03	0.00E+00	0.00E+00
		25.10		22.70	5.92E-03		0.00E+00	0.00E+00
	I-129	29.78		57.00	5.91E-01	5.91E-01	5.15E+00	2.92E-01
		33.60		13.20	5.19E+00		6.46E+00	2.56E+00
		39.58		7.52	4.41E+00		5.77E-01	2.04E+00
+	BA-133	81.00	*	34.06	3.61E+01	2.61E+01	4.90E+02	1.72E+01
		302.84	*	18.33	1.24E+02		4.67E+02	5.71E+01
		356.01	*	62.05	2.61E+01		4.40E+02	1.20E+01
	CE-139	165.85		80.35	3.53E+01	3.53E+01	9.08E+00	1.63E+01
	CE-144	133.54		10.80	2.11E+02	2.11E+02	-2.54E+01	9.74E+01
+	HG-203	279.19	*	77.30	3.45E+01	3.45E+01	2.88E+01	1.60E+01
	PB-210	46.50		4.25	1.95E+01	1.95E+01	5.03E+00	9.07E+00
	TH-231	25.64		14.70	1.06E-02	1.06E-02	0.00E+00	0.00E+00
		84.21		6.40	1.80E+02		-3.98E+01	8.52E+01
+	PA-234M	9.89		89.00	4.30E-07	4.30E-07	0.00E+00	0.00E+00
		21.72		64.90	7.08E-04		0.00E+00	0.00E+00
		37.93	*	23.75	1.92E+00		5.66E+00	9.33E-01
+	TH-234	63.29	*	3.80	1.31E+02	1.31E+02	2.92E+02	6.26E+01
	NP-237	29.37		14.00	2.20E+00	2.20E+00	1.91E+01	1.08E+00
		86.50		12.60	7.20E+01		-2.83E+01	3.33E+01
	U-237	97.08		16.30	8.08E+01	6.00E+01	2.73E+01	3.75E+01
		101.07		26.30	6.00E+01		1.20E+01	2.80E+01
		114.00		12.30	2.42E+02		-8.92E+01	1.16E+02
		208.01		22.00	1.32E+02		4.97E+00	6.04E+01
+	AM-241	59.54	*	35.90	1.38E+01	1.38E+01	3.09E+01	6.62E+00
	AM-243	74.67		66.00	9.38E+00	9.38E+00	-4.12E+00	4.37E+00

\+ = Nuclide identified during the nuclide identification
* = Energy line found in the spectrum
\> = MDA value not calculated
@ = Half-life too short to be able to perform the decay correction

Apex-Gamma

Analysis Report for 2104092-03
H-20

GAMMA SPECTRUM ANALYSIS

Sample Identification	: 2104092-03
Sample Description	: H-20
Sample Type	: RA RECOVERY
Sample Size	: 1.000E+00 units
Facility	: Countroom
Sample Taken On	: 5/3/2021 8:52:53AM
Acquisition Started	: 5/3/2021 10:39:32AM
Procedure	: BAFIL
Operator	: Administrator
Detector Name	: GE3
Geometry	: BAFIL
Live Time	: 900.0 seconds
Real Time	: 902.2 seconds
Dead Time	: 0.25 %
Peak Locate Threshold	: 2.50
Peak Locate Range (in channels)	: 1 - 4096
Peak Area Range (in channels)	: 10 - 4096
Identification Energy Tolerance	: 2.500 keV
Energy Calibration Used Done On	: 6/6/2020
Efficiency Calibration Used Done On	: 10/19/2019
Efficiency Calibration Description	:
Sample Number	: 110290

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 5/3/2021 10:54:42AM

Peak Analysis From Channel : 1
Peak Analysis To Channel : 4096

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)

Analysis Report for 2104092-03

H-20

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
	1	20.79	18 -	25	21.22	5.12E+01	45.48	3.16E+02	1.85
M	2	31.00	27 -	40	31.42	1.67E+03	87.92	1.88E+02	1.92
m	3	35.27	27 -	40	35.69	3.98E+02	53.72	1.38E+02	1.91
	4	52.18	49 -	55	52.58	3.38E+01	30.43	1.44E+02	3.70
M	5	61.96	58 -	70	62.35	2.51E+02	41.96	1.44E+02	1.91
m	6	66.33	58 -	70	66.71	8.12E+01	33.24	1.53E+02	2.00
	7	81.18	76 -	87	81.54	6.96E+02	71.64	2.93E+02	2.06
	8	95.28	90 -	100	95.62	6.18E+01	38.46	1.62E+02	7.16
	9	111.64	106 -	115	111.97	2.04E+02	51.51	2.56E+02	2.01
	10	277.03	272 -	280	277.15	3.75E+01	23.65	6.30E+01	1.70
M	11	303.11	298 -	311	303.21	1.17E+02	26.83	5.35E+01	2.26
m	12	307.11	298 -	311	307.21	2.54E+01	22.97	4.49E+01	2.26
M	13	334.15	330 -	344	334.21	6.14E+01	22.15	4.03E+01	2.28
m	14	338.15	330 -	344	338.21	2.70E+01	20.26	2.28E+01	2.28
	15	356.47	352 -	362	356.50	3.81E+02	42.61	3.95E+01	2.20
M	16	384.23	382 -	396	384.23	8.54E+01	19.70	8.50E+00	1.88
m	17	387.29	382 -	396	387.28	1.78E+02	33.12	1.79E+01	2.43
m	18	392.22	382 -	396	392.20	3.76E+01	23.52	2.02E+01	2.48
M	19	415.04	411 -	428	415.00	2.79E+01	12.49	1.98E+01	2.12
m	20	419.04	411 -	428	419.00	3.23E+01	14.42	1.02E+01	2.12
	21	437.59	433 -	442	437.52	1.02E+02	24.10	2.45E+01	2.21
	22	468.33	465 -	470	468.23	1.95E+01	11.66	1.10E+01	1.46
	23	512.27	508 -	517	512.11	2.31E+01	11.36	5.73E+00	3.44
	24	1217.23	1213 -	1218	1216.20	5.00E+00	4.47	0.00E+00	2.75

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

BACKGROUND SUBTRACT REPORT

Peak Analysis Performed on : 5/3/2021 10:54:42AM

Env. Background File : \\OR-GAMMA1\ApexRoot\Countroom\Data\0000110264.CNF

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
	1	20.79	5.12E+01	45.48			5.12E+01	4.55E+01
M	2	31.00	1.67E+03	87.92			1.67E+03	8.79E+01
m	3	35.27	3.98E+02	53.72			3.98E+02	5.37E+01
	4	52.18	3.38E+01	30.43	7.08E-01	6.90E-01	3.31E+01	3.04E+01
M	5	61.96	2.51E+02	41.96	1.48E+01	1.85E+00	2.36E+02	4.20E+01

Analysis Report for 2104092-03

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	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
m	6	66.33	8.12E+01	33.24			8.12E+01	3.32E+01
	7	81.18	6.96E+02	71.64			6.96E+02	7.16E+01
	8	95.28	6.18E+01	38.46	2.07E+01	3.53E+00	4.11E+01	3.86E+01
	9	111.64	2.04E+02	51.51			2.04E+02	5.15E+01
	10	277.03	3.75E+01	23.65			3.75E+01	2.37E+01
M	11	303.11	1.17E+02	26.83			1.17E+02	2.68E+01
m	12	307.11	2.54E+01	22.97			2.54E+01	2.30E+01
M	13	334.15	6.14E+01	22.15			6.14E+01	2.21E+01
m	14	338.15	2.70E+01	20.26			2.70E+01	2.03E+01
	15	356.47	3.81E+02	42.61			3.81E+02	4.26E+01
M	16	384.23	8.54E+01	19.70			8.54E+01	1.97E+01
m	17	387.29	1.78E+02	33.12			1.78E+02	3.31E+01
m	18	392.22	3.76E+01	23.52			3.76E+01	2.35E+01
M	19	415.04	2.79E+01	12.49			2.79E+01	1.25E+01
m	20	419.04	3.23E+01	14.42			3.23E+01	1.44E+01
	21	437.59	1.02E+02	24.10			1.02E+02	2.41E+01
	22	468.33	1.95E+01	11.66			1.95E+01	1.17E+01
	23	512.27	2.31E+01	11.36	1.49E+01	1.29E+00	8.27E+00	1.14E+01
	24	1217.23	5.00E+00	4.47			5.00E+00	4.47E+00

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : \\OR-GAMMA1\ApexRoot\Countroom\Library\WSRC.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/units)	Activity Uncertainty
SN-113	0.94	255.12		1.93		
		391.69	*	61.90	3.17E+01	2.02E+01
I-129	0.86	29.78	*	57.00	2.28E+01	1.20E+00
		33.60	*	13.20	3.94E+01	5.32E+00
		39.58		7.52		
BA-133	0.99	81.00	*	34.06	3.45E+02	4.89E+01
		302.84	*	18.33	3.86E+02	1.42E+02
		356.01	*	62.05	3.44E+02	5.74E+01
HG-203	0.88	279.19	*	77.30	3.00E+01	2.10E+01
TH-234	0.95	63.29	*	3.80	5.31E+02	9.80E+01

Analysis Report for 2104092-03
H-20

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/units)	Activity Uncertainty
AM-241	0.86	59.54	*	35.90	5.62E+01	1.04E+01

* = Energy line found in the spectrum.
\- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 2.500 keV
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma

INTERFERENCE CORRECTED REPORT

	Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/units)	Wt mean Activity Uncertainty	Comments
	SN-113	0.949	3.17E+01	2.02E+01	
	I-129	0.865	2.36E+01	1.17E+00	
	BA-133	0.997	3.47E+02	3.60E+01	
	HG-203	0.887	3.00E+01	2.10E+01	
?	TH-234	0.956	5.31E+02	9.80E+01	
X	NP-237	0.743			
?	AM-241	0.861	5.62E+01	1.04E+01	

? = nuclide is part of an undetermined solution
X = nuclide rejected by the interference analysis
@ = nuclide contains energy lines not used in Weighted Mean Activity

Errors quoted at 2.000sigma

Analysis Report for 2104092-03

H-20

UNIDENTIFIED PEAKS

Peak Locate Performed on : 5/3/2021 10:54:42AM
Peak Locate From Channel : 1
Peak Locate To Channel : 4096

	Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
	1	20.79	5.68607E-02	44.43	Tol.	PA-234M
	4	52.18	3.67923E-02	45.97		
m	6	66.33	9.02032E-02	20.47	Sum	
	8	95.28	4.56684E-02	46.99	Sum	
	9	111.64	2.26687E-01	12.62	Sum	
m	12	307.11	2.82716E-02	45.14	Sum	
M	13	334.15	6.82041E-02	18.04	Sum	
m	14	338.15	3.00130E-02	37.50	Sum	
M	16	384.23	9.48863E-02	11.53	Sum	
m	17	387.29	1.97769E-01	9.31	Sum	
M	19	415.04	3.10127E-02	22.37		
m	20	419.04	3.59095E-02	22.31	Sum	
	21	437.59	1.13046E-01	11.85	Sum	
	22	468.33	2.16444E-02	29.93		
	23	512.27	9.18740E-03	69.12		
	24	1217.23	5.55556E-03	44.72		

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE MDA REPORT

Nuclide Library Used : \\OR-GAMMA1\ApexRoot\Countroom\Library\WSRC.NLB

Analysis Report for 2104092-03

H-20

	Nuclide Name	Energy (keV)		Yield(%)	Line MDA (pCi/units)	Nuclide MDA (pCi/units)	Activity (pCi/units)	Dec. Level (pCi/units)
	CA-41	3.00		77.00	8.48E-09	8.48E-09	0.00E+00	0.00E+00
		3.31		12.30	1.24E-07		0.00E+00	0.00E+00
	FE-55	5.89		24.50	6.04E-06	6.04E-06	0.00E+00	0.00E+00
	CO-57	122.06		85.51	1.78E+01	1.78E+01	-5.83E+00	8.31E+00
		136.48		10.60	1.68E+02		6.16E+00	7.85E+01
	NI-59	6.92		29.80	1.71E-04	1.71E-04	1.47E-05	7.73E-05
	MO-93	16.59		52.90	4.15E-02	4.15E-02	-2.29E-03	1.97E-02
		18.60		10.00	4.92E-01		3.43E-03	2.36E-01
	NB-93M	16.57		9.43	2.32E-01	2.32E-01	-1.28E-02	1.10E-01
	CD-109	88.03		3.72	2.30E+02	2.30E+02	2.63E+01	1.08E+02
+	SN-113	255.12		1.93	9.85E+02	2.72E+01	5.54E+01	4.49E+02
		391.69	*	61.90	2.72E+01		3.17E+01	1.24E+01
	SN-119M	23.87		16.10	1.03E+00	8.28E-01	-1.36E-01	4.96E-01
		25.10		22.70	8.28E-01		-2.20E+01	3.96E-01
+	I-129	29.78	*	57.00	1.35E+00	1.35E+00	2.28E+01	6.55E-01
		33.60	*	13.20	9.63E+00		3.94E+01	4.68E+00
		39.58		7.52	1.49E+01		5.61E-01	7.08E+00
+	BA-133	81.00	*	34.06	4.08E+01	2.77E+01	3.45E+02	1.97E+01
		302.84	*	18.33	1.66E+02		3.86E+02	7.87E+01
		356.01	*	62.05	2.77E+01		3.44E+02	1.26E+01
	CE-139	165.85		80.35	2.70E+01	2.70E+01	-1.41E+01	1.26E+01
	CE-144	133.54		10.80	1.59E+02	1.59E+02	1.21E+01	7.44E+01
+	HG-203	279.19	*	77.30	2.88E+01	2.88E+01	3.00E+01	1.33E+01
	PB-210	46.50		4.25	3.52E+01	3.52E+01	1.10E+01	1.65E+01
	TH-231	25.64		14.70	1.41E+00	1.41E+00	-3.75E+01	6.73E-01
		84.21		6.40	2.94E+02		8.22E+02	1.43E+02
	PA-234M	9.89		89.00	1.10E-03	1.10E-03	1.27E-03	5.21E-04
		21.72		64.90	1.65E-01		1.54E-01	7.90E-02
		37.93		23.75	7.36E+00		2.17E+01	3.58E+00
+	TH-234	63.29	*	3.80	1.88E+02	1.88E+02	5.31E+02	9.09E+01
	NP-237	29.37	*	14.00	5.49E+00	5.49E+00	9.29E+01	2.67E+00
		86.50		12.60	6.98E+01		7.48E+00	3.28E+01
	U-237	97.08		16.30	7.13E+01	4.79E+01	-1.83E+01	3.36E+01
		101.07		26.30	4.79E+01		1.38E+01	2.26E+01
		114.00		12.30	2.24E+02		4.07E+01	1.08E+02
		208.01		22.00	1.16E+02		9.26E+00	5.44E+01
+	AM-241	59.54	*	35.90	1.99E+01	1.99E+01	5.62E+01	9.63E+00
	AM-243	74.67		66.00	9.64E+00	9.64E+00	1.93E+00	4.54E+00

\+ = Nuclide identified during the nuclide identification
* = Energy line found in the spectrum
\> = MDA value not calculated
@ = Half-life too short to be able to perform the decay correction

VCB 5/13/21

Apex-Gamma

Analysis Report for 2104092-04
H-20

GAMMA SPECTRUM ANALYSIS

Sample Identification	: 2104092-04
Sample Description	: H-20
Sample Type	: RA RECOVERY
Sample Size	: 1.000E+00 units
Facility	: Countroom
Sample Taken On	: 5/3/2021 8:53:05AM
Acquisition Started	: 5/3/2021 10:39:40AM
Procedure	: BAFIL
Operator	: Administrator
Detector Name	: GE4
Geometry	: BAFIL
Live Time	: 900.0 seconds
Real Time	: 903.1 seconds
Dead Time	: 0.35 %
Peak Locate Threshold	: 2.50
Peak Locate Range (in channels)	: 1 - 4096
Peak Area Range (in channels)	: 9 - 4096
Identification Energy Tolerance	: 2.500 keV
Energy Calibration Used Done On	: 8/25/2020
Efficiency Calibration Used Done On	: 10/12/2019
Efficiency Calibration Description	:
Sample Number	: 110291

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 5/3/2021 10:54:51AM

Peak Analysis From Channel : 1
Peak Analysis To Channel : 4096

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)

Analysis Report for 2104092-04

H-20

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
	1	20.40	16 -	24	19.94	5.65E+01	47.38	3.11E+02	2.42
M	2	31.10	25 -	41	30.64	1.35E+03	80.82	1.87E+02	2.35
m	3	34.97	25 -	41	34.51	3.99E+02	87.06	1.62E+02	2.97
	4	53.52	49 -	56	53.06	5.29E+01	31.69	1.32E+02	1.49
M	5	61.76	57 -	68	61.29	1.20E+02	39.60	1.50E+02	3.03
m	6	66.11	57 -	68	65.64	7.15E+01	29.14	9.71E+01	2.06
	7	81.32	76 -	86	80.84	5.34E+02	62.83	2.41E+02	2.17
M	8	112.04	107 -	121	111.55	8.99E+01	31.56	1.15E+02	2.30
m	9	116.08	107 -	121	115.59	3.22E+01	34.35	1.13E+02	2.83
	10	176.20	167 -	182	175.68	5.73E+01	43.68	1.67E+02	9.78
	11	276.82	274 -	280	276.27	4.31E+01	19.97	3.99E+01	1.65
	12	303.53	298 -	309	302.98	1.00E+02	26.23	3.60E+01	2.28
	13	319.73	315 -	323	319.17	9.78E+00	12.37	1.64E+01	1.48
	14	334.93	330 -	339	334.36	4.46E+01	21.45	4.08E+01	2.08
	15	356.18	349 -	362	355.60	2.79E+02	36.99	2.87E+01	2.35
	16	386.15	379 -	392	385.56	1.40E+02	28.50	2.86E+01	2.39
	17	421.27	416 -	427	420.67	1.17E+01	13.71	1.65E+01	8.21
	18	437.04	431 -	440	436.44	3.80E+01	14.90	1.00E+01	2.32
	19	455.09	451 -	457	454.48	5.29E+00	6.34	3.43E+00	2.69
	20	866.94	861 -	868	866.20	5.00E+00	4.47	0.00E+00	2.31

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

BACKGROUND SUBTRACT REPORT

Peak Analysis Performed on : 5/3/2021 10:54:51AM

Env. Background File : \\OR-GAMMA1\ApexRoot\Countroom\Data\0000110265.CNF

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
	1	20.40	5.65E+01	47.38			5.65E+01	4.74E+01
M	2	31.10	1.35E+03	80.82			1.35E+03	8.08E+01
m	3	34.97	3.99E+02	87.06			3.99E+02	8.71E+01
	4	53.52	5.29E+01	31.69			5.29E+01	3.17E+01
M	5	61.76	1.20E+02	39.60	1.41E+01	2.12E+00	1.05E+02	3.97E+01
m	6	66.11	7.15E+01	29.14			7.15E+01	2.91E+01
	7	81.32	5.34E+02	62.83			5.34E+02	6.28E+01
M	8	112.04	8.99E+01	31.56			8.99E+01	3.16E+01
m	9	116.08	3.22E+01	34.35			3.22E+01	3.44E+01

Analysis Report for 2104092-04

H-20

Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
10	176.20	5.73E+01	43.68			5.73E+01	4.37E+01
11	276.82	4.31E+01	19.97			4.31E+01	2.00E+01
12	303.53	1.00E+02	26.23			1.00E+02	2.62E+01
13	319.73	9.78E+00	12.37			9.78E+00	1.24E+01
14	334.93	4.46E+01	21.45			4.46E+01	2.14E+01
15	356.18	2.79E+02	36.99			2.79E+02	3.70E+01
16	386.15	1.40E+02	28.50			1.40E+02	2.85E+01
17	421.27	1.17E+01	13.71			1.17E+01	1.37E+01
18	437.04	3.80E+01	14.90			3.80E+01	1.49E+01
19	455.09	5.29E+00	6.34			5.29E+00	6.34E+00
20	866.94	5.00E+00	4.47			5.00E+00	4.47E+00

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : \\OR-GAMMA1\ApexRoot\Countroom\Library\WSRC.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/units)	Activity Uncertainty
I-129	0.80	29.78	*	57.00	4.07E+02	4.55E+01
		33.60	*	13.20	4.98E+02	1.18E+02
		39.58		7.52		
BA-133	0.99	81.00	*	34.06	2.78E+02	4.26E+01
		302.84	*	18.33	3.56E+02	1.51E+02
		356.01	*	62.05	3.79E+02	7.77E+01
HG-203	0.86	279.19	*	77.30	3.17E+01	1.74E+01
TH-234	0.94	63.29	*	3.80	4.51E+02	1.74E+02
AM-241	0.88	59.54	*	35.90	4.77E+01	1.85E+01

Analysis Report for 2104092-04

H-20

* = Energy line found in the spectrum.
\- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 2.500 keV
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma

INTERFERENCE CORRECTED REPORT

	Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/units)	Wt mean Activity Uncertainty	Comments
	I-129	0.800	4.19E+02	4.25E+01	
	BA-133	0.997	3.05E+02	3.63E+01	
	HG-203	0.866	3.17E+01	1.74E+01	
?	TH-234	0.942	4.51E+02	1.74E+02	
?	AM-241	0.881	4.77E+01	1.85E+01	

? = nuclide is part of an undetermined solution
X = nuclide rejected by the interference analysis
@ = nuclide contains energy lines not used in Weighted Mean Activity

Errors quoted at 2.000sigma

Analysis Report for 2104092-04

H-20

UNIDENTIFIED PEAKS

Peak Locate Performed on : 5/3/2021 10:54:51AM
Peak Locate From Channel : 1
Peak Locate To Channel : 4096

	Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
	1	20.40	6.27306E-02	41.96	Tol.	PA-234M
	4	53.52	5.87628E-02	29.96		
m	6	66.11	7.94956E-02	20.36	Sum	
M	8	112.04	9.98675E-02	17.55	Sum	
m	9	116.08	3.57328E-02	53.41	Sum	
	10	176.20	6.36879E-02	38.10		
	13	319.73	1.08642E-02	63.25		
	14	334.93	4.95385E-02	24.05	Sum	
	16	386.15	1.55216E-01	10.20	Sum	
	17	421.27	1.30278E-02	58.47		
	18	437.04	4.22222E-02	19.60	Sum	
	19	455.09	5.87302E-03	60.01		
	20	866.94	5.55556E-03	44.72		

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE MDA REPORT

Nuclide Library Used : \\OR-GAMMA1\ApexRoot\Countroom\Library\WSRC.NLB

Nuclide Name	Energy (keV)	Yield(%)	Line MDA (pCi/units)	Nuclide MDA (pCi/units)	Activity (pCi/units)	Dec. Level (pCi/units)
CA-41	3.00	77.00	1.38E+01	1.38E+01	0.00E+00	0.00E+00
	3.31	12.30	6.90E+01		0.00E+00	0.00E+00

Analysis Report for 2104092-04

H-20

	Nuclide Name	Energy (keV)		Yield(%)	Line MDA (pCi/units)	Nuclide MDA (pCi/units)	Activity (pCi/units)	Dec. Level (pCi/units)
	FE-55	5.89		24.50	1.10E+01	1.10E+01	0.00E+00	0.00E+00
	CO-57	122.06		85.51	1.05E+01	1.05E+01	-1.56E-01	4.91E+00
		136.48		10.60	9.46E+01		-1.77E+01	4.41E+01
	NI-59	6.92		29.80	4.96E+01	4.96E+01	-1.91E+01	2.13E+01
	MO-93	16.59		52.90	2.82E+01	2.82E+01	1.41E+00	1.34E+01
		18.60		10.00	1.50E+02		9.71E+01	7.17E+01
	NB-93M	16.57		9.43	1.58E+02	1.58E+02	7.94E+00	7.54E+01
	CD-109	88.03		3.72	2.08E+02	2.08E+02	-1.15E+02	9.72E+01
	SN-113	255.12		1.93	5.74E+02	6.27E+01	-2.21E+02	2.52E+02
		391.69		61.90	6.27E+01		-2.41E+00	2.92E+01
	SN-119M	23.87		16.10	7.58E+01	4.95E+01	-2.87E+01	3.63E+01
		25.10		22.70	4.95E+01		-8.50E+02	2.36E+01
+	I-129	29.78	*	57.00	3.17E+01	3.17E+01	4.07E+02	1.55E+01
		33.60	*	13.20	1.31E+02		4.98E+02	6.39E+01
		39.58		7.52	1.27E+02		-1.21E+02	6.07E+01
+	BA-133	81.00	*	34.06	3.79E+01	3.79E+01	2.78E+02	1.83E+01
		302.84	*	18.33	1.09E+02		3.56E+02	4.97E+01
		356.01	*	62.05	3.93E+01		3.79E+02	1.78E+01
	CE-139	165.85		80.35	1.45E+01	1.45E+01	-1.16E+00	6.74E+00
	CE-144	133.54		10.80	8.57E+01	8.57E+01	-2.96E+01	3.98E+01
+	HG-203	279.19	*	77.30	2.02E+01	2.02E+01	3.17E+01	9.12E+00
	PB-210	46.50		4.25	1.45E+02	1.45E+02	-3.30E+00	6.77E+01
	TH-231	25.64		14.70	7.55E+01	7.55E+01	-1.30E+03	3.60E+01
		84.21		6.40	2.76E+02		7.55E+02	1.34E+02
	PA-234M	9.89		89.00	2.10E+01	2.03E+01	9.43E+00	9.82E+00
		21.72		64.90	2.03E+01		1.09E+01	9.74E+00
		37.93		23.75	6.42E+01		1.08E+02	3.12E+01
+	TH-234	63.29	*	3.80	2.88E+02	2.88E+02	4.51E+02	1.38E+02
	NP-237	29.37		14.00	2.24E+02	6.51E+01	1.39E+03	1.10E+02
		86.50		12.60	6.51E+01		-3.10E+00	3.06E+01
	U-237	97.08		16.30	4.94E+01	2.91E+01	-1.88E+01	2.31E+01
		101.07		26.30	2.91E+01		1.53E+00	1.35E+01
		114.00		12.30	1.19E+02		2.27E+02	5.72E+01
		208.01		22.00	7.49E+01		1.33E+01	3.51E+01
+	AM-241	59.54	*	35.90	3.05E+01	3.05E+01	4.77E+01	1.46E+01
	AM-243	74.67		66.00	1.15E+01	1.15E+01	-3.38E+00	5.41E+00

\+ = Nuclide identified during the nuclide identification
* = Energy line found in the spectrum
\> = MDA value not calculated
@ = Half-life too short to be able to perform the decay correction

Apex-Gamma

Analysis Report for 2104092-05
H-22

GAMMA SPECTRUM ANALYSIS

Sample Identification	: 2104092-05
Sample Description	: H-22
Sample Type	: RA RECOVERY
Sample Size	: 1.000E+00 units
Facility	: Countroom
Sample Taken On	: 5/3/2021 8:53:16AM
Acquisition Started	: 5/3/2021 10:55:20AM
Procedure	: BAFIL
Operator	: Administrator
Detector Name	: GE2
Geometry	: BAFIL
Live Time	: 900.0 seconds
Real Time	: 900.2 seconds
Dead Time	: 0.02 %
Peak Locate Threshold	: 2.50
Peak Locate Range (in channels)	: 1 - 4096
Peak Area Range (in channels)	: 29 - 4096
Identification Energy Tolerance	: 2.500 keV
Energy Calibration Used Done On	: 6/6/2020
Efficiency Calibration Used Done On	: 9/14/2019
Efficiency Calibration Description	:
Sample Number	: 110293

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 5/3/2021 11:10:23AM

Peak Analysis From Channel : 1
Peak Analysis To Channel : 4096

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)

Analysis Report for 2104092-05

H-22

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
	1	35.58	36 -	40	36.27	3.09E+02	67.61	2.80E+02	1.75
	2	53.13	50 -	57	53.80	7.52E+01	33.76	1.40E+02	1.12
M	3	61.76	58 -	70	62.43	1.80E+02	37.27	1.18E+02	1.87
m	4	66.04	58 -	70	66.70	9.42E+01	33.60	1.35E+02	1.88
	5	81.08	78 -	85	81.72	7.59E+02	66.57	2.34E+02	1.37
	6	111.62	107 -	115	112.23	1.35E+02	43.77	2.12E+02	1.97
	7	116.73	116 -	120	117.34	3.64E+01	25.56	1.13E+02	1.10
	8	276.35	272 -	280	276.79	7.62E+01	22.58	3.15E+01	1.63
	9	302.88	297 -	306	303.29	1.37E+02	34.32	9.00E+01	1.95
	10	307.65	307 -	310	308.06	2.64E+01	13.42	1.52E+01	1.47
	11	333.60	331 -	336	333.99	4.69E+01	16.67	1.81E+01	1.72
	12	337.98	337 -	342	338.36	2.22E+01	13.82	1.96E+01	1.43
m	13	356.11	351 -	362	356.47	4.96E+02	44.97	7.58E+00	1.62
M	14	384.03	382 -	394	384.36	1.21E+02	22.00	1.39E+01	2.02
m	15	387.26	382 -	394	387.60	1.32E+02	27.63	1.06E+01	1.83
m	16	391.19	382 -	394	391.52	3.60E+01	16.03	7.05E+00	1.97
M	17	414.73	411 -	423	415.04	3.35E+01	13.53	7.68E+00	2.14
m	18	418.23	411 -	423	418.53	2.05E+01	16.34	9.96E+00	2.14
	19	437.11	433 -	441	437.40	7.58E+01	21.20	2.24E+01	1.74
	20	467.91	465 -	471	468.17	8.61E+00	9.63	1.08E+01	2.14
	21	511.04	508 -	516	511.25	4.00E+01	12.65	0.00E+00	3.82
	22	609.97	606 -	614	610.09	1.04E+01	10.02	9.20E+00	1.66
	23	719.71	716 -	724	719.73	1.10E+01	6.63	0.00E+00	3.22

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

BACKGROUND SUBTRACT REPORT

Peak Analysis Performed on : 5/3/2021 11:10:23AM

Env. Background File : \\OR-GAMMA1\ApexRoot\Countroom\Data\0000110263.CNF

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
	1	35.58	3.09E+02	67.61			3.09E+02	6.76E+01
	2	53.13	7.52E+01	33.76			7.52E+01	3.38E+01
M	3	61.76	1.80E+02	37.27	7.25E+00	7.41E-01	1.72E+02	3.73E+01
m	4	66.04	9.42E+01	33.60	7.64E-01	2.89E-01	9.34E+01	3.36E+01
	5	81.08	7.59E+02	66.57			7.59E+02	6.66E+01
	6	111.62	1.35E+02	43.77			1.35E+02	4.38E+01

Analysis Report for 2104092-05

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	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
	7	116.73	3.64E+01	25.56			3.64E+01	2.56E+01
	8	276.35	7.62E+01	22.58			7.62E+01	2.26E+01
	9	302.88	1.37E+02	34.32			1.37E+02	3.43E+01
	10	307.65	2.64E+01	13.42			2.64E+01	1.34E+01
	11	333.60	4.69E+01	16.67			4.69E+01	1.67E+01
	12	337.98	2.22E+01	13.82			2.22E+01	1.38E+01
m	13	356.11	4.96E+02	44.97			4.96E+02	4.50E+01
M	14	384.03	1.21E+02	22.00			1.21E+02	2.20E+01
m	15	387.26	1.32E+02	27.63			1.32E+02	2.76E+01
m	16	391.19	3.60E+01	16.03			3.60E+01	1.60E+01
M	17	414.73	3.35E+01	13.53			3.35E+01	1.35E+01
m	18	418.23	2.05E+01	16.34			2.05E+01	1.63E+01
	19	437.11	7.58E+01	21.20			7.58E+01	2.12E+01
	20	467.91	8.61E+00	9.63			8.61E+00	9.63E+00
	21	511.04	4.00E+01	12.65	1.86E+01	1.24E+00	2.14E+01	1.27E+01
	22	609.97	1.04E+01	10.02	1.73E+00	9.16E-01	8.67E+00	1.01E+01
	23	719.71	1.10E+01	6.63			1.10E+01	6.63E+00

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : \\OR-GAMMA1\ApexRoot\Countroom\Library\WSRC.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/units)	Activity Uncertainty
SN-113	0.95	255.12		1.93		
		391.69	*	61.90	2.37E+01	1.08E+01
BA-133	1.00	81.00	*	34.06	4.63E+02	6.22E+01
		302.84	*	18.33	4.87E+02	1.92E+02
		356.01	*	62.05	3.97E+02	5.70E+01
PA-234M	0.98	9.89		89.00		
		21.72		64.90		
		37.93	*	23.75	6.38E+00	1.40E+00
TH-234	0.94	63.29	*	3.80	3.53E+02	7.77E+01
AM-241	0.88	59.54	*	35.90	3.74E+01	8.22E+00

Analysis Report for 2104092-05

H-22

* = Energy line found in the spectrum.
\- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 2.500 keV
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma

INTERFERENCE CORRECTED REPORT

	Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/units)	Wt mean Activity Uncertainty	Comments
	SN-113	0.959	2.37E+01	1.08E+01	
	BA-133	1.000	4.30E+02	4.10E+01	
	PA-234M	0.981	6.38E+00	1.40E+00	
?	TH-234	0.942	3.53E+02	7.77E+01	
?	AM-241	0.881	3.74E+01	8.22E+00	

? = nuclide is part of an undetermined solution
X = nuclide rejected by the interference analysis
@ = nuclide contains energy lines not used in Weighted Mean Activity

Errors quoted at 2.000sigma

Analysis Report for 2104092-05
H-22

UNIDENTIFIED PEAKS

Peak Locate Performed on : 5/3/2021 11:10:23AM
Peak Locate From Channel : 1
Peak Locate To Channel : 4096

	Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
	2	53.13	8.35364E-02	22.45		
m	4	66.04	1.03791E-01	17.99		
	6	111.62	1.49929E-01	16.22	Tol.	U-237
	7	116.73	4.04182E-02	35.13	Sum	
	8	276.35	8.46981E-02	14.81		
	10	307.65	2.93301E-02	25.41		
	11	333.60	5.21627E-02	17.76		
	12	337.98	2.46528E-02	31.14	Sum	
M	14	384.03	1.34785E-01	9.07	Sum	
m	15	387.26	1.46204E-01	10.50		
M	17	414.73	3.71963E-02	20.20		
m	18	418.23	2.27666E-02	39.87	Sum	
	19	437.11	8.42401E-02	13.98	Sum	
	20	467.91	9.56349E-03	55.95		
	21	511.04	2.38300E-02	29.63		
	22	609.97	9.63479E-03	58.05		
	23	719.71	1.22222E-02	30.15		

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE MDA REPORT

Nuclide Library Used : \\OR-GAMMA1\ApexRoot\Countroom\Library\WSRC.NLB

Analysis Report for 2104092-05

H-22

	Nuclide Name	Energy (keV)		Yield(%)	Line MDA (pCi/units)	Nuclide MDA (pCi/units)	Activity (pCi/units)	Dec. Level (pCi/units)
	CA-41	3.00		77.00	1.84E-13	1.84E-13	0.00E+00	0.00E+00
		3.31		12.30	4.70E-12		0.00E+00	0.00E+00
	FE-55	5.89		24.50	4.58E-09	4.58E-09	0.00E+00	0.00E+00
	CO-57	122.06		85.51	2.31E+01	2.31E+01	-1.21E-01	1.07E+01
		136.48		10.60	2.06E+02		-9.39E+01	9.47E+01
	NI-59	6.92		29.80	2.55E-08	2.55E-08	0.00E+00	0.00E+00
	MO-93	16.59		52.90	9.74E-05	9.74E-05	0.00E+00	0.00E+00
		18.60		10.00	1.34E-03		0.00E+00	0.00E+00
	NB-93M	16.57		9.43	5.41E-04	5.41E-04	0.00E+00	0.00E+00
	CD-109	88.03		3.72	2.66E+02	2.66E+02	9.36E+01	1.23E+02
+	SN-113	255.12		1.93	1.18E+03	1.80E+01	-2.45E+02	5.37E+02
		391.69	*	61.90	1.80E+01		2.37E+01	8.12E+00
	SN-119M	23.87		16.10	5.80E-03	5.80E-03	0.00E+00	0.00E+00
		25.10		22.70	5.92E-03		0.00E+00	0.00E+00
	I-129	29.78		57.00	5.84E-01	5.84E-01	4.99E+00	2.88E-01
		33.60		13.20	5.13E+00		1.33E+00	2.53E+00
		39.58		7.52	4.60E+00		7.73E-01	2.14E+00
+	BA-133	81.00	*	34.06	3.91E+01	1.68E+01	4.63E+02	1.87E+01
		302.84	*	18.33	1.56E+02		4.87E+02	7.34E+01
		356.01	*	62.05	1.68E+01		3.97E+02	7.31E+00
	CE-139	165.85		80.35	3.94E+01	3.94E+01	1.20E+01	1.83E+01
	CE-144	133.54		10.80	2.19E+02	2.19E+02	1.33E+02	1.01E+02
	HG-203	279.19		77.30	2.55E+01	2.55E+01	2.80E+00	1.15E+01
	PB-210	46.50		4.25	1.62E+01	1.62E+01	-9.21E+00	7.40E+00
	TH-231	25.64		14.70	1.06E-02	1.06E-02	0.00E+00	0.00E+00
		84.21		6.40	1.79E+02		-3.79E+01	8.48E+01
+	PA-234M	9.89		89.00	4.30E-07	4.30E-07	0.00E+00	0.00E+00
		21.72		64.90	7.08E-04		0.00E+00	0.00E+00
		37.93	*	23.75	2.02E+00		6.38E+00	9.80E-01
+	TH-234	63.29	*	3.80	1.56E+02	1.56E+02	3.53E+02	7.54E+01
	NP-237	29.37		14.00	2.17E+00	2.17E+00	1.85E+01	1.07E+00
		86.50		12.60	8.06E+01		-4.54E+01	3.76E+01
	U-237	97.08		16.30	8.02E+01	5.25E+01	-1.28E+01	3.72E+01
		101.07		26.30	5.25E+01		-2.69E+00	2.43E+01
		114.00		12.30	2.40E+02		-7.12E+00	1.14E+02
		208.01		22.00	1.29E+02		8.25E+01	5.90E+01
+	AM-241	59.54	*	35.90	1.66E+01	1.66E+01	3.74E+01	7.98E+00
	AM-243	74.67		66.00	9.52E+00	9.52E+00	-1.68E+00	4.44E+00

\+ = Nuclide identified during the nuclide identification
* = Energy line found in the spectrum
\> = MDA value not calculated
@ = Half-life too short to be able to perform the decay correction

Apex-Gamma

Analysis Report for 2104092-06
H-23

GAMMA SPECTRUM ANALYSIS

Sample Identification	: 2104092-06
Sample Description	: H-23
Sample Type	: RA RECOVERY
Sample Size	: 1.000E+00 units
Facility	: Countroom
Sample Taken On	: 5/3/2021 8:53:28AM
Acquisition Started	: 5/3/2021 10:55:26AM
Procedure	: BAFIL
Operator	: Administrator
Detector Name	: GE3
Geometry	: BAFIL
Live Time	: 900.0 seconds
Real Time	: 902.1 seconds
Dead Time	: 0.24 %
Peak Locate Threshold	: 2.50
Peak Locate Range (in channels)	: 1 - 4096
Peak Area Range (in channels)	: 10 - 4096
Identification Energy Tolerance	: 2.500 keV
Energy Calibration Used Done On	: 6/6/2020
Efficiency Calibration Used Done On	: 10/19/2019
Efficiency Calibration Description	:
Sample Number	: 110294

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 5/3/2021 11:10:35AM

Peak Analysis From Channel : 1
Peak Analysis To Channel : 4096

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)

Analysis Report for 2104092-06

H-23

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
	1	20.74	17 -	24	21.17	1.08E+02	45.43	2.71E+02	2.21
M	2	30.98	25 -	40	31.40	1.99E+03	94.29	1.81E+02	1.99
m	3	35.30	25 -	40	35.72	4.91E+02	58.64	1.65E+02	2.00
m	4	53.22	43 -	56	53.62	7.00E+01	35.44	1.63E+02	2.22
M	5	62.05	58 -	69	62.44	2.78E+02	47.30	1.85E+02	2.26
m	6	66.12	58 -	69	66.51	1.25E+02	42.63	1.61E+02	2.06
	7	81.22	77 -	87	81.58	8.10E+02	70.69	2.28E+02	2.11
M	8	107.07	106 -	124	107.40	1.47E+01	15.30	5.73E+01	2.30
m	9	112.07	106 -	124	112.40	2.46E+02	40.64	1.18E+02	2.08
m	10	116.41	106 -	124	116.73	4.88E+01	37.92	1.44E+02	2.31
	11	276.90	273 -	280	277.03	4.57E+01	24.74	7.07E+01	1.30
M	12	303.20	296 -	316	303.30	1.54E+02	27.97	3.80E+01	2.37
m	13	307.52	296 -	316	307.61	4.19E+01	18.38	1.83E+01	1.99
	14	333.83	329 -	338	333.88	4.86E+01	35.76	1.55E+02	1.49
	15	356.37	350 -	361	356.40	4.78E+02	46.39	2.96E+01	2.10
	16	364.87	362 -	368	364.89	1.35E+01	16.94	4.29E+01	1.82
M	17	384.87	381 -	394	384.86	1.21E+02	36.00	2.84E+01	2.77
m	18	387.43	381 -	394	387.42	1.86E+02	32.48	1.03E+01	1.82
m	19	391.47	381 -	394	391.46	5.52E+01	25.00	2.73E+00	2.45
	20	406.85	403 -	410	406.82	1.02E+01	10.58	1.16E+01	3.12
M	21	415.19	411 -	421	415.15	3.06E+01	19.35	2.89E+01	2.33
m	22	418.26	411 -	421	418.21	2.49E+01	19.25	4.92E+01	2.33
	23	437.14	433 -	441	437.07	1.01E+02	21.55	9.75E+00	1.93

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

BACKGROUND SUBTRACT REPORT

Peak Analysis Performed on : 5/3/2021 11:10:35AM

Env. Background File : \\OR-GAMMA1\ApexRoot\Countroom\Data\0000110264.CNF

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
	1	20.74	1.08E+02	45.43			1.08E+02	4.54E+01
M	2	30.98	1.99E+03	94.29			1.99E+03	9.43E+01
m	3	35.30	4.91E+02	58.64			4.91E+02	5.86E+01
m	4	53.22	7.00E+01	35.44	7.08E-01	6.90E-01	6.93E+01	3.55E+01
M	5	62.05	2.78E+02	47.30	1.48E+01	1.85E+00	2.63E+02	4.73E+01
m	6	66.12	1.25E+02	42.63			1.25E+02	4.26E+01

Analysis Report for 2104092-06

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	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
	7	81.22	8.10E+02	70.69			8.10E+02	7.07E+01
M	8	107.07	1.47E+01	15.30			1.47E+01	1.53E+01
m	9	112.07	2.46E+02	40.64			2.46E+02	4.06E+01
m	10	116.41	4.88E+01	37.92			4.88E+01	3.79E+01
	11	276.90	4.57E+01	24.74			4.57E+01	2.47E+01
M	12	303.20	1.54E+02	27.97			1.54E+02	2.80E+01
m	13	307.52	4.19E+01	18.38			4.19E+01	1.84E+01
	14	333.83	4.86E+01	35.76			4.86E+01	3.58E+01
	15	356.37	4.78E+02	46.39			4.78E+02	4.64E+01
	16	364.87	1.35E+01	16.94			1.35E+01	1.69E+01
M	17	384.87	1.21E+02	36.00			1.21E+02	3.60E+01
m	18	387.43	1.86E+02	32.48			1.86E+02	3.25E+01
m	19	391.47	5.52E+01	25.00			5.52E+01	2.50E+01
	20	406.85	1.02E+01	10.58			1.02E+01	1.06E+01
M	21	415.19	3.06E+01	19.35			3.06E+01	1.94E+01
m	22	418.26	2.49E+01	19.25			2.49E+01	1.92E+01
	23	437.14	1.01E+02	21.55			1.01E+02	2.16E+01

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : \\OR-GAMMA1\ApexRoot\Countroom\Library\WSRC.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/units)	Activity Uncertainty
SN-113	0.95	255.12		1.93		
		391.69	*	61.90	4.66E+01	2.18E+01
I-129	0.86	29.78	*	57.00	2.71E+01	1.29E+00
		33.60	*	13.20	4.87E+01	5.83E+00
		39.58		7.52		
BA-133	0.99	81.00	*	34.06	4.02E+02	5.27E+01
		302.84	*	18.33	5.07E+02	1.73E+02
		356.01	*	62.05	4.31E+02	6.80E+01
HG-203	0.87	279.19	*	77.30	3.65E+01	2.27E+01
TH-234	0.96	63.29	*	3.80	5.93E+02	1.11E+02

Analysis Report for 2104092-06

H-23

* = Energy line found in the spectrum.
\- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 2.500 keV
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma

INTERFERENCE CORRECTED REPORT

	Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/units)	Wt mean Activity Uncertainty	Comments
	SN-113	0.954	4.66E+01	2.18E+01	
	I-129	0.865	2.81E+01	1.26E+00	
	BA-133	0.997	4.18E+02	4.05E+01	
	HG-203	0.875	3.65E+01	2.27E+01	
	TH-234	0.961	5.93E+02	1.11E+02	
X	NP-237	0.744			

? = nuclide is part of an undetermined solution
X = nuclide rejected by the interference analysis
@ = nuclide contains energy lines not used in Weighted Mean Activity

Errors quoted at 2.000sigma

Analysis Report for 2104092-06

H-23

UNIDENTIFIED PEAKS

Peak Locate Performed on : 5/3/2021 11:10:35AM
Peak Locate From Channel : 1
Peak Locate To Channel : 4096

	Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
	1	20.74	1.20528E-01	20.94	Tol.	PA-234M
m	4	53.22	7.69706E-02	25.59		
m	6	66.12	1.38713E-01	17.07	Sum	
M	8	107.07	1.63102E-02	52.10		
m	9	112.07	2.73480E-01	8.26	Sum	
m	10	116.41	5.42431E-02	38.84	Sum	
m	13	307.52	4.65582E-02	21.94	Sum	
	14	333.83	5.40079E-02	36.79	Sum	
	16	364.87	1.50317E-02	62.61	Sum	
M	17	384.87	1.34603E-01	14.86	Sum	
m	18	387.43	2.07084E-01	8.71	Sum	
	20	406.85	1.13542E-02	51.78		
M	21	415.19	3.40374E-02	31.59		
m	22	418.26	2.76896E-02	38.62	Sum	
	23	437.14	1.12358E-01	10.66	Sum	

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE MDA REPORT

Nuclide Library Used : \\OR-GAMMA1\ApexRoot\Countroom\Library\WSRC.NLB

Analysis Report for 2104092-06

H-23

	Nuclide Name	Energy (keV)		Yield(%)	Line MDA (pCi/units)	Nuclide MDA (pCi/units)	Activity (pCi/units)	Dec. Level (pCi/units)
	CA-41	3.00		77.00	8.48E-09	8.48E-09	0.00E+00	0.00E+00
		3.31		12.30	1.24E-07		0.00E+00	0.00E+00
	FE-55	5.89		24.50	6.04E-06	6.04E-06	0.00E+00	0.00E+00
	CO-57	122.06		85.51	1.76E+01	1.76E+01	-1.81E+01	8.25E+00
		136.48		10.60	1.64E+02		-7.41E+01	7.68E+01
	NI-59	6.92		29.80	1.29E-04	1.29E-04	-5.00E-05	5.64E-05
	MO-93	16.59		52.90	4.56E-02	4.56E-02	3.60E-03	2.18E-02
		18.60		10.00	5.34E-01		6.98E-01	2.57E-01
	NB-93M	16.57		9.43	2.54E-01	2.54E-01	2.01E-02	1.21E-01
	CD-109	88.03		3.72	2.43E+02	2.43E+02	-9.05E+01	1.14E+02
+	SN-113	255.12		1.93	1.01E+03	2.43E+01	-3.09E+02	4.61E+02
		391.69	*	61.90	2.43E+01		4.66E+01	1.10E+01
	SN-119M	23.87		16.10	1.11E+00	9.18E-01	-7.17E-01	5.33E-01
		25.10		22.70	9.18E-01		-2.46E+01	4.41E-01
+	I-129	29.78	*	57.00	1.48E+00	1.48E+00	2.71E+01	7.20E-01
		33.60	*	13.20	1.07E+01		4.87E+01	5.23E+00
		39.58		7.52	1.69E+01		2.84E+00	8.11E+00
+	BA-133	81.00	*	34.06	3.55E+01	2.54E+01	4.02E+02	1.71E+01
		302.84	*	18.33	1.95E+02		5.07E+02	9.31E+01
		356.01	*	62.05	2.54E+01		4.31E+02	1.15E+01
	CE-139	165.85		80.35	2.85E+01	2.85E+01	-3.09E+00	1.34E+01
	CE-144	133.54		10.80	1.62E+02	1.62E+02	-5.37E+01	7.59E+01
+	HG-203	279.19	*	77.30	2.94E+01	2.94E+01	3.65E+01	1.36E+01
	PB-210	46.50		4.25	4.35E+01	4.35E+01	-1.21E+01	2.06E+01
	TH-231	25.64		14.70	1.56E+00	1.56E+00	-4.18E+01	7.49E-01
		84.21		6.40	3.02E+02		8.36E+02	1.47E+02
	PA-234M	9.89		89.00	1.04E-03	1.04E-03	9.73E-04	4.89E-04
		21.72		64.90	1.78E-01		1.82E-01	8.58E-02
		37.93		23.75	8.12E+00		2.53E+01	3.96E+00
+	TH-234	63.29	*	3.80	1.86E+02	1.86E+02	5.93E+02	8.98E+01
	NP-237	29.37	*	14.00	6.01E+00	6.01E+00	1.10E+02	2.93E+00
		86.50		12.60	7.09E+01		-6.31E+00	3.34E+01
	U-237	97.08		16.30	7.35E+01	4.94E+01	-3.42E+01	3.47E+01
		101.07		26.30	4.94E+01		1.79E+01	2.33E+01
		114.00		12.30	2.42E+02		7.07E+02	1.18E+02
		208.01		22.00	1.16E+02		-5.48E+01	5.41E+01
	AM-241	59.54		35.90	1.91E+01	1.91E+01	3.89E+01	9.24E+00
	AM-243	74.67		66.00	1.04E+01	1.04E+01	1.79E+00	4.91E+00

\+ = Nuclide identified during the nuclide identification
* = Energy line found in the spectrum
\> = MDA value not calculated
@ = Half-life too short to be able to perform the decay correction

Apex-Gamma

Analysis Report for 2104092-07
H-24

GAMMA SPECTRUM ANALYSIS

Sample Identification	: 2104092-07
Sample Description	: H-24
Sample Type	: RA RECOVERY
Sample Size	: 1.000E+00 units
Facility	: Countroom
Sample Taken On	: 5/3/2021 8:53:40AM
Acquisition Started	: 5/3/2021 10:55:34AM
Procedure	: BAFIL
Operator	: Administrator
Detector Name	: GE4
Geometry	: BAFIL
Live Time	: 900.0 seconds
Real Time	: 903.4 seconds
Dead Time	: 0.38 %
Peak Locate Threshold	: 2.50
Peak Locate Range (in channels)	: 1 - 4096
Peak Area Range (in channels)	: 9 - 4096
Identification Energy Tolerance	: 2.500 keV
Energy Calibration Used Done On	: 8/25/2020
Efficiency Calibration Used Done On	: 10/12/2019
Efficiency Calibration Description	:
Sample Number	: 110295

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 5/3/2021 11:10:45AM

Peak Analysis From Channel : 1
Peak Analysis To Channel : 4096

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)

Analysis Report for 2104092-07

H-24

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
M	1	20.57	17 -	40	20.12	6.93E+01	37.70	3.06E+02	2.55
m	2	31.14	17 -	40	30.68	1.94E+03	96.72	2.67E+02	2.43
m	3	35.47	17 -	40	35.01	4.49E+02	86.75	1.77E+02	2.35
	4	52.60	48 -	56	52.14	6.71E+01	37.97	1.82E+02	1.85
M	5	61.95	57 -	69	61.48	1.98E+02	45.17	1.99E+02	2.75
m	6	65.62	57 -	69	65.15	9.07E+01	47.75	2.19E+02	2.76
	7	81.42	74 -	87	80.94	7.78E+02	81.46	3.91E+02	2.46
M	8	112.26	105 -	119	111.77	1.72E+02	40.84	1.57E+02	2.57
m	9	117.26	105 -	119	116.77	4.05E+01	26.44	9.00E+01	2.57
	10	275.86	269 -	280	275.31	6.51E+01	30.53	8.38E+01	1.40
M	11	303.26	298 -	311	302.70	1.15E+02	28.43	4.91E+01	2.76
m	12	307.08	298 -	311	306.52	3.15E+01	27.78	3.87E+01	2.82
	13	334.25	328 -	339	333.68	6.97E+01	29.26	7.26E+01	2.20
	14	356.43	350 -	362	355.85	3.64E+02	45.99	7.66E+01	2.25
	15	386.51	379 -	394	385.92	2.34E+02	34.23	2.29E+01	4.94
M	16	413.97	409 -	431	413.37	2.01E+01	14.83	2.25E+01	3.39
m	17	419.69	409 -	431	419.09	2.54E+01	18.25	2.42E+01	3.39
	18	437.28	432 -	440	436.68	5.20E+01	18.03	1.80E+01	2.25
	19	467.29	463 -	470	466.67	1.90E+01	11.14	8.00E+00	2.64
	20	665.41	662 -	667	664.73	4.42E+00	5.74	3.17E+00	1.88
	21	921.95	917 -	923	921.20	5.00E+00	4.47	0.00E+00	2.75

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

BACKGROUND SUBTRACT REPORT

Peak Analysis Performed on : 5/3/2021 11:10:45AM

Env. Background File : \\OR-GAMMA1\ApexRoot\Countroom\Data\0000110265.CNF

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
M	1	20.57	6.93E+01	37.70			6.93E+01	3.77E+01
m	2	31.14	1.94E+03	96.72			1.94E+03	9.67E+01
m	3	35.47	4.49E+02	86.75			4.49E+02	8.68E+01
	4	52.60	6.71E+01	37.97			6.71E+01	3.80E+01
M	5	61.95	1.98E+02	45.17	1.41E+01	2.12E+00	1.84E+02	4.52E+01
m	6	65.62	9.07E+01	47.75	1.41E+01	2.12E+00	7.66E+01	4.78E+01
	7	81.42	7.78E+02	81.46			7.78E+02	8.15E+01
M	8	112.26	1.72E+02	40.84			1.72E+02	4.08E+01

Analysis Report for 2104092-07

H-24

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
m	9	117.26	4.05E+01	26.44			4.05E+01	2.64E+01
	10	275.86	6.51E+01	30.53			6.51E+01	3.05E+01
M	11	303.26	1.15E+02	28.43			1.15E+02	2.84E+01
m	12	307.08	3.15E+01	27.78			3.15E+01	2.78E+01
	13	334.25	6.97E+01	29.26			6.97E+01	2.93E+01
	14	356.43	3.64E+02	45.99			3.64E+02	4.60E+01
	15	386.51	2.34E+02	34.23			2.34E+02	3.42E+01
M	16	413.97	2.01E+01	14.83			2.01E+01	1.48E+01
m	17	419.69	2.54E+01	18.25			2.54E+01	1.82E+01
	18	437.28	5.20E+01	18.03			5.20E+01	1.80E+01
	19	467.29	1.90E+01	11.14			1.90E+01	1.11E+01
	20	665.41	4.42E+00	5.74			4.42E+00	5.74E+00
	21	921.95	5.00E+00	4.47			5.00E+00	4.47E+00

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : \\OR-GAMMA1\ApexRoot\Countroom\Library\WSRC.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/units)	Activity Uncertainty
I-129	0.79	29.78	*	57.00	5.84E+02	6.24E+01
		33.60	*	13.20	5.60E+02	1.19E+02
		39.58		7.52		
BA-133	0.99	81.00	*	34.06	4.06E+02	5.82E+01
		302.84	*	18.33	4.09E+02	1.70E+02
		356.01	*	62.05	4.95E+02	9.96E+01
PA-234M	0.33	9.89		89.00		
		21.72	*	64.90	2.28E+01	1.27E+01
		37.93	*	23.75	3.11E+02	6.64E+01
TH-234	0.95	63.29	*	3.80	7.86E+02	2.06E+02
AM-241	0.86	59.54	*	35.90	8.32E+01	2.18E+01

Analysis Report for 2104092-07

H-24

* = Energy line found in the spectrum.
\- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 2.500 keV
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma

INTERFERENCE CORRECTED REPORT

	Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/units)	Wt mean Activity Uncertainty	Comments
	I-129	0.791	5.71E+02	5.55E+01	
	BA-133	0.996	4.27E+02	4.82E+01	
	PA-234M	0.333	2.18E+01	1.25E+01	
?	TH-234	0.955	7.86E+02	2.06E+02	
?	AM-241	0.862	8.32E+01	2.18E+01	

? = nuclide is part of an undetermined solution
X = nuclide rejected by the interference analysis
@ = nuclide contains energy lines not used in Weighted Mean Activity

Errors quoted at 2.000sigma

Analysis Report for 2104092-07
H-24

UNIDENTIFIED PEAKS

Peak Locate Performed on : 5/3/2021 11:10:45AM
Peak Locate From Channel : 1
Peak Locate To Channel : 4096

	Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
	4	52.60	7.45007E-02	28.32	Sum	
m	6	65.62	8.51469E-02	31.19	Sum	
M	8	112.26	1.91495E-01	11.85	Sum	
m	9	117.26	4.49742E-02	32.66	Sum	
	10	275.86	7.23365E-02	23.45		
m	12	307.08	3.50461E-02	44.05		
	13	334.25	7.74528E-02	20.99	Sum	
	15	386.51	2.59515E-01	7.33	Sum	
M	16	413.97	2.23812E-02	36.82		
m	17	419.69	2.81766E-02	35.98	Sum	
	18	437.28	5.77778E-02	17.33	Sum	
	19	467.29	2.11111E-02	29.30		
	20	665.41	4.90741E-03	65.03		
	21	921.95	5.55556E-03	44.72		

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE MDA REPORT

Nuclide Library Used : \\OR-GAMMA1\ApexRoot\Countroom\Library\WSRC.NLB

Nuclide Name	Energy (keV)	Yield(%)	Line MDA (pCi/units)	Nuclide MDA (pCi/units)	Activity (pCi/units)	Dec. Level (pCi/units)
CA-41	3.00	77.00	1.38E+01	1.38E+01	0.00E+00	0.00E+00
	3.31	12.30	6.90E+01		0.00E+00	0.00E+00

Analysis Report for 2104092-07

H-24

	Nuclide Name	Energy (keV)		Yield(%)	Line MDA (pCi/units)	Nuclide MDA (pCi/units)	Activity (pCi/units)	Dec. Level (pCi/units)
	FE-55	5.89		24.50	1.10E+01	1.10E+01	0.00E+00	0.00E+00
	CO-57	122.06		85.51	1.17E+01	1.17E+01	1.41E+00	5.47E+00
		136.48		10.60	1.07E+02		-3.53E+01	5.02E+01
	NI-59	6.92		29.80	4.79E+01	4.79E+01	-3.18E+01	2.05E+01
	MO-93	16.59		52.90	2.86E+01	2.86E+01	5.64E-02	1.37E+01
		18.60		10.00	1.62E+02		2.69E+01	7.81E+01
	NB-93M	16.57		9.43	1.61E+02	1.61E+02	3.17E-01	7.67E+01
	CD-109	88.03		3.72	2.29E+02	2.29E+02	-1.41E+02	1.08E+02
	SN-113	255.12		1.93	8.90E+02	7.68E+01	-3.36E+02	4.10E+02
		391.69		61.90	7.68E+01		5.59E+01	3.62E+01
	SN-119M	23.87		16.10	8.30E+01	5.66E+01	-8.45E+01	3.99E+01
		25.10		22.70	5.66E+01		-1.15E+03	2.72E+01
+	I-129	29.78	*	57.00	5.27E+01	5.27E+01	5.84E+02	2.60E+01
		33.60	*	13.20	2.17E+02		5.60E+02	1.07E+02
		39.58		7.52	1.51E+02		-7.72E+00	7.24E+01
+	BA-133	81.00	*	34.06	5.24E+01	5.24E+01	4.06E+02	2.55E+01
		302.84	*	18.33	1.63E+02		4.09E+02	7.67E+01
		356.01	*	62.05	6.13E+01		4.95E+02	2.88E+01
	CE-139	165.85		80.35	1.81E+01	1.81E+01	7.81E+00	8.52E+00
	CE-144	133.54		10.80	1.08E+02	1.08E+02	5.80E+01	5.11E+01
	HG-203	279.19		77.30	3.29E+01	3.29E+01	-3.73E+00	1.54E+01
	PB-210	46.50		4.25	1.55E+02	1.55E+02	6.78E+00	7.25E+01
	TH-231	25.64		14.70	8.63E+01	8.63E+01	-1.76E+03	4.14E+01
		84.21		6.40	3.28E+02		1.12E+03	1.60E+02
+	PA-234M	9.89		89.00	2.30E+01	2.30E+01	2.18E+01	1.08E+01
		21.72	*	64.90	5.80E+01		2.28E+01	2.86E+01
		37.93	*	23.75	1.21E+02		3.11E+02	5.94E+01
+	TH-234	63.29	*	3.80	3.74E+02	3.74E+02	7.86E+02	1.81E+02
	NP-237	29.37		14.00	2.67E+02	8.03E+01	2.11E+03	1.32E+02
		86.50		12.60	8.03E+01		-7.25E+00	3.82E+01
	U-237	97.08		16.30	5.24E+01	3.23E+01	-2.50E+01	2.46E+01
		101.07		26.30	3.23E+01		-5.04E+00	1.51E+01
		114.00		12.30	1.45E+02		3.74E+02	7.02E+01
		208.01		22.00	8.02E+01		-1.35E+01	3.77E+01
+	AM-241	59.54	*	35.90	3.96E+01	3.96E+01	8.32E+01	1.92E+01
	AM-243	74.67		66.00	1.25E+01	1.25E+01	-6.83E-01	5.90E+00

\+ = Nuclide identified during the nuclide identification
* = Energy line found in the spectrum
\> = MDA value not calculated
@ = Half-life too short to be able to perform the decay correction

SECTION XI

ANALYTICAL DATA (TOTAL DISSOLVED SOLIDS)

Eberline Services - Oak Ridge
Version 1.0 9/1999

TDS / TSS Worksheet

Printed: 4/28/2021 01:31

Work Order	Run	Analysis Code	Technician
21-04092	**1**	**TDS**	**MHIGHTOWER**

TRetec Fraction	ERM Client ID	Aliquot ml	Filter Data: Filter Tare (g)	Filter Final (g)	Filter Net (g)	TDS/TSS (mg/L)	Maximum Aliq (mL)
04	**H-20**	100.0000	102.8804	103.0951	**0.2147**	**2147.0000**	**46.58**
05	**H-22**	100.0000	94.1327	94.3051	**0.1724**	**1724.0000**	**58.00**
06	**H-23**	100.0000	97.0135	97.2098	**0.1963**	**1963.0000**	**50.94**
07	**H-24**	100.0000	102.9400	103.1394	**0.1994**	**1994.0000**	**50.15**

0155

Technician: MH Date: 4/28/21

Eberline Analytical
Oak Ridge Laboratory

Aliquot Worksheet

Printed: 4/27/2021 10:56 PM

Work Order	Run	Analysis Code	Rpt Units	Lab Deadline	Technician
21-04092	1	TDS	liters	5/11/2021	MHIGHTOWER

Lab Fraction	ERM Client ID	Sample Type	Muffle Data Ratio Post/Pre	Dilution Data No of Dils	Dil Factor	Ratio	Aliquot Data Aliquot	Net Equiv	MS Aliquot Data Aliquot	Net Equiv	H-3 Solids Only Water Added (ml)	H3 Dist Aliq
01	LCS	LCS					1.0000E+00	1.0000E+00				
02	BLANK	MBL					1.0000E+00	1.0000E+00				
03	DUP	DUP					1.0000E-01	1.0000E-01				
04	H-20	TRG					1.0000E-01	1.0000E-01				
05	H-22	TRG					1.0000E-01	1.0000E-01				
06	H-23	TRG					1.0000E-01	1.0000E-01				
07	H-24	TRG					1.0000E-01	1.0000E-01				

Comments	

0156

Technician: MH Date: 4/22/21

ERM

0526033 HENNING

STANDARD LEVEL IV
REPORT OF ANALYSIS

WORK ORDER #21-08094-OR

October 7, 2021

EBERLINE ANALYTICAL/OAK RIDGE LABORATORY
OAK RIDGE, TN

TABLE OF CONTENTS

Eberline Services – Oak Ridge Laboratory

LABORATORY DATA SUPPORT CHECKLIST

MP-001-3

Eberline Services Work Order # 21-08094

The checklist items listed below are to be initialed by appropriate staff upon completion/verification.

Date for Partial	Initials	Date	Initials	Checklist Items
		9/30/21	BRB	Sample Log-In
		9/13/21		Data Compilation
		9-14-21	MLT	First Technical Data Review
		9/15/21	MM	Second Technical Data Review
		10/5/21	CW	Data Entry/Electronic Deliverable
		10/5/21	CW	Case Narrative
		10/6/21		Electronic Deliverable Proof
		10/6/21	MM	Samples Analyzed within Holding Time Yes? ✓ No?
		10/6/21	MM	QA/QC Review
		10/7/21	CW	Client in Possession of Data Electronic or Hard Copy
				Invoiced by Laboratory

Technical/Clerical Corrections, Signatures Needed, Problems, Etc	Date/Initials

Date package approved by: _____ 10/7/21

Laboratory Manager Date

Copy No. _____

SECTION I

CHAIN OF CUSTODY
& pH CHECK

Chain of Custody Record

ERM

№ 21-08091

Eberline Services
601 Scarboro Road
Oak Ridge, TN 37830
(865) 481-0683 Phone • (865) 483-4621 Fax

EBERLINE SERVICES

Project Name: Henning	Project Number: 05216033
Send Report To: Shawn Wiggins	Sampler (Print Name): Holly Midkiff
Address: 840 W Sam Houston Parkway N, Ste 600	Sampler (Print Name):
	Shipment Method: Fed Ex
Texas, Houston, 77024	Airbill Number:
Phone: 971-303-2385	Laboratory Receiving:
Fax:	

Page 1 of 1

REC'D AUG 30 2021

Purchase Order #: _____

	Field Sample ID	Sample Date	Sample Time	Sample Matrix	Number of Containers	Analysis Requested: Rad 226	Rad 228	Comments, Special Instructions, etc.	Lab Sample ID (to be completed by lab)
4	H-34	8/23/21	1055	GW	1	X	X		
5	H-32A	8/23/21	1200	GW	1	X	X		
6	H-32B	8/23/21	1350	GW	1	X	X		
7	H-33	8/23/21	1450	GW	1	X	X		

Relinquished by: (Signature)	Received by: (Signature)	Date:	Time:
— ERM	Bobby Bannister	8/30/21	0920
Relinquished by: (Signature)	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Received by: (Signature)	Date:	Time:

Sample Custodian Remarks (Completed By Laboratory):

QA/QC Level	Turnaround
Level I ☐	Routine ☐
Level II ☐	24 Hour ☐
Level III ☐	1 Week ☐
Other ☐	Other _____

Sample Receipt	
Total # Containers Received?	
COC Seals Present?	
COC Seals Intact?	
Received Containers Intact?	
Temperature?	

Eberline Services
Oak Ridge Laboratory

Internal Chain of Custody

Work Order #	21-08094
Lab Deadline	9/13/2021
Analysis	Ra226 - Level 4
Sample Matrix	Water

Comments

Sample Fraction	HP 210 / 270 Detector Activity	Storage Location
04	20	EE1.3
05	20	EE1.3
06	30	EE1.3
07	30	EE1.3

	Location (circle one)					Initials	Date
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	8/31/21 0900	[illegible]
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	[illegible]	9/1/21 0815
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	AY 9/1/21	0830
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	AY 9/7/21	0806
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	KP 9/7/21	0807
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	KP 9/8/21	0550
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		

Printed: 8/30/2021 4:48 PM

EBERLINE SERVICES
Oak Ridge Laboratory

Internal Chain of Custody

Work Order #	21-08094
Lab Deadline	9/13/2021
Analysis	Ra228 - Level 4
Sample Matrix	Water

Comments	Sample Fraction	HP 210 / 270 Detector Activity	Storage Location
	04	20	EE1.3
	05	20	EE1.3
	06	30	EE1.3
	07	30	EE1.3

	Location (circle one)					Initials	Date
Received by	(Sample Storage)	Rough Prep	Prep	Separations	Count Room	[illegible]	8/31/21 0900
Relinquished by	Sample Storage	Rough Prep	(Prep)	Separations	Count Room	[illegible]	9/1/21 0815
Received by	Sample Storage	Rough Prep	Prep	(Separations)	Count Room	AY	9/7/21 0830
Relinquished by	Sample Storage	Rough Prep	Prep	(Separations)	Count Room	AY	9/7/21 0806
Received by	Sample Storage	Rough Prep	Prep	Separations	(Count Room)	KP	9/7/21 0807
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	(Count Room)	KP	9/8/21 0550
Received by	Sample Storage	Rough Prep	Prep	(Separations)	Count Room	AY	9/8/21 0710
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	(Count Room)	KP	9/8/21 0948
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	(Count Room)	KP	9/9/21 1152
Received by	(Sample Storage)	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		

Printed: 8/30/2021 4:48 PM

EBERLINE SERVICES
Oak Ridge Laboratory

Internal Chain of Custody

Work Order #	21-08094
Lab Deadline	8/30/2021
Analysis	TDS - Level 4
Sample Matrix	Water

Comments

Sample Fraction	HP 210 / 270 Detector Activity	Storage Location
04	20	EE1.3
05	20	EE1.3
06	30	EE1.3
07	30	EE1.3

	Location (circle one)					Initials	Date
Received by	Sample Storage (circled)	Rough Prep	Prep	Separations	Count Room	MH	15SEP21
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	MH	15SEP21 0430
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		

EBERLINE SERVICES

Sample Receiving Report
(Volumes, pH, & CPM)

Internal Work Order
21-08094
Received By
RSPENCER

FR	ClientID	# Btls	Comments	Matrix	Storage	Rec Vol Ttl	CPM Max
01	LCS	0		WA	EE1.3		
02	BLANK	0		WA	EE1.3		
03	DUP	0		WA	EE1.3		
04	H-34	1		WA	EE1.3	3.76	20
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	7	7	3.7600	20
05	H-32A	1				3.76	20
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	7	7	3.7600	20
06	H- 32B	1				3.76	30
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	7	7	3.7600	30
07	H-33	1				0.00	30
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	7	7		30

Received by: Bobby Bannister Date: 8-30-21

SECTION II

SAMPLE ACKNOWLEDGEMENT

Client Name	Contract/PO	Project Type	Date Received	Required Turnaround Days	Eberline Services Work Order
ERM	0526033	Environmental	08/30/2021	21	21-08094
Project Name	**Client WO**	**Sample Disp**	**Lab Deadline**	**Internal Deadline**	**Client Deadline**
526033	HENNING	W	09/13/2021	09/17/2021	09/20/2021

Internal ID	Client ID	Sample Date	Matrix	Storage	Ra226	Ra228	TDS																						Ttl
01	LCS	08/30/21	WA	EE1.3	X	X	X																						3
02	BLANK	08/30/21	WA	EE1.3	X	X	X																						3
03	DUP	08/30/21	WA	EE1.3	X	X	X																						3
04	H-34	08/23/21 10:55	WA	EE1.3	X	X	X																						3
05	H-32A	08/23/21 12:00	WA	EE1.3	X	X	X																						3
06	H-32B	08/23/21 13:50	WA	EE1.3	X	X	X																						3
07	H-33	08/23/21 14:50	WA	EE1.3	X	X	X																						3
																													0
																													0
																													0
																													0
																													0
																													0
																													0
																													0
																													0
																													0
																													0
																													0
																													0
Totals Per Analysis (non QA samples)					4	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

EBERLINE SERVICES

0011

Sample Log In Report

Oak Ridge Laboratory
601 Scarboro Rd.
Oak Ridge, TN 37830

Voice: (865) 481-0683
Fax: (865) 483-4621

Invoice	Accounts Payable
	ERM
	840 W Sam Houston Pkwy N, Suite 600
	Houston, TX 77024
Voice	281-242-5700
Fax	281-520-4625
Contact	Shawn Wiggins
Voice	971-303-2385
Fax	

Report Data	Shawn Wiggins
	ERM
	840 W Sam Houston Parkway N #600
	Houston, TX 77024
Voice	971-303-2385
Fax	

Printed: 8/31/2021 9:21 AM

Eberline Services – Oak Ridge Laboratory

SAMPLE RECEIPT CHECKLIST
MP-001-2

WORK ORDER # 21-08094

SAMPLE MATRIX/MATRICES: (CIRCLE ONE OR BOTH)

(AQUEOUS) NON-AQUEOUS

(CIRCLE EITHER YES, NO, OR N/A)

WERE SAMPLES:

Received in good condition?	(Y)	N	
If aqueous, properly preserved	(Y)	N	N/A

WERE CHAIN OF CUSTODY SEALS:

Present on outside of package?	(Y)	N
Unbroken on outside of package?	(Y)	N
Present on samples?	(Y)	N
Unbroken on samples?	(Y)	N
Was chain of custody present upon sample receipt?	(Y)	N

IF THE RESPONSE TO ANY OF THE ABOVE IS **NO**, A DISCREPANT SAMPLE RECEIPT REPORT (DSR) HAS BEEN ISSUED.

REMARKS: _____

SIGNATURE: Bobby Bannister DATE: 08-30-21

SECTION III

CASE NARRATIVE

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

EBS-OR-48933

October 7, 2021

Shawn Wiggins
ERM
840 W Sam Houston Pkwy N #600
Houston, TX 77024

CASE NARRATIVE
Work Order # 21-08094-OR

SAMPLE RECEIPT

This work order contains four water samples received 08/30/2021. Samples were analyzed for Radium-226/228 and Total Dissolved Solids.

CLIENT ID	LAB ID
H-34	21-08094-04
H-32A	21-08094-05
H-32B	21-08094-06
H-33	21-08094-07

ANALYTICAL METHODS

Radium-226 was analyzed using EPA Method 903.0 Modified. Radium-228 was analyzed using EPA Method 904.0. Total Dissolved Solids were performed using Standard Methods 2540C.

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.

RADIUM-226

Samples were prepared by removing representative aliquots followed by mixed acid digestions as appropriate. This was followed by precipitations of Radium/Barium Sulfate. Precipitates were dissolved in alkaline EDTA. Radium was selectively precipitated and mounted on micro-porous filter media. Samples were counted by alpha spectroscopy using an energy specific region of interest for Radium-226. The final result was corrected for inherent self-absorption from elemental Barium. Chemical recovery was calculated using a Barium-133 tracer, which was determined by HPGe gamma spectroscopy.

ANALYTICAL RESULTS CONTINUED

RADIUM-226 CONTINUED

Samples demonstrated acceptable results for all Radium-226 analyses. Chemical recovery was acceptable for all analyses. The Radium-226 method blank demonstrated an acceptable result. Results for the Radium-226 duplicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Radium-226 laboratory control sample demonstrated an acceptable percent recovery.

RADIUM-228

Following alpha spectroscopy analysis of Radium-226, Barium/Radium Sulfate precipitates were redissolved and allowed for sufficient ingrowth of the Actinium-228 daughter. After ingrowth, Actinium-228 was selectively precipitated. Precipitates were filtered and beta emissions for Actinium-228 were counted on a gas proportional counter. Chemical recovery was determined using a Barium-133 tracer, the activity of which was determined by HPGe gamma spectroscopy and an elemental Yttrium carrier by gravimetric measurements. The product of these two recoveries was used to calculate chemical yield.

Samples demonstrated acceptable results for all Radium-228 analyses. Chemical recovery was acceptable for all analyses. The Radium-228 method blank demonstrated an acceptable result. Results for the Radium-228 duplicate demonstrated a slightly high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Radium-228 laboratory control sample demonstrated an acceptable percent recovery.

TOTAL DISSOLVED SOLIDS (TDS)

A volumetric aliquot of each sample was filtered through 0.45µm filter media into a tared 250 ml beaker. Samples were then dried on a hot plate and were allowed to cool. The TDS content was determined by reweighing tared beakers.

Samples demonstrated results for Total Dissolved Solids content that ranged from 807.0 to 1,383.0 mg/L.

CERTIFICATION OF ACCURACY

I certify that this data report complies 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: 10/7/2021

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.

SECTION IV

ANALYTICAL RESULTS SUMMARY

Eberline Analytical
Final Report of Analysis

Report To:
Shawn Wiggins
ERM
840 W Sam Houston Parkway N #600
Houston, TX 77024

Work Order Details:
SDG: 21-08094
Purchase Order: 0526033
Analysis Category: ENVIRONMENTAL
Sample Matrix: WA

Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Report Units
21-08094-01	LCS	KNOWN	08/30/21 00:00	8/30/2021	9/7/2021	21-08094	Radium-226	EPA 903.0 Modified	1.01E+01	4.63E-01			pCi/l
21-08094-01	LCS	SPIKE	08/30/21 00:00	8/30/2021	9/7/2021	21-08094	Radium-226	EPA 903.0 Modified	1.11E+01	1.70E+00	2.89E+00	4.37E-01	pCi/l
21-08094-02	MBL	BLANK	08/30/21 00:00	8/30/2021	9/7/2021	21-08094	Radium-226	EPA 903.0 Modified	-6.27E-02	1.41E-01	1.42E-01	4.15E-01	pCi/l
21-08094-03	DUP	H-34	08/23/21 10:55	8/30/2021	9/7/2021	21-08094	Radium-226	EPA 903.0 Modified	2.19E-01	2.50E-01	2.54E-01	3.74E-01	pCi/l
21-08094-04	DO	H-34	08/23/21 10:55	8/30/2021	9/7/2021	21-08094	Radium-226	EPA 903.0 Modified	3.87E-01	2.81E-01	2.92E-01	3.07E-01	pCi/l
21-08094-05	TRG	H-32A	08/23/21 12:00	8/30/2021	9/7/2021	21-08094	Radium-226	EPA 903.0 Modified	7.93E-02	2.01E-01	2.02E-01	4.01E-01	pCi/l
21-08094-06	TRG	H-32B	08/23/21 13:50	8/30/2021	9/7/2021	21-08094	Radium-226	EPA 903.0 Modified	1.93E-01	2.16E-01	2.20E-01	3.05E-01	pCi/l
21-08094-07	TRG	H-33	08/23/21 14:50	8/30/2021	9/7/2021	21-08094	Radium-226	EPA 903.0 Modified	2.84E-01	2.51E-01	2.58E-01	2.72E-01	pCi/l
21-08094-01	LCS	KNOWN	08/30/21 00:00	8/30/2021	9/9/2021	21-08094	Radium-228	EPA 904.0	9.17E+00	4.67E-01			pCi/l
21-08094-01	LCS	SPIKE	08/30/21 00:00	8/30/2021	9/9/2021	21-08094	Radium-228	EPA 904.0	9.64E+00	1.48E+00	2.64E+00	1.29E+00	pCi/l
21-08094-02	MBL	BLANK	08/30/21 00:00	8/30/2021	9/9/2021	21-08094	Radium-228	EPA 904.0	2.66E-01	4.03E-01	4.08E-01	8.33E-01	pCi/l
21-08094-03	DUP	H-34	08/23/21 10:55	8/30/2021	9/9/2021	21-08094	Radium-228	EPA 904.0	4.36E-01	4.30E-01	4.41E-01	8.71E-01	pCi/l
21-08094-04	DO	H-34	08/23/21 10:55	8/30/2021	9/9/2021	21-08094	Radium-228	EPA 904.0	6.34E-01	4.77E-01	4.98E-01	9.56E-01	pCi/l
21-08094-05	TRG	H-32A	08/23/21 12:00	8/30/2021	9/9/2021	21-08094	Radium-228	EPA 904.0	3.44E-01	3.71E-01	3.79E-01	7.55E-01	pCi/l
21-08094-06	TRG	H-32B	08/23/21 13:50	8/30/2021	9/9/2021	21-08094	Radium-228	EPA 904.0	4.95E-01	3.41E-01	3.59E-01	6.70E-01	pCi/l
21-08094-07	TRG	H-33	08/23/21 14:50	8/30/2021	9/7/2021	21-08094	Radium-228	EPA 904.0	2.65E-01	3.84E-01	3.89E-01	7.92E-01	pCi/l
21-08094-04	TRG	H-34	08/23/21 10:55	8/30/2021	8/31/2021	21-08094	TDS	SM 2540C	9.82E+02				mg/l
21-08094-05	TRG	H-32A	08/23/21 12:00	8/30/2021	8/31/2021	21-08094	TDS	SM 2540C	8.07E+02				mg/l
21-08094-06	TRG	H-32B	08/23/21 13:50	8/30/2021	8/31/2021	21-08094	TDS	SM 2540C	1.38E+03				mg/l
21-08094-07	TRG	H-33	08/23/21 14:50	8/30/2021	8/31/2021	21-08094	TDS	SM 2540C	1.13E+03				mg/l

0017

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

SECTION V

ANALYTICAL STANDARD

CERTIFICATE OF CALIBRATION
ALPHA STANDARD SOLUTION

Ra-5
QA/QC REVIEWED
Date 2/8/94 Initials WT

Radionuclide:	Ra-226	Customer:	TMA EBERLINE
Half Life:	1600 ± 7 years	P.O.No.:	VH1888
Catalog No.:	7226	Reference Date:	February 1 1994 12:00 PST.
Source No.:	453-26	Contained Radioactivity: (Ra-226)	1.001 μCi.
		Contained Radioactivity: (Ra-226)	37.0 kBq.

Description of Solution

a. Mass of solution:	5.1864 g (in a 5 ml Flame Sealed Ampoule)	
b. Chemical form:	Ra(NO3)2 in 1 N HNO3	
c. Carrier content:	None added	
d. Density:	1.0318	g/ml @ 20°C.

Radioimpurities: None detected(other than daughters)

Radioactive Daughters
Rn-222, Po-218, At-218, Pb-214, Bi-214, Po-214, Tl-210, Pb-210, Bi-210, Po-210 and Tl-206.

Radionuclide Concentration

(Ra-226) 0.1929 μCi/g.

Method of Calibration

Weighed aliquots of the solution were assayed using gamma spectrometry:
Energy peak(s) integrated under: 186 keV.
Branching ratio(s) used: 0.0351 gamma rays per decay.

Uncertainty of Measurement

a. Systematic uncertainty in instrument calibration:	±3.4%
b. Random uncertainty in assay:	±3.1%
c. Random uncertainty in weighing(s):	±0.2%
d. Total uncertainty at the 99% confidence level:	±4.6%

NIST Traceability

This calibration is implicitly traceable to the National Institute of Standards and Technology.

Leak Test(s)

See reverse side for Leak Test(s) applied to this source.

Notes

1. Nuclear data were taken from "Table of Radioactive Isotopes", edited by Virginia S. Shirley, 1986.
2. IPL participates in an NIST measurement assurance program to establish and maintain implicit traceability for a number of nuclides, based on the blind assay (and later NIST certification) of Standard Reference Materials (As in NRC Regulatory Guide 4.15).

Ana U. Nunez
QUALITY CONTROL

Feb. 3, 1994
Date Signed

ISOTOPE PRODUCTS LABORATORIES
1800 North Keystone Street
Burbank, California 91504
(818) 843 - 7000

EBERLINE SERVICES

QUALITY CONTROL PROGRAM
MP 009

Rev.8; 11/01/03
Title: Radioactive Reference Standards Solutions & Records

EBERLINE SERVICES - OAK RIDGE LABORATORY
RADIOACTIVE REFERENCE SOLUTIONS
PRIMARY DILUTION RECERTIFICATION
MP 009

		CURRENT DATE	8/18/2021 0:00
SOLUTION REFERENCE #	IPL 453-26	**SOLUTION #**	Ra-5

Principal Radionuclide	**Half Life, Years**	**Half Life, Days**
^{226}Radium	1.600E+03	5.844E+05

Radionuclide	^{226}Radium	**Reference Date**	2/1/1994 0:00
Certified Activity	1.001E+00	µCi	
Certified Concentration		µCi per gram	

Ampoule /Solution Gross		**Weight, Grams**
Empty Ampoule		**Weight, Grams**
Solution Net		**Weight, Grams**
Total Activity in Ampoule	1.0010	µCi

Chemical Composition of Standard Solution
$^{226}Ra(NO_3)_2$ in 1M HNO_3

Dilution Instructions: **Dilution Solvent Used** 1M HNO_3

Dilute to a volume of 1000.00 **milliliters**

Certified Total Activity of 1.0010 µCi **Which Equals** 2.222E+06 **dpm at the date listed above**

And after dilution the activity of this solution is 2.222E+03 **dpm/ml**

This activity concentration is based on the original reference date listed above. All activities are corrected to the date and time of analysis by the laboratory data processing software.

Expiration Date: August 18, 2022

Verified & Approved By _____ Date: 8/18/2021

QC Approval Marianne Mary Date: 8-30-21

EBERLINE SERVICES

QUALITY CONTROL PROGRAM
MP 009

Rev.8; 11/01/03
Title: **Radioactive Reference Standards Solutions & Records**

EBERLINE SERVICES - OAK RIDGE LABORATORY
RADIOACTIVE REFERENCE STANDARD SOLUTIONS
SECONDARY DILUTION RECERTIFICATION

MP 009

Solution Reference #	IPL-453-26	**Date**	8/18/2021 0:00
		Solution #	Ra-5b

Principal Radionuclide	**Half Life, Years**	**Half Life, Days**
^{226}Radium	1.600E+03	5.844E+05

Radionuclide of Interest ^{226}Radium
Parent Solution Conc. 2.22E+03 **dpm/ml**

Reference Date 2/1/1994 0:00

Chemical Composition of Standard Solution
$^{226}Ra(NO_3)_2$ in 1M HNO_3

Dilution Instructions:

Dilution Solvent Used 1M HNO_3

SECONDARY VOLUMETRIC DILUTION

Vol. Parent Solution: 20.0000 **ml**
Total Activity: 4.4440E+04 **dpm**
Final Volume: 1000.00 **ml**

Final Activity Concentration: 4.4440E+01 **dpm/ml**

This activity concentration is based on the original reference date listed above. All activities are corrected to the date and time of analysis by the laboratory data processing software.

NOTES:

Expiration Date: 18-Aug-22

Verified & Approved By _____ Date: 8/18/2021 0:00

QC Approval Manami May Date: 8-30-21

ANALYTICS #411 Rec'd 2/15/06 R Prentiss

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318 • U.S.A.

Phone (404) 352-8677
Fax (404) 352-2837

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

Ra-228

72325-207

Ra-228 5 mL Liquid in Flame Sealed Vial

This standard radionuclide source was prepared gravimetrically from a calibrated master solution. The master solution was calibrated using a germanium gamma spectrometer system.

Radionuclide purity and calibration were checked using a germanium gamma spectrometer system. The nuclear decay rate and assay date for this source are given below.

ANALYTICS maintains traceability to the National Institute of Standards and Technology through Measurements Assurance Programs as described in USNRC Reg. Guide 4.15, Revision 1.

ISOTOPE:	Ra-228
ACTIVITY (dps):	4.022 E3
HALF-LIFE:	5.75 years
CALIBRATION DATE:	February 10, 2006 12:00 EST
RELATIVE EXPANDED UNCERTAINTY (k=2):	4.0%

Impurities: γ-impurities <0.1%

5.10721 grams 0.1M HCl solution with 50 µg/g Ba carrier.

P O NUMBER 00003181, Item 1

SOURCE PREPARED BY: M Taskaeva
M. Taskaeva, Radiochemist

Q A APPROVED: 2-13-06

EBERLINE SERVICES

QUALITY CONTROL PROGRAM

MP-009

Rev.8; 1/10/03
Title: Radioactive Reference Standards Solutions & Records

EBERLINE SERVICES - OAK RIDGE LABORATORY
RADIOACTIVE REFERENCE SOLUTIONS
RECERTIFICATION
MP 009

		CURRENT DATE	1/11/2021 0:00
SOLUTION REFERENCE #	Analytics 7235-207	**SOLUTION #**	Ra-12

Principal Radionuclide	**Half Life, Years**	**Half Life, Days**
^{228}Ra	5.750E+00	2.100E+03

Radionuclide	^{228}Ra	
Certified Activity	1.087E-01	µCi
Certified Concentration		µCi per gram

Reference Date 2/10/2006 0:00

Ampoule /Solution Gross	9.0741	**Weight, Grams**
Empty Ampoule	3.9858	**Weight, Grams**
Solution Net	5.0883	**Weight, Grams**
Total Activity in Ampoule	0.1087	µCi

Chemical Composition of Standard Solution

$^{228}Ra(NO_3)_2$ in 0.5 M HCl

Dilution Instructions: **Dilution Solvent Used** 0.5 M HCl

Dilute to a volume of 991.00 **Kg**

Certified Total Activity of 0.1087 µCi **Which Equals** 2.413E+05 **dpm at the date listed above**

And after dilution the activity of this solution is **2.435E+02** **dpm/ml**

This activity concentration is based on the original reference date listed above. All activities are corrected to the date and time of analysis by the laboratory data processing software.

Expiration Date: January 11, 2022

Recertified By _____ Date: 1/11/21

QC Approval _____ Date: 1/11/21

Ba-6
(# 6a)

National Institute of Standards & Technology

Certificate

ORIGINAL

Standard Reference Material 4251C
Barium-133 Radioactivity Standard

ORIGINAL

This Standard Reference Material (SRM) consists of radioactive barium-133 chloride, non-radioactive barium chloride, and hydrochloric acid dissolved in 5 mL of distilled water. The solution is contained in a flame-sealed NIST borosilicate-glass ampoule. The SRM is intended for the calibration of ionization chambers and solid-state gamma-ray spectrometry systems.

Radiological Hazard

The SRM ampoule contains barium-133 with a total activity of approximately 2.5 MBq. Barium-133 decays by electron capture and during the decay process X-rays and gamma rays with energies from 4 to 400 keV are emitted. Most of these photons escape from the SRM ampoule and can represent a radiation hazard. Approximate unshielded dose rates at several distances (as of the reference time) are given in note [a]*. Appropriate shielding and/or distance should be used to minimize personnel exposure. The SRM should be used only by persons qualified to handle radioactive material.

Chemical Hazard

The SRM ampoule contains hydrochloric acid (HCl) with a concentration of 1 mole per liter of water. The solution is corrosive and represents a health hazard if it comes in contact with eyes or skin. If the ampoule is to be opened to transfer the solution, the recommended procedure is given on page 2. The ampoule should be opened only by persons qualified to handle both radioactive material and strong acid solution.

Storage and Handling

The SRM should be stored and used at a temperature between 5 and 65 °C. The solution in an unopened ampoule should remain stable and homogeneous until at least June 2004.

The ampoule (or any subsequent container) should always be clearly marked as containing radioactive material. If the ampoule is transported it should be packed, marked, labeled, and shipped in accordance with the applicable national, international, and carrier regulations. The solution in the ampoule is a dangerous good (hazardous material) both because of the radioactivity and because of the strong acid.

Preparation

This Standard Reference Material was prepared in the Physics Laboratory, Ionizing Radiation Division, Radioactivity Group, J.M.R. Hutchinson, Group Leader. The overall technical direction and physical measurements leading to certification were provided by L.L. Lucas of the Radioactivity Group and D.B. Golas, Nuclear Energy Institute Research Associate.

The support aspects involved in the preparation, certification, and issuance of this SRM were coordinated through the Standard Reference Materials Program by N.M. Trahey.

Gaithersburg, Maryland 20899
October 1994

Thomas E. Gills, Chief
Standard Reference Materials Program

*Notes and references are on pages 5 and 6.

EBERLINE SERVICES

QUALITY CONTROL PROGRAM
QCP-009

Rev.8; 11/10/03
Title: Radioactive Reference Standards Solutions & Records

EBERLINE SERVICES - OAK RIDGE LABORATORY
RADIOACTIVE REFERENCE STANDARD SOLUTIONS

	QCP-009-1-A	Date	4/23/21
Solution Reference #	NIST SRM4251C	Solution #	Ba-6a

Principal Radionuclide	Half Life, Years	Half Life, Days
^{133}Ba	1.048E+01	3.828E+03

Radionuclide of Interest	^{133}Ba	Reference Date	9/1/1993 0:00
Parent Solution Conc.	1.48E+05 dpm/ml		

Chemical Composition of Standard Solution
$^{133}BaCl_2$ in 1M HCl

Dilution Instructions: **Dilution Solvent Used** 1M HCl

SECONDARY VOLUMETRIC DILUTION

Vol. Parent Solution:	25.0000 ml		
Total Activity:	3.6950E+06 dpm	Final Activity Concentration:	3.6950E+03 dpm/ml
Final Volume:	1000.00 ml		

NOTES:

This activity concentration is based on the original reference date listed above. All activities are corrected to the date and time of analysis by the laboratory data processing software.

Expiration Date: April 20, 2022

Verified & Approved By _____ Date: 4/23/21

QC Approval Marianne Mac Date: 4/26/21

SECTION VI

QUALITY CONTROL SAMPLE RESULTS SUMMARY

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
21-08094	Ra226	1	pCi	l	ERM

Laboratory Control Sample

Analyte		LCS Measured	CSU Measured	LCS Expected	Uncert. Expected	Known	Known Error	Result	CSU	Standard ID	Standard ACT (dpm)	Standard Error	Standard Added (g)
RA-226		109.91%	26.14%	100.00%	4.60%	1.01E+01	4.63E-01	1.11E+01	2.89E+00	Ra-5b	4.39E+01	4.60E+00	5.09E-01

Matrix Spike

Analyte	*Normalized Difference*	*MS Actual % Rec*	*Expected MS Result*	*Expected MS Uncert*	*Actual MS Result*	*Actual MS CSU*	*Sample Result*	*Sample CSU*	*Sample Aliquot*	*Standard ID*	*Standard ACT (dpm)*	*Standard Error %*	*Standard Added (g)*

Replicate Sample

Analyte	*Normalized Difference*	*RPD*	*Original Result*	*Original CSU*	*Replicate Result*	*Replicate CSU*
RA-226	0.85	55.42	3.87E-01	2.92E-01	2.19E-01	2.54E-01

QC Summary

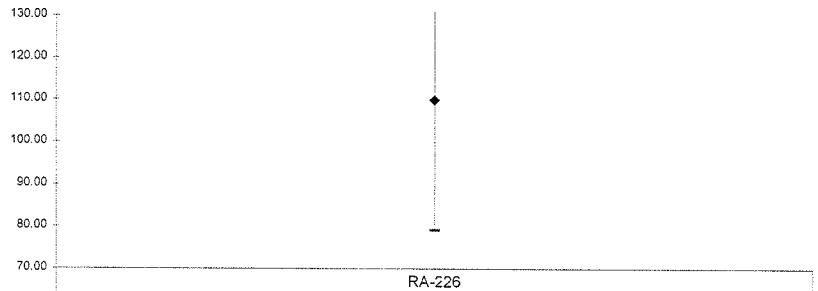
LCS Relative Bias	*LCS % R*		*MS % R*	*MS ND*	*Rep RPD*	*Rep ND*
1.10	OK				NA	OK

0027

Version

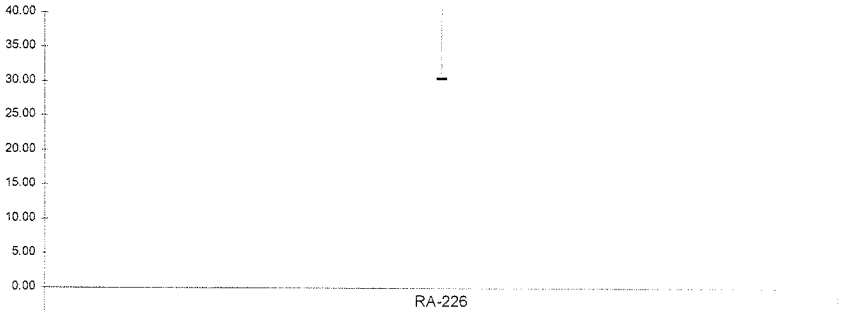
WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
21-08094	Ra226	1	pCi	l	ERM

LCS % Recovery



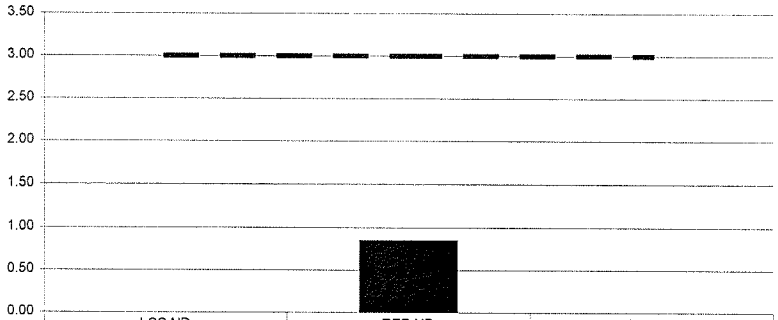
	RA-226
Lower Error	79.17
Upper Error	140.55
%R	109.91
LCL	75
Mean	100
UCL	125

Replicate Sample RPD



	RA-226
Lower Error	80.45
Upper Error	30.38
RPD	55.42
CL	35

Normalized Difference



	LCS ND	REP ND	MS ND
RA-226	0.00	0.85	0.00
UCL	3	3	3

No Matrix Spike

0028

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
21-08094	Ra228	1	pCi	l	ERM

Laboratory Control Sample

Analyte	LCS Measured	CSU Measured	LCS Expected	Uncert. Expected	Known	Known Error	Result	CSU	Standard ID	Standard ACT (dpm)	Standard Error	Standard Added (g)
RA-228	105.12%	27.37%	100.00%	5.10%	9.17E+00	4.67E-01	9.64E+00	2.64E+00	Ra-12	3.72E+01	5.10E+00	5.47E-01

Matrix Spike

Analyte	*Normalized Difference*	*MS Actual % Rec*	*Expected MS Result*	*Expected MS Uncert*	*Actual MS Result*	*Actual MS CSU*	*Sample Result*	*Sample CSU*	*Sample Aliquot*	*Standard ID*	*Standard ACT (dpm)*	*Standard Error %*	*Standard Added (g)*

Replicate Sample

Analyte	*Normalized Difference*	*RPD*	*Original Result*	*Original CSU*	*Replicate Result*	*Replicate CSU*
RA-228	0.58	36.91	6.34E-01	4.98E-01	4.36E-01	4.41E-01

QC Summary

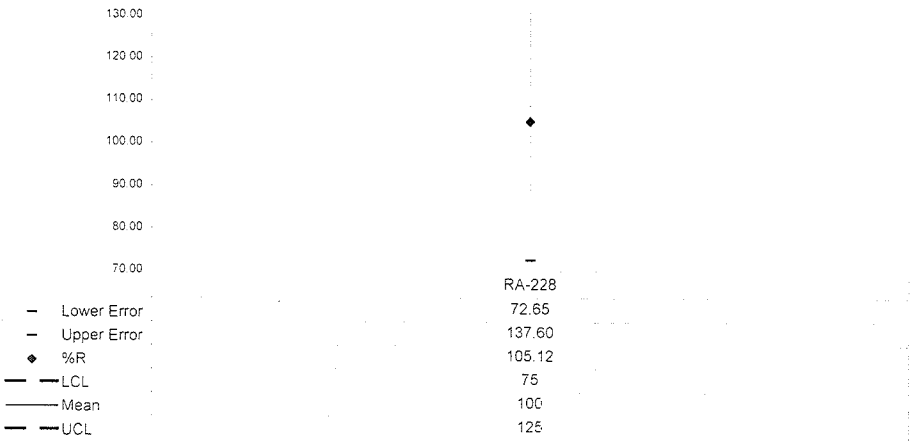
LCS Relative Bias	*LCS % R*	*MS % R*	*MS ND*	*Rep RPD*	*Rep ND*
1.05	OK			NA	OK

0029

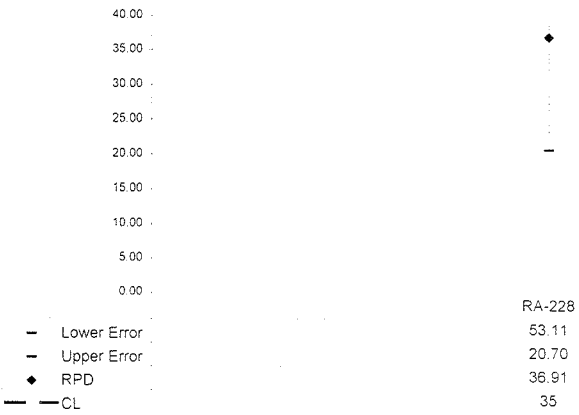
Version

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
21-08094	Ra228	1	pCi	l	ERM

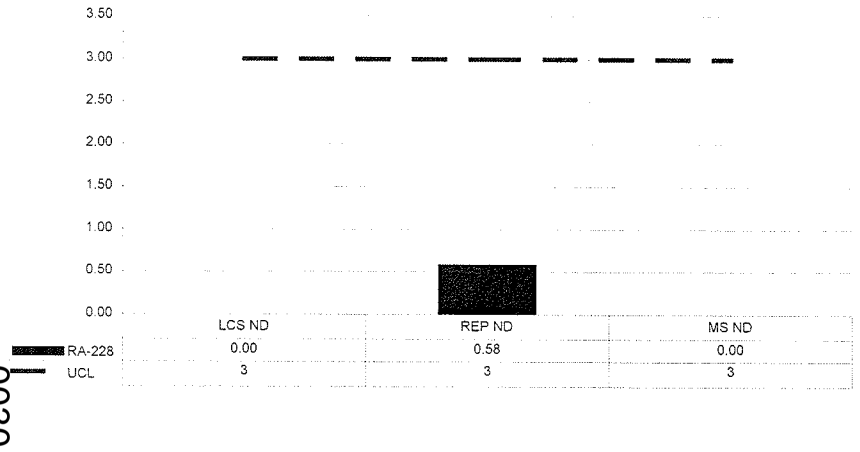
LCS % Recovery



Replicate Sample RPD



Normalized Difference



No Matrix Spike

0030

SECTION VII

LABORATORY TECHNICIAN'S NOTES

RA-226 NOTES

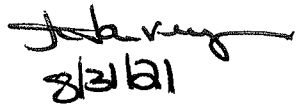
EBERLINE SERVICES

Work Order Analysis Notes

Oak Ridge Laboratory
601 Scarboro Rd.
Oak Ridge, TN 37830
Voice: 865.481.0683
www.eberlineservices.com

Internal Work Order	21-08094
Analysis Code	Ra226
Run Number	1

#	Date	Dept	User	Notes
1	08/31/21 10:40	PREP	JHARVEY	ALIQUOTED AND ADDED SPIKE AND TRACER- PH'D SAMPLES- PRECIPITATED WITH BA AND PB CARRIERS AND AMMONIUM SULFATE- DECANTED SAMPLES AND CENTRIFUGED- SUBMITTED RADIUM PRECIP TO SEPARATIONS



EBERLINE SERVICES

Work Order Analysis Notes

Oak Ridge Laboratory
601 Scarboro Rd.
Oak Ridge, TN 37830
Voice: 865.481.0683
www.eberlineservices.com

Internal Work Order	21-08094
Analysis Code	Ra226
Run Number	1

#	Date	Dept	User	Notes
1	08/31/21 10:40	PREP	JHARVEY	ALIQUOTED AND ADDED SPIKE AND TRACER- PH'D SAMPLES- PRECIPITATED WITH BA AND PB CARRIERS AND AMMONIUM SULFATE- DECANTED SAMPLES AND CENTRIFUGED- SUBMITTED RADIUM PRECIP TO SEPARATIONS
2	09/07/21 07:57	CHEM	AYARBER	ADDED EDTA TO SAMPLES AND LET SIT. ADDED AMMONIUM SULFATE AND ACETIC ACID TO SAMPLES. FILTERED ONTO TARED FILTER PAPERS, LET DRY UNDER HEAT LAMP, REWEIGHED, AND SUBMITTED TO COUNT.

Andrea Yarber 9/7/21

EBERLINE SERVICES

Reagents Used in an Analysis

Internal Work Order	
21-08094	
Analysis Code	Run
Ra226	1

Reagent ID	Reagent Name	Reagent Concentration	Analyst ID	Date Recorded
022612P	Ammonium Hydroxide	Reagent Grade	JHARVEY	8/31/2021
023431D01	Ammonium Sulfate	200 mg/ml	JHARVEY	8/31/2021
023160D03	Barium Carrier	1 mg/ml	JHARVEY	8/31/2021
022880D01	Lead Carrier	166 mg/ml	JHARVEY	8/31/2021
023563P	Nitric Acid	Reagent Grade	JHARVEY	8/31/2021
023012P	Acetic Acid	Reagent Grade	AYARBER	9/7/2021
023495D01	Ammonium Sulfate	200 mg/ml	AYARBER	9/7/2021
023004D02	EDTA	0.25M	AYARBER	9/7/2021

Alpha Bank 3

Date	Sample #	Client	Loadtime	Counttime	Analysis	Tech
		KP	1107	2hr 50min		
9/1/21	2108052A (1-7)	TN Dept.	1107	16hrs	UU	ICP
9/1/21	2108078A (3-15)	Warner Media	1203	2hr 50min	Ra^6	ICP
	~~2108078A (16-18)~~	~~Warner Media~~	0730	ICP	~~Ra6~~	~~ICP~~
9/2/21	2108080A (1-4)	UCOR	0759	2hr 50min	Ra^6	ICP
9/2/21	2108080A (1-4)	UCOR	0759	2hr 50 min	Am^{241}	ICP
9/2/21	2108080A (1-4)	UCOR	0800	2hr 50 min	Am^{243}	ICP
9/2/21	2108080A (1-4)	UCOR	0800	2hr 50 Min	Np	ICP
9/2/21	2108078A (16-18)	Warner Media	0801	2hr 50 min	Ra^6	ICP
9/2/21	Daily Pulser	Lab	0730	10 min	NA	ICP
9/2/21	2108080A (2)	UCOR	1101	2hr 50 min	Am^{241}	ICP
9/3/21	Daily Pulser	Lab	0930	10 min	NA	ICP
9/3/21	Cal Check (33-48)	Lab	0915	2hr 30min	NA	ICP
9/3/21	2108083A (1-7)	PCC Structural	0949	2hr 50min	Th	ICP
9/3/21	2108081A (1-2)	PCC Structural	0950	2hr 50min	Th	ICP
9/3/21	2108084A (5)	PCC Structural	1221	2hr 50min	Th	ICP
9/3/21	2108054A (1-10)	TN Dept	1222	2hr 50min	UU	ICP
9/3/21	Cal Check (49-64)	Lab	1242	2hr 30min	NA	ICP
9/3/21	2108054A (11)	TN Dept.	1516	2hr 50min	UU	ICP
9/3/21	2108080A (1-4)	UCOR	1516	2hr 50min	UU	ICP
9/3/21	2108080A (4)	UCOR	1517	2hr 50min	UUNT	ICP
9/3/21	2108091A (1-4)	UCOR	1517	2hr 50min	UU	ICP
9/4/21	System BKgd	Lab	0738	16hr 40min	NA	ICP
9/7/21	Daily Pulser	Lab	0408	10 min	NA	ICP
9/7/21	2108101A (3-9)	PCC Structural	0816	2hr 50min	Th	ICP
9/7/21	2108080A (1-4)	UCOR	0817	2hr 50min	Th	ICP
9/7/21	2108080A (1-4,7)	UCOR	0818	2hr 50min	Pu	ICP
9/7/21	2108080A (1-4)	UCOR	0818	2hr 50min	Th^{229}	ICP
9/7/21	2108080A (1-4)	UCOR	1125	2hr 50min	Pu^{242}	ICP
9/7/21	2108094A (1-7)	ERM	1126	2hr 50min	Ra^6	ICP
9/7/21	2108098A (1-6)	ERM	1127	2hr 50min	Ra^6	ICP

RA-228 NOTES

EBERLINE SERVICES

Work Order Analysis Notes

Oak Ridge Laboratory
601 Scarboro Rd.
Oak Ridge, TN 37830
Voice: 865.481.0683
www.eberlineservices.com

Internal Work Order	21-08094
Analysis Code	Ra228
Run Number	1

#	Date	Dept	User	Notes
1	08/31/21 10:40	PREP	JHARVEY	ALIQUOTED AND ADDED SPIKE AND TRACER- PH'D SAMPLES- PRECIPITATED WITH BA AND PB CARRIERS AND AMMONIUM SULFATE- DECANTED SAMPLES AND CENTRIFUGED- SUBMITTED RADIUM PRECIP TO SEPARATIONS

8/31/21

EBERLINE SERVICES

Work Order Analysis Notes

Oak Ridge Laboratory
601 Scarboro Rd.
Oak Ridge, TN 37830
Voice: 865.481.0683
www.eberlineservices.com

Internal Work Order	21-08094
Analysis Code	Ra228
Run Number	1

#	Date	Dept	User	Notes
1	08/31/21 10:40	PREP	JHARVEY	ALIQUOTED AND ADDED SPIKE AND TRACER- PH'D SAMPLES- PRECIPITATED WITH BA AND PB CARRIERS AND AMMONIUM SULFATE- DECANTED SAMPLES AND CENTRIFUGED- SUBMITTED RADIUM PRECIP TO SEPARATIONS
2	09/09/21 09:45	CHEM	AYARBER	ADDED FILTER PAPERS FROM COUNT ROOM TO LABELED C-TUBES, FILLED WITH EDTA SOLUTION AND LET SIT OVERNIGHT. REMOVED FILTER FROM EDTA-ADDED 2MLS YTTRIUM 9MG/ML CARRIER ADDED 18N NAOH TO SAMPLES AND RECORDED T1. HOT BATHED FOR 15 MIN, CENTRIFUGED AND DISCARDED SUPERNANT. ADDED 6N HNO3, DI WATER, AND 10N NAOH. HOT BATHED FOR 15 MIN, CENTRIFUGED AND DISCARDED SUPERNANT. ADDED 1N HNO3, DI WATER, AND AMMONIUM OXALATE. FILTERED ONTO TARED FILTER PAPERS. LET DRY UNDER HEAT LAMP, REWEIGHED AND SUBMITTED TO COUNT.

Andrew L Yarber 9/9/21

EBERLINE SERVICES

Reagents Used in an Analysis

Internal Work Order	
21-08094	
Analysis Code	Run
Ra228	1

Reagent ID	Reagent Name	Reagent Concentration	Analyst ID	Date Recorded
022612P	Ammonium Hydroxide	Reagent Grade	JHARVEY	8/31/2021
023431D01	Ammonium Sulfate	200 mg/ml	JHARVEY	8/31/2021
023160D03	Barium Carrier	1 mg/ml	JHARVEY	8/31/2021
022880D01	Lead Carrier	166 mg/ml	JHARVEY	8/31/2021
023563P	Nitric Acid	Reagent Grade	JHARVEY	8/31/2021
023118D01	Ammonium Oxalate	5%	AYARBER	9/9/2021
022128D01	EDTA	0.25M	AYARBER	9/9/2021
022763D07	Nitric Acid	1N	AYARBER	9/9/2021
022345D14	Nitric Acid	6N	AYARBER	9/9/2021
023120D02	Sodium Hydroxide	10M	AYARBER	9/9/2021
023120D01	Sodium Hydroxide	18M	AYARBER	9/9/2021
023151D01	Yttrium Carrier	9 mg/ml	AYARBER	9/9/2021

Aqua LB4110

Date	Sample #	Client	Load time	Count time	Analysis	Tech
9/9/21	Daily Bkgd/QC	Lab	0650/0814	1hr/30min	XB	KP
9/9/21	Cross Talk	Lab	0853	5 min	XB	KP
9/9/21	Cross Talk	Lab	0859	5 min	XB	KP
9/9/21	2109027AB (1-4)	BR water well	0920	2 hrs	XB	KP
9/9/21	2108094Ra (1)	ERM	0951	30 min	Ra^8	KP
9/9/21	2108094Ra (2-7)	ERM	0951	2 hrs	Ra^8	KP

TDS NOTES

EBERLINE SERVICES

Work Order Analysis Notes

Oak Ridge Laboratory
601 Scarboro Rd.
Oak Ridge, TN 37830
Voice: 865.481.0683
www.eberlineservices.com

Internal Work Order	21-08094
Analysis Code	TDS
Run Number	1

#	Date	Dept	User	Notes
1	08/31/21 14:46	PREP	JPACHELLA	Samples were filtered, aliquoted into tared beakers, dried, and reweighed.

8-31-21 JPachella

SECTION VIII

ANALYTICAL DATA (RADIUM-226)

Work Order	21-08094
Analysis Code	Ra226
Run	1
Date Received	8/29/2021
Lab Deadline	9/13/2021
Client	ERM
Project	526033
Report Level	4
Activity Units	pCi
Aliquot Units	l
Matrix	WA
Method	EPA 903.0 Modified
Instrument Type	Alpha Spectroscopy
Radiometric Tracer	Ba-133
Radiometric Sol#	Ba-6a
Tracer Act (dpm/g)	390.1
Carrier	
Carrier Conc (mg/ml)	

Internal Fraction	Sample Desc	Client ID	Login CPM	Sample Date	Sample Aliquot
01	LCS	LCS		08/30/21 00:00	1.0000E+00
02	MBL	BLANK		08/30/21 00:00	1.0000E+00
03	DUP	H-34	20	08/23/21 10:55	1.0000E+00
04	DO	H-34	20	08/23/21 10:55	1.0000E+00
05	TRG	H-32A	20	08/23/21 12:00	1.0000E+00
06	TRG	H-32B	30	08/23/21 13:50	1.0000E+00
07	TRG	H-33	30	08/23/21 14:50	1.0000E+00

0045

* SAF1 is used for Gross Alpha and all other radionuclides. SAF2 is used for Gross Beta only. ^ Indicates estimated SAF value.
** Actual mass exceeded the calibration curve range. Results should be qualified as appropriate.

Internal Fraction	Sample Desc	Tracer Aliquot (g)	Tracer Total ACT (dpm)	Radiometric Tracer (pCi)	Radiometric % Rec	Grav Carrier Added (ml)	Grav Filter Tare (g)	Grav Filter Final (g)	Grav Filter Net (g)	Grav % Rec	Mean % Rec	SAF 1*	SAF 2*
01	LCS	2.2350	871.9	425.0	108.22		0.0206	0.0310	0.0104		108.22	3.00^	1.00
02	MBL	2.2233	867.3	482.0	123.37		0.0204	0.0305	0.0101		110.00	3.00^	1.00
03	DUP	2.2064	860.7	395.0	101.88		0.0206	0.0306	0.0100		101.88	3.00^	1.00
04	DO	2.2208	866.3	403.0	103.27		0.0205	0.0293	0.0088		103.27	2.96	1.00
05	TRG	2.2160	864.5	410.0	105.29		0.0206	0.0314	0.0108		105.29	3.00^	1.00
06	TRG	2.2164	864.6	437.0	112.20		0.0206	0.0303	0.0097		110.00	3.00^	1.00
07	TRG	2.2109	862.5	383.0	98.58		0.0203	0.0302	0.0099		98.58	3.00^	1.00

* SAF1 is used for Gross Alpha and all other radionuclides. SAF2 is used for Gross Beta only. ^ Indicates estimated SAF value.
** Actual mass exceeded the calibration curve range. Results should be qualified as appropriate.

21-08094
Ra226
Run 1

Internal Fraction	Sample Desc	Rough Prep Date	Rough Prep By	Prep Date	Prep By	Sep t0 Date/Time	Sep t0 By	Sep t1 Date/Time	Sep t1 By
01	LCS			09/01/21 08:08	JHARVEY	09/07/21 07:32	AYARBER		
02	MBL			09/01/21 08:08	JHARVEY	09/07/21 07:32	AYARBER		
03	DUP			09/01/21 08:08	JHARVEY	09/07/21 07:32	AYARBER		
04	DO			09/01/21 08:08	JHARVEY	09/07/21 07:32	AYARBER		
05	TRG			09/01/21 08:08	JHARVEY	09/07/21 07:32	AYARBER		
06	TRG			09/01/21 08:08	JHARVEY	09/07/21 07:32	AYARBER		
07	TRG			09/01/21 08:08	JHARVEY	09/07/21 07:32	AYARBER		

* SAF1 is used for Gross Alpha and all other radionuclides. SAF2 is used for Gross Beta only. ^ Indicates estimated SAF value.
** Actual mass exceeded the calibration curve range. Results should be qualified as appropriate.

Preliminary Data Report & Analytical Calculations
Work Order: 21-08094-Ra226-1

Run: 1
Analysis Code: Ra226
Eberline Services Work Order: 21-08094
Client: ERM
0048

Lab Fraction	Nuclide	Sample Desc	Client Identification	Activity Units	Results	Error Estimate	MDA	LCS Known	LCS %R	LCS Flag	RPD Flag	MDA Flag	Blank Flag
01	RA-226	LCS	LCS	pCi/l	1.11E+01	1.70E+00	4.37E-01	1.01E+01	109.91	OK		OK	
02	RA-226	MBL	BLANK	pCi/l	-6.27E-02	1.41E-01	4.15E-01					OK	OK
03	RA-226	DUP	H-34	pCi/l	2.19E-01	2.50E-01	3.74E-01				NA	OK	
04	RA-226	DO	H-34	pCi/l	3.87E-01	2.81E-01	3.07E-01					OK	
05	RA-226	TRG	H-32A	pCi/l	7.93E-02	2.01E-01	4.01E-01					OK	
06	RA-226	TRG	H-32B	pCi/l	1.93E-01	2.16E-01	3.05E-01					OK	
07	RA-226	TRG	H-33	pCi/l	2.84E-01	2.51E-01	2.72E-01					OK	

Run: 1
Analysis Code: Ra226
Eberline Services Work Order: 21-08094
Client: ERM
0049

Lab Fraction	Nuclide	Sample Desc	Sample Date	Sample Aliquot	Radiometric % Rec	Grav % Rec	Mean % Rec	SAF	Sep t0 Date/Time	Sep t1 Date/Time
01	RA-226	LCS	08/30/21 00:00	1.00E+00	100.00	0.00	108.22		9/7/2021 7:32	
02	RA-226	MBL	08/30/21 00:00	1.00E+00	100.00	0.00	110.00		9/7/2021 7:32	
03	RA-226	DUP	08/23/21 10:55	1.00E+00	100.00	0.00	101.88		9/7/2021 7:32	
04	RA-226	DO	08/23/21 10:55	1.00E+00	100.00	0.00	103.27		9/7/2021 7:32	
05	RA-226	TRG	08/23/21 12:00	1.00E+00	100.00	0.00	105.29		9/7/2021 7:32	
06	RA-226	TRG	08/23/21 13:50	1.00E+00	100.00	0.00	110.00		9/7/2021 7:32	
07	RA-226	TRG	08/23/21 14:50	1.00E+00	98.58	0.00	98.58		9/7/2021 7:32	

Preliminary Data Report & Analytical Calculations

Work Order: 21-08094-Ra226-1

Run: 1
Analysis Code: Ra226
Eberline Services Work Order: 21-08094
Client: ERM
0060

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Halflife (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff	A to B, Cor
01	RA-226	LCS	09/07/21 11:26		A_Spec	Alpha_035	170	1.74 E+02	8.00 E-03	12.5	
02	RA-226	MBL	09/07/21 11:26		A_Spec	Alpha_036	170	-1.40 E+00	2.00 E-02	17.8	
03	RA-226	DUP	09/07/21 11:26		A_Spec	Alpha_039	170	4.30 E+00	1.00 E-02	15.6	
04	RA-226	DO	09/07/21 11:26		A_Spec	Alpha_041	170	8.64 E+00	8.00 E-03	17.5	
05	RA-226	TRG	09/07/21 11:26		A_Spec	Alpha_042	170	1.62 E+00	1.40 E-02	16.2	
06	RA-226	TRG	09/07/21 11:26		A_Spec	Alpha_045	170	3.98 E+00	6.00 E-03	16.4	
07	RA-226	TRG	09/07/21 11:26		A_Spec	Alpha_046	170	5.49 E+00	3.00 E-03	15.6	

Count Room Report
Client: ERM

21-08094-Ra226-1 (pCi/l) in WA
Tracer ID: Ba-6a

Internal Fraction	Sample Desc	Client ID	Sample Date	Sample Aliquot	Tracer Aliquot (g)	Tracer ACT (dpm)	Radiometric Tracer (pCi)	Radiometric % Rec	SAF 1*	SAF 2*
01	LCS	LCS	08/30/21 00:00	1.0000	2.2350	871.8735	425.0000	108.22	3.00^	1.00
02	MBL	BLANK	08/30/21 00:00	1.0000	2.2233	867.3093	482.0000	123.37	3.00^	1.00
03	DUP	H-34	08/23/21 10:55	1.0000	2.2064	860.7166	395.0000	101.88	3.00^	1.00
04	DO	H-34	08/23/21 10:55	1.0000	2.2208	866.3341	403.0000	103.27	2.96	1.00
05	TRG	H-32A	08/23/21 12:00	1.0000	2.2160	864.4616	410.0000	105.29	3.00^	1.00
06	TRG	H-32B	08/23/21 13:50	1.0000	2.2164	864.6176	437.0000	112.20	3.00^	1.00
07	TRG	H-33	08/23/21 14:50	1.0000	2.2109	862.4721	383.0000	98.58	3.00^	1.00

Eberline Services
Oak Ridge Laboratory

Spike and Tracer Worksheet

Printed: 9/1/2021 08:08

Internal Work Order	Run	Analysis Code	Date	Technician	Technician Initials	Witness Initials
21-08094	1	Ra226	9/1/2021 08:07	JHARVEY		

LCS & Matrix Spikes					LCS	MS	LCSD	MSD	LCS		MS		LCSD		MSD	
Isotope	*Sol #*	*Activity dpm/g*	*Solution Date*	*Approx Addition*	*Volume Used (g)*	*Volume Used (g)*	*Volume Used (g)*	*Volume Used (g)*	*Known pCi*	*Error Estimate*	*Added pCi*	*Error Estimate*	*Known pCi*	*Error Estimate*	*Added pCi*	*Error Estimate*
Ra-226	Ra-5b	43.910	9/1/2021	0.500	0.5091				10.07	0.463	0.00	0.000	0.00	0.000	0.00	0.000

Tracers

fraction	*Isotope*	*Sol #*	*Activity dpm/g*	*Solution Date*	*Volume Used (g)*	*Approx Addition*
01	Ba-133	Ba-6a	390.100	9/1/2021	2.2350	2.6000
02	Ba-133	Ba-6a	390.100	9/1/2021	2.2233	2.6000
03	Ba-133	Ba-6a	390.100	9/1/2021	2.2064	2.6000
04	Ba-133	Ba-6a	390.100	9/1/2021	2.2208	2.6000
05	Ba-133	Ba-6a	390.100	9/1/2021	2.2160	2.6000
06	Ba-133	Ba-6a	390.100	9/1/2021	2.2164	2.6000
07	Ba-133	Ba-6a	390.100	9/1/2021	2.2109	2.6000

Balance Printer Tapes

Tracer

LCS

Matrix Spike

0052

Eberline Analytical
Oak Ridge Laboratory

Aliquot Worksheet

Printed: 9/1/2021 08:10

Work Order	Run	Analysis Code	Rpt Units	Lab Deadline	Technician
21-08094	1	Ra226	liters	9/13/2021	JHARVEY

Lab Fraction	ERM Client ID	Sample Type	Muffle Data Ratio Post/Pre	Dilution Data No of Dils	Dil Factor	Ratio	Aliquot Data Aliquot	Net Equiv	MS Aliquot Data Aliquot	Net Equiv	H-3 Solids Only Water Added (ml)	H3 Dist Aliq
01	LCS	LCS					1.0000E+00	1.0000E+00				
02	BLANK	MBL					1.0000E+00	1.0000E+00				
03	H-34	DUP					1.0000E+00	1.0000E+00				
04	H-34	DO					1.0000E+00	1.0000E+00				
05	H-32A	TRG					1.0000E+00	1.0000E+00				
06	H-32B	TRG					1.0000E+00	1.0000E+00				
07	H-33	TRG					1.0000E+00	1.0000E+00				

Comments	

0053

Technician: JHarvey Date: 9/1/21

Gravimetric Worksheet

Work Order	Run	Analysis Code	Gravimetric Carrier	Carrier Conc (mg/ml)	Technician
21-08094	**1**	**Ra226**			**AYARBER**

TRetec Fraction	ERM Client ID	Sample Type	Carrier Data	Filter Data			Gravimetric
			Carrier Added (ml)	Filter Tare (g)	Filter Final (g)	Filter Net (g)	% Recovery
01	LCS	LCS		0.0206	0.0310	**0.0104**	
02	BLANK	MBL		0.0204	0.0305	**0.0101**	
03	DUP	DUP		0.0206	0.0306	**0.0100**	
04	H-34	DO		0.0205	0.0293	**0.0088**	
05	H-32A	TRG		0.0206	0.0314	**0.0108**	
06	H-32B	TRG		0.0206	0.0303	**0.0097**	
07	H-33	TRG		0.0203	0.0302	**0.0099**	

0054

Technician: Andrew Ayarber Date: 9/7/21

KP
9/8/21

Apex-Alpha™

Sample Description: SPIKE
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00002983
Batch Identification: 2108094A-RA
Sample Identification: 01
Sample Geometry: Shelf 2
Procedure Description: Ra

Detector Name: Alpha_035
Chamber Serial Number: 04026477A
Detector Serial Number: 58771
Env. Background: System Bkgd 304523
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Generic Mult. Factor: 3.000E+000 Generic Div. Factor: 1.000E+000
Sample Date/Time: 9/7/2021 8:25:10 AM
Acquisition Date/Time: 9/7/2021 11:26:27 AM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 1.0000 +/- 0.0000
Counting Efficiency: 0.1247 +/- 0.0023 on 5/21/2021 9:18:11 AM
Effective Efficiency: 0.1247 +/- 0.0023

Control Certificate Name: Ra226_Ra-5b
Chem. Recov. of Control: RA-226 0.366343 +/- 0.030771
Peak Match Tolerance: 0.350 MeV

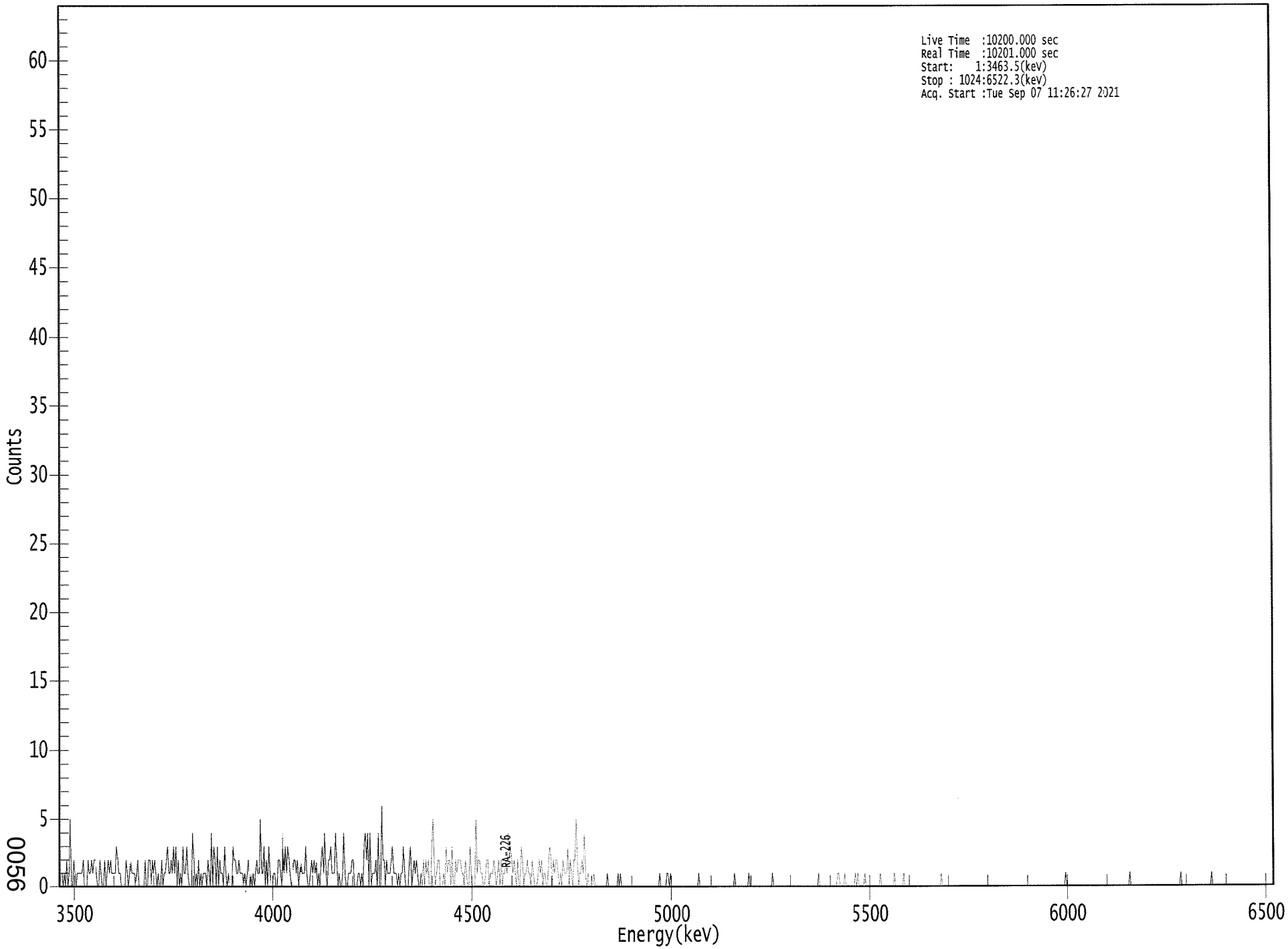
PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.493	9.81	66.87	1.19	0.00E+000	3.0
RA-226	4.586	173.64	14.94	1.36	0.00E+000	6.0

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.953	5685.50*	6.58E-001 +/- 4.40E-001	4.42E-001 +/- 1.60E-002
RA-226	0.950	4785.00*	1.11E+001 +/- 1.70E+000	4.37E-001 +/- 1.59E-002

0000298334.CNF



****
***** S P E C T R A L D A T A R E P O R T *****
****

Sample Title: 01

Elapsed Live time: 10200
Elapsed Real Time: 10201

Channel								
1:	1	1	1	0	1	0	2	0
9:	1	5	0	0	2	1	0	1
17:	1	1	1	1	2	0	0	0
25:	2	1	1	2	1	2	2	1
33:	0	0	2	1	0	0	2	0
41:	1	2	1	2	1	1	1	1
49:	3	2	1	1	0	0	0	0
57:	2	1	0	1	2	1	1	1
65:	0	1	2	0	0	0	0	0
73:	2	0	0	2	2	0	2	1
81:	2	1	0	1	0	0	2	0
89:	1	1	2	3	1	1	2	1
97:	3	1	3	0	2	0	1	0
105:	3	1	1	3	1	0	0	0
113:	4	2	0	1	0	2	0	1
121:	0	1	1	1	0	2	1	0
129:	4	0	3	2	0	3	0	2
137:	1	1	0	3	1	0	1	0
145:	0	0	3	2	2	1	1	2
153:	1	1	1	0	1	0	1	2
161:	0	1	0	1	0	1	2	1
169:	1	5	1	1	3	0	2	0
177:	3	1	0	0	1	1	0	0
185:	2	2	1	0	4	1	3	1
193:	3	2	1	0	1	2	2	1
201:	2	0	1	2	1	1	1	3
209:	1	0	0	1	2	1	2	1
217:	2	0	1	0	2	3	1	4
225:	1	0	2	2	3	1	1	1
233:	4	2	0	1	0	0	1	4
241:	1	0	0	1	1	1	2	2
249:	0	0	0	1	1	0	1	0
257:	3	4	2	4	0	4	0	1
265:	1	1	2	0	4	0	0	6
273:	2	2	0	2	1	1	1	2
281:	3	1	1	1	0	1	0	1
289:	1	3	1	0	0	0	2	3
297:	0	1	2	1	2	1	0	0
305:	1	0	2	0	2	1	2	0
313:	0	3	5	2	0	1	2	2
321:	0	0	0	1	0	3	1	2
329:	2	0	3	0	0	2	1	2
337:	2	2	1	1	0	2	1	0
345:	0	3	1	0	0	0	5	1
353:	2	2	1	1	0	0	1	2
361:	2	0	1	1	1	2	1	0

369:	1	2	0	2	0	1	1	2

Sample Title: 01

Channel								
377:	1	4	2	3	2	1	2	1
385:	0	2	0	0	3	2	0	1
393:	1	2	1	1	0	2	1	0
401:	0	0	1	2	1	2	0	1
409:	1	0	0	2	3	2	0	2
417:	1	2	2	1	0	1	0	2
425:	1	1	1	3	0	2	1	0
433:	2	2	5	2	0	1	1	2
441:	1	4	1	0	1	0	0	0
449:	0	1	0	0	0	0	0	0
457:	0	0	0	0	1	0	0	0
465:	0	0	0	0	0	1	0	1
473:	0	0	0	0	0	0	0	0
481:	0	0	0	0	0	0	0	0
489:	0	0	0	0	0	0	0	0
497:	0	0	0	0	0	0	0	0
505:	1	0	0	0	0	0	1	1
513:	0	1	0	0	0	0	0	0
521:	0	0	0	0	0	0	0	0
529:	0	0	0	0	0	0	0	0
537:	0	1	0	0	0	0	0	0
545:	0	0	0	0	0	0	0	0
553:	0	0	0	0	0	0	0	0
561:	0	0	0	0	0	0	0	1
569:	0	0	0	0	0	0	0	0
577:	0	0	0	1	0	0	0	0
585:	0	0	0	0	0	0	0	0
593:	0	0	0	0	0	0	0	1
601:	0	0	0	0	0	0	0	0
609:	0	0	0	0	0	0	0	0
617:	0	0	0	0	0	0	0	0
625:	0	0	0	0	0	0	0	0
633:	0	0	0	0	0	0	1	0
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	1	1
657:	0	0	0	0	1	0	0	0
665:	0	0	0	0	0	1	0	1
673:	0	0	0	0	0	1	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	1	0	0	0	0	0
697:	0	0	0	0	0	0	1	0
705:	0	0	0	0	0	0	1	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	1	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801:	0	0	0	0	0	0	0	0

Sample Title: 01

Channel								
809:	0	0	0	0	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	1
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	1	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	1	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	1	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0

KP
9/8/21

Apex-Alpha™

Sample Description: BLANK
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00002983
Batch Identification: 2108094A-RA
Sample Identification: 02
Sample Geometry: Shelf 2
Procedure Description: Ra

Detector Name: Alpha_036
Chamber Serial Number: 04026477B
Detector Serial Number: 84167
Env. Background: System Bkgd 304524
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Generic Mult. Factor: 3.000E+000 Generic Div. Factor: 1.000E+000
Sample Date/Time: 9/7/2021 8:25:10 AM
Acquisition Date/Time: 9/7/2021 11:26:28 AM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 1.0000 +/- 0.0000
Counting Efficiency: 0.1776 +/- 0.0031 on 5/21/2021 9:18:09 AM
Effective Efficiency: 0.1776 +/- 0.0031

Peak Match Tolerance: 0.350 MeV

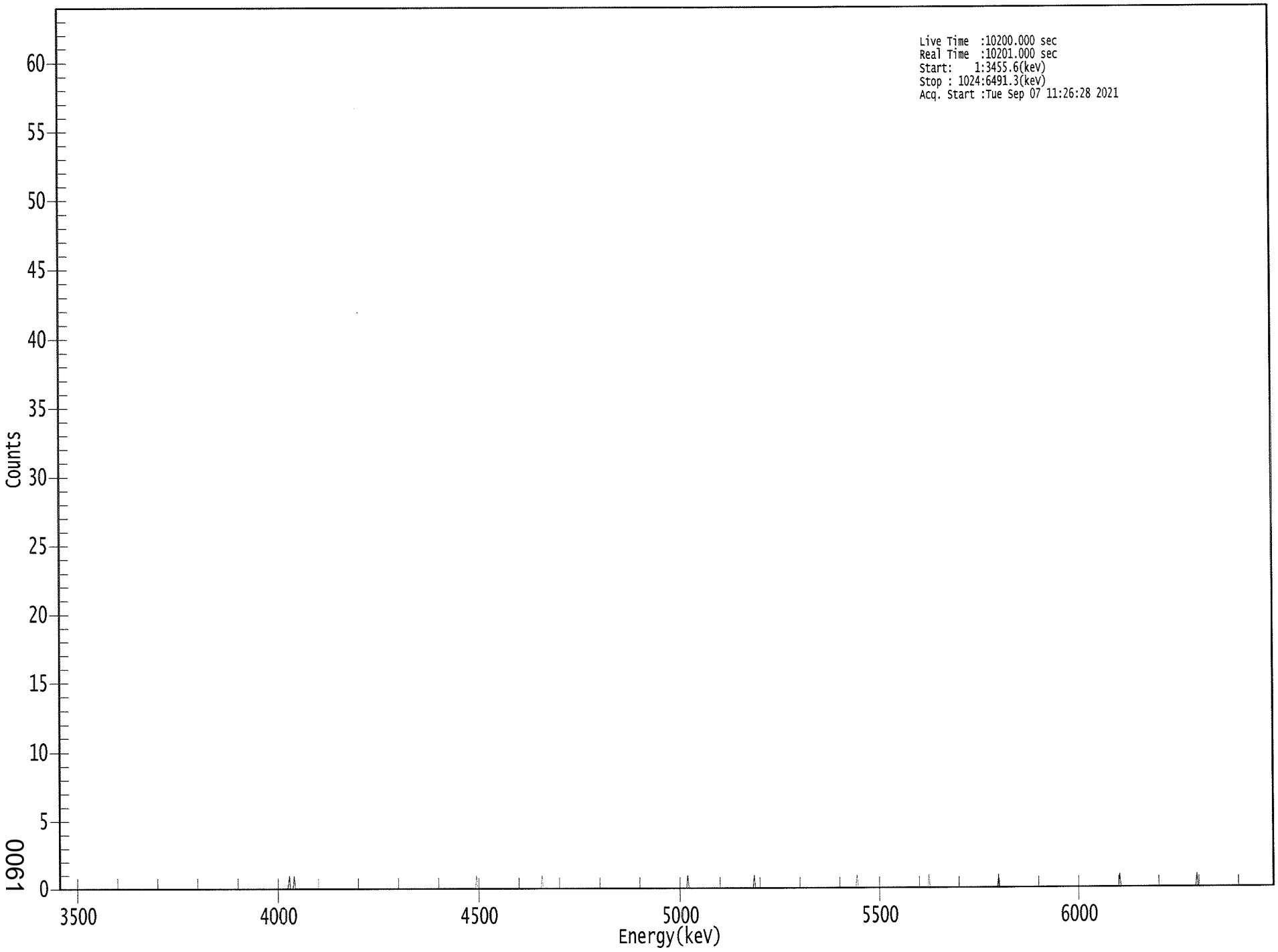
PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.534	1.83	152.56	0.17	0.00E+000	3.0
RA-226	4.576	-1.40	224.79	3.40	0.00E+000	3.0

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.971	5685.50*	8.61E-002 +/- 1.31E-001	1.96E-001 +/- 6.76E-003
RA-226	0.944	4785.00*	-6.27E-002 +/- 1.41E-001	4.15E-001 +/- 1.43E-002

0000298335.CNF



****
***** S P E C T R A L D A T A R E P O R T *****
****

Sample Title: 02

Elapsed Live time: 10200
Elapsed Real Time: 10201

Channel								
1:	0	0	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0	0
137:	0	0	0	0	0	0	0	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	0	0
161:	0	0	0	0	0	0	0	0
169:	0	0	0	0	0	0	0	0
177:	0	0	0	0	0	0	0	0
185:	0	0	0	0	0	0	0	0
193:	0	1	0	0	0	1	0	0
201:	0	0	0	0	0	0	0	0
209:	0	0	0	0	0	0	0	0
217:	0	0	0	0	0	0	0	0
225:	0	0	0	0	0	0	0	0
233:	0	0	0	0	0	0	0	0
241:	0	0	0	0	0	0	0	0
249:	0	0	0	0	0	0	0	0
257:	0	0	0	0	0	0	0	0
265:	0	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	0	0
321:	0	0	0	0	0	0	0	0
329:	0	0	0	0	0	0	0	0
337:	0	0	0	0	0	0	0	0
345:	0	0	0	0	0	0	1	0
353:	0	0	0	0	0	0	0	0
361:	0	0	0	0	0	0	0	0

369:	0	0	0	0	0	0	0	0

Sample Title: 02

Channel								
377:	0	0	0	0	0	0	0	0
385:	0	0	0	0	0	0	0	0
393:	0	0	0	0	0	0	0	0
401:	0	0	0	0	0	1	0	0
409:	0	0	0	0	0	0	0	0
417:	0	0	0	0	0	0	0	0
425:	0	0	0	0	0	0	0	0
433:	0	0	0	0	0	0	0	0
441:	0	0	0	0	0	0	0	0
449:	0	0	0	0	0	0	0	0
457:	0	0	0	0	0	0	0	0
465:	0	0	0	0	0	0	0	0
473:	0	0	0	0	0	0	0	0
481:	0	0	0	0	0	0	0	0
489:	0	0	0	0	0	0	0	0
497:	0	0	0	0	0	0	0	0
505:	0	0	0	0	0	0	0	0
513:	0	0	0	0	0	0	0	0
521:	0	0	0	0	0	0	0	1
529:	0	0	0	0	0	0	0	0
537:	0	0	0	0	0	0	0	0
545:	0	0	0	0	0	0	0	0
553:	0	0	0	0	0	0	0	0
561:	0	0	0	0	0	0	0	0
569:	0	0	0	0	0	0	0	0
577:	0	0	0	0	0	0	0	1
585:	0	0	0	0	0	0	0	0
593:	0	0	0	0	0	0	0	0
601:	0	0	0	0	0	0	0	0
609:	0	0	0	0	0	0	0	0
617:	0	0	0	0	0	0	0	0
625:	0	0	0	0	0	0	0	0
633:	0	0	0	0	0	0	0	0
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	1	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	1	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	1	0
793:	0	0	0	0	0	0	0	0

801:	0	0	0	0	0	0	0	0

Sample Title: 02

Channel								
809:	0	0	0	0	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	1	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	1	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0

KP
9/8/21

Apex-Alpha™

Sample Description: H-34 DUP
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00002983
Batch Identification: 2108094A-RA
Sample Identification: 03
Sample Geometry: Shelf 2
Procedure Description: Ra

Detector Name: Alpha_039
Chamber Serial Number: 06027396A
Detector Serial Number: 83109
Env. Background: System Bkgd 304527
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Generic Mult. Factor: 3.000E+000 Generic Div. Factor: 1.000E+000
Sample Date/Time: 8/23/2021 8:25:10 AM
Acquisition Date/Time: 9/7/2021 11:26:30 AM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 1.0000 +/- 0.0000
Counting Efficiency: 0.1562 +/- 0.0028 on 5/21/2021 9:18:04 AM
Effective Efficiency: 0.1562 +/- 0.0028

Peak Match Tolerance: 0.350 MeV

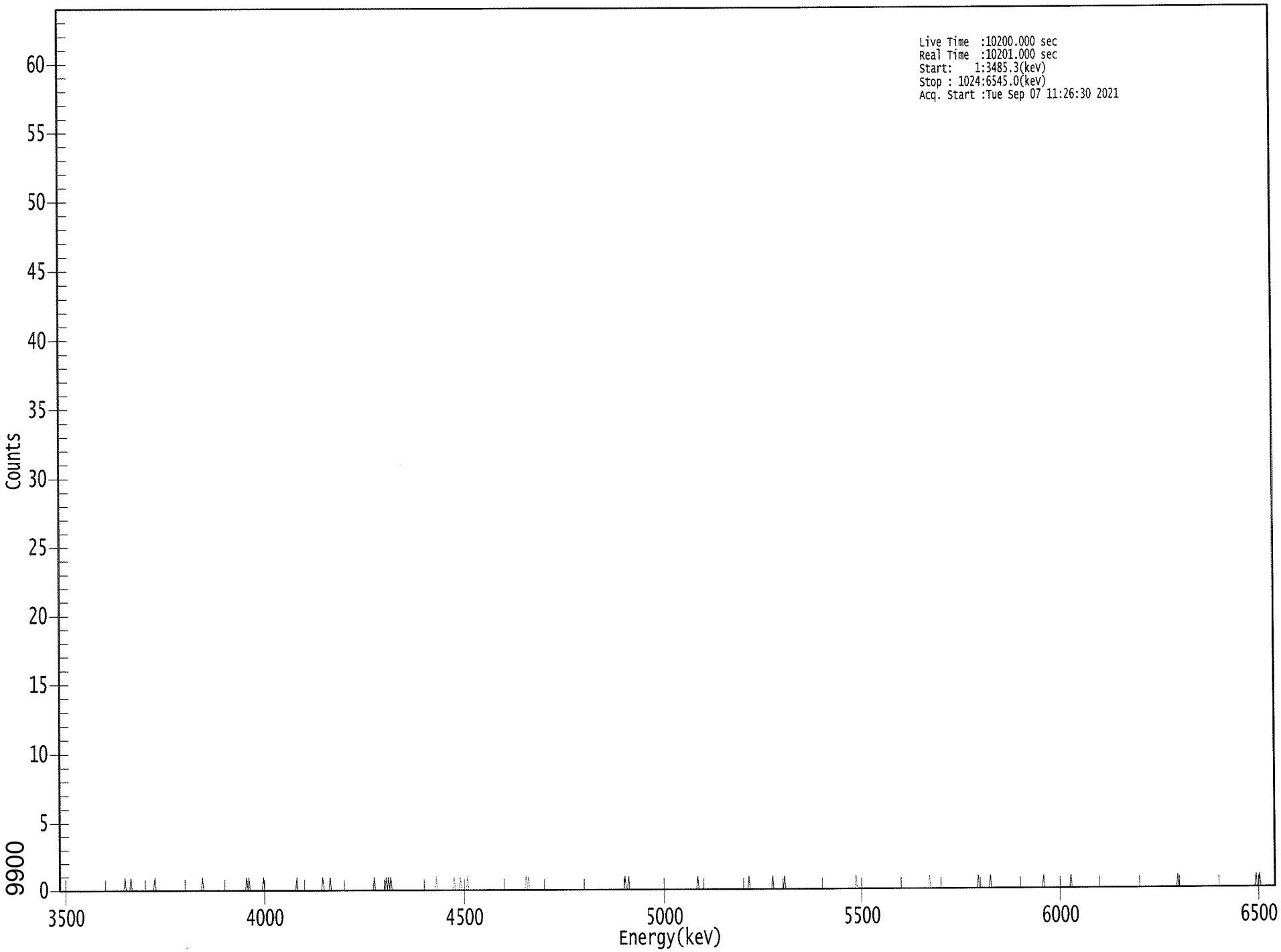
PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.579	0.13	2295.4	1.87	0.00E+000	3.0
RA-226	4.537	4.30	114.31	1.70	0.00E+000	3.0

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.985	5685.50*	6.99E-003 +/- 1.60E-001	4.07E-001 +/- 1.43E-002
RA-226	0.923	4785.00*	2.19E-001 +/- 2.50E-001	3.74E-001 +/- 1.31E-002

0000298342.CNF



ROI Type: 1

****
***** S P E C T R A L D A T A R E P O R T *****
****

Sample Title: 03

Elapsed Live time: 10200
Elapsed Real Time: 10201

Channel								
1:	0	0	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	1
57:	0	0	0	0	1	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	1	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	1	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0	0
137:	0	0	0	0	0	0	0	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	0	1	0	1
161:	0	0	0	0	0	0	0	0
169:	0	0	0	1	0	0	0	0
177:	0	0	0	0	0	0	0	0
185:	0	0	0	0	0	0	0	0
193:	0	0	0	0	0	0	0	1
201:	0	0	0	0	0	0	0	0
209:	0	0	0	0	0	0	0	0
217:	0	0	0	0	0	1	0	0
225:	0	0	0	1	0	0	0	0
233:	0	0	0	0	0	0	0	0
241:	0	0	0	0	0	0	0	0
249:	0	0	0	0	0	0	0	0
257:	0	0	0	0	0	0	0	0
265:	1	0	0	0	0	0	0	0
273:	0	0	1	0	1	0	1	0
281:	0	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	0	0
313:	0	0	0	0	1	0	0	0
321:	0	0	0	0	0	0	0	0
329:	0	0	0	1	0	0	0	0
337:	1	0	0	0	0	0	1	0
345:	0	0	0	0	0	0	0	0
353:	0	0	0	0	0	0	0	0
361:	0	0	0	0	0	0	0	0

369:	0	0	0	0	0	0	0	0

Sample Title: 03

Channel								
377:	0	0	0	0	0	0	0	0
385:	0	0	0	0	0	0	0	1
393:	0	1	0	0	0	0	0	0
401:	0	0	0	0	0	0	0	0
409:	0	0	0	0	0	0	0	0
417:	0	0	0	0	0	0	0	0
425:	0	0	0	0	0	0	0	0
433:	0	0	0	0	0	0	0	0
441:	0	0	0	0	0	0	0	0
449:	0	0	0	0	0	0	0	0
457:	0	0	0	0	0	0	0	0
465:	0	0	0	0	0	0	0	0
473:	0	0	1	0	0	1	0	0
481:	0	0	0	0	0	0	0	0
489:	0	0	0	0	0	0	0	0
497:	0	0	0	0	0	0	0	0
505:	0	0	0	0	0	0	0	0
513:	0	0	0	0	0	0	0	0
521:	0	0	0	0	0	0	0	0
529:	0	0	0	0	0	0	0	1
537:	0	0	0	0	0	0	0	0
545:	0	0	0	0	0	0	0	0
553:	0	0	0	0	0	0	0	0
561:	0	0	0	0	0	0	0	0
569:	0	0	0	0	0	0	0	0
577:	0	0	1	0	0	0	0	0
585:	0	0	0	0	0	0	0	0
593:	0	0	0	0	0	0	1	0
601:	0	0	0	0	0	0	0	0
609:	1	0	0	0	0	0	0	0
617:	0	0	0	0	0	0	0	0
625:	0	0	0	0	0	0	0	0
633:	0	0	0	0	0	0	0	0
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	1	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	1	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	1	0	0	0
777:	0	0	0	0	0	0	1	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801:	0	0	0	0	0	0	0	0

Sample Title: 03

Channel								
809:	0	0	0	0	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	1	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	0	0	1	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	1	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	1	0
1009:	0	1	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0

KP
9/8/21

Apex-Alpha™

Sample Description: H-34
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00002983
Batch Identification: 2108094A-RA
Sample Identification: 04
Sample Geometry: Shelf 2
Procedure Description: Ra

Detector Name: Alpha_041
Chamber Serial Number: 05026930A
Detector Serial Number: 91087
Env. Background: System Bkgd 304528
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Generic Mult. Factor: 2.960E+000 Generic Div. Factor: 1.000E+000
Sample Date/Time: 8/23/2021 8:25:10 AM
Acquisition Date/Time: 9/7/2021 11:26:32 AM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 1.0000 +/- 0.0000
Counting Efficiency: 0.1753 +/- 0.0031 on 5/21/2021 9:18:01 AM
Effective Efficiency: 0.1753 +/- 0.0031

Peak Match Tolerance: 0.350 MeV

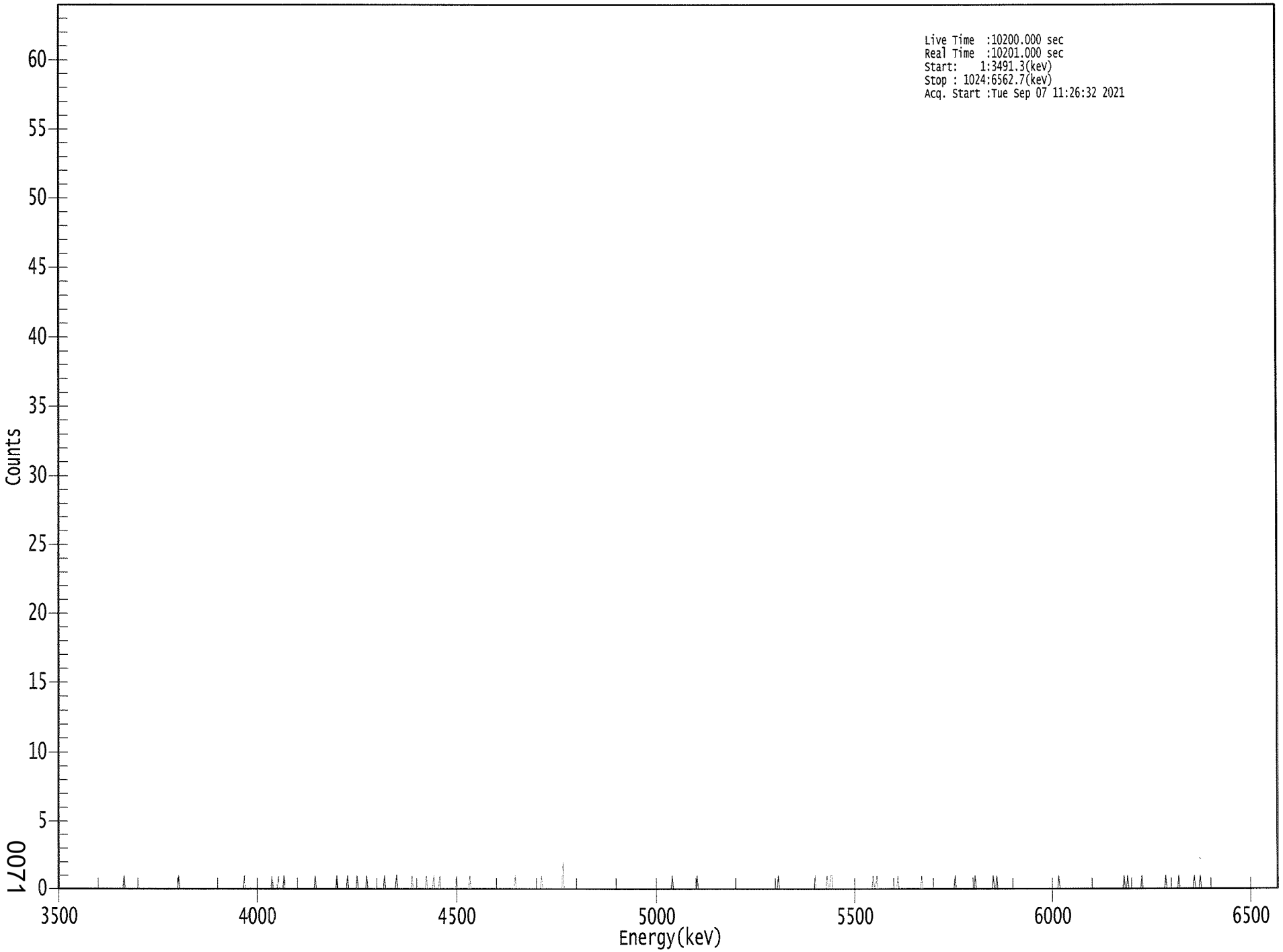
PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.504	6.98	80.28	1.02	0.00E+000	3.0
RA-226	4.555	8.64	72.56	1.36	0.00E+000	3.0

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.958	5685.50*	3.30E-001 +/- 2.65E-001	2.98E-001 +/- 1.02E-002
RA-226	0.933	4785.00*	3.87E-001 +/- 2.81E-001	3.07E-001 +/- 1.05E-002

0000298348.CNF



ROI Type: 1

0071

****
***** S P E C T R A L D A T A R E P O R T *****
****

Sample Title: 04

Elapsed Live time: 10200
Elapsed Real Time: 10201

Channel							
1:	0	0	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	1
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	0	1	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0	0
137:	0	0	0	0	0	0	0	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	1	0	0	0
161:	0	0	0	0	0	0	0	0
169:	0	0	0	0	0	0	0	0
177:	0	0	0	1	0	0	0	0
185:	1	0	0	0	0	1	0	0
193:	0	0	0	0	0	0	0	0
201:	0	0	0	0	0	0	0	0
209:	0	0	0	0	0	0	0	1
217:	0	0	0	0	0	0	0	0
225:	0	0	0	0	0	0	0	0
233:	0	1	0	0	0	0	0	0
241:	0	0	1	0	0	0	0	0
249:	0	0	1	0	0	0	0	0
257:	0	0	1	0	0	0	0	0
265:	0	0	0	0	0	0	0	0
273:	0	1	0	0	0	0	0	0
281:	0	0	0	1	0	0	0	0
289:	0	0	0	0	0	0	0	0
297:	1	0	0	0	0	0	0	0
305:	0	0	0	0	1	0	0	0
313:	0	0	1	0	0	0	0	1
321:	0	0	0	0	0	0	0	0
329:	0	0	0	0	0	1	0	0
337:	0	0	0	0	0	0	0	0
345:	1	0	0	0	0	0	0	0
353:	0	0	0	0	0	0	0	0
361:	0	0	0	0	0	0	0	0

369:	0	0	0	0	0	0	0	0

Sample Title: 04

Channel								
377:	0	0	0	0	0	0	1	0
385:	0	0	0	0	0	0	0	0
393:	0	0	0	0	0	0	0	0
401:	0	0	0	0	1	0	0	0
409:	0	0	0	0	0	0	0	0
417:	0	0	0	0	0	0	2	0
425:	0	0	0	0	0	0	0	0
433:	0	0	0	0	0	0	0	0
441:	0	0	0	0	0	0	0	0
449:	0	0	0	0	0	0	0	0
457:	0	0	0	0	0	0	0	0
465:	0	0	0	0	0	0	0	0
473:	0	0	0	0	0	0	0	0
481:	0	0	0	0	0	0	0	0
489:	0	0	0	0	0	0	0	0
497:	0	0	0	0	0	0	0	0
505:	0	0	0	0	0	0	0	0
513:	0	1	0	0	0	0	0	0
521:	0	0	0	0	0	0	0	0
529:	0	0	0	0	0	0	1	0
537:	0	0	0	0	0	0	0	0
545:	0	0	0	0	0	0	0	0
553:	0	0	0	0	0	0	0	0
561:	0	0	0	0	0	0	0	0
569:	0	0	0	0	0	0	0	0
577:	0	0	0	0	0	0	0	0
585:	0	0	0	0	0	0	0	0
593:	0	0	0	0	0	0	0	0
601:	0	0	1	0	0	0	0	0
609:	0	0	0	0	0	0	0	0
617:	0	0	0	0	0	0	0	0
625:	0	0	0	0	0	0	0	0
633:	0	1	0	0	0	0	0	0
641:	0	0	0	1	0	0	1	1
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	1	0	0	1	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	1
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	1	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	1
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	1	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	1
785:	0	0	1	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801:	0	0	0	0	0	0	0	0

Sample Title: 04

Channel								
809:	0	0	0	0	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	1	0
841:	0	0	0	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	1	0	0
897:	1	0	0	0	0	0	0	0
905:	0	0	0	0	1	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	1	0	0	0	0	0	0	0
937:	0	0	0	1	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	1	0	0	0	0	1	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0

Apex-Alpha™

LD 9/8/21

Sample Description: H-32A
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00002983
Batch Identification: 2108094A-RA
Sample Identification: 05
Sample Geometry: Shelf 2
Procedure Description: Ra

Detector Name: Alpha_042
Chamber Serial Number: 05026930B
Detector Serial Number: 84185
Env. Background: System Bkgd 304529
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Generic Mult. Factor: 3.000E+000 Generic Div. Factor: 1.000E+000
Sample Date/Time: 8/23/2021 8:25:10 AM
Acquisition Date/Time: 9/7/2021 11:26:33 AM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 1.0000 +/- 0.0000
Counting Efficiency: 0.1624 +/- 0.0029 on 5/21/2021 9:17:59 AM
Effective Efficiency: 0.1624 +/- 0.0029

Peak Match Tolerance: 0.350 MeV

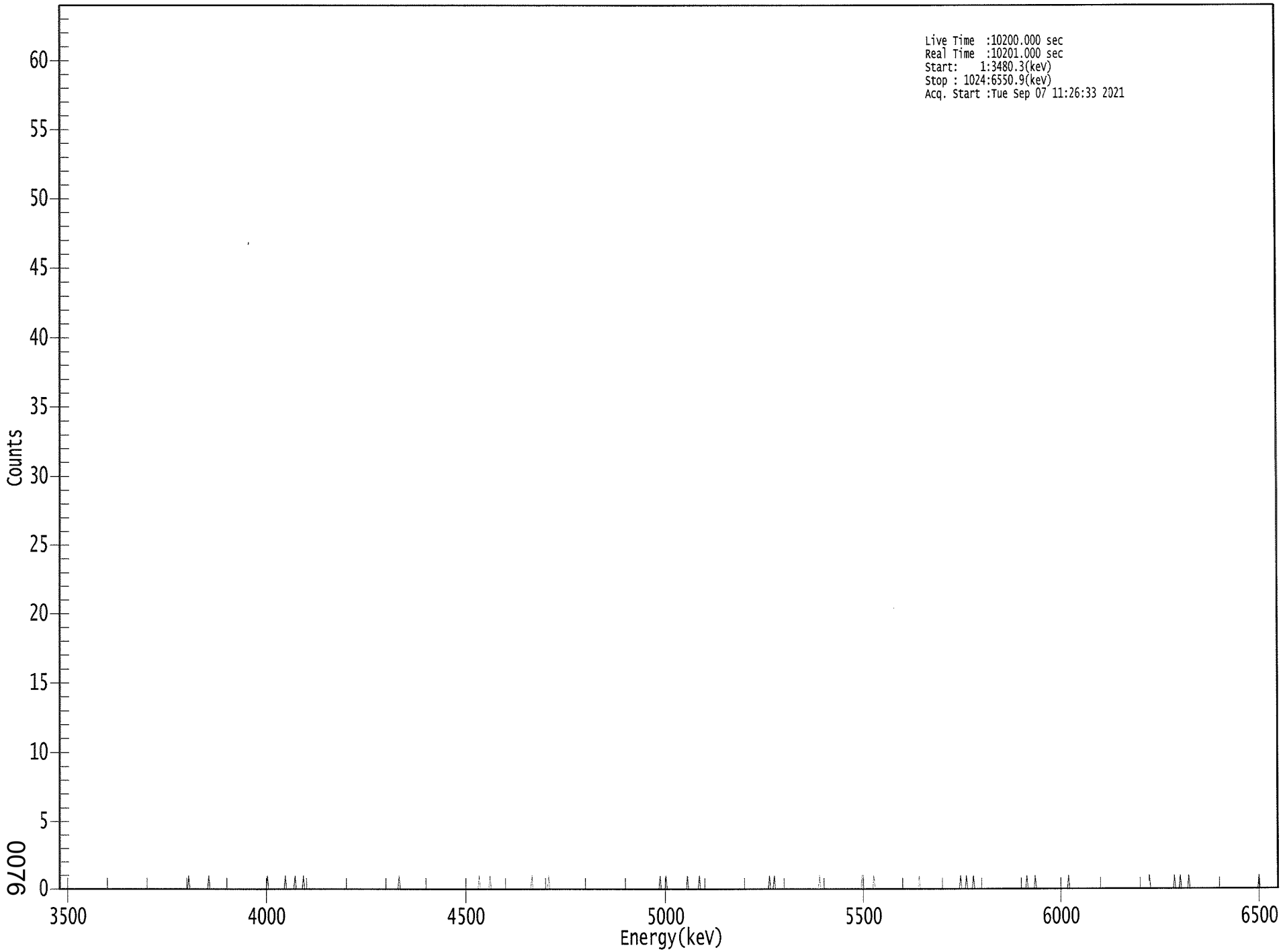
PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.511	2.79	162.88	2.21	0.00E+000	3.0
RA-226	4.617	1.62	253.92	2.38	0.00E+000	3.0

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.961	5685.50*	1.44E-001 +/- 2.35E-001	4.14E-001 +/- 1.44E-002
RA-226	0.964	4785.00*	7.93E-002 +/- 2.01E-001	4.01E-001 +/- 1.39E-002

0000298344.CNF



0076

ROI Type: 1

****
***** S P E C T R A L D A T A R E P O R T *****
****

Sample Title: 05

Elapsed Live time: 10200
Elapsed Real Time: 10201

Channel								
1:	0	0	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	0	0	1	0	0	0
113:	0	0	0	0	0	0	0	0
121:	0	0	0	0	0	1	0	0
129:	0	0	0	0	0	0	0	0
137:	0	0	0	0	0	0	0	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	0	0
161:	0	0	0	0	0	0	0	0
169:	0	0	0	0	0	0	1	0
177:	0	0	0	0	0	0	0	0
185:	0	0	0	0	0	1	0	0
193:	0	0	0	0	0	1	0	0
201:	0	0	0	0	1	0	0	0
209:	0	0	0	0	0	0	0	0
217:	0	0	0	0	0	0	0	0
225:	0	0	0	0	0	0	0	0
233:	0	0	0	0	0	0	0	0
241:	0	0	0	0	0	0	0	0
249:	0	0	0	0	0	0	0	0
257:	0	0	0	0	0	0	0	0
265:	0	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	0	0	0	1	0	0	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	0	0
321:	0	0	0	0	0	0	0	0
329:	0	0	0	0	0	0	0	0
337:	0	0	0	0	0	0	0	0
345:	0	0	0	0	0	0	0	1
353:	0	0	0	0	0	0	0	0
361:	1	0	0	0	0	0	0	0

369:	0	0	0	0	0	0	0	0

Sample Title: 05

Channel								
377:	0	0	0	0	0	0	0	0
385:	0	0	0	0	0	0	0	0
393:	0	0	0	1	0	0	0	0
401:	0	0	0	0	0	0	0	0
409:	0	1	0	0	0	0	0	0
417:	0	0	0	0	0	0	0	0
425:	0	0	0	0	0	0	0	0
433:	0	0	0	0	0	0	0	0
441:	0	0	0	0	0	0	0	0
449:	0	0	0	0	0	0	0	0
457:	0	0	0	0	0	0	0	0
465:	0	0	0	0	0	0	0	0
473:	0	0	0	0	0	0	0	0
481:	0	0	0	0	0	0	0	0
489:	0	0	0	0	0	0	0	0
497:	0	0	0	0	0	0	1	0
505:	0	0	0	1	0	0	0	0
513:	0	0	0	0	0	0	0	0
521:	0	0	0	0	0	1	0	0
529:	0	0	0	0	0	0	0	1
537:	0	0	0	0	0	0	0	0
545:	0	0	0	0	0	0	0	0
553:	0	0	0	0	0	0	0	0
561:	0	0	0	0	0	0	0	0
569:	0	0	0	0	0	0	0	0
577:	0	0	0	0	0	0	0	0
585:	0	0	0	0	0	0	0	0
593:	0	0	1	0	0	0	1	0
601:	0	0	0	0	0	0	0	0
609:	0	0	0	0	0	0	0	0
617:	0	0	0	0	0	0	0	0
625:	0	0	0	0	0	0	0	0
633:	0	0	0	0	1	0	0	0
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	1	1	0	0	0	0	0	0
681:	0	0	1	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	1	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	1	0	0	0	0
761:	1	0	0	0	0	0	1	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801:	0	0	0	0	0	0	0	0

Sample Title: 05

Channel								
809:	0	0	0	1	0	0	0	0
817:	0	0	1	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	1	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	1	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	1
937:	0	0	0	0	1	0	0	0
945:	0	0	0	1	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	1	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0

Apex-Alpha™

KP
9/8/21

Sample Description: H-32B
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00002983
Batch Identification: 2108094A-RA
Sample Identification: 06
Sample Geometry: Shelf 2
Procedure Description: Ra

Detector Name: Alpha_045
Chamber Serial Number: 04026482A
Detector Serial Number: 91131
Env. Background: System Bkgd 304530
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Generic Mult. Factor: 3.000E+000 Generic Div. Factor: 1.000E+000
Sample Date/Time: 8/23/2021 8:25:10 AM
Acquisition Date/Time: 9/7/2021 11:26:35 AM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 1.0000 +/- 0.0000
Counting Efficiency: 0.1642 +/- 0.0029 on 5/21/2021 9:18:20 AM
Effective Efficiency: 0.1642 +/- 0.0029

Peak Match Tolerance: 0.350 MeV

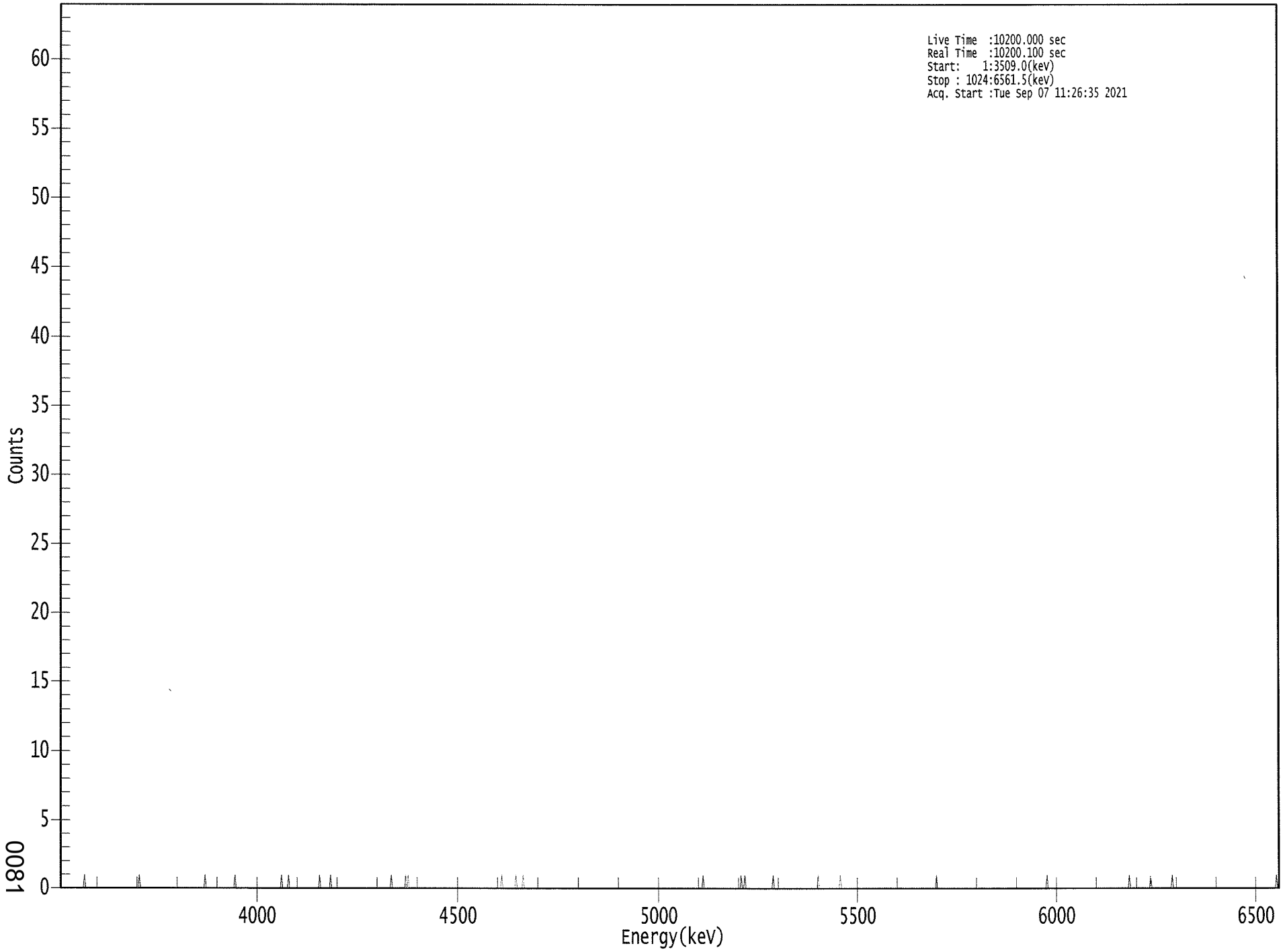
PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.429	1.32	215.97	0.68	0.00E+000	3.0
RA-226	4.534	3.98	112.01	1.02	0.00E+000	3.0

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.918	5685.50*	6.75E-002 +/- 1.46E-001	2.89E-001 +/- 1.01E-002
RA-226	0.921	4785.00*	1.93E-001 +/- 2.16E-001	3.05E-001 +/- 1.06E-002

0000298345.CNF



0081

ROI Type: 1

****
***** S P E C T R A L D A T A R E P O R T *****
****

Sample Title: 06

Elapsed Live time: 10200
Elapsed Real Time: 10200

Channel								
1:	0	0	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	1	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	1	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	0	1	0	0	0	0	0	0
129:	0	0	0	0	0	0	0	0
137:	0	0	0	0	0	0	0	0
145:	0	0	1	0	0	0	0	0
153:	0	0	0	0	0	0	0	0
161:	0	0	0	0	0	0	0	0
169:	0	0	0	0	0	0	0	0
177:	0	0	0	0	0	0	0	0
185:	0	1	0	0	0	0	0	1
193:	0	0	0	0	0	0	0	0
201:	0	0	0	0	0	0	0	0
209:	0	0	0	0	0	0	0	0
217:	0	1	0	0	0	0	0	0
225:	0	0	1	0	0	0	0	0
233:	0	0	0	0	0	0	0	0
241:	0	0	0	0	0	0	0	0
249:	0	0	0	0	0	0	0	0
257:	0	0	0	0	0	0	0	0
265:	0	0	0	0	0	0	0	0
273:	0	0	0	0	0	1	0	0
281:	0	0	0	0	0	0	0	0
289:	0	1	0	1	0	0	0	0
297:	0	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	0	0
321:	0	0	0	0	0	0	0	0
329:	0	0	0	0	0	0	0	0
337:	0	0	0	0	0	0	0	0
345:	0	0	0	0	0	0	0	0
353:	0	0	0	0	0	0	0	0
361:	0	0	0	0	0	0	0	0

369:	0	1	0	0	0	0	0	0

Sample Title: 06

Channel								
377:	0	0	0	0	0	1	0	0
385:	0	0	0	1	0	0	0	0
393:	0	0	0	0	0	0	0	0
401:	0	0	0	0	0	0	0	0
409:	0	0	0	0	0	0	0	0
417:	0	0	0	0	0	0	0	0
425:	0	0	0	0	0	0	0	0
433:	0	0	0	0	0	0	0	0
441:	0	0	0	0	0	0	0	0
449:	0	0	0	0	0	0	0	0
457:	0	0	0	0	0	0	0	0
465:	0	0	0	0	0	0	0	0
473:	0	0	0	0	0	0	0	0
481:	0	0	0	0	0	0	0	0
489:	0	0	0	0	0	0	0	0
497:	0	0	0	0	0	0	0	0
505:	0	0	0	0	0	0	0	0
513:	0	0	0	0	0	0	0	0
521:	0	0	0	0	0	0	0	0
529:	0	0	0	0	0	0	0	0
537:	0	1	0	0	0	0	0	0
545:	0	0	0	0	0	0	0	0
553:	0	0	0	0	0	0	0	0
561:	0	0	0	0	0	0	0	0
569:	0	1	0	0	1	0	0	0
577:	0	0	0	0	0	0	0	0
585:	0	0	0	0	0	0	0	0
593:	0	0	0	0	1	0	0	0
601:	0	0	0	0	0	0	0	0
609:	0	0	0	0	0	0	0	0
617:	0	0	0	0	0	0	0	0
625:	0	0	0	0	0	0	0	0
633:	0	0	1	0	0	0	0	0
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	1	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	1	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801:	0	0	0	0	0	0	0	0

Sample Title: 06

Channel								
809:	0	0	0	0	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	1	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	1	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	1	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	1	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	1	0	0	0

Apex-Alpha™

KP
9/8/21

Sample Description: H-33
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00002983
Batch Identification: 2108094A-RA
Sample Identification: 07
Sample Geometry: Shelf 2
Procedure Description: Ra

Detector Name: Alpha_046
Chamber Serial Number: 04026482B
Detector Serial Number: 58762
Env. Background: System Bkgd 304531
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Generic Mult. Factor: 3.000E+000 Generic Div. Factor: 1.000E+000
Sample Date/Time: 8/23/2021 8:25:10 AM
Acquisition Date/Time: 9/7/2021 11:26:37 AM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9858 +/- 0.0000
Counting Efficiency: 0.1557 +/- 0.0028 on 5/21/2021 9:18:19 AM
Effective Efficiency: 0.1535 +/- 0.0027

Peak Match Tolerance: 0.350 MeV

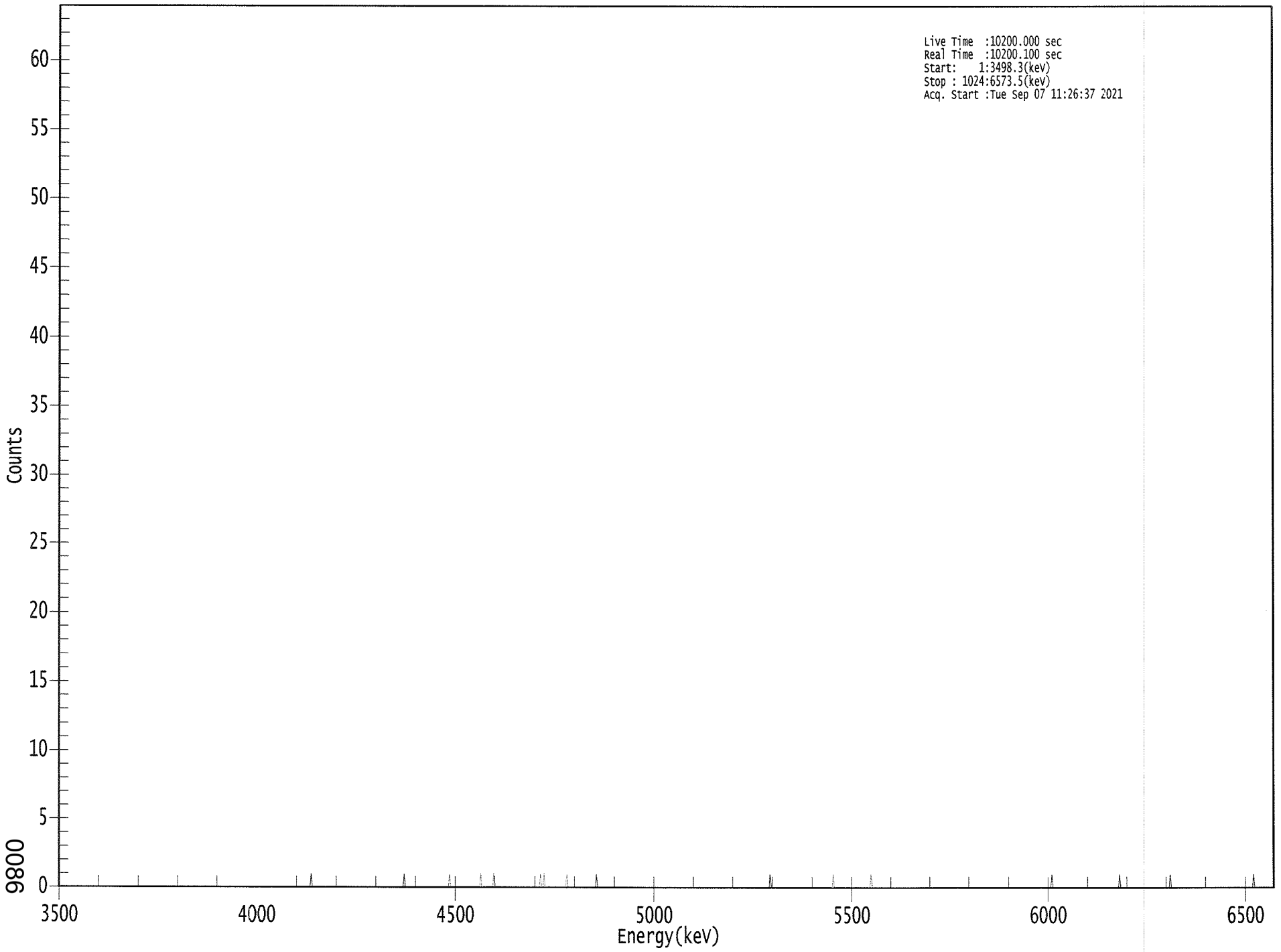
PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.500	1.49	190.02	0.51	0.00E+000	3.0
RA-226	4.643	5.49	88.08	0.51	0.00E+000	3.0

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.956	5685.50*	8.15E-002 +/- 1.55E-001	2.87E-001 +/- 1.01E-002
RA-226	0.974	4785.00*	2.84E-001 +/- 2.51E-001	2.72E-001 +/- 9.54E-003

0000298346.CNF



****
***** S P E C T R A L D A T A R E P O R T *****
****

Sample Title: 07

Elapsed Live time: 10200
Elapsed Real Time: 10200

Channel								
1:	0	0	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0	0
137:	0	0	0	0	0	0	0	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	0	0
161:	0	0	0	0	0	0	0	0
169:	0	0	0	0	0	0	0	0
177:	0	0	0	0	0	0	0	0
185:	0	0	0	0	0	0	0	0
193:	0	0	0	0	0	0	0	0
201:	0	0	0	0	0	0	0	0
209:	0	0	0	0	1	0	0	0
217:	0	0	0	0	0	0	0	0
225:	0	0	0	0	0	0	0	0
233:	0	0	0	0	0	0	0	0
241:	0	0	0	0	0	0	0	0
249:	0	0	0	0	0	0	0	0
257:	0	0	0	0	0	0	0	0
265:	0	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	0	0
289:	0	0	1	0	0	0	0	0
297:	0	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	0	0
321:	0	0	0	0	0	0	0	0
329:	1	0	0	0	0	0	0	0
337:	0	0	0	0	0	0	0	0
345:	0	0	0	0	0	0	0	0
353:	0	0	1	0	0	0	0	0
361:	0	0	0	0	0	1	0	0

369:	0	0	0	0	0	0	0	0

Sample Title: 07

Channel								
377:	0	0	0	0	0	0	0	0
385:	0	0	0	0	0	0	0	0
393:	0	0	0	0	0	0	0	0
401:	0	0	0	0	1	0	0	1
409:	0	0	0	0	0	0	0	0
417:	0	0	0	0	0	0	0	0
425:	0	0	1	0	0	0	0	0
433:	0	0	0	0	0	0	0	0
441:	0	0	0	0	0	0	0	0
449:	0	0	0	1	0	0	0	0
457:	0	0	0	0	0	0	0	0
465:	0	0	0	0	0	0	0	0
473:	0	0	0	0	0	0	0	0
481:	0	0	0	0	0	0	0	0
489:	0	0	0	0	0	0	0	0
497:	0	0	0	0	0	0	0	0
505:	0	0	0	0	0	0	0	0
513:	0	0	0	0	0	0	0	0
521:	0	0	0	0	0	0	0	0
529:	0	0	0	0	0	0	0	0
537:	0	0	0	0	0	0	0	0
545:	0	0	0	0	0	0	0	0
553:	0	0	0	0	0	0	0	0
561:	0	0	0	0	0	0	0	0
569:	0	0	0	0	0	0	0	0
577:	0	0	0	0	0	0	0	0
585:	0	0	0	0	0	0	0	0
593:	0	0	0	0	0	1	0	0
601:	0	0	0	0	0	0	0	0
609:	0	0	0	0	0	0	0	0
617:	0	0	0	0	0	0	0	0
625:	0	0	0	0	0	0	0	0
633:	0	0	0	0	0	0	0	0
641:	0	0	0	0	0	0	0	0
649:	0	0	1	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	1	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801:	0	0	0	0	0	0	0	0

Sample Title: 07

Channel								
809:	0	0	0	0	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	1	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	1	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	1
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	1	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0

9/7/2021 4:22:27 AM

Apex-Alpha™

QA SUMMARY REPORT
Review Of QA Results - Pulser Check

Date : 9/7/2021
Time : 4:22:27 AM

CHAMBER	DEVICE	PARAMETER	FLAG	DATE
Alpha_001	21f	ALL	Not Done	
Alpha_002	21f	ALL	Not Done	
Alpha_003	21f	ALL	Not Done	
Alpha_004	21f	ALL	Not Done	
Alpha_005	21f	ALL	Not Done	
Alpha_006	21f	ALL	Not Done	
Alpha_007	21f	ALL	Not Done	
Alpha_008	21f	ALL	Not Done	
Alpha_009	21f	ALL	Not Done	
Alpha_010	21f	ALL	Not Done	
Alpha_011	21f	ALL	Passed	9/7/2021 4:07:31 AM
Alpha_012	21f	ALL	Passed	9/7/2021 4:07:31 AM
Alpha_013	21f	ALL	Not Done	
Alpha_014	21f	ALL	Not Done	
Alpha_015	21f	ALL	Not Done	
Alpha_016	21f	ALL	Not Done	
Alpha_033	Alpha Analyst100DC	ALL	Passed	9/7/2021 4:07:32 AM
Alpha_034	Alpha Analyst100DC	ALL	Passed	9/7/2021 4:07:34 AM
Alpha_035	Alpha Analyst100DC	ALL	Passed	9/7/2021 4:07:35 AM
Alpha_036	Alpha Analyst100DC	ALL	Passed	9/7/2021 4:07:37 AM
Alpha_037	Alpha Analyst100DC	ALL	Passed	9/7/2021 4:07:38 AM
Alpha_038	Alpha Analyst100DC	Peak Energy	Action	9/7/2021 4:07:40 AM
Alpha_039	Alpha Analyst100DC	ALL	Passed	9/7/2021 4:07:42 AM
Alpha_040	Alpha Analyst100DC	ALL	Not Done	
Alpha_041	Alpha Analyst100DC	ALL	Passed	9/7/2021 4:07:43 AM
Alpha_042	Alpha Analyst100DC	ALL	Passed	9/7/2021 4:07:45 AM
Alpha_043	Alpha Analyst100DC	ALL	Not Done	
Alpha_044	Alpha Analyst100DC	ALL	Not Done	
Alpha_045	Alpha Analyst100DC	ALL	Passed	9/7/2021 4:07:46 AM
Alpha_046	Alpha Analyst100DC	ALL	Passed	9/7/2021 4:07:48 AM
Alpha_047	Alpha Analyst100DC	ALL	Not Done	
Alpha_048	Alpha Analyst100DC	ALL	Not Done	
Alpha_049	Alpha Analyst100DC	ALL	Passed	9/7/2021 4:07:50 AM
Alpha_050	Alpha Analyst100DC	ALL	Passed	9/7/2021 4:07:51 AM
Alpha_051	Alpha Analyst100DC	ALL	Passed	9/7/2021 4:07:53 AM
Alpha_052	Alpha Analyst100DC	ALL	Passed	9/7/2021 4:07:55 AM
Alpha_053	Alpha Analyst100DC	ALL	Not Done	
Alpha_054	Alpha Analyst100DC	ALL	Passed	9/7/2021 4:07:56 AM
Alpha_055	Alpha Analyst100DC	ALL	Not Done	
Alpha_056	Alpha Analyst100DC	ALL	Not Done	
Alpha_057	Alpha Analyst100DC	ALL	Passed	9/7/2021 4:07:58 AM
Alpha_058	Alpha Analyst100DC	ALL	Passed	9/7/2021 4:08:00 AM

9/7/2021 4:22:27 AM

CHAMBER	DEVICE	PARAMETER	FLAG	DATE
Alpha_059	Alpha Analyst100DC	ALL	Passed	9/7/2021 4:08:02 AM
Alpha_060	Alpha Analyst100DC	ALL	Passed	9/7/2021 4:08:04 AM

APPROVED BY: KP

APPROVAL DATE: 9/7/21

****
***** L I B R A R Y L I S T I N G R E P O R T *****
****

Nuclide Library Title: Radium

Nuclide Library Description: Ra-226, Po-218, Rn-222

Nuclide Name	Half-Life (Seconds)	Energy (keV)	Energy Uncert. (keV)	Yield (%)	Yield Uncert.(Abs.+-)
PO-218	5.049E+010	6003.000*	0.000	99.9800	0.0000
RN-222	5.049E+010	5490.000*	0.000	99.9200	0.0000
RA-226	5.049E+010	4785.000*	0.000	100.0000	0.0000

* = key line

TOTALS: 3 Nuclides 3 Energy Lines

SECTION IX

ANALYTICAL DATA (RADIUM-228)

21-08094
Ra228
Run 1

Work Order	21-08094
Analysis Code	Ra228
Run	1
Date Received	8/29/2021
Lab Deadline	9/13/2021
Client	ERM
Project	526033
Report Level	4
Activity Units	pCi
Aliquot Units	l
Matrix	WA
Method	EPA 904.0
Instrument Type	Alpha/Beta GPC
Radiometric Tracer	Ba-133
Radiometric Sol#	Ba-6a
Tracer Act (dpm/g)	389.53
Carrier	Yttrium
Carrier Conc (mg/ml)	34.65

Internal Fraction	Sample Desc	Client ID	Login CPM	Sample Date	Sample Aliquot
01	LCS	LCS		08/30/21 00:00	1.0000E+00
02	MBL	BLANK		08/30/21 00:00	1.0000E+00
03	DUP	H-34	20	08/23/21 10:55	1.0000E+00
04	DO	H-34	20	08/23/21 10:55	1.0000E+00
05	TRG	H-32A	20	08/23/21 12:00	1.0000E+00
06	TRG	H-32B	30	08/23/21 13:50	1.0000E+00
07	TRG	H-33	30	08/23/21 14:50	1.0000E+00

0094

* SAF1 is used for Gross Alpha and all other radionuclides. SAF2 is used for Gross Beta only. ^ Indicates estimated SAF value.
** Actual mass exceeded the calibration curve range. Results should be qualified as appropriate.

21-08094
Ra228
Run 1

Internal Fraction	Sample Desc	Tracer Aliquot (g)	Tracer Total ACT (dpm)	Radiometric Tracer (pCi)	Radiometric % Rec	Grav Carrier Added (ml)	Grav Filter Tare (g)	Grav Filter Final (g)	Grav Filter Net (g)	Grav % Rec	Mean % Rec	SAF 1*	SAF 2*
01	LCS	2.2350	870.6	425.0	108.37	2.000	0.0889	0.1622	0.0733	105.77	110.00	1.00	1.00
02	MBL	2.2233	866.0	482.0	123.56	2.000	0.0893	0.1588	0.0695	100.29	110.00	1.00	1.00
03	DUP	2.2064	859.5	395.0	102.03	2.000	0.0892	0.1613	0.0721	104.04	106.15	1.00	1.00
04	DO	2.2208	865.1	403.0	103.42	2.000	0.0886	0.1600	0.0714	103.03	106.55	1.00	1.00
05	TRG	2.2160	863.2	410.0	105.45	2.000	0.0890	0.1614	0.0724	104.47	110.00	1.00	1.00
06	TRG	2.2164	863.4	437.0	112.37	2.000	0.0890	0.1655	0.0765	110.39	110.00	1.00	1.00
07	TRG	2.2109	861.2	383.0	98.73	2.000	0.0876	0.1640	0.0764	110.25	108.60	1.00	1.00

0095

* SAF1 is used for Gross Alpha and all other radionuclides. SAF2 is used for Gross Beta only. ^ Indicates estimated SAF value.
** Actual mass exceeded the calibration curve range. Results should be qualified as appropriate.

21-08094
Ra228
Run 1

Internal Fraction	Sample Desc	Rough Prep Date	Rough Prep By	Prep Date	Prep By	Sep t0 Date/Time	Sep t0 By	Sep t1 Date/Time	Sep t1 By
01	LCS			09/09/21 07:53	AYARBER	09/07/21 07:32	AYARBER	09/09/21 08:01	AYARBER
02	MBL			09/09/21 07:53	AYARBER	09/07/21 07:32	AYARBER	09/09/21 08:01	AYARBER
03	DUP			09/09/21 07:53	AYARBER	09/07/21 07:32	AYARBER	09/09/21 08:01	AYARBER
04	DO			09/09/21 07:53	AYARBER	09/07/21 07:32	AYARBER	09/09/21 08:01	AYARBER
05	TRG			09/09/21 07:53	AYARBER	09/07/21 07:32	AYARBER	09/09/21 08:01	AYARBER
06	TRG			09/09/21 07:53	AYARBER	09/07/21 07:32	AYARBER	09/09/21 08:01	AYARBER
07	TRG			09/09/21 07:53	AYARBER	09/07/21 07:32	AYARBER	09/09/21 08:01	AYARBER

9600

* SAF1 is used for Gross Alpha and all other radionuclides. SAF2 is used for Gross Beta only. ^ Indicates estimated SAF value.
** Actual mass exceeded the calibration curve range. Results should be qualified as appropriate.

Preliminary Data Report & Analytical Calculations

Work Order: 21-08094-Ra228-1

Client: ERM
Eberline Services Work Order: 21-08094
Analysis Code: Ra228
Run: 1
7600

Lab Fraction	Nuclide	Sample Desc	Client Identification	Activity Units	Results	Error Estimate	MDA	LCS Known	LCS %R	LCS Flag	RPD Flag	MDA Flag	Blank Flag
01	RA-228	LCS	LCS	pCi/l	9.64E+00	1.48E+00	1.29E+00	9.17E+00	105.12	OK		OK	
02	RA-228	MBL	BLANK	pCi/l	2.66E-01	4.03E-01	8.33E-01					OK	OK
03	RA-228	DUP	H-34	pCi/l	4.36E-01	4.30E-01	8.71E-01				NA	OK	
04	RA-228	DO	H-34	pCi/l	6.34E-01	4.77E-01	9.56E-01					OK	
05	RA-228	TRG	H-32A	pCi/l	3.44E-01	3.71E-01	7.55E-01					OK	
06	RA-228	TRG	H-32B	pCi/l	4.95E-01	3.41E-01	6.70E-01					OK	
07	RA-228	TRG	H-33	pCi/l	2.65E-01	3.84E-01	7.92E-01					OK	

8600 Client ERM
Eberline Services Work Order 21-08094
Analysis Code Ra228
Run 1

Lab Fraction	Nuclide	Sample Desc	Sample Date	Sample Aliquot	Radiometric % Rec	Grav % Rec	Mean % Rec	SAF	Sep t0 Date/Time	Sep t1 Date/Time
01	RA-228	LCS	08/30/21 00:00	1.00E+00	108.37	105.77	110.00	1.00	9/7/2021 7:32	9/9/2021 8:01
02	RA-228	MBL	08/30/21 00:00	1.00E+00	123.56	100.29	110.00	1.00	9/7/2021 7:32	9/9/2021 8:01
03	RA-228	DUP	08/23/21 10:55	1.00E+00	102.03	104.04	106.15	1.00	9/7/2021 7:32	9/9/2021 8:01
04	RA-228	DO	08/23/21 10:55	1.00E+00	103.42	103.03	106.55	1.00	9/7/2021 7:32	9/9/2021 8:01
05	RA-228	TRG	08/23/21 12:00	1.00E+00	105.45	104.47	110.00	1.00	9/7/2021 7:32	9/9/2021 8:01
06	RA-228	TRG	08/23/21 13:50	1.00E+00	112.37	110.39	110.00	1.00	9/7/2021 7:32	9/9/2021 8:01
07	RA-228	TRG	08/23/21 14:50	1.00E+00	98.73	110.25	108.60	1.00	9/7/2021 7:32	9/9/2021 8:01

Preliminary Data Report & Analytical Calculations

Work Order: 21-08094-Ra228-1

6600 Client ERM | Eberline Services Work Order 21-08094 | Analysis Code Ra228 | Run 1

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Halflife (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	RA-228	LCS	09/09/21 09:51		LB4110A	A4	30	277	1.583333333	0.4548
02	RA-228	MBL	09/09/21 09:51		LB4110A	B1	120	216	1.583333333	0.4626
03	RA-228	DUP	09/09/21 09:51		LB4110A	B3	120	222	1.516666667	0.449
04	RA-228	DO	09/09/21 09:51		LB4110A	B4	120	296	1.966666667	0.4619
05	RA-228	TRG	09/09/21 09:51		LB4110A	C1	120	192	1.316666667	0.4667
06	RA-228	TRG	09/09/21 09:51		LB4110A	C2	120	166	0.983333333	0.4578
07	RA-228	TRG	09/09/21 09:51		LB4110A	C3	120	198	1.433333333	0.4699

Count Room Report
Client: ERM

21-08094-Ra228-1 (pCi/l) in WA
Tracer ID: Ba-6a

Internal Fraction	Sample Desc	Client ID	Sample Date	Sample Aliquot	Tracer Aliquot (g)	Tracer ACT (dpm)	Radiometric Tracer (pCi)	Radiometric % Rec	SAF 1*	SAF 2*
01	LCS	LCS	08/30/21 00:00	1.0000	2.2350	870.5996	425.0000	108.37	1.00	1.00
02	MBL	BLANK	08/30/21 00:00	1.0000	2.2233	866.0420	482.0000	123.56	1.00	1.00
03	DUP	H-34	08/23/21 10:55	1.0000	2.2064	859.4590	395.0000	102.03	1.00	1.00
04	DO	H-34	08/23/21 10:55	1.0000	2.2208	865.0682	403.0000	103.42	1.00	1.00
05	TRG	H-32A	08/23/21 12:00	1.0000	2.2160	863.1985	410.0000	105.45	1.00	1.00
06	TRG	H-32B	08/23/21 13:50	1.0000	2.2164	863.3543	437.0000	112.37	1.00	1.00
07	TRG	H-33	08/23/21 14:50	1.0000	2.2109	861.2119	383.0000	98.73	1.00	1.00

0100

Spike and Tracer Worksheet

Internal Work Order	Run	Analysis Code	Date	Technician	Technician Initials	Witness Initials
21-08094	1	Ra228	9/9/2021 7:52	AYARBER	AY	

LCS & Matrix Spikes					LCS	MS	LCSD	MSD	LCS		MS		LCSD		MSD	
Isotope	*Sol #*	*Activity dpm/g*	*Solution Date*	*Approx Addition*	*Volume Used (g)*	*Volume Used (g)*	*Volume Used (g)*	*Volume Used (g)*	*Known pCi*	*Error Estimate*	*Added pCi*	*Error Estimate*	*Known pCi*	*Error Estimate*	*Added pCi*	*Error Estimate*
Ra-228	Ra-12	37.230	9/9/2021	**0.540**	**0.5466**				9.17	0.467	0.00	0.000	0.00	0.000	0.00	0.000

Tracers						
fraction	*Isotope*	*Sol #*	*Activity dpm/g*	*Solution Date*	*Volume Used (g)*	*Approx Addition*
01	**Ba-133**	Ba-6a	389.530	9/9/2021	**2.2350**	**2.6000**
02	**Ba-133**	Ba-6a	389.530	9/9/2021	**2.2233**	**2.6000**
03	**Ba-133**	Ba-6a	389.530	9/9/2021	**2.2064**	**2.6000**
04	**Ba-133**	Ba-6a	389.530	9/9/2021	**2.2208**	**2.6000**
05	**Ba-133**	Ba-6a	389.530	9/9/2021	**2.2160**	**2.6000**
06	**Ba-133**	Ba-6a	389.530	9/9/2021	**2.2164**	**2.6000**
07	**Ba-133**	Ba-6a	389.530	9/9/2021	**2.2109**	**2.6000**

Balance Printer Tapes

Tracer	LCS

Matrix Spike

0101

Eberline Analytical
Oak Ridge Laboratory

Aliquot Worksheet

Printed: 9/1/2021 08:10

Work Order	Run	Analysis Code	Rpt Units	Lab Deadline	Technician
21-08094	1	Ra228	liters	9/13/2021	JHARVEY

Lab Fraction	ERM Client ID	Sample Type	Muffle Data Ratio Post/Pre	Dilution Data No of Dils	Dil Factor	Ratio	Aliquot Data Aliquot	Net Equiv	MS Aliquot Data Aliquot	Net Equiv	H-3 Solids Only Water Added (ml)	H3 Dist Aliq
01	LCS	LCS					1.0000E+00	1.0000E+00				
02	BLANK	MBL					1.0000E+00	1.0000E+00				
03	H-34	DUP					1.0000E+00	1.0000E+00				
04	H-34	DO					1.0000E+00	1.0000E+00				
05	H-32A	TRG					1.0000E+00	1.0000E+00				
06	H-32B	TRG					1.0000E+00	1.0000E+00				
07	H-33	TRG					1.0000E+00	1.0000E+00				

Comments	

0102

Technician: JHarvey Date: 9/1/21

Gravimetric Worksheet

Work Order	Run	Analysis Code	Gravimetric Carrier	Carrier Conc (mg/ml)	Technician
21-08094	1	Ra228	Yttrium	34.6500	AYARBER

TRetec Fraction	ERM Client ID	Sample Type	Carrier Data	Filter Data			Gravimetric
			Carrier Added (ml)	Filter Tare (g)	Filter Final (g)	Filter Net (g)	% Recovery
01	LCS	LCS	2.0000	0.0889	0.1622	0.0733	105.77
02	BLANK	MBL	2.0000	0.0893	0.1588	0.0695	100.29
03	DUP	DUP	2.0000	0.0892	0.1613	0.0721	104.04
04	H-34	DO	2.0000	0.0886	0.1600	0.0714	103.03
05	H-32A	TRG	2.0000	0.0890	0.1614	0.0724	104.47
06	H-32B	TRG	2.0000	0.0890	0.1655	0.0765	110.39
07	H-33	TRG	2.0000	0.0876	0.1640	0.0764	110.25

0103

Technician: Andrew Yarber Date: 9/9/21

Detector ID	Sample ID	Alpha	Beta	Count Time	Voltage	TOD
A4	2108094-01	11	277	30	1410	9/9/2021 9:51:20 AM
B1	2108094-02	25	216	120	1410	9/9/2021 9:51:20 AM
B3	2108094-03	39	222	120	1410	9/9/2021 9:51:20 AM
B4	2108094-04	33	296	120	1410	9/9/2021 9:51:21 AM
C1	2108094-05	20	192	120	1410	9/9/2021 9:51:21 AM
C2	2108094-06	16	166	120	1410	9/9/2021 9:51:21 AM
C3	2108094-07	14	198	120	1410	9/9/2021 9:51:21 AM

KP
9/9/21

GPC Detector Report
(ALL Backgrounds)

KP 9/9/21

Detector	A pha/Beta	Calibration Date	Count Date	Bkg CPM	PFW	LCL	Mean	UCL
LB4110A - A1	Alpha	11/2/2019	9/9/2021	1.17E-01	P	1.52E-03	1.57E-01	3.13E-01
LB4110A - A2	Alpha	11/2/2019	9/9/2021	2.17E-01	P	8.86E-03	1.44E-01	2.80E-01
LB4110A - A3	Alpha	11/2/2019	9/9/2021	1.50E-01	P	1.06E-02	1.56E-01	3.00E-01
LB4110A - A4	Alpha	11/2/2019	9/9/2021	1.33E-01	P	1.37E-02	1.56E-01	2.98E-01
LB4110A - B1	Alpha	11/2/2019	9/9/2021	1.00E-01	P	-1.33E-02	1.35E-01	2.83E-01
LB4110A - B2	Alpha	11/2/2019	9/9/2021	2.33E-01	P	4.83E-02	2.08E-01	3.69E-01
LB4110A - B3	Alpha	11/2/2019	9/9/2021	1.50E-01	P	1.63E-02	1.69E-01	3.22E-01
LB4110A - B4	Alpha	11/2/2019	9/9/2021	1.67E-01	P	-9.35E-03	1.14E-01	2.37E-01
LB4110A - C1	Alpha	11/2/2019	9/9/2021	8.33E-02	P	-1.87E-02	1.07E-01	2.33E-01
LB4110A - C2	Alpha	11/2/2019	9/9/2021	8.33E-02	P	-1.94E-02	1.07E-01	2.33E-01
LB4110A - C3	Alpha	11/2/2019	9/9/2021	1.17E-01	P	-2.33E-02	8.45E-02	1.92E-01
LB4110A - C4	Alpha	11/2/2019	9/9/2021	2.67E-01	P	2.83E-02	2.13E-01	3.98E-01
LB4110A - D1	Alpha	11/2/2019	9/9/2021	6.67E-02	P	-2.64E-02	7.35E-02	1.73E-01
LB4110A - D2	Alpha	11/2/2019	9/9/2021	8.33E-02	P	-1.01E-02	1.03E-01	2.15E-01
LB4110A - D3	Alpha	11/2/2019	9/9/2021	1.33E-01	P	-2.57E-03	1.24E-01	2.51E-01
LB4110A - D4	Alpha	11/2/2019	9/9/2021	1.17E-01	P	2.80E-02	1.68E-01	3.08E-01
LB4110A - E1	Alpha	11/2/2017	5/19/2020	1.00E+05	F	-2.35E+04	8.93E+02	2.53E+04
LB4110A - E2	Alpha	11/2/2017	5/19/2020	1.00E+05	F	-2.35E+04	8.93E+02	2.53E+04
LB4110A - E3	Alpha	11/2/2017	5/19/2020	1.00E+05	F	-2.35E+04	8.93E+02	2.53E+04
LB4110A - E4	Alpha	11/2/2017	5/19/2020	1.00E+05	F	-2.35E+04	8.93E+02	2.53E+04
LB4110A - F1	Alpha	11/2/2019	9/9/2021	1.67E-01	P	-1.62E-02	1.23E-01	2.62E-01
LB4110A - F2	Alpha	11/2/2019	9/9/2021	1.17E-01	P	-3.80E-02	1.13E-01	2.65E-01
LB4110A - F3	Alpha	11/2/2019	9/9/2021	1.50E-01	P	-1.49E-02	1.01E-01	2.18E-01
LB4110A - F4	Alpha	11/2/2019	9/9/2021	1.67E-02	P	-3.52E-02	6.81E-02	1.71E-01
LB4110A - G1	Alpha	11/2/2019	9/9/2021	1.67E-01	P	-2.19E-02	8.50E-02	1.92E-01
LB4110A - G2	Alpha	11/2/2019	9/9/2021	8.33E-02	P	-1.98E-02	8.53E-02	1.90E-01
LB4110A - G3	Alpha	11/2/2019	9/9/2021	1.17E-01	P	-1.08E-02	1.37E-01	2.84E-01
LB4110A - G4	Alpha	11/2/2019	9/9/2021	1.00E-01	P	-2.52E-02	9.74E-02	2.20E-01

Eberline Analytical
Oak Ridge Laboratory

GPC Detector Report
(ALL Backgrounds)

Printed: 9/9/2021 9:23 AM

KD
9/9/21

Detector	Alpha/Beta	Calibration Date	Count Date	Bkg CPM	PFW	LCL	Mean	UCL
LB4110A - A1	Beta	11/2/2019	9/9/2021	1.35E+00	P	-1.75E+00	1.39E+00	4.52E+00
LB4110A - A2	Beta	11/2/2019	9/9/2021	1.47E+00	P	-1.57E+00	1.68E+00	4.92E+00
LB4110A - A3	Beta	11/2/2019	9/9/2021	1.30E+00	P	-1.54E+00	1.47E+00	4.48E+00
LB4110A - A4	Beta	11/2/2019	9/9/2021	1.58E+00	P	-1.67E+00	1.51E+00	4.68E+00
LB4110A - B1	Beta	11/2/2019	9/9/2021	1.58E+00	P	1.02E+00	1.40E+00	1.77E+00
LB4110A - B2	Beta	11/2/2019	9/9/2021	1.42E+00	P	8.16E-01	1.41E+00	2.00E+00
LB4110A - B3	Beta	11/2/2019	9/9/2021	1.52E+00	P	9.29E-01	1.33E+00	1.72E+00
LB4110A - B4	Beta	11/2/2019	9/9/2021	1.97E+00	P	6.84E-01	1.56E+00	2.44E+00
LB4110A - C1	Beta	11/2/2019	9/9/2021	1.32E+00	P	8.02E-01	1.17E+00	1.54E+00
LB4110A - C2	Beta	11/2/2019	9/9/2021	9.83E-01	P	6.71E-01	1.02E+00	1.37E+00
LB4110A - C3	Beta	11/2/2019	9/9/2021	1.43E+00	P	7.81E-01	1.35E+00	1.92E+00
LB4110A - C4	Beta	11/2/2019	9/9/2021	1.18E+00	P	8.62E-01	1.23E+00	1.71E+00
LB4110A - D1	Beta	11/2/2019	9/9/2021	9.67E-01	P	6.70E-01	1.08E+00	1.48E+00
LB4110A - D2	Beta	11/2/2019	9/9/2021	1.25E+00	P	-1.34E+00	2.48E+00	6.30E+00
LB4110A - D3	Beta	11/2/2019	9/9/2021	9.67E-01	P	7.39E-01	1.12E+00	1.50E+00
LB4110A - D4	Beta	11/2/2019	9/9/2021	1.35E+00	P	1.04E+00	1.47E+00	1.90E+00
LB4110A - E1	Beta	11/2/2017	5/19/2020	1.00E+05	F	-2.35E+04	8.94E+02	2.53E+04
LB4110A - E2	Beta	11/2/2017	5/19/2020	1.00E+05	F	-2.35E+04	8.94E+02	2.53E+04
LB4110A - E3	Beta	11/2/2017	5/19/2020	1.00E+05	F	-2.35E+04	8.94E+02	2.53E+04
LB4110A - E4	Beta	11/2/2017	5/19/2020	1.00E+05	F	-2.35E+04	8.94E+02	2.53E+04
LB4110A - F1	Beta	11/2/2019	9/9/2021	1.20E+00	P	2.63E-01	1.29E+00	2.32E+00
LB4110A - F2	Beta	11/2/2019	9/9/2021	2.18E+00	F	-4.67E-01	1.19E+00	2.84E+00
LB4110A - F3	Beta	11/2/2019	9/9/2021	1.02E+00	P	-2.14E-01	1.20E+00	2.61E+00
LB4110A - F4	Beta	11/2/2019	9/9/2021	3.15E+00	F	-1.27E+00	1.60E+00	4.46E+00
LB4110A - G1	Beta	11/2/2019	9/9/2021	1.23E+00	P	7.58E-01	1.17E+00	1.59E+00
LB4110A - G2	Beta	11/2/2019	9/9/2021	1.53E+00	P	1.13E+00	1.58E+00	2.04E+00
LB4110A - G3	Beta	11/2/2019	9/9/2021	9.83E-01	P	7.54E-01	1.17E+00	1.59E+00
LB4110A - G4	Beta	11/2/2019	9/9/2021	1.37E+00	P	7.21E-01	1.25E+00	1.77E+00

Eberline Analytical
Oak Ridge Laboratory

GPC Detector Report
(ALL Efficiencies)

Printed: 9/9/2021 9:24 AM

Detector	Alpha/Beta	Calibration Date	Count Date	Eff	PFW	LCL	Mean	UCL
LB4110A - A1	Alpha	11/2/2019	9/9/2021	0.2304	P	0.2049	0.2329	0.2610
LB4110A - A2	Alpha	11/2/2019	9/9/2021	0.2032	P	0.1771	0.2019	0.2268
LB4110A - A3	Alpha	11/2/2019	9/9/2021	0.1961	P	0.1720	0.1966	0.2212
LB4110A - A4	Alpha	11/2/2019	9/9/2021	0.2255	P	0.1978	0.2259	0.2540
LB4110A - B1	Alpha	11/2/2019	9/9/2021	0.2106	P	0.1824	0.2106	0.2388
LB4110A - B2	Alpha	11/2/2019	9/9/2021	0.2049	P	0.1724	0.1984	0.2244
LB4110A - B3	Alpha	11/2/2019	9/9/2021	0.2358	P	0.2034	0.2343	0.2652
LB4110A - B4	Alpha	11/2/2019	9/9/2021	0.2376	P	0.1965	0.2276	0.2587
LB4110A - C1	Alpha	11/2/2019	9/9/2021	0.1945	P	0.1736	0.1988	0.2239
LB4110A - C2	Alpha	11/2/2019	9/9/2021	0.1930	P	0.1748	0.2008	0.2267
LB4110A - C3	Alpha	11/2/2019	9/9/2021	0.2130	P	0.1934	0.2255	0.2577
LB4110A - C4	Alpha	11/2/2019	9/9/2021	0.1954	P	0.1786	0.2105	0.2423
LB4110A - D1	Alpha	11/2/2019	9/9/2021	0.1976	P	0.1720	0.1976	0.2233
LB4110A - D2	Alpha	11/2/2019	9/9/2021	0.2350	P	0.2059	0.2354	0.2650
LB4110A - D3	Alpha	11/2/2019	9/9/2021	0.2433	P	0.2114	0.2415	0.2716
LB4110A - D4	Alpha	11/2/2019	9/9/2021	0.1839	P	0.1611	0.1848	0.2086
LB4110A - E1	Alpha	11/2/2017	5/19/2020	0.2075	P	0.1686	0.2257	0.2828
LB4110A - E2	Alpha	11/2/2017	5/19/2020	0.1778	P	0.1514	0.2049	0.2583
LB4110A - E3	Alpha	11/2/2017	5/19/2020	0.2234	P	0.1549	0.2076	0.2604
LB4110A - E4	Alpha	11/2/2017	5/19/2020	0.2155	P	0.1746	0.2353	0.2961
LB4110A - F1	Alpha	11/2/2019	9/9/2021	0.1950	P	0.1807	0.2114	0.2422
LB4110A - F2	Alpha	11/2/2019	9/9/2021	0.1620	P	0.1521	0.1768	0.2014
LB4110A - F3	Alpha	11/2/2019	9/9/2021	0.2173	P	0.1907	0.2206	0.2505
LB4110A - F4	Alpha	11/2/2019	9/9/2021	0.2093	P	0.1864	0.2153	0.2441
LB4110A - G1	Alpha	11/2/2019	9/9/2021	0.1867	P	0.1756	0.1868	0.1981
LB4110A - G2	Alpha	11/2/2019	9/9/2021	0.1844	P	0.1717	0.1833	0.1950
LB4110A - G3	Alpha	11/2/2019	9/9/2021	0.2148	P	0.2027	0.2152	0.2276
LB4110A - G4	Alpha	11/2/2019	9/9/2021	0.1859	P	0.1622	0.1832	0.2042

LP 9/9/21

LP 9/9/21 out of service

LP

0107

Eberline Analytical
Oak Ridge Laboratory

GPC Detector Report
(ALL Efficiencies)

Printed: 9/9/2021 9:24 AM

KP 9/9/21

Detector	Alpha/Beta	Calibration Date	Count Date	Eff	PFW	LCL	Mean	UCL
LB4110A - A1	Beta	11/2/2019	9/9/2021	0.5736	P	0.4966	0.5651	0.6336
LB4110A - A2	Beta	11/2/2019	9/9/2021	0.4408	P	0.3882	0.4432	0.4981
LB4110A - A3	Beta	11/2/2019	9/9/2021	0.4777	P	0.4194	0.4790	0.5386
LB4110A - A4	Beta	11/2/2019	9/9/2021	0.5645	P	0.4858	0.5535	0.6213
LB4110A - B1	Beta	11/2/2019	9/9/2021	0.4971	P	0.4273	0.4944	0.5615
LB4110A - B2	Beta	11/2/2019	9/9/2021	0.5034	P	0.4291	0.4944	0.5596
LB4110A - B3	Beta	11/2/2019	9/9/2021	0.5910	P	0.5094	0.5860	0.6627
LB4110A - B4	Beta	11/2/2019	9/9/2021	0.5767	P	0.4853	0.5631	0.6408
LB4110A - C1	Beta	11/2/2019	9/9/2021	0.4777	P	0.4192	0.4781	0.5371
LB4110A - C2	Beta	11/2/2019	9/9/2021	0.4610	P	0.4205	0.4811	0.5417
LB4110A - C3	Beta	11/2/2019	9/9/2021	0.5447	P	0.4898	0.5700	0.6502
LB4110A - C4	Beta	11/2/2019	9/9/2021	0.4983	P	0.4397	0.5143	0.5889
LB4110A - D1	Beta	11/2/2019	9/9/2021	0.5780	P	0.5052	0.5782	0.6513
LB4110A - D2	Beta	11/2/2019	9/9/2021	0.5971	P	0.5200	0.5943	0.6685
LB4110A - D3	Beta	11/2/2019	9/9/2021	0.6091	P	0.5295	0.6036	0.6778
LB4110A - D4	Beta	11/2/2019	9/9/2021	0.4876	P	0.4238	0.4836	0.5433
LB4110A - E1	Beta	11/2/2017	5/19/2020	0.5360	P	0.4167	0.5408	0.6649
LB4110A - E2	Beta	11/2/2017	5/19/2020	0.4520	P	0.3728	0.4910	0.6092
LB4110A - E3	Beta	11/2/2017	5/19/2020	0.5775	P	0.3848	0.5001	0.6154
LB4110A - E4	Beta	11/2/2017	5/19/2020	0.5466	P	0.4532	0.5887	0.7241
LB4110A - F1	Beta	11/2/2019	9/9/2021	0.5076	P	0.4743	0.5319	0.5895
LB4110A - F2	Beta	11/2/2019	9/9/2021	0.4175	P	0.3930	0.4436	0.4941
LB4110A - F3	Beta	11/2/2019	9/9/2021	0.5645	P	0.5086	0.5737	0.6388
LB4110A - F4	Beta	11/2/2019	9/9/2021	0.5424	P	0.4918	0.5530	0.6143
LB4110A - G1	Beta	11/2/2019	9/9/2021	0.4447	P	0.4181	0.4440	0.4699
LB4110A - G2	Beta	11/2/2019	9/9/2021	0.4392	P	0.4059	0.4346	0.4633
LB4110A - G3	Beta	11/2/2019	9/9/2021	0.5155	P	0.4914	0.5189	0.5464
LB4110A - G4	Beta	11/2/2019	9/9/2021	0.4371	P	0.3918	0.4396	0.4873

KP 9/9/21 out of service

0108

SECTION X

BARIUM-133 ANALYTICAL TRACER DATA

LP 9/7/21

Apex-Gamma

Analysis Report for 2108094-01
SPIKE

GAMMA SPECTRUM ANALYSIS

Sample Identification	: 2108094-01
Sample Description	: SPIKE
Sample Type	: RA RECOVERY
Sample Size	: 1.000E+00 units
Facility	: Countroom
Sample Taken On	: 9/7/2021 8:24:04AM
Acquisition Started	: 9/7/2021 10:04:32AM
Procedure	: BAFIL
Operator	: Administrator
Detector Name	: GE1
Geometry	: BAFIL
Live Time	: 900.0 seconds
Real Time	: 900.2 seconds
Dead Time	: 0.03 %
Peak Locate Threshold	: 2.50
Peak Locate Range (in channels)	: 1 - 4096
Peak Area Range (in channels)	: 32 - 4096
Identification Energy Tolerance	: 2.500 keV
Energy Calibration Used Done On	: 10/12/2019
Efficiency Calibration Used Done On	: 10/12/2019
Efficiency Calibration Description	:
Sample Number	: 114537

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 9/7/2021 10:19:35AM

Peak Analysis From Channel : 1
Peak Analysis To Channel : 4096

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)

Analysis Report for 2108094-01

SPIKE

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
	1	52.95	49 -	57	53.41	5.32E+01	44.58	2.70E+02	2.17
	2	62.63	58 -	69	63.09	3.25E+02	67.32	4.10E+02	2.50
	3	80.82	76 -	85	81.27	8.21E+02	74.77	3.29E+02	2.32
M	4	111.65	106 -	121	112.07	1.77E+02	46.09	2.22E+02	2.72
m	5	116.22	106 -	121	116.64	2.76E+01	35.27	1.75E+02	2.11
	6	274.43	261 -	280	274.72	8.01E+01	44.81	1.44E+02	2.23
M	7	302.95	297 -	311	303.22	1.58E+02	31.06	6.28E+01	2.42
m	8	306.95	297 -	311	307.22	2.10E+01	25.54	6.85E+01	2.42
M	9	333.53	327 -	346	333.78	6.18E+01	21.32	3.03E+01	2.44
m	10	338.53	327 -	346	338.78	2.54E+01	19.35	4.14E+01	2.45
M	11	356.15	349 -	363	356.39	5.30E+02	48.70	4.30E+01	2.61
m	12	360.98	349 -	363	361.21	1.51E+01	22.16	4.16E+01	2.71
M	13	384.31	379 -	398	384.52	1.39E+02	39.01	4.06E+01	3.00
m	14	387.14	379 -	398	387.35	1.91E+02	37.06	2.13E+01	2.28
m	15	391.33	379 -	398	391.53	5.03E+01	26.26	1.04E+01	2.39
M	16	414.93	410 -	424	415.12	3.61E+01	19.15	4.02E+01	2.50
m	17	418.82	410 -	424	419.00	3.23E+01	19.67	3.67E+01	2.27
	18	436.84	431 -	442	437.01	9.31E+01	23.75	2.38E+01	2.51
M	19	464.62	463 -	474	464.77	7.49E+00	7.75	1.48E+01	2.53
m	20	468.08	463 -	474	468.23	2.61E+01	15.23	2.08E+01	2.53
	21	529.07	525 -	531	529.17	6.00E+00	4.90	0.00E+00	2.74
	22	602.84	600 -	605	602.88	5.38E+00	7.07	5.25E+00	2.85
	23	610.00	607 -	612	610.03	6.45E+00	8.43	9.09E+00	2.16

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

BACKGROUND SUBTRACT REPORT

Peak Analysis Performed on : 9/7/2021 10:19:35AM

Env. Background File : \\OR-GAMMA1\ApexRoot\Countroom\Data\0000114498.CNF

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
	1	52.95	5.32E+01	44.58			5.32E+01	4.46E+01
	2	62.63	3.25E+02	67.32	2.45E+01	2.35E+00	3.00E+02	6.74E+01
	3	80.82	8.21E+02	74.77			8.21E+02	7.48E+01
M	4	111.65	1.77E+02	46.09	1.10E+00	1.84E+00	1.76E+02	4.61E+01
m	5	116.22	2.76E+01	35.27			2.76E+01	3.53E+01
	6	274.43	8.01E+01	44.81			8.01E+01	4.48E+01

Analysis Report for 2108094-01

SPIKE

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
M	7	302.95	1.58E+02	31.06			1.58E+02	3.11E+01
m	8	306.95	2.10E+01	25.54			2.10E+01	2.55E+01
M	9	333.53	6.18E+01	21.32			6.18E+01	2.13E+01
m	10	338.53	2.54E+01	19.35			2.54E+01	1.94E+01
M	11	356.15	5.30E+02	48.70			5.30E+02	4.87E+01
m	12	360.98	1.51E+01	22.16			1.51E+01	2.22E+01
M	13	384.31	1.39E+02	39.01			1.39E+02	3.90E+01
m	14	387.14	1.91E+02	37.06			1.91E+02	3.71E+01
m	15	391.33	5.03E+01	26.26			5.03E+01	2.63E+01
M	16	414.93	3.61E+01	19.15			3.61E+01	1.92E+01
m	17	418.82	3.23E+01	19.67			3.23E+01	1.97E+01
	18	436.84	9.31E+01	23.75			9.31E+01	2.37E+01
M	19	464.62	7.49E+00	7.75			7.49E+00	7.75E+00
m	20	468.08	2.61E+01	15.23			2.61E+01	1.52E+01
	21	529.07	6.00E+00	4.90			6.00E+00	4.90E+00
	22	602.84	5.38E+00	7.07			5.38E+00	7.07E+00
	23	610.00	6.45E+00	8.43			6.45E+00	8.43E+00

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : \\OR-GAMMA1\ApexRoot\Countroom\Library\WSRC.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/units)	Activity Uncertainty
SN-113	0.95	255.12		1.93		
		391.69	*	61.90	3.90E+01	2.08E+01
BA-133	0.99	81.00	*	34.06	4.21E+02	5.67E+01
		302.84	*	18.33	4.47E+02	1.53E+02
		356.01	*	62.05	4.26E+02	6.23E+01
TH-234	0.98	63.29	*	3.80	8.41E+02	1.95E+02

Analysis Report for 2108094-01
SPIKE

* = Energy line found in the spectrum.
\- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 2.500 keV
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma

INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/units)	Wt mean Activity Uncertainty	Comments
SN-113	0.950	3.90E+01	2.08E+01	
BA-133	0.999	4.25E+02	4.04E+01	
TH-234	0.989	8.41E+02	1.95E+02	

? = nuclide is part of an undetermined solution
X = nuclide rejected by the interference analysis
@ = nuclide contains energy lines not used in Weighted Mean Activity

Errors quoted at 2.000sigma

Analysis Report for 2108094-01
SPIKE

UNIDENTIFIED PEAKS

Peak Locate Performed on : 9/7/2021 10:19:35AM
Peak Locate From Channel : 1
Peak Locate To Channel : 4096

	Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
	1	52.95	5.90751E-02	41.92		
M	4	111.65	1.95743E-01	13.09	Tol.	U-237
m	5	116.22	3.06238E-02	63.99	Tol.	U-237
	6	274.43	8.90205E-02	27.97		
m	8	306.95	2.33334E-02	60.82		
M	9	333.53	6.87158E-02	17.24		
m	10	338.53	2.81999E-02	38.12		
m	12	360.98	1.68229E-02	73.18		
M	13	384.31	1.54778E-01	14.00	Sum	
m	14	387.14	2.12705E-01	9.68		
M	16	414.93	4.01336E-02	26.51		
m	17	418.82	3.58626E-02	30.46	Sum	
	18	436.84	1.03429E-01	12.76	Sum	
M	19	464.62	8.31828E-03	51.73		
m	20	468.08	2.89793E-02	29.20		
	21	529.07	6.66667E-03	40.82		
	22	602.84	5.97222E-03	65.78		
	23	610.00	7.17172E-03	65.27		

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE MDA REPORT

Nuclide Library Used : \\OR-GAMMA1\ApexRoot\Countroom\Library\WSRC.NLB

Analysis Report for 2108094-01

SPIKE

	Nuclide Name	Energy (keV)		Yield(%)	Line MDA (pCi/units)	Nuclide MDA (pCi/units)	Activity (pCi/units)	Dec. Level (pCi/units)
	CA-41	3.00		77.00	8.60E-07	8.60E-07	0.00E+00	0.00E+00
		3.31		12.30	1.01E-05		0.00E+00	0.00E+00
	FE-55	5.89		24.50	1.49E-04	1.49E-04	0.00E+00	0.00E+00
	CO-57	122.06		85.51	1.69E+01	1.69E+01	-1.40E+00	7.97E+00
		136.48		10.60	1.50E+02		-4.71E+01	7.04E+01
	NI-59	6.92		29.80	2.91E-04	2.91E-04	0.00E+00	0.00E+00
	MO-93	16.59		52.90	9.33E-03	9.33E-03	0.00E+00	0.00E+00
		18.60		10.00	7.73E-02		0.00E+00	0.00E+00
	NB-93M	16.57		9.43	5.21E-02	5.21E-02	0.00E+00	0.00E+00
	CD-109	88.03		3.72	3.05E+02	3.05E+02	-3.71E+02	1.45E+02
+	SN-113	255.12		1.93	9.08E+02	3.63E+01	3.75E+01	4.18E+02
		391.69	*	61.90	3.63E+01		3.90E+01	1.71E+01
	SN-119M	23.87		16.10	1.20E-01	1.01E-01	0.00E+00	0.00E+00
		25.10		22.70	1.01E-01		0.00E+00	0.00E+00
	I-129	29.78		57.00	1.78E+00	1.78E+00	7.46E-01	8.53E-01
		33.60		13.20	2.18E+01		1.10E+02	1.07E+01
		39.58		7.52	3.40E+01		-7.18E+01	1.64E+01
+	BA-133	81.00	*	34.06	4.19E+01	3.73E+01	4.21E+02	2.02E+01
		302.84	*	18.33	1.64E+02		4.47E+02	7.83E+01
		356.01	*	62.05	3.73E+01		4.26E+02	1.75E+01
	CE-139	165.85		80.35	2.36E+01	2.36E+01	-1.73E+01	1.11E+01
	CE-144	133.54		10.80	1.37E+02	1.37E+02	-4.68E+01	6.41E+01
	HG-203	279.19		77.30	3.02E+01	3.02E+01	-2.13E+00	1.42E+01
	PB-210	46.50		4.25	6.47E+01	6.47E+01	-1.88E+01	3.07E+01
	TH-231	25.64		14.70	1.68E-01	1.68E-01	0.00E+00	0.00E+00
		84.21		6.40	3.05E+02		9.72E+00	1.49E+02
	PA-234M	9.89		89.00	5.79E-04	5.79E-04	0.00E+00	0.00E+00
		21.72		64.90	2.12E-02		0.00E+00	0.00E+00
		37.93		23.75	1.48E+01		3.66E+01	7.24E+00
+	TH-234	63.29	*	3.80	2.74E+02	2.74E+02	8.41E+02	1.33E+02
	NP-237	29.37		14.00	6.92E+00	6.92E+00	2.91E+00	3.32E+00
		86.50		12.60	9.38E+01		-5.90E+01	4.48E+01
	U-237	97.08		16.30	6.81E+01	4.71E+01	-5.76E+01	3.21E+01
		101.07		26.30	4.71E+01		1.01E+01	2.23E+01
		114.00		12.30	2.00E+02		4.00E+02	9.67E+01
		208.01		22.00	8.93E+01		-2.17E+01	4.16E+01
	AM-241	59.54		35.90	2.30E+01	2.30E+01	3.49E+01	1.12E+01
	AM-243	74.67		66.00	1.20E+01	1.20E+01	-2.75E+00	5.69E+00

\+ = Nuclide identified during the nuclide identification
* = Energy line found in the spectrum
\> = MDA value not calculated
@ = Half-life too short to be able to perform the decay correction

KP 9/7/21

Apex-Gamma

Analysis Report for 2108094-02
BLANK

GAMMA SPECTRUM ANALYSIS

Sample Identification	: 2108094-02
Sample Description	: BLANK
Sample Type	: RA RECOVERY
Sample Size	: 1.000E+00 units
Facility	: Countroom
Sample Taken On	: 9/7/2021 8:24:11AM
Acquisition Started	: 9/7/2021 10:04:39AM
Procedure	: BAFIL
Operator	: Administrator
Detector Name	: GE2
Geometry	: BAFIL
Live Time	: 900.0 seconds
Real Time	: 900.2 seconds
Dead Time	: 0.03 %
Peak Locate Threshold	: 2.50
Peak Locate Range (in channels)	: 1 - 4096
Peak Area Range (in channels)	: 28 - 4096
Identification Energy Tolerance	: 2.500 keV
Energy Calibration Used Done On	: 6/6/2020
Efficiency Calibration Used Done On	: 9/14/2019
Efficiency Calibration Description	:
Sample Number	: 114538

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 9/7/2021 10:19:49AM

Peak Analysis From Channel : 1
Peak Analysis To Channel : 4096

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)

Analysis Report for 2108094-02

BLANK

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
	1	36.74	37 -	41	37.43	4.09E+02	69.53	3.12E+02	2.19
	2	53.75	51 -	58	54.42	7.96E+01	34.12	1.43E+02	1.64
M	3	63.25	59 -	74	63.91	1.95E+02	37.39	1.12E+02	1.70
m	4	67.16	59 -	74	67.82	1.01E+02	33.13	1.23E+02	1.71
	5	82.29	79 -	86	82.93	8.18E+02	67.59	2.16E+02	1.22
M	6	109.51	109 -	125	110.13	1.38E+01	11.22	3.37E+01	1.38
m	7	113.34	109 -	125	113.95	1.55E+02	31.62	6.14E+01	1.38
m	8	117.27	109 -	125	117.87	3.60E+01	21.26	5.57E+01	1.39
M	9	183.60	183 -	190	184.14	1.34E+01	11.62	3.43E+01	1.50
	10	241.11	238 -	247	241.59	2.50E+01	25.69	8.00E+01	2.17
M	11	273.55	273 -	281	274.00	7.48E+00	5.83	4.38E+00	1.47
m	12	277.41	273 -	281	277.85	6.42E+01	19.76	2.36E+01	1.62
M	13	303.82	301 -	320	304.23	1.50E+02	26.93	3.70E+01	1.63
m	14	308.38	301 -	320	308.79	2.32E+01	16.16	2.36E+01	1.82
	15	324.44	321 -	328	324.83	1.30E+01	14.00	2.40E+01	1.00
	16	335.20	331 -	340	335.59	5.30E+01	29.65	9.60E+01	1.58
	17	356.86	352 -	360	357.23	5.57E+02	49.09	3.09E+01	1.68
	18	364.62	362 -	368	364.98	2.15E+01	11.16	7.00E+00	4.07
M	19	374.65	374 -	400	375.00	7.45E+00	5.74	3.06E+00	1.57
m	20	384.93	374 -	400	385.26	1.07E+02	24.49	8.93E+00	1.91
m	21	387.81	374 -	400	388.14	1.46E+02	27.44	1.15E+01	1.60
m	22	392.00	374 -	400	392.33	2.89E+01	19.90	1.67E+01	1.92
	23	416.67	411 -	421	416.97	5.76E+01	22.80	3.87E+01	5.04
	24	423.30	422 -	427	423.59	1.22E+01	12.61	2.36E+01	2.59
	25	437.80	433 -	441	438.08	8.77E+01	20.99	1.47E+01	1.56
	26	468.12	465 -	470	468.38	7.46E+00	9.38	1.11E+01	1.73
	27	481.79	479 -	484	482.04	6.56E+00	6.40	2.88E+00	1.61
	28	518.18	516 -	521	518.39	5.88E+00	7.07	4.25E+00	1.03
	29	579.45	576 -	582	579.60	6.50E+00	8.03	7.00E+00	2.99

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

BACKGROUND SUBTRACT REPORT

Peak Analysis Performed on : 9/7/2021 10:19:49AM

Env. Background File : \\OR-GAMMA1\ApexRoot\Countroom\Data\0000114499.CNF

Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.

Analysis Report for 2108094-02

BLANK

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
	1	36.74	4.09E+02	69.53			4.09E+02	6.95E+01
	2	53.75	7.96E+01	34.12			7.96E+01	3.41E+01
M	3	63.25	1.95E+02	37.39	5.84E+00	2.00E+00	1.90E+02	3.74E+01
m	4	67.16	1.01E+02	33.13			1.01E+02	3.31E+01
	5	82.29	8.18E+02	67.59			8.18E+02	6.76E+01
M	6	109.51	1.38E+01	11.22			1.38E+01	1.12E+01
m	7	113.34	1.55E+02	31.62			1.55E+02	3.16E+01
m	8	117.27	3.60E+01	21.26			3.60E+01	2.13E+01
M	9	183.60	1.34E+01	11.62			1.34E+01	1.16E+01
	10	241.11	2.50E+01	25.69	3.40E+00	1.65E+00	2.16E+01	2.57E+01
M	11	273.55	7.48E+00	5.83			7.48E+00	5.83E+00
m	12	277.41	6.42E+01	19.76			6.42E+01	1.98E+01
M	13	303.82	1.50E+02	26.93			1.50E+02	2.69E+01
m	14	308.38	2.32E+01	16.16			2.32E+01	1.62E+01
	15	324.44	1.30E+01	14.00			1.30E+01	1.40E+01
	16	335.20	5.30E+01	29.65			5.30E+01	2.96E+01
	17	356.86	5.57E+02	49.09			5.57E+02	4.91E+01
	18	364.62	2.15E+01	11.16			2.15E+01	1.12E+01
M	19	374.65	7.45E+00	5.74			7.45E+00	5.74E+00
m	20	384.93	1.07E+02	24.49			1.07E+02	2.45E+01
m	21	387.81	1.46E+02	27.44			1.46E+02	2.74E+01
m	22	392.00	2.89E+01	19.90			2.89E+01	1.99E+01
	23	416.67	5.76E+01	22.80			5.76E+01	2.28E+01
	24	423.30	1.22E+01	12.61			1.22E+01	1.26E+01
	25	437.80	8.77E+01	20.99			8.77E+01	2.10E+01
	26	468.12	7.46E+00	9.38			7.46E+00	9.38E+00
	27	481.79	6.56E+00	6.40			6.56E+00	6.40E+00
	28	518.18	5.88E+00	7.07			5.88E+00	7.07E+00
	29	579.45	6.50E+00	8.03			6.50E+00	8.03E+00

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : \\OR-GAMMA1\ApexRoot\Countroom\Library\WSRC.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/units)	Activity Uncertainty

Analysis Report for 2108094-02

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Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/units)	Activity Uncertainty
SN-113	0.96	255.12		1.93		
		391.69	*	61.90	1.89E+01	1.31E+01
BA-133	0.97	81.00	*	34.06	5.22E+02	7.04E+01
		302.84	*	18.33	5.31E+02	1.86E+02
		356.01	*	62.05	4.44E+02	6.28E+01
HG-203	0.92	279.19	*	77.30	6.05E+01	2.78E+01
PA-234M	0.99	9.89		89.00		
		21.72		64.90		
		37.93	*	23.75	1.02E+01	1.74E+00
TH-234	1.00	63.29	*	3.80	4.28E+02	8.64E+01

* = Energy line found in the spectrum.
\- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 2.500 keV
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma

INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/units)	Wt mean Activity Uncertainty	Comments
SN-113	0.963	1.89E+01	1.31E+01	
BA-133	0.974	4.82E+02	4.55E+01	
HG-203	0.922	6.05E+01	2.78E+01	
PA-234M	0.995	1.02E+01	1.74E+00	
TH-234	1.000	4.28E+02	8.64E+01	

? = nuclide is part of an undetermined solution
X = nuclide rejected by the interference analysis
@ = nuclide contains energy lines not used in Weighted Mean Activity

Errors quoted at 2.000sigma

Analysis Report for 2108094-02

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UNIDENTIFIED PEAKS

Peak Locate Performed on : 9/7/2021 10:19:49AM
Peak Locate From Channel : 1
Peak Locate To Channel : 4096

	Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
	2	53.75	8.84032E-02	21.44		
m	4	67.16	1.12354E-01	16.38		
M	6	109.51	1.53627E-02	40.59		
m	7	113.34	1.72496E-01	10.18	Tol.	U-237
m	8	117.27	3.99783E-02	29.54	Sum	
M	9	183.60	1.48731E-02	43.40		
	10	241.11	2.40050E-02	59.58		
M	11	273.55	8.31637E-03	38.95		
m	14	308.38	2.58191E-02	34.78		
	15	324.44	1.44444E-02	53.85		
	16	335.20	5.88999E-02	27.96		
	18	364.62	2.38889E-02	25.95	Sum	
M	19	374.65	8.28245E-03	38.53		
m	20	384.93	1.19385E-01	11.40	Sum	
m	21	387.81	1.62348E-01	9.39	Sum	
	23	416.67	6.40476E-02	19.78		
	24	423.30	1.35417E-02	51.73		
	25	437.80	9.73977E-02	11.97	Sum	
	26	468.12	8.29060E-03	62.86		
	27	481.79	7.29167E-03	48.79		
	28	518.18	6.52778E-03	60.18		
	29	579.45	7.22222E-03	61.78	Sum	

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

Analysis Report for 2108094-02

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NUCLIDE MDA REPORT

Nuclide Library Used : \\OR-GAMMA1\ApexRoot\Countroom\Library\WSRC.NLB

	Nuclide Name	Energy (keV)		Yield(%)	Line MDA (pCi/units)	Nuclide MDA (pCi/units)	Activity (pCi/units)	Dec. Level (pCi/units)
	CA-41	3.00		77.00	1.84E-13	1.84E-13	0.00E+00	0.00E+00
		3.31		12.30	4.70E-12		0.00E+00	0.00E+00
	FE-55	5.89		24.50	4.58E-09	4.58E-09	0.00E+00	0.00E+00
	CO-57	122.06		85.51	2.25E+01	2.25E+01	-3.42E-01	1.04E+01
		136.48		10.60	2.36E+02		-2.70E+01	1.09E+02
	NI-59	6.92		29.80	2.55E-08	2.55E-08	0.00E+00	0.00E+00
	MO-93	16.59		52.90	9.74E-05	9.74E-05	0.00E+00	0.00E+00
		18.60		10.00	1.34E-03		0.00E+00	0.00E+00
	NB-93M	16.57		9.43	5.41E-04	5.41E-04	0.00E+00	0.00E+00
	CD-109	88.03		3.72	2.77E+02	2.77E+02	1.38E+01	1.29E+02
+	SN-113	255.12		1.93	1.13E+03	3.15E+01	4.56E+02	5.11E+02
		391.69	*	61.90	3.15E+01		1.89E+01	1.49E+01
	SN-119M	23.87		16.10	5.80E-03	5.80E-03	0.00E+00	0.00E+00
		25.10		22.70	5.14E-02		-6.56E-02	2.28E-02
	I-129	29.78		57.00	3.07E-01	3.07E-01	-6.01E+00	1.50E-01
		33.60		13.20	5.66E+00		1.82E+01	2.79E+00
		39.58		7.52	9.08E+00		-7.96E-01	4.38E+00
+	BA-133	81.00	*	34.06	3.95E+01	1.99E+01	5.22E+02	1.89E+01
		302.84	*	18.33	2.25E+02		5.31E+02	1.08E+02
		356.01	*	62.05	1.99E+01		4.44E+02	8.87E+00
	CE-139	165.85		80.35	3.17E+01	3.17E+01	-8.12E+00	1.45E+01
	CE-144	133.54		10.80	2.35E+02	2.35E+02	1.19E+02	1.10E+02
+	HG-203	279.19	*	77.30	2.70E+01	2.70E+01	6.05E+01	1.22E+01
	PB-210	46.50		4.25	1.81E+01	1.81E+01	1.22E+01	8.36E+00
	TH-231	25.64		14.70	9.24E-02	9.24E-02	-1.18E-01	4.09E-02
		84.21		6.40	4.76E+02		2.39E+03	2.33E+02
+	PA-234M	9.89		89.00	4.30E-07	4.30E-07	0.00E+00	0.00E+00
		21.72		64.90	7.08E-04		0.00E+00	0.00E+00
		37.93	*	23.75	2.39E+00		1.02E+01	1.16E+00
+	TH-234	63.29	*	3.80	2.18E+02	2.18E+02	4.28E+02	1.06E+02
	NP-237	29.37		14.00	1.14E+00	1.14E+00	-2.23E+01	5.55E-01
		86.50		12.60	8.00E+01		2.00E+00	3.73E+01
	U-237	97.08		16.30	7.01E+01	5.57E+01	-6.19E+01	3.22E+01
		101.07		26.30	5.57E+01		2.20E+01	2.59E+01
		114.00		12.30	2.95E+02		2.67E+02	1.42E+02
		208.01		22.00	1.57E+02		1.01E+02	7.31E+01
	AM-241	59.54		35.90	7.92E+00	7.92E+00	-2.15E+01	3.71E+00
	AM-243	74.67		66.00	1.03E+01	1.03E+01	3.84E+00	4.84E+00

\+ = Nuclide identified during the nuclide identification
* = Energy line found in the spectrum
\> = MDA value not calculated
@ = Half-life too short to be able to perform the decay correction

Analysis Report for 2108094-02

BLANK

ICP 9/7/21

Apex-Gamma

Analysis Report for 2108094-03
H-34

GAMMA SPECTRUM ANALYSIS

Sample Identification	: 2108094-03
Sample Description	: H-34
Sample Type	: RA RECOVERY
Sample Size	: 1.000E+00 units
Facility	: Countroom
Sample Taken On	: 9/7/2021 8:24:18AM
Acquisition Started	: 9/7/2021 10:04:47AM
Procedure	: BAFIL
Operator	: Administrator
Detector Name	: GE3
Geometry	: BAFIL
Live Time	: 900.0 seconds
Real Time	: 908.4 seconds
Dead Time	: 0.93 %
Peak Locate Threshold	: 2.50
Peak Locate Range (in channels)	: 1 - 4096
Peak Area Range (in channels)	: 8 - 4096
Identification Energy Tolerance	: 2.500 keV
Energy Calibration Used Done On	: 6/6/2020
Efficiency Calibration Used Done On	: 10/19/2019
Efficiency Calibration Description	:
Sample Number	: 114539

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 9/7/2021 10:20:11AM

Peak Analysis From Channel : 1
Peak Analysis To Channel : 4096

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)

Analysis Report for 2108094-03

H-34

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
M	1	31.00	17 -	45	31.43	2.04E+03	109.87	3.36E+02	3.28
m	2	35.07	17 -	45	35.49	5.37E+02	113.07	3.22E+02	3.87
	3	52.05	49 -	56	52.45	4.41E+01	40.25	2.42E+02	1.95
M	4	61.38	57 -	71	61.77	1.90E+02	62.02	3.75E+02	3.23
m	5	64.97	57 -	71	65.35	1.29E+02	63.80	4.07E+02	3.27
	6	81.31	75 -	87	81.67	8.14E+02	82.74	4.21E+02	3.59
M	7	112.09	106 -	123	112.42	2.72E+02	56.41	2.64E+02	3.71
m	8	116.85	106 -	123	117.17	4.50E+01	42.94	1.72E+02	2.68
M	9	242.03	240 -	248	242.20	1.49E+01	17.05	5.01E+01	2.22
m	10	245.63	240 -	248	245.80	2.29E+01	21.56	6.21E+01	2.22
	11	277.11	272 -	284	277.23	8.63E+01	28.99	5.74E+01	3.88
M	12	300.46	299 -	311	300.56	2.34E+01	11.84	1.47E+01	1.83
m	13	303.34	299 -	311	303.43	9.18E+01	26.58	3.16E+01	2.49
	14	335.92	329 -	348	335.98	9.10E+01	39.55	1.00E+02	5.84
	15	356.35	351 -	363	356.38	4.52E+02	48.09	6.15E+01	4.02
	16	387.18	380 -	398	387.17	3.04E+02	45.37	6.10E+01	4.58
	17	416.80	410 -	426	416.75	6.08E+01	30.82	6.44E+01	3.43
	18	437.12	431 -	442	437.06	9.91E+01	24.25	2.37E+01	3.50
	19	467.97	464 -	473	467.86	1.65E+01	15.65	2.70E+01	3.48
	20	540.48	538 -	542	540.29	7.00E+00	5.29	0.00E+00	1.16

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

BACKGROUND SUBTRACT REPORT

Peak Analysis Performed on : 9/7/2021 10:20:11AM

Env. Background File : \\OR-GAMMA1\ApexRoot\Countroom\Data\0000114496.CNF

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
M	1	31.00	2.04E+03	109.87			2.04E+03	1.10E+02
m	2	35.07	5.37E+02	113.07			5.37E+02	1.13E+02
	3	52.05	4.41E+01	40.25			4.41E+01	4.02E+01
M	4	61.38	1.90E+02	62.02	1.24E+01	2.62E+00	1.78E+02	6.21E+01
m	5	64.97	1.29E+02	63.80	1.24E+01	2.62E+00	1.16E+02	6.39E+01
	6	81.31	8.14E+02	82.74			8.14E+02	8.27E+01
M	7	112.09	2.72E+02	56.41			2.72E+02	5.64E+01
m	8	116.85	4.50E+01	42.94			4.50E+01	4.29E+01
M	9	242.03	1.49E+01	17.05			1.49E+01	1.71E+01

Analysis Report for 2108094-03

H-34

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
m	10	245.63	2.29E+01	21.56			2.29E+01	2.16E+01
	11	277.11	8.63E+01	28.99			8.63E+01	2.90E+01
M	12	300.46	2.34E+01	11.84			2.34E+01	1.18E+01
m	13	303.34	9.18E+01	26.58			9.18E+01	2.66E+01
	14	335.92	9.10E+01	39.55			9.10E+01	3.95E+01
	15	356.35	4.52E+02	48.09			4.52E+02	4.81E+01
	16	387.18	3.04E+02	45.37			3.04E+02	4.54E+01
	17	416.80	6.08E+01	30.82			6.08E+01	3.08E+01
	18	437.12	9.91E+01	24.25			9.91E+01	2.42E+01
	19	467.97	1.65E+01	15.65			1.65E+01	1.57E+01
	20	540.48	7.00E+00	5.29			7.00E+00	5.29E+00

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : \\OR-GAMMA1\ApexRoot\Countroom\Library\WSRC.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/units)	Activity Uncertainty
I-129	0.86	29.78	*	57.00	2.79E+01	1.51E+00
		33.60	*	13.20	5.19E+01	1.09E+01
		39.58		7.52		
BA-133	0.99	81.00	*	34.06	4.05E+02	5.72E+01
		302.84	*	18.33	3.03E+02	1.24E+02
		356.01	*	62.05	4.08E+02	6.67E+01
HG-203	0.89	279.19	*	77.30	6.90E+01	3.12E+01
TH-234	0.93	63.29	*	3.80	2.97E+02	1.64E+02
AM-241	0.91	59.54	*	35.90	4.12E+01	1.45E+01

Analysis Report for 2108094-03

H-34

* = Energy line found in the spectrum.
\- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 2.500 keV
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma

INTERFERENCE CORRECTED REPORT

	Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/units)	Wt mean Activity Uncertainty	Comments
	I-129	0.867	2.84E+01	1.49E+00	
	BA-133	0.997	3.95E+02	4.10E+01	
	HG-203	0.895	6.90E+01	3.12E+01	
	TH-234	0.931	2.97E+02	1.64E+02	
X	NP-237	0.743			
	AM-241	0.917	4.12E+01	1.45E+01	

? = nuclide is part of an undetermined solution
X = nuclide rejected by the interference analysis
@ = nuclide contains energy lines not used in Weighted Mean Activity

Errors quoted at 2.000sigma

Analysis Report for 2108094-03

H-34

UNIDENTIFIED PEAKS

Peak Locate Performed on : 9/7/2021 10:20:11AM
Peak Locate From Channel : 1
Peak Locate To Channel : 4096

	Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
	3	52.05	4.89899E-02	45.64		
M	7	112.09	3.01925E-01	10.38	Sum	
m	8	116.85	5.00524E-02	47.66	Sum	
M	9	242.03	1.65139E-02	57.36		
m	10	245.63	2.54910E-02	46.98		
M	12	300.46	2.60177E-02	25.29		
	14	335.92	1.01111E-01	21.73	Sum	
	16	387.18	3.37232E-01	7.47	Sum	
	17	416.80	6.75448E-02	25.35	Sum	
	18	437.12	1.10160E-01	12.23	Sum	
	19	467.97	1.83333E-02	47.43		
	20	540.48	7.77778E-03	37.80		

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE MDA REPORT

Nuclide Library Used : \\OR-GAMMA1\ApexRoot\Countroom\Library\WSRC.NLB

Nuclide Name	Energy (keV)	Yield(%)	Line MDA (pCi/units)	Nuclide MDA (pCi/units)	Activity (pCi/units)	Dec. Level (pCi/units)
CA-41	3.00	77.00	8.48E-09	8.48E-09	0.00E+00	0.00E+00
	3.31	12.30	1.24E-07		0.00E+00	0.00E+00
FE-55	5.89	24.50	3.15E-05	3.15E-05	-1.18E-04	1.27E-05
CO-57	122.06	85.51	2.04E+01	2.04E+01	9.09E-01	9.64E+00

Analysis Report for 2108094-03

H-34

	Nuclide Name	Energy (keV)		Yield(%)	Line MDA (pCi/units)	Nuclide MDA (pCi/units)	Activity (pCi/units)	Dec. Level (pCi/units)
	CO-57	136.48		10.60	1.92E+02	2.04E+01	5.05E+01	9.04E+01
	NI-59	6.92		29.80	2.15E-04	2.15E-04	7.14E-05	9.95E-05
	MO-93	16.59		52.90	5.41E-02	5.41E-02	6.09E-03	2.60E-02
		18.60		10.00	5.42E-01		1.85E-01	2.61E-01
	NB-93M	16.57		9.43	3.02E-01	3.02E-01	3.39E-02	1.45E-01
	CD-109	88.03		3.72	3.09E+02	3.09E+02	4.06E+00	1.47E+02
	SN-113	255.12		1.93	1.12E+03	3.79E+01	-1.54E+01	5.18E+02
		391.69		61.90	3.79E+01		-6.99E+00	1.78E+01
	SN-119M	23.87		16.10	1.10E+00	1.10E+00	-4.44E+00	5.28E-01
		25.10		22.70	1.18E+00		-1.62E+01	5.71E-01
+	I-129	29.78	*	57.00	2.78E+00	2.78E+00	2.79E+01	1.37E+00
		33.60	*	13.20	1.97E+01		5.19E+01	9.73E+00
		39.58		7.52	2.04E+01		-1.87E+01	9.82E+00
+	BA-133	81.00	*	34.06	5.03E+01	3.57E+01	4.05E+02	2.45E+01
		302.84	*	18.33	1.23E+02		3.03E+02	5.71E+01
		356.01	*	62.05	3.57E+01		4.08E+02	1.66E+01
	CE-139	165.85		80.35	2.96E+01	2.96E+01	-5.13E+00	1.39E+01
	CE-144	133.54		10.80	1.74E+02	1.74E+02	3.37E+01	8.18E+01
+	HG-203	279.19	*	77.30	3.14E+01	3.14E+01	6.90E+01	1.46E+01
	PB-210	46.50		4.25	4.24E+01	4.24E+01	1.21E+01	2.01E+01
	TH-231	25.64		14.70	2.01E+00	2.01E+00	-2.75E+01	9.71E-01
		84.21		6.40	3.14E+02		5.76E+02	1.53E+02
	PA-234M	9.89		89.00	1.31E-03	1.31E-03	1.23E-03	6.27E-04
		21.72		64.90	1.79E-01		7.24E-02	8.60E-02
		37.93		23.75	7.81E+00		-7.35E-01	3.81E+00
+	TH-234	63.29	*	3.80	3.14E+02	3.14E+02	2.97E+02	1.53E+02
	NP-237	29.37	*	14.00	1.13E+01	1.13E+01	1.14E+02	5.59E+00
		86.50		12.60	1.03E+02		1.13E+01	4.92E+01
	U-237	97.08		16.30	7.89E+01	5.43E+01	-3.28E+01	3.74E+01
		101.07		26.30	5.43E+01		1.23E+01	2.58E+01
		114.00		12.30	2.36E+02		4.66E+02	1.15E+02
		208.01		22.00	1.04E+02		3.61E+00	4.81E+01
+	AM-241	59.54	*	35.90	2.82E+01	2.82E+01	4.12E+01	1.38E+01
	AM-243	74.67		66.00	1.23E+01	1.23E+01	1.61E+00	5.87E+00

\+ = Nuclide identified during the nuclide identification
* = Energy line found in the spectrum
\> = MDA value not calculated
@ = Half-life too short to be able to perform the decay correction

KP 9/7/21

Apex-Gamma

Analysis Report for 2108094-04
H-34

GAMMA SPECTRUM ANALYSIS

Sample Identification	: 2108094-04
Sample Description	: H-34
Sample Type	: RA RECOVERY
Sample Size	: 1.000E+00 units
Facility	: Countroom
Sample Taken On	: 9/7/2021 8:24:27AM
Acquisition Started	: 9/7/2021 10:04:53AM
Procedure	: BAFIL
Operator	: Administrator
Detector Name	: GE4
Geometry	: BAFIL
Live Time	: 900.0 seconds
Real Time	: 900.4 seconds
Dead Time	: 0.05 %
Peak Locate Threshold	: 2.50
Peak Locate Range (in channels)	: 1 - 4096
Peak Area Range (in channels)	: 9 - 4096
Identification Energy Tolerance	: 2.500 keV
Energy Calibration Used Done On	: 8/25/2020
Efficiency Calibration Used Done On	: 10/12/2019
Efficiency Calibration Description	:
Sample Number	: 114540

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 9/7/2021 10:20:00AM

Peak Analysis From Channel : 1
Peak Analysis To Channel : 4096

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)

Analysis Report for 2108094-04

H-34

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
M	1	31.24	25 -	40	30.78	1.79E+03	91.41	1.76E+02	2.45
m	2	35.49	25 -	40	35.03	4.56E+02	84.85	1.44E+02	2.44
	3	52.97	47 -	56	52.51	8.40E+01	41.22	1.94E+02	3.31
	4	63.36	57 -	69	62.89	2.73E+02	58.96	2.83E+02	2.24
	5	81.40	75 -	88	80.92	7.28E+02	75.39	3.08E+02	2.68
M	6	112.15	105 -	118	111.66	1.96E+02	40.94	1.32E+02	2.74
m	7	115.93	105 -	118	115.44	4.38E+01	33.12	9.70E+01	2.03
	8	232.72	226 -	238	232.19	3.66E+01	31.08	9.28E+01	9.47
	9	276.79	270 -	280	276.24	5.38E+01	28.87	8.25E+01	5.21
	10	303.30	298 -	308	302.74	1.11E+02	31.39	7.33E+01	2.45
	11	334.42	331 -	338	333.85	3.44E+01	24.33	7.52E+01	1.61
	12	356.33	349 -	361	355.75	3.45E+02	40.01	2.64E+01	2.66
	13	386.87	379 -	393	386.28	2.21E+02	33.12	2.27E+01	4.78
	14	417.85	411 -	424	417.25	4.68E+01	20.88	2.64E+01	5.57
	15	436.84	431 -	440	436.23	5.24E+01	17.75	1.51E+01	2.27
	16	589.29	586 -	591	588.63	5.36E+00	6.08	3.29E+00	3.29

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

BACKGROUND SUBTRACT REPORT

Peak Analysis Performed on : 9/7/2021 10:20:00AM

Env. Background File : \\OR-GAMMA1\ApexRoot\Countroom\Data\0000114497.CNF

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
M	1	31.24	1.79E+03	91.41			1.79E+03	9.14E+01
m	2	35.49	4.56E+02	84.85			4.56E+02	8.49E+01
	3	52.97	8.40E+01	41.22			8.40E+01	4.12E+01
	4	63.36	2.73E+02	58.96	1.14E+01	2.11E+00	2.62E+02	5.90E+01
	5	81.40	7.28E+02	75.39			7.28E+02	7.54E+01
M	6	112.15	1.96E+02	40.94			1.96E+02	4.09E+01
m	7	115.93	4.38E+01	33.12			4.38E+01	3.31E+01
	8	232.72	3.66E+01	31.08			3.66E+01	3.11E+01
	9	276.79	5.38E+01	28.87			5.38E+01	2.89E+01
	10	303.30	1.11E+02	31.39			1.11E+02	3.14E+01
	11	334.42	3.44E+01	24.33			3.44E+01	2.43E+01
	12	356.33	3.45E+02	40.01			3.45E+02	4.00E+01
	13	386.87	2.21E+02	33.12			2.21E+02	3.31E+01

Analysis Report for 2108094-04
H-34

Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
14	417.85	4.68E+01	20.88			4.68E+01	2.09E+01
15	436.84	5.24E+01	17.75			5.24E+01	1.77E+01
16	589.29	5.36E+00	6.08			5.36E+00	6.08E+00

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : \\OR-GAMMA1\ApexRoot\Countroom\Library\WSRC.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/units)	Activity Uncertainty
I-129	0.78	29.78	*	57.00	5.37E+02	5.76E+01
		33.60	*	13.20	5.68E+02	1.18E+02
		39.58		7.52		
BA-133	0.99	81.00	*	34.06	3.80E+02	5.42E+01
		302.84	*	18.33	3.96E+02	1.73E+02
		356.01	*	62.05	4.69E+02	9.13E+01
HG-203	0.86	279.19	*	77.30	3.96E+01	2.43E+01
TH-234	1.00	63.29	*	3.80	1.13E+03	2.73E+02

* = Energy line found in the spectrum.
- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 2.500 keV
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma

INTERFERENCE CORRECTED REPORT

Analysis Report for 2108094-04

H-34

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/units)	Wt mean Activity Uncertainty	Comments
I-129	0.786	5.43E+02	5.18E+01	
BA-133	0.996	4.03E+02	4.50E+01	
HG-203	0.863	3.96E+01	2.43E+01	
TH-234	1.000	1.13E+03	2.73E+02	

? = nuclide is part of an undetermined solution
X = nuclide rejected by the interference analysis
@ = nuclide contains energy lines not used in Weighted Mean Activity

Errors quoted at 2.000sigma

Analysis Report for 2108094-04
H-34

UNIDENTIFIED PEAKS

Peak Locate Performed on : 9/7/2021 10:20:00AM
Peak Locate From Channel : 1
Peak Locate To Channel : 4096

	Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
	3	52.97	9.33763E-02	24.52		
M	6	112.15	2.17846E-01	10.44	Sum	
m	7	115.93	4.86820E-02	37.80	Sum	
	8	232.72	4.06827E-02	42.44		
	11	334.42	3.82485E-02	35.34	Sum	
	13	386.87	2.45163E-01	7.50	Sum	
	14	417.85	5.20000E-02	22.31	Sum	
	15	436.84	5.82778E-02	16.92	Sum	
	16	589.29	5.95238E-03	56.77		

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE MDA REPORT

Nuclide Library Used : \\OR-GAMMA1\ApexRoot\Countroom\Library\WSRC.NLB

Nuclide Name	Energy (keV)	Yield(%)	Line MDA (pCi/units)	Nuclide MDA (pCi/units)	Activity (pCi/units)	Dec. Level (pCi/units)
CA-41	3.00	77.00	1.38E+01	1.38E+01	0.00E+00	0.00E+00
	3.31	12.30	6.90E+01		0.00E+00	0.00E+00
FE-55	5.89	24.50	1.10E+01	1.10E+01	0.00E+00	0.00E+00
CO-57	122.06	85.51	1.21E+01	1.21E+01	-6.02E+00	5.67E+00
	136.48	10.60	1.19E+02		4.51E+00	5.64E+01
NI-59	6.92	29.80	4.43E+01	4.43E+01	-3.44E+01	1.87E+01
MO-93	16.59	52.90	2.91E+01	2.91E+01	-2.77E+01	1.39E+01
	18.60	10.00	1.55E+02		5.16E+01	7.43E+01

Analysis Report for 2108094-04

H-34

	Nuclide Name	Energy (keV)		Yield(%)	Line MDA (pCi/units)	Nuclide MDA (pCi/units)	Activity (pCi/units)	Dec. Level (pCi/units)
	NB-93M	16.57		9.43	1.63E+02	1.63E+02	-1.56E+02	7.80E+01
	CD-109	88.03		3.72	2.15E+02	2.15E+02	-6.26E+01	1.01E+02
	SN-113	255.12		1.93	7.72E+02	8.23E+01	-6.68E+01	3.51E+02
		391.69		61.90	8.23E+01		-2.68E+00	3.90E+01
	SN-119M	23.87		16.10	7.88E+01	5.21E+01	6.37E+01	3.77E+01
		25.10		22.70	5.21E+01		-3.31E+00	2.49E+01
+	I-129	29.78	*	57.00	2.97E+01	2.97E+01	5.37E+02	1.44E+01
		33.60	*	13.20	1.22E+02		5.68E+02	5.94E+01
		39.58		7.52	1.51E+02		-3.42E+00	7.26E+01
+	BA-133	81.00	*	34.06	4.66E+01	3.70E+01	3.80E+02	2.26E+01
		302.84	*	18.33	1.46E+02		3.96E+02	6.80E+01
		356.01	*	62.05	3.70E+01		4.69E+02	1.67E+01
	CE-139	165.85		80.35	1.70E+01	1.70E+01	-2.20E+00	8.02E+00
	CE-144	133.54		10.80	1.16E+02	1.16E+02	6.78E+00	5.48E+01
+	HG-203	279.19	*	77.30	3.21E+01	3.21E+01	3.96E+01	1.51E+01
	PB-210	46.50		4.25	1.68E+02	1.68E+02	-4.62E+00	7.90E+01
	TH-231	25.64		14.70	7.95E+01	7.95E+01	-5.05E+00	3.80E+01
		84.21		6.40	3.13E+02		9.82E+02	1.52E+02
	PA-234M	9.89		89.00	2.07E+01	2.07E+01	5.13E+00	9.68E+00
		21.72		64.90	2.12E+01		1.58E+01	1.01E+01
		37.93		23.75	7.33E+01		8.82E+01	3.57E+01
+	TH-234	63.29	*	3.80	3.61E+02	3.61E+02	1.13E+03	1.74E+02
	NP-237	29.37		14.00	2.55E+02	7.73E+01	1.91E+03	1.26E+02
		86.50		12.60	7.73E+01		-5.37E+02	3.67E+01
	U-237	97.08		16.30	4.94E+01	3.32E+01	-2.92E+01	2.31E+01
		101.07		26.30	3.32E+01		1.30E+01	1.56E+01
		114.00		12.30	1.46E+02		3.57E+02	7.07E+01
		208.01		22.00	7.49E+01		1.01E+01	3.50E+01
	AM-241	59.54		35.90	3.16E+01	3.16E+01	1.68E+01	1.52E+01
	AM-243	74.67		66.00	1.18E+01	1.18E+01	1.94E+00	5.54E+00

\+ = Nuclide identified during the nuclide identification
* = Energy line found in the spectrum
\> = MDA value not calculated
@ = Half-life too short to be able to perform the decay correction

KP 9/7/21

Apex-Gamma

Analysis Report for 2108094-05
H-32A

GAMMA SPECTRUM ANALYSIS

Sample Identification	: 2108094-05
Sample Description	: H-32A
Sample Type	: RA RECOVERY
Sample Size	: 1.000E+00 units
Facility	: Countroom
Sample Taken On	: 9/7/2021 8:24:35AM
Acquisition Started	: 9/7/2021 10:20:20AM
Procedure	: BAFIL
Operator	: Administrator
Detector Name	: GE1
Geometry	: BAFIL
Live Time	: 900.0 seconds
Real Time	: 900.2 seconds
Dead Time	: 0.02 %
Peak Locate Threshold	: 2.50
Peak Locate Range (in channels)	: 1 - 4096
Peak Area Range (in channels)	: 32 - 4096
Identification Energy Tolerance	: 2.500 keV
Energy Calibration Used Done On	: 10/12/2019
Efficiency Calibration Used Done On	: 10/12/2019
Efficiency Calibration Description	:
Sample Number	: 114541

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 9/7/2021 10:35:24AM

Peak Analysis From Channel : 1
Peak Analysis To Channel : 4096

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)

Analysis Report for 2108094-05

H-32A

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
	1	52.01	49 -	56	52.48	4.99E+01	35.83	1.82E+02	3.08
M	2	61.53	57 -	69	61.99	2.25E+02	48.66	2.17E+02	2.64
m	3	65.65	57 -	69	66.11	1.22E+02	46.49	1.77E+02	2.49
	4	80.93	75 -	87	81.37	8.01E+02	76.45	3.07E+02	2.26
	5	91.50	89 -	96	91.94	6.14E+01	35.89	1.77E+02	3.62
	6	111.60	107 -	117	112.03	1.67E+02	56.47	3.38E+02	1.95
	7	173.47	170 -	177	173.85	2.48E+01	27.35	1.08E+02	1.44
	8	184.13	180 -	188	184.49	4.68E+01	33.53	1.44E+02	5.38
M	9	276.10	272 -	290	276.39	4.54E+01	23.52	4.86E+01	3.20
m	10	280.71	272 -	290	281.00	1.17E+01	16.07	2.74E+01	2.19
m	11	285.13	272 -	290	285.41	1.19E+01	19.72	3.42E+01	3.21
M	12	302.80	297 -	311	303.08	1.25E+02	30.69	8.13E+01	2.42
m	13	307.95	297 -	311	308.22	2.19E+01	22.93	7.77E+01	2.43
	14	334.14	327 -	341	334.39	5.64E+01	38.79	1.33E+02	3.03
	15	356.01	349 -	362	356.24	5.25E+02	54.01	8.96E+01	2.29
M	16	383.90	381 -	396	384.11	1.21E+02	24.46	3.62E+01	2.50
m	17	386.81	381 -	396	387.02	2.00E+02	38.50	3.60E+01	2.38
m	18	391.00	381 -	396	391.21	7.01E+01	38.19	3.15E+01	3.63
M	19	414.94	411 -	424	415.13	3.92E+01	16.55	1.87E+01	2.50
m	20	418.82	411 -	424	419.00	3.33E+01	17.71	2.90E+01	2.27
	21	437.50	433 -	442	437.67	6.18E+01	25.69	5.65E+01	1.74
	22	636.98	633 -	639	637.00	5.00E+00	4.47	0.00E+00	2.98
	23	841.24	837 -	843	841.11	5.57E+00	6.34	2.86E+00	2.68

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

BACKGROUND SUBTRACT REPORT

Peak Analysis Performed on : 9/7/2021 10:35:24AM

Env. Background File : \\OR-GAMMA1\ApexRoot\Countroom\Data\0000114498.CNF

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
	1	52.01	4.99E+01	35.83			4.99E+01	3.58E+01
M	2	61.53	2.25E+02	48.66	2.45E+01	2.35E+00	2.00E+02	4.87E+01
m	3	65.65	1.22E+02	46.49			1.22E+02	4.65E+01
	4	80.93	8.01E+02	76.45			8.01E+02	7.64E+01
	5	91.50	6.14E+01	35.89	3.29E+01	1.58E+00	2.85E+01	3.59E+01
	6	111.60	1.67E+02	56.47	1.10E+00	1.84E+00	1.66E+02	5.65E+01

Analysis Report for 2108094-05

H-32A

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
	7	173.47	2.48E+01	27.35			2.48E+01	2.73E+01
	8	184.13	4.68E+01	33.53	1.30E+01	1.90E+00	3.38E+01	3.36E+01
M	9	276.10	4.54E+01	23.52			4.54E+01	2.35E+01
m	10	280.71	1.17E+01	16.07			1.17E+01	1.61E+01
m	11	285.13	1.19E+01	19.72			1.19E+01	1.97E+01
M	12	302.80	1.25E+02	30.69			1.25E+02	3.07E+01
m	13	307.95	2.19E+01	22.93			2.19E+01	2.29E+01
	14	334.14	5.64E+01	38.79			5.64E+01	3.88E+01
	15	356.01	5.25E+02	54.01			5.25E+02	5.40E+01
M	16	383.90	1.21E+02	24.46			1.21E+02	2.45E+01
m	17	386.81	2.00E+02	38.50			2.00E+02	3.85E+01
m	18	391.00	7.01E+01	38.19			7.01E+01	3.82E+01
M	19	414.94	3.92E+01	16.55			3.92E+01	1.65E+01
m	20	418.82	3.33E+01	17.71			3.33E+01	1.77E+01
	21	437.50	6.18E+01	25.69			6.18E+01	2.57E+01
	22	636.98	5.00E+00	4.47			5.00E+00	4.47E+00
	23	841.24	5.57E+00	6.34			5.57E+00	6.34E+00

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : \\OR-GAMMA1\ApexRoot\Countroom\Library\WSRC.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/units)	Activity Uncertainty
SN-113	0.94	255.12		1.93		
		391.69	*	61.90	5.43E+01	3.02E+01
BA-133	1.00	81.00	*	34.06	4.11E+02	5.68E+01
		302.84	*	18.33	3.52E+02	1.31E+02
		356.01	*	62.05	4.22E+02	6.47E+01
HG-203	0.94	279.19	*	77.30	7.89E+00	1.10E+01
TH-234	0.92	63.29	*	3.80	5.40E+02	1.35E+02
AM-241	0.90	59.54	*	35.90	5.72E+01	1.43E+01

Analysis Report for 2108094-05
H-32A

* = Energy line found in the spectrum.
\- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 2.500 keV
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma

INTERFERENCE CORRECTED REPORT

	Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/units)	Wt mean Activity Uncertainty	Comments
	SN-113	0.942	5.43E+01	3.02E+01	
	BA-133	1.000	4.10E+02	4.06E+01	
	HG-203	0.943	7.89E+00	1.10E+01	
?	TH-234	0.924	5.40E+02	1.35E+02	
?	AM-241	0.903	5.72E+01	1.43E+01	

? = nuclide is part of an undetermined solution
X = nuclide rejected by the interference analysis
@ = nuclide contains energy lines not used in Weighted Mean Activity

Errors quoted at 2.000sigma

Analysis Report for 2108094-05
H-32A

UNIDENTIFIED PEAKS

Peak Locate Performed on : 9/7/2021 10:35:24AM
Peak Locate From Channel : 1
Peak Locate To Channel : 4096

	Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
	1	52.01	5.54374E-02	35.91		
m	3	65.65	1.35182E-01	19.11		
	5	91.50	3.16712E-02	63.01		
	6	111.60	1.84368E-01	17.03	Tol.	U-237
	7	173.47	2.75949E-02	55.06		
	8	184.13	3.76050E-02	49.61		
M	9	276.10	5.04651E-02	25.89		
m	11	285.13	1.32652E-02	82.60		
m	13	307.95	2.43085E-02	52.40		
	14	334.14	6.26603E-02	34.39		
M	16	383.90	1.34417E-01	10.11	Sum	
m	17	386.81	2.21959E-01	9.64		
M	19	414.94	4.35568E-02	21.10		
m	20	418.82	3.70048E-02	26.59	Sum	
	21	437.50	6.86296E-02	20.80	Sum	
	22	636.98	5.55556E-03	44.72	Sum	
	23	841.24	6.19048E-03	56.94		

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE MDA REPORT

Nuclide Library Used : \\OR-GAMMA1\ApexRoot\Countroom\Library\WSRC.NLB

Analysis Report for 2108094-05

H-32A

	Nuclide Name	Energy (keV)		Yield(%)	Line MDA (pCi/units)	Nuclide MDA (pCi/units)	Activity (pCi/units)	Dec. Level (pCi/units)
	CA-41	3.00		77.00	8.60E-07	8.60E-07	0.00E+00	0.00E+00
		3.31		12.30	1.01E-05		0.00E+00	0.00E+00
	FE-55	5.89		24.50	1.49E-04	1.49E-04	0.00E+00	0.00E+00
	CO-57	122.06		85.51	1.69E+01	1.69E+01	-7.59E+00	7.97E+00
		136.48		10.60	1.28E+02		-1.38E+02	5.93E+01
	NI-59	6.92		29.80	2.91E-04	2.91E-04	0.00E+00	0.00E+00
	MO-93	16.59		52.90	9.33E-03	9.33E-03	0.00E+00	0.00E+00
		18.60		10.00	7.73E-02		0.00E+00	0.00E+00
	NB-93M	16.57		9.43	5.21E-02	5.21E-02	0.00E+00	0.00E+00
	CD-109	88.03		3.72	2.68E+02	2.68E+02	-1.01E+03	1.27E+02
+	SN-113	255.12		1.93	8.99E+02	3.59E+01	2.55E+02	4.13E+02
		391.69	*	61.90	3.59E+01		5.43E+01	1.69E+01
	SN-119M	23.87		16.10	1.20E-01	1.01E-01	0.00E+00	0.00E+00
		25.10		22.70	1.01E-01		0.00E+00	0.00E+00
	I-129	29.78		57.00	1.62E+00	1.62E+00	-5.02E-02	7.73E-01
		33.60		13.20	2.10E+01		9.61E+01	1.03E+01
		39.58		7.52	3.34E+01		-4.37E+01	1.61E+01
+	BA-133	81.00	*	34.06	4.48E+01	3.99E+01	4.11E+02	2.17E+01
		302.84	*	18.33	1.85E+02		3.52E+02	8.86E+01
		356.01	*	62.05	3.99E+01		4.22E+02	1.89E+01
	CE-139	165.85		80.35	2.21E+01	2.21E+01	-7.94E+00	1.03E+01
	CE-144	133.54		10.80	1.33E+02	1.33E+02	2.45E+01	6.23E+01
+	HG-203	279.19	*	77.30	3.44E+01	3.44E+01	7.89E+00	1.63E+01
	PB-210	46.50		4.25	5.41E+01	5.41E+01	1.76E+01	2.54E+01
	TH-231	25.64		14.70	1.68E-01	1.68E-01	0.00E+00	0.00E+00
		84.21		6.40	2.75E+02		2.24E+02	1.34E+02
	PA-234M	9.89		89.00	5.79E-04	5.79E-04	0.00E+00	0.00E+00
		21.72		64.90	2.12E-02		0.00E+00	0.00E+00
		37.93		23.75	1.49E+01		4.50E+01	7.26E+00
+	TH-234	63.29	*	3.80	2.41E+02	2.41E+02	5.40E+02	1.17E+02
	NP-237	29.37		14.00	6.30E+00	6.30E+00	-1.96E-01	3.01E+00
		86.50		12.60	8.12E+01		-5.88E+02	3.85E+01
	U-237	97.08		16.30	6.82E+01	4.51E+01	-5.19E+00	3.21E+01
		101.07		26.30	4.51E+01		9.89E+00	2.12E+01
		114.00		12.30	1.93E+02		3.90E+02	9.32E+01
		208.01		22.00	9.01E+01		1.73E+01	4.20E+01
+	AM-241	59.54	*	35.90	2.55E+01	2.55E+01	5.72E+01	1.24E+01
	AM-243	74.67		66.00	1.27E+01	1.27E+01	1.83E+00	6.03E+00

\+ = Nuclide identified during the nuclide identification
* = Energy line found in the spectrum
\> = MDA value not calculated
@ = Half-life too short to be able to perform the decay correction

KP 9/7/21

Apex-Gamma

Analysis Report for 2108094-06
H-32B

GAMMA SPECTRUM ANALYSIS

Sample Identification	: 2108094-06
Sample Description	: H-32B
Sample Type	: RA RECOVERY
Sample Size	: 1.000E+00 units
Facility	: Countroom
Sample Taken On	: 9/7/2021 8:24:46AM
Acquisition Started	: 9/7/2021 10:20:27AM
Procedure	: BAFIL
Operator	: Administrator
Detector Name	: GE2
Geometry	: BAFIL
Live Time	: 900.0 seconds
Real Time	: 900.2 seconds
Dead Time	: 0.02 %
Peak Locate Threshold	: 2.50
Peak Locate Range (in channels)	: 1 - 4096
Peak Area Range (in channels)	: 28 - 4096
Identification Energy Tolerance	: 2.500 keV
Energy Calibration Used Done On	: 6/6/2020
Efficiency Calibration Used Done On	: 9/14/2019
Efficiency Calibration Description	:
Sample Number	: 114542

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 9/7/2021 10:35:37AM

Peak Analysis From Channel : 1
Peak Analysis To Channel : 4096

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)

Analysis Report for 2108094-06

H-32B

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
	1	36.74	37 -	41	37.43	3.94E+02	68.72	2.97E+02	1.94
	2	54.24	51 -	58	54.91	5.48E+01	32.92	1.44E+02	1.47
M	3	63.19	59 -	72	63.85	2.01E+02	37.51	1.24E+02	1.55
m	4	67.29	59 -	72	67.95	9.88E+01	31.22	1.44E+02	1.56
	5	82.27	80 -	86	82.91	7.79E+02	65.60	2.20E+02	1.23
M	6	113.25	109 -	122	113.86	1.51E+02	32.19	8.56E+01	1.52
m	7	117.13	109 -	122	117.73	4.24E+01	25.54	7.93E+01	1.53
	8	222.95	219 -	226	223.45	3.38E+01	21.07	5.03E+01	1.28
	9	277.41	275 -	281	277.85	6.24E+01	22.97	5.32E+01	1.23
	10	282.88	281 -	285	283.32	1.39E+01	10.84	1.23E+01	1.20
M	11	303.80	299 -	311	304.21	1.45E+02	25.81	2.01E+01	1.62
m	12	308.27	299 -	311	308.68	1.79E+01	13.64	1.58E+01	1.82
M	13	331.56	331 -	342	331.95	7.93E+00	1.22	2.00E+00	1.68
m	14	334.77	331 -	342	335.15	5.86E+01	18.48	1.44E+01	1.68
m	15	338.62	331 -	342	339.00	1.81E+01	13.32	1.86E+01	1.54
	16	356.82	352 -	361	357.18	4.84E+02	47.81	4.97E+01	1.74
	17	377.17	373 -	382	377.51	1.39E+01	16.19	2.82E+01	5.57
M	18	384.52	382 -	390	384.86	9.61E+01	24.72	2.96E+01	1.87
m	19	387.49	382 -	390	387.82	1.66E+02	32.18	6.20E+01	1.72
	20	392.13	391 -	395	392.46	3.84E+01	15.76	1.93E+01	1.92
M	21	415.22	412 -	427	415.53	1.35E+01	14.46	3.61E+01	2.14
m	22	420.70	412 -	427	421.00	1.63E+01	13.43	1.56E+01	1.61
	23	437.61	433 -	442	437.90	6.80E+01	21.95	3.01E+01	1.44
	24	467.82	464 -	472	468.07	1.20E+01	12.85	1.80E+01	3.85
	25	570.70	568 -	574	570.86	7.00E+00	5.29	0.00E+00	1.16
	26	897.36	894 -	900	897.22	9.00E+00	6.00	0.00E+00	3.24

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

BACKGROUND SUBTRACT REPORT

Peak Analysis Performed on : 9/7/2021 10:35:37AM

Env. Background File : \\OR-GAMMA1\ApexRoot\Countroom\Data\0000114499.CNF

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
	1	36.74	3.94E+02	68.72			3.94E+02	6.87E+01
	2	54.24	5.48E+01	32.92			5.48E+01	3.29E+01
M	3	63.19	2.01E+02	37.51	5.84E+00	2.00E+00	1.95E+02	3.76E+01

Analysis Report for 2108094-06

H-32B

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
m	4	67.29	9.88E+01	31.22			9.88E+01	3.12E+01
	5	82.27	7.79E+02	65.60			7.79E+02	6.56E+01
M	6	113.25	1.51E+02	32.19			1.51E+02	3.22E+01
m	7	117.13	4.24E+01	25.54			4.24E+01	2.55E+01
	8	222.95	3.38E+01	21.07			3.38E+01	2.11E+01
	9	277.41	6.24E+01	22.97			6.24E+01	2.30E+01
	10	282.88	1.39E+01	10.84			1.39E+01	1.08E+01
M	11	303.80	1.45E+02	25.81			1.45E+02	2.58E+01
m	12	308.27	1.79E+01	13.64			1.79E+01	1.36E+01
M	13	331.56	7.93E+00	1.22			7.93E+00	1.22E+00
m	14	334.77	5.86E+01	18.48			5.86E+01	1.85E+01
m	15	338.62	1.81E+01	13.32			1.81E+01	1.33E+01
	16	356.82	4.84E+02	47.81			4.84E+02	4.78E+01
	17	377.17	1.39E+01	16.19			1.39E+01	1.62E+01
M	18	384.52	9.61E+01	24.72			9.61E+01	2.47E+01
m	19	387.49	1.66E+02	32.18			1.66E+02	3.22E+01
	20	392.13	3.84E+01	15.76			3.84E+01	1.58E+01
M	21	415.22	1.35E+01	14.46			1.35E+01	1.45E+01
m	22	420.70	1.63E+01	13.43			1.63E+01	1.34E+01
	23	437.61	6.80E+01	21.95			6.80E+01	2.20E+01
	24	467.82	1.20E+01	12.85			1.20E+01	1.28E+01
	25	570.70	7.00E+00	5.29			7.00E+00	5.29E+00
	26	897.36	9.00E+00	6.00			9.00E+00	6.00E+00

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : \\OR-GAMMA1\ApexRoot\Countroom\Library\WSRC.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/units)	Activity Uncertainty
SN-113	0.96	255.12		1.93		
		391.69	*	61.90	2.51E+01	1.06E+01
BA-133	0.97	81.00	*	34.06	4.97E+02	6.75E+01
		302.84	*	18.33	5.14E+02	1.79E+02
		356.01	*	62.05	3.86E+02	5.73E+01
HG-203	0.92	279.19	*	77.30	5.88E+01	2.95E+01

Analysis Report for 2108094-06

H-32B

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/units)	Activity Uncertainty
PA-234M	0.99	9.89		89.00		
		21.72		64.90		
		37.93	*	23.75	9.84E+00	1.72E+00
TH-234	1.00	63.29	*	3.80	4.39E+02	8.65E+01

* = Energy line found in the spectrum.
\- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 2.500 keV
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma

INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/units)	Wt mean Activity Uncertainty	Comments
SN-113	0.960	2.51E+01	1.06E+01	
BA-133	0.975	4.37E+02	4.24E+01	
HG-203	0.922	5.88E+01	2.95E+01	
PA-234M	0.995	9.84E+00	1.72E+00	
TH-234	1.000	4.39E+02	8.65E+01	

? = nuclide is part of an undetermined solution
X = nuclide rejected by the interference analysis
@ = nuclide contains energy lines not used in Weighted Mean Activity

Errors quoted at 2.000sigma

Analysis Report for 2108094-06
H-32B

UNIDENTIFIED PEAKS

Peak Locate Performed on : 9/7/2021 10:35:37AM
Peak Locate From Channel : 1
Peak Locate To Channel : 4096

	Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
	2	54.24	6.09011E-02	30.03		
m	4	67.29	1.09759E-01	15.80		
M	6	113.25	1.67460E-01	10.68		
m	7	117.13	4.70593E-02	30.16	Sum	
	8	222.95	3.75895E-02	31.14		
	10	282.88	1.53889E-02	39.13		
m	12	308.27	1.99365E-02	38.00		
M	13	331.56	8.80698E-03	7.73		
m	14	334.77	6.50660E-02	15.78		
m	15	338.62	2.00735E-02	36.87	Sum	
	17	377.17	1.54365E-02	58.25		
M	18	384.52	1.06723E-01	12.87	Sum	
m	19	387.49	1.84307E-01	9.70	Sum	
M	21	415.22	1.49685E-02	53.66		
m	22	420.70	1.80764E-02	41.26	Sum	
	23	437.61	7.55154E-02	16.15	Sum	
	24	467.82	1.33333E-02	53.52		
	25	570.70	7.77778E-03	37.80		
	26	897.36	1.00000E-02	33.33		

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE MDA REPORT

Nuclide Library Used : \\OR-GAMMA1\ApexRoot\Countroom\Library\WSRC.NLB

Analysis Report for 2108094-06

H-32B

	Nuclide Name	Energy (keV)		Yield(%)	Line MDA (pCi/units)	Nuclide MDA (pCi/units)	Activity (pCi/units)	Dec. Level (pCi/units)
	CA-41	3.00		77.00	1.84E-13	1.84E-13	0.00E+00	0.00E+00
		3.31		12.30	4.70E-12		0.00E+00	0.00E+00
	FE-55	5.89		24.50	4.58E-09	4.58E-09	0.00E+00	0.00E+00
	CO-57	122.06		85.51	2.13E+01	2.13E+01	-5.97E-02	9.78E+00
		136.48		10.60	2.04E+02		-1.01E+02	9.36E+01
	NI-59	6.92		29.80	2.55E-08	2.55E-08	0.00E+00	0.00E+00
	MO-93	16.59		52.90	9.74E-05	9.74E-05	0.00E+00	0.00E+00
		18.60		10.00	1.34E-03		0.00E+00	0.00E+00
	NB-93M	16.57		9.43	5.41E-04	5.41E-04	0.00E+00	0.00E+00
	CD-109	88.03		3.72	2.72E+02	2.72E+02	-2.30E+01	1.26E+02
+	SN-113	255.12		1.93	8.21E+02	1.22E+01	-5.07E+02	3.55E+02
		391.69	*	61.90	1.22E+01		2.51E+01	5.24E+00
	SN-119M	23.87		16.10	5.80E-03	5.80E-03	0.00E+00	0.00E+00
		25.10		22.70	3.97E-02		-1.12E-01	1.69E-02
	I-129	29.78		57.00	2.99E-01	2.99E-01	-6.45E+00	1.46E-01
		33.60		13.20	5.62E+00		1.79E+01	2.77E+00
		39.58		7.52	8.50E+00		1.91E+00	4.09E+00
+	BA-133	81.00	*	34.06	3.79E+01	2.67E+01	4.97E+02	1.81E+01
		302.84	*	18.33	1.23E+02		5.14E+02	5.66E+01
		356.01	*	62.05	2.67E+01		3.86E+02	1.23E+01
	CE-139	165.85		80.35	3.69E+01	3.69E+01	1.05E+01	1.71E+01
	CE-144	133.54		10.80	1.90E+02	1.90E+02	-4.45E+00	8.69E+01
+	HG-203	279.19	*	77.30	3.27E+01	3.27E+01	5.88E+01	1.51E+01
	PB-210	46.50		4.25	1.89E+01	1.89E+01	-9.08E-01	8.76E+00
	TH-231	25.64		14.70	7.13E-02	7.13E-02	-2.00E-01	3.03E-02
		84.21		6.40	4.69E+02		2.32E+03	2.30E+02
+	PA-234M	9.89		89.00	4.30E-07	4.30E-07	0.00E+00	0.00E+00
		21.72		64.90	7.08E-04		0.00E+00	0.00E+00
		37.93	*	23.75	2.37E+00		9.84E+00	1.15E+00
+	TH-234	63.29	*	3.80	2.01E+02	2.01E+02	4.39E+02	9.74E+01
	NP-237	29.37		14.00	1.11E+00	1.11E+00	-2.40E+01	5.41E-01
		86.50		12.60	8.12E+01		-2.34E+01	3.79E+01
	U-237	97.08		16.30	8.02E+01	5.39E+01	-2.82E+00	3.72E+01
		101.07		26.30	5.39E+01		9.96E+00	2.50E+01
		114.00		12.30	2.87E+02		2.06E+02	1.38E+02
		208.01		22.00	1.52E+02		9.88E+01	7.08E+01
	AM-241	59.54		35.90	7.67E+00	7.67E+00	-2.36E+01	3.58E+00
	AM-243	74.67		66.00	1.04E+01	1.04E+01	2.24E-01	4.87E+00

\+ = Nuclide identified during the nuclide identification
* = Energy line found in the spectrum
\> = MDA value not calculated
@ = Half-life too short to be able to perform the decay correction

KP 9/7/21

Apex-Gamma

Analysis Report for 2108094-07
H-33

GAMMA SPECTRUM ANALYSIS

Sample Identification	: 2108094-07
Sample Description	: H-33
Sample Type	: RA RECOVERY
Sample Size	: 1.000E+00 units
Facility	: Countroom
Sample Taken On	: 9/7/2021 8:24:53AM
Acquisition Started	: 9/7/2021 10:20:34AM
Procedure	: BAFIL
Operator	: Administrator
Detector Name	: GE3
Geometry	: BAFIL
Live Time	: 900.0 seconds
Real Time	: 908.1 seconds
Dead Time	: 0.89 %
Peak Locate Threshold	: 2.50
Peak Locate Range (in channels)	: 1 - 4096
Peak Area Range (in channels)	: 8 - 4096
Identification Energy Tolerance	: 2.500 keV
Energy Calibration Used Done On	: 6/6/2020
Efficiency Calibration Used Done On	: 10/19/2019
Efficiency Calibration Description	:
Sample Number	: 114543

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 9/7/2021 10:35:59AM

Peak Analysis From Channel : 1
Peak Analysis To Channel : 4096

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)

Analysis Report for 2108094-07

H-33

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
M	1	22.06	18 -	41	22.49	1.34E+02	48.23	2.68E+02	4.59
m	2	30.78	18 -	41	31.21	1.78E+03	102.07	2.52E+02	3.34
m	3	34.39	18 -	41	34.81	5.57E+02	110.76	3.15E+02	4.25
	4	52.00	49 -	56	52.39	3.88E+01	44.00	2.98E+02	3.23
M	5	62.23	58 -	72	62.61	2.58E+02	60.84	3.80E+02	3.60
m	6	65.86	58 -	72	66.24	9.31E+01	69.35	4.85E+02	3.61
	7	73.02	72 -	75	73.39	2.90E+01	23.83	1.06E+02	1.88
	8	81.25	76 -	90	81.62	7.99E+02	83.72	4.16E+02	3.21
M	9	112.14	106 -	121	112.47	2.24E+02	55.95	3.18E+02	3.37
m	10	116.28	106 -	121	116.60	3.64E+01	41.90	1.96E+02	2.31
	11	184.57	182 -	188	184.81	3.35E+01	26.67	1.05E+02	3.78
	12	191.85	189 -	195	192.08	3.77E+01	24.62	8.07E+01	3.10
	13	278.31	272 -	285	278.43	3.26E+01	34.41	1.35E+02	8.98
	14	304.19	298 -	310	304.28	1.49E+02	38.31	9.89E+01	4.05
	15	334.49	327 -	341	334.55	9.10E+01	26.63	6.00E+01	6.93
	16	356.54	351 -	362	356.57	3.95E+02	45.87	6.46E+01	2.95
	17	386.68	380 -	394	386.68	2.67E+02	48.46	1.33E+02	3.74
	18	420.92	419 -	425	420.87	1.43E+01	16.46	3.34E+01	1.37
M	19	435.05	432 -	451	434.99	1.59E+01	11.34	5.00E+00	3.12
m	20	438.02	432 -	451	437.96	7.03E+01	20.51	9.00E+00	2.84
m	21	449.10	432 -	451	449.02	9.79E+00	8.03	7.00E+00	3.13
	22	470.80	464 -	477	470.70	2.58E+01	15.03	1.25E+01	4.15
	23	653.59	650 -	655	653.26	5.64E+00	6.08	2.71E+00	2.07
	24	701.87	698 -	703	701.48	4.75E+00	5.74	2.50E+00	1.79
	25	1191.39	1186 -	1192	1190.40	5.00E+00	4.47	0.00E+00	1.24

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

BACKGROUND SUBTRACT REPORT

Peak Analysis Performed on : 9/7/2021 10:35:59AM

Env. Background File : \\OR-GAMMA1\ApexRoot\Countroom\Data\0000114496.CNF

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
M	1	22.06	1.34E+02	48.23	4.27E+00	2.93E+00	1.30E+02	4.83E+01
m	2	30.78	1.78E+03	102.07			1.78E+03	1.02E+02
m	3	34.39	5.57E+02	110.76			5.57E+02	1.11E+02
	4	52.00	3.88E+01	44.00			3.88E+01	4.40E+01

Analysis Report for 2108094-07

H-33

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
M	5	62.23	2.58E+02	60.84	1.24E+01	2.62E+00	2.45E+02	6.09E+01
m	6	65.86	9.31E+01	69.35	1.24E+01	2.62E+00	8.07E+01	6.94E+01
	7	73.02	2.90E+01	23.83			2.90E+01	2.38E+01
	8	81.25	7.99E+02	83.72			7.99E+02	8.37E+01
M	9	112.14	2.24E+02	55.95			2.24E+02	5.59E+01
m	10	116.28	3.64E+01	41.90			3.64E+01	4.19E+01
	11	184.57	3.35E+01	26.67	6.99E+00	1.68E+00	2.65E+01	2.67E+01
	12	191.85	3.77E+01	24.62			3.77E+01	2.46E+01
	13	278.31	3.26E+01	34.41			3.26E+01	3.44E+01
	14	304.19	1.49E+02	38.31			1.49E+02	3.83E+01
	15	334.49	9.10E+01	26.63			9.10E+01	2.66E+01
	16	356.54	3.95E+02	45.87			3.95E+02	4.59E+01
	17	386.68	2.67E+02	48.46			2.67E+02	4.85E+01
	18	420.92	1.43E+01	16.46			1.43E+01	1.65E+01
M	19	435.05	1.59E+01	11.34			1.59E+01	1.13E+01
m	20	438.02	7.03E+01	20.51			7.03E+01	2.05E+01
m	21	449.10	9.79E+00	8.03			9.79E+00	8.03E+00
	22	470.80	2.58E+01	15.03			2.58E+01	1.50E+01
	23	653.59	5.64E+00	6.08			5.64E+00	6.08E+00
	24	701.87	4.75E+00	5.74			4.75E+00	5.74E+00
	25	1191.39	5.00E+00	4.47			5.00E+00	4.47E+00

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : \\OR-GAMMA1\ApexRoot\Countroom\Library\WSRC.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/units)	Activity Uncertainty
I-129	0.88	29.78	*	57.00	2.36E+01	1.36E+00
		33.60	*	13.20	4.99E+01	9.93E+00
		39.58		7.52		
BA-133	0.98	81.00	*	34.06	3.96E+02	5.69E+01
		302.84	*	18.33	4.89E+02	1.88E+02
		356.01	*	62.05	3.56E+02	6.05E+01
HG-203	0.98	279.19	*	77.30	2.60E+01	2.86E+01
TH-234	0.97	63.29	*	3.80	5.58E+02	1.41E+02

Analysis Report for 2108094-07

H-33

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/units)	Activity Uncertainty
AM-243	0.93	74.67	*	66.00	5.76E+00	4.76E+00

* = Energy line found in the spectrum.
\- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 2.500 keV
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma

INTERFERENCE CORRECTED REPORT

	Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/units)	Wt mean Activity Uncertainty	Comments
	I-129	0.883	2.41E+01	1.34E+00	
	BA-133	0.988	3.83E+02	4.05E+01	
	HG-203	0.980	2.60E+01	2.86E+01	
	TH-234	0.972	5.58E+02	1.41E+02	
X	NP-237	0.752			
	AM-243	0.932	5.76E+00	4.76E+00	

? = nuclide is part of an undetermined solution
X = nuclide rejected by the interference analysis
@ = nuclide contains energy lines not used in Weighted Mean Activity

Errors quoted at 2.000sigma

Analysis Report for 2108094-07
H-33

UNIDENTIFIED PEAKS

Peak Locate Performed on : 9/7/2021 10:35:59AM
Peak Locate From Channel : 1
Peak Locate To Channel : 4096

	Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
M	1	22.06	1.44383E-01	18.59	Tol.	SN-119M PA-234M
	4	52.00	4.31442E-02	56.66		
m	6	65.86	8.96499E-02	43.01	Sum	
M	9	112.14	2.48472E-01	12.51	Sum	
m	10	116.28	4.04914E-02	57.49	Sum	
	11	184.57	2.94504E-02	50.42		
	12	191.85	4.18376E-02	32.69		
	15	334.49	1.01133E-01	14.63	Sum	
	17	386.68	2.97033E-01	9.06	Sum	
	18	420.92	1.58961E-02	57.53	Sum	
M	19	435.05	1.76922E-02	35.60		
m	20	438.02	7.80784E-02	14.59	Sum	
m	21	449.10	1.08724E-02	41.04		
	22	470.80	2.86111E-02	29.19		
	23	653.59	6.26984E-03	53.90		
	24	701.87	5.27778E-03	60.47		
	25	1191.39	5.55556E-03	44.72		

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE MDA REPORT

Nuclide Library Used : \\OR-GAMMA1\ApexRoot\Countroom\Library\WSRC.NLB

Analysis Report for 2108094-07

H-33

	Nuclide Name	Energy (keV)		Yield(%)	Line MDA (pCi/units)	Nuclide MDA (pCi/units)	Activity (pCi/units)	Dec. Level (pCi/units)
	CA-41	3.00		77.00	8.48E-09	8.48E-09	0.00E+00	0.00E+00
		3.31		12.30	1.24E-07		0.00E+00	0.00E+00
	FE-55	5.89		24.50	3.35E-05	3.35E-05	-1.11E-04	1.37E-05
	CO-57	122.06		85.51	1.97E+01	1.97E+01	2.21E+00	9.29E+00
		136.48		10.60	1.76E+02		2.59E+01	8.26E+01
	NI-59	6.92		29.80	2.31E-04	2.31E-04	1.49E-04	1.08E-04
	MO-93	16.59		52.90	4.29E-02	4.29E-02	-2.81E-03	2.04E-02
		18.60		10.00	4.70E-01		-7.50E-04	2.25E-01
	NB-93M	16.57		9.43	2.39E-01	2.39E-01	-1.57E-02	1.14E-01
	CD-109	88.03		3.72	3.06E+02	3.06E+02	-1.13E+03	1.46E+02
	SN-113	255.12		1.93	1.03E+03	3.56E+01	-3.03E+02	4.73E+02
		391.69		61.90	3.56E+01		-3.03E+01	1.67E+01
	SN-119M	23.87		16.10	1.08E+00	1.08E+00	-4.50E+00	5.18E-01
		25.10		22.70	1.19E+00		-1.46E+01	5.77E-01
+	I-129	29.78	*	57.00	1.95E+00	1.95E+00	2.36E+01	9.57E-01
		33.60	*	13.20	1.33E+01		4.99E+01	6.52E+00
		39.58		7.52	1.91E+01		-1.11E+00	9.19E+00
+	BA-133	81.00	*	34.06	5.18E+01	3.64E+01	3.96E+02	2.52E+01
		302.84	*	18.33	1.69E+02		4.89E+02	8.01E+01
		356.01	*	62.05	3.64E+01		3.56E+02	1.70E+01
	CE-139	165.85		80.35	2.68E+01	2.68E+01	-4.09E+00	1.25E+01
	CE-144	133.54		10.80	1.64E+02	1.64E+02	5.17E+01	7.69E+01
+	HG-203	279.19	*	77.30	5.41E+01	5.41E+01	2.60E+01	2.60E+01
	PB-210	46.50		4.25	4.68E+01	4.68E+01	5.57E+00	2.23E+01
	TH-231	25.64		14.70	2.03E+00	2.03E+00	-2.48E+01	9.82E-01
		84.21		6.40	3.07E+02		5.03E+02	1.50E+02
	PA-234M	9.89		89.00	1.31E-03	1.31E-03	1.96E-03	6.23E-04
		21.72		64.90	1.69E-01		1.64E-01	8.12E-02
		37.93		23.75	7.49E+00		1.98E+00	3.65E+00
+	TH-234	63.29	*	3.80	2.87E+02	2.87E+02	5.58E+02	1.41E+02
	NP-237	29.37	*	14.00	7.94E+00	7.94E+00	9.60E+01	3.90E+00
		86.50		12.60	1.02E+02		-4.41E+02	4.87E+01
	U-237	97.08		16.30	7.97E+01	5.56E+01	-4.65E+01	3.78E+01
		101.07		26.30	5.56E+01		9.49E+00	2.64E+01
		114.00		12.30	2.38E+02		5.75E+02	1.15E+02
		208.01		22.00	1.16E+02		4.50E+01	5.44E+01
	AM-241	59.54		35.90	1.88E+01	1.88E+01	2.08E+01	9.13E+00
+	AM-243	74.67	*	66.00	7.50E+00	7.50E+00	5.76E+00	3.48E+00

\+ = Nuclide identified during the nuclide identification
* = Energy line found in the spectrum
\> = MDA value not calculated
@ = Half-life too short to be able to perform the decay correction

SECTION XI

ANALYTICAL DATA (TOTAL DISSOLVED SOLIDS)

TDS / TSS Worksheet

Work Order	Run	Analysis Code	Technician
21-08094	1	TDS	JPACHELLA

TRetec Fraction	ERM Client ID	Aliquot ml	Filter Data: Filter Tare (g)	Filter Data: Filter Final (g)	Filter Data: Filter Net (g)	TDS/TSS (mg/L)	Maximum Aliq (mL)
04	H-34	100.0000	85.9466	86.0448	0.0982	982.0000	101.83
05	H-32A	100.0000	84.1684	84.2491	0.0807	807.0000	123.92
06	H-32B	100.0000	85.4866	85.6249	0.1383	1383.0000	72.31
07	H-33	100.0000	83.7576	83.8706	0.1130	1130.0000	88.50

0154

Technician: JPachella Date: 8/31/21

Eberline Analytical
Oak Ridge Laboratory

Aliquot Worksheet

Work Order	Run	Analysis Code	Rpt Units	Lab Deadline	Technician
21-08094	1	TDS	liters	9/13/2021	JPACHELLA

Lab Fraction	ERM Client ID	Sample Type	Muffle Data Ratio Post/Pre	Dilution Data No of Dils	Dil Factor	Ratio	Aliquot Data Aliquot	Net Equiv	MS Aliquot Data Aliquot	Net Equiv	H-3 Solids Only Water Added (ml)	H3 Dist Aliq
01	LCS	LCS					1.0000E+00	1.0000E+00				
02	BLANK	MBL					1.0000E+00	1.0000E+00				
03	DUP	DUP					1.0000E-01	1.0000E-01				
04	H-34	TRG					1.0000E-01	1.0000E-01				
05	H-32A	TRG					1.0000E-01	1.0000E-01				
06	H-32B	TRG					1.0000E-01	1.0000E-01				
07	H-33	TRG					1.0000E-01	1.0000E-01				

Comments	

0155

Technician: JPachella Date: 8/31/21

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November 25, 2019

Dave Angle
Environmental Resources Management
CityCentre Four
840 W. Sam Houston Pkwy North, Suite 600
Houston, TX 77024
TEL: (281) 242-5700
FAX: (281) 524-4625

RE: Henning 0526033 Order No.: 19101487

Dear Dave Angle:

Element Materials Technology Lafayette received 6 sample(s) on 10/31/2019 for the analyses presented in the following report.

In accordance with your instructions Element Lafayette conducted the analysis shown on the following pages on samples submitted by your company. The results related only to the items tested. Unless otherwise noted, all analyses were conducted using EPA approved methodologies and all test results meet all requirements of TNI. All relevant sampling information is on the attached Chain-of-Custody form.

All soil data, except for 29-B, are on a wet-weight basis unless otherwise indicated in the units field as –dry.

LELAP Certification No.: 01997. TCEQ Certification No.: T104704261. LDHH Certification No.: LA180028. ISDH Certification No.: C-LA-01. NDELCP Certification No.: R-226. A scope of accredited parameters is available upon request. A "#" by the test method or analyte indicates this parameter is outside the scope of accreditation.

Estimated uncertainty is available upon request. This report shall not be reproduced except in full, without the written approval of the laboratory.

If you have any questions regarding these test results, please feel free to call.

Cristina Thibeaux
Customer Service Supervisor
2417 W. Pinhook Road
Lafayette, LA 70508-3344

Element Materials Technology Lafayette
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Case Narrative

WO#: **19101487**
Date: **11/25/2019**

CLIENT: Environmental Resources Management
Project: Henning 0526033

Unless specified by the client, a duplicate or MS/MSD, wherever applicable, is randomly selected and analyzed from each analytical batch provided sample volume is sufficient. The sample chosen for duplicate or MS/MSD may or may not be a sample submitted in this workorder. A method blank and/or a lab control sample (LCS)/lab control sample duplicate (LCSD), wherever applicable, are processed as a quality control check for each analytical batch. When the matrix QC data is not available due to insufficient sample volume or when the results indicate possible matrix effect, the validity of the batch is determined by the method blank and LCS/LCSD.

The results of the laboratory internal quality control data are provided in the QC Summary Report section of the report for your review. Laboratory-related QC exceptions that may impact the validity of data are discussed in the case narrative. Sample-related QC exceptions are flagged either in the results page(s) or in the QC report page(s). End users should consider QC exceptions when evaluating sample data against data quality objectives.

Any other exceptions associated with this report will be footnoted in the results page(s) or the QC summary page(s).

Element Materials Technology Lafayette
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Analytical Report

(consolidated)

WO#: **19101487**

Date Reported: **11/25/2019**

CLIENT: Environmental Resources Management **Collection Date:** 10/29/2019 2:50:00 PM

Project: Henning 0526033

Lab ID: 19101487-001 **Matrix:** SOIL

Client Sample ID H-1 6-8

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXL**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	33.8	0.100		meq/100g	1	11/11/2019
29B SALTS				**LDNR 29-B**		Analyst: **BXL**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	4.26	0.10	*	mmhos/cm	1	11/6/2019 11:36:00 AM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXL**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	13.4	0.10		%	1	11/11/2019
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	10.5	0.10			1	11/12/2019
Soluble Calcium	6.35	0.02		meq/L	1	11/12/2019
Soluble Magnesium	3.08	0.05		meq/L	1	11/12/2019
Soluble Sodium	22.8	0.25		meq/L	1	11/12/2019
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.108	0.108		mg/Kg	1	11/1/2019 1:27:28 PM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	7.06	1.00		mg/Kg	1	11/22/2019 3:42:17 PM
Barium	133	0.502		mg/Kg	1	11/22/2019 3:42:17 PM
Cadmium	< 0.251	0.251		mg/Kg	1	11/22/2019 3:42:17 PM
Chromium	6.33	0.502		mg/Kg	1	11/22/2019 3:42:17 PM
Lead	6.58	0.502		mg/Kg	1	11/22/2019 3:42:17 PM
Selenium	< 2.01	2.01		mg/Kg	1	11/22/2019 3:42:17 PM
Silver	< 0.251	0.251		mg/Kg	1	11/22/2019 3:42:17 PM
Zinc	16.8	0.502		mg/Kg	1	11/22/2019 3:42:17 PM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
M	Matrix Interference	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	RL	Reporting Limit
S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode

Element Materials Technology Lafayette
2417 W. Pinhook Road
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Website: www.element.com

Analytical Report

(consolidated)

WO#: **19101487**

Date Reported: **11/25/2019**

CLIENT: Environmental Resources Management **Collection Date:** 10/29/2019 2:50:00 PM

Project: Henning 0526033

Lab ID: 19101487-001 **Matrix:** SOIL

Client Sample ID H-1 6-8

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	360	49.5		mg/Kg-dry	1	11/13/2019 7:25:35 AM
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXL**
Percent Moisture	17.0	1.00		wt%	1	11/1/2019 11:50:00 AM

Qualifiers:				
	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	M	Matrix Interference	ND	Not Detected at the Reporting Limit
	R	RPD outside accepted recovery limits	RL	Reporting Limit
	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
	U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode

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Analytical Report

(consolidated)

WO#: **19101487**

Date Reported: **11/25/2019**

CLIENT: Environmental Resources Management **Collection Date:** 10/29/2019 3:50:00 PM

Project: Henning 0526033

Lab ID: 19101487-002 **Matrix:** SOIL

Client Sample ID H-1 10-12

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXL**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	61.6	0.100		meq/100g	1	11/11/2019
29B SALTS				**LDNR 29-B**		Analyst: **BXL**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	2.32	0.10		mmhos/cm	1	11/6/2019 11:36:00 AM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXL**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	5.59	0.10		%	1	11/11/2019
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	4.30	0.10			1	11/12/2019
Soluble Calcium	5.83	0.02		meq/L	1	11/12/2019
Soluble Magnesium	2.78	0.05		meq/L	1	11/12/2019
Soluble Sodium	8.92	0.25		meq/L	1	11/12/2019
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.108	0.108		mg/Kg	1	11/1/2019 1:29:47 PM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	2.70	0.968		mg/Kg	1	11/6/2019 7:30:17 PM
Barium	45.5	0.484		mg/Kg	1	11/6/2019 7:30:17 PM
Cadmium	0.731	0.242		mg/Kg	1	11/6/2019 7:30:17 PM
Chromium	10.9	0.484		mg/Kg	1	11/6/2019 7:30:17 PM
Lead	6.19	0.484		mg/Kg	1	11/6/2019 7:30:17 PM
Selenium	< 1.94	1.94		mg/Kg	1	11/6/2019 7:30:17 PM
Silver	< 0.242	0.242		mg/Kg	1	11/6/2019 7:30:17 PM
Zinc	45.1	0.484		mg/Kg	1	11/6/2019 7:30:17 PM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
M	Matrix Interference	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	RL	Reporting Limit
S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode

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Analytical Report

(consolidated)

WO#: **19101487**

Date Reported: **11/25/2019**

CLIENT: Environmental Resources Management **Collection Date:** 10/29/2019 3:50:00 PM

Project: Henning 0526033

Lab ID: 19101487-002 **Matrix:** SOIL

Client Sample ID H-1 10-12

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	341	48.9		mg/Kg-dry	1	11/13/2019 7:30:35 AM
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXL**
Percent Moisture	25.6	1.00		wt%	1	11/1/2019 11:50:00 AM

Qualifiers:				
	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	M	Matrix Interference	ND	Not Detected at the Reporting Limit
	R	RPD outside accepted recovery limits	RL	Reporting Limit
	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
	U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode

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Analytical Report

(consolidated)

WO#: **19101487**

Date Reported: **11/25/2019**

CLIENT: Environmental Resources Management **Collection Date:** 10/29/2019 4:45:00 PM

Project: Henning 0526033

Lab ID: 19101487-003 **Matrix:** SOIL

Client Sample ID H-1 32-34

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
ELECTRICAL CONDUCTIVITY @ SATURATION				**LDNR 29-B**		Analyst: **BXL**
Electrical Conductivity	1.21	0.10		mmhos/cm	1	11/6/2019 11:36:00 AM
INORGANIC ANIONS, SPLP LEACHED BY SW1312/9056A				**SW9056A**		Analyst: **SGP**
Chloride	8.57	0.500		mg/L	2	11/5/2019 10:49:34 AM
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXL**
Percent Moisture	20.8	1.00		wt%	1	11/1/2019 11:50:00 AM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
M	Matrix Interference	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	RL	Reporting Limit
S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode

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Analytical Report

(consolidated)

WO#: **19101487**

Date Reported: **11/25/2019**

CLIENT: Environmental Resources Management **Collection Date:** 10/30/2019 8:35:00 AM

Project: Henning 0526033

Lab ID: 19101487-004 **Matrix:** SOIL

Client Sample ID H-1 42-44

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
ELECTRICAL CONDUCTIVITY @ SATURATION				**LDNR 29-B**		Analyst: **BXL**
Electrical Conductivity	0.59	0.10		mmhos/cm	1	11/6/2019 11:36:00 AM
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXL**
Percent Moisture	22.1	1.00		wt%	1	11/1/2019 11:50:00 AM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
M	Matrix Interference	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	RL	Reporting Limit
S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode

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Analytical Report

(consolidated)

WO#: **19101487**

Date Reported: **11/25/2019**

CLIENT: Environmental Resources Management **Collection Date:** 10/30/2019 3:10:00 PM

Project: Henning 0526033

Lab ID: 19101487-005 **Matrix:** SOIL

Client Sample ID H-2 10-12

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXL**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	32.4	0.100		meq/100g	1	11/11/2019
29B SALTS				**LDNR 29-B**		Analyst: **BXL**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	0.73	0.10		mmhos/cm	1	11/6/2019 11:36:00 AM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXL**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	6.07	0.10		%	1	11/11/2019
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	4.42	0.10			1	11/12/2019
Soluble Calcium	1.20	0.02		meq/L	1	11/12/2019
Soluble Magnesium	0.67	0.05		meq/L	1	11/12/2019
Soluble Sodium	4.27	0.25		meq/L	1	11/12/2019
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.106	0.106		mg/Kg	1	11/1/2019 1:32:06 PM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	4.10	0.960		mg/Kg	1	11/6/2019 7:33:45 PM
Barium	339	0.480		mg/Kg	1	11/6/2019 7:33:45 PM
Cadmium	0.504	0.240		mg/Kg	1	11/6/2019 7:33:45 PM
Chromium	12.2	0.480		mg/Kg	1	11/6/2019 7:33:45 PM
Lead	7.66	0.480		mg/Kg	1	11/6/2019 7:33:45 PM
Selenium	< 1.92	1.92		mg/Kg	1	11/6/2019 7:33:45 PM
Silver	< 0.240	0.240		mg/Kg	1	11/6/2019 7:33:45 PM
Zinc	41.1	0.480		mg/Kg	1	11/6/2019 7:33:45 PM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
M	Matrix Interference	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	RL	Reporting Limit
S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode

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Analytical Report

(consolidated)

WO#: **19101487**

Date Reported: **11/25/2019**

CLIENT: Environmental Resources Management **Collection Date:** 10/30/2019 3:10:00 PM

Project: Henning 0526033

Lab ID: 19101487-005 **Matrix:** SOIL

Client Sample ID H-2 10-12

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	387	46.4		mg/Kg-dry	1	11/13/2019 7:35:35 AM
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXL**
Percent Moisture	17.2	1.00		wt%	1	11/1/2019 11:50:00 AM

Qualifiers:				
	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	M	Matrix Interference	ND	Not Detected at the Reporting Limit
	R	RPD outside accepted recovery limits	RL	Reporting Limit
	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
	U	Analyte not detected	W	Sample container temperature is out of limit as specified at test code

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Analytical Report

(consolidated)

WO#: **19101487**

Date Reported: **11/25/2019**

CLIENT: Environmental Resources Management **Collection Date:** 10/30/2019 3:55:00 PM

Project: Henning 0526033

Lab ID: 19101487-006 **Matrix:** SOIL

Client Sample ID H-2 28-30

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
ELECTRICAL CONDUCTIVITY @ SATURATION				**LDNR 29-B**		Analyst: **BXL**
Electrical Conductivity	1.41	0.10		mmhos/cm	1	11/6/2019 11:36:00 AM
INORGANIC ANIONS, SPLP LEACHED BY SW1312/9056A				**SW9056A**		Analyst: **SGP**
Chloride	6.75	0.500		mg/L	2	11/5/2019 11:03:18 AM
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXL**
Percent Moisture	16.0	1.00		wt%	1	11/1/2019 11:50:00 AM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
M	Matrix Interference	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	RL	Reporting Limit
S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at test code

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QC SUMMARY REPORT

WO#: **19101487**

25-Nov-19

Client: Environmental Resources Management
Project: Henning 0526033 **BatchID:** **32094**

Sample ID: **19101089-001AMS**	SampType: **MS**	TestCode: **HG_S_7471A**	Units: **mg/Kg**	Prep Date: **11/1/2019**	RunNo: **83393**
Client ID: **ZZZZZZ**	Batch ID: **32094**	TestNo: **SW7471A**	**SW7471A**	Analysis Date: **11/1/2019**	SeqNo: **2087499**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	1.04	0.105	0.8736	0.04317	114	75	125				

Sample ID: **19101089-001AMSD**	SampType: **MSD**	TestCode: **HG_S_7471A**	Units: **mg/Kg**	Prep Date: **11/1/2019**	RunNo: **83393**
Client ID: **ZZZZZZ**	Batch ID: **32094**	TestNo: **SW7471A**	**SW7471A**	Analysis Date: **11/1/2019**	SeqNo: **2087502**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	1.03	0.104	0.8643	0.04317	115	75	125	1.041	0.610	20	

Sample ID: **LCS**	SampType: **LCS**	TestCode: **HG_S_7471A**	Units: **mg/Kg**	Prep Date:	RunNo: **83393**
Client ID: **LCSS**	Batch ID: **32094**	TestNo: **SW7471A**	**SW7471A**	Analysis Date: **11/1/2019**	SeqNo: **2087519**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.930	0.100	0.8330	0	112	80	120				

Sample ID: **LCSD**	SampType: **LCSD**	TestCode: **HG_S_7471A**	Units: **mg/Kg**	Prep Date:	RunNo: **83393**
Client ID: **LCSS02**	Batch ID: **32094**	TestNo: **SW7471A**	**SW7471A**	Analysis Date: **11/1/2019**	SeqNo: **2087520**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.932	0.100	0.8330	0	112	80	120	0.9298	0.208	20	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	M	Matrix Interference	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected	W	Sample container temperature is out of limit as s

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QC SUMMARY REPORT

WO#: **19101487**

25-Nov-19

Client: Environmental Resources Management

Project: Henning 0526033 **BatchID:** **32094**

Sample ID:	**MB-32094**	SampType:	**MBLK**	TestCode:	**HG_S_7471A**	Units:	**mg/Kg**	Prep Date:	**11/1/2019**	RunNo:	**83393**
Client ID:	**PBS**	Batch ID:	**32094**	TestNo:	**SW7471A**	**SW7471A**		Analysis Date:	**11/1/2019**	SeqNo:	**2087565**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	< 0.100	0.100									

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	M	Matrix Interference	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected	W	Sample container temperature is out of limit as s

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QC SUMMARY REPORT

WO#: **19101487**

25-Nov-19

Client: Environmental Resources Management
Project: Henning 0526033 **BatchID:** **32130**

Sample ID: **MB-32130** SampType: **MBLK** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/5/2019** RunNo: **83503**
Client ID: **PBS** Batch ID: **32130** TestNo: **SW6010B** **SW3050B** Analysis Date: **11/6/2019** SeqNo: **2089775**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	< 1.00	1.00									
Barium	< 0.500	0.500									
Cadmium	< 0.250	0.250									
Chromium	< 0.500	0.500									
Lead	< 0.500	0.500									
Selenium	< 2.00	2.00									
Silver	< 0.250	0.250									
Zinc	< 0.500	0.500									

Sample ID: **LCS-32130** SampType: **LCS** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/5/2019** RunNo: **83503**
Client ID: **LCSS** Batch ID: **32130** TestNo: **SW6010B** **SW3050B** Analysis Date: **11/6/2019** SeqNo: **2089776**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	26.1	1.00	25.00	0	104	80	120				
Barium	26.6	0.500	25.00	0	107	80	120				
Cadmium	26.7	0.250	25.00	0	107	80	120				
Chromium	26.8	0.500	25.00	0	107	80	120				
Lead	26.5	0.500	25.00	0	106	80	120				
Selenium	26.7	2.00	25.00	0	107	80	120				
Silver	5.30	0.250	5.000	0	106	80	120				
Zinc	26.8	0.500	25.00	0	107	80	120				

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	M	Matrix Interference	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected	W	Sample container temperature is out of limit as s

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QC SUMMARY REPORT

WO#: **19101487**

25-Nov-19

Client: Environmental Resources Management
Project: Henning 0526033 **BatchID:** **32130**

Sample ID: **LCSD-32130** SampType: **LCSD** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/5/2019** RunNo: **83503**
Client ID: **LCSS02** Batch ID: **32130** TestNo: **SW6010B** **SW3050B** Analysis Date: **11/6/2019** SeqNo: **2089777**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	26.0	1.00	25.00	0	104	80	120	26.08	0.288	20	
Barium	26.4	0.500	25.00	0	106	80	120	26.65	0.829	20	
Cadmium	26.6	0.250	25.00	0	106	80	120	26.70	0.469	20	
Chromium	26.6	0.500	25.00	0	107	80	120	26.80	0.561	20	
Lead	26.4	0.500	25.00	0	106	80	120	26.54	0.642	20	
Selenium	26.8	2.00	25.00	0	107	80	120	26.70	0.504	20	
Silver	5.22	0.250	5.000	0	104	80	120	5.295	1.43	20	
Zinc	26.6	0.500	25.00	0	107	80	120	26.84	0.710	20	

Sample ID: **19101355-007AMS** SampType: **MS** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/5/2019** RunNo: **83503**
Client ID: **ZZZZZZ** Batch ID: **32130** TestNo: **SW6010B** **SW3050B** Analysis Date: **11/6/2019** SeqNo: **2089783**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	33.7	0.984	24.60	3.755	122	75	125				
Barium	99.5	0.492	24.60	70.46	118	75	125				
Cadmium	30.4	0.246	24.60	0.1256	123	75	125				
Chromium	42.0	0.492	24.60	7.476	140	75	125				S
Lead	37.6	0.492	24.60	6.104	128	75	125				S
Selenium	33.3	1.97	24.60	0	135	75	125				S
Silver	5.66	0.246	4.921	0	115	75	125				
Zinc	45.2	0.492	24.60	11.16	138	75	125				S

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	M	Matrix Interference	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected	W	Sample container temperature is out of limit as s

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QC SUMMARY REPORT

WO#: **19101487**

25-Nov-19

Client: Environmental Resources Management

Project: Henning 0526033 **BatchID:** **32130**

Sample ID:	**19101355-007AMSD**	SampType:	**MSD**	TestCode:	**6010_S**	Units:	**mg/Kg**	Prep Date:	**11/5/2019**	RunNo:	**83503**
Client ID:	**ZZZZZZ**	Batch ID:	**32130**	TestNo:	**SW6010B**	**SW3050B**		Analysis Date:	**11/6/2019**	SeqNo:	**2089784**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	34.3	0.966	24.15	3.755	126	75	125	33.67	1.73	20	S
Barium	98.1	0.483	24.15	70.46	114	75	125	99.49	1.45	20	
Cadmium	29.7	0.242	24.15	0.1256	123	75	125	30.37	2.19	20	
Chromium	41.5	0.483	24.15	7.476	141	75	125	41.95	1.12	20	S
Lead	36.8	0.483	24.15	6.104	127	75	125	37.55	1.98	20	S
Selenium	34.1	1.93	24.15	0	141	75	125	33.28	2.46	20	S
Silver	5.56	0.242	4.830	0	115	75	125	5.659	1.67	20	
Zinc	44.3	0.483	24.15	11.16	137	75	125	45.16	1.85	20	S

NOTES:

S - Spike recovery indicates matrix interference. The method is in control as indicated by the Lab Control Sample.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	M	Matrix Interference	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected	W	Sample container temperature is out of limit as s

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QC SUMMARY REPORT

WO#: **19101487**

25-Nov-19

Client: Environmental Resources Management
Project: Henning 0526033 **BatchID:** **32146**

Sample ID: **19110003-006ADUP** SampType: **DUP** TestCode: **SAR_S** Units: Prep Date: **11/6/2019** RunNo: **83649**
Client ID: **ZZZZZZ** Batch ID: **32146** TestNo: **LDNR 29-B** **LDNR 29-B** Analysis Date: **11/12/2019** SeqNo: **2092685**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sodium Adsorption Ratio	< 1.00	1.00						0	0	20	
Soluble Calcium	0.17	0.02						0.17	0.26	20	
Soluble Magnesium	0.09	0.05						0.09	1.29	20	
Soluble Sodium	< 0.25	0.25						0	0	20	

Sample ID: **19110030-002CDUP** SampType: **DUP** TestCode: **SAR_S** Units: Prep Date: **11/6/2019** RunNo: **83649**
Client ID: **ZZZZZZ** Batch ID: **32146** TestNo: **LDNR 29-B** **LDNR 29-B** Analysis Date: **11/12/2019** SeqNo: **2093353**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sodium Adsorption Ratio	1.48	0.10						1.46	1.65	20	
Soluble Calcium	32.1	0.02						30.59	4.92	20	
Soluble Magnesium	33.7	0.05						32.46	3.73	20	
Soluble Sodium	8.51	0.25						8.19	3.80	20	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	M	Matrix Interference	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected	W	Sample container temperature is out of limit as s

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QC SUMMARY REPORT

WO#: **19101487**

25-Nov-19

Client: Environmental Resources Management
Project: Henning 0526033 **BatchID:** **32177**

Sample ID: **MB-32177**	SampType: **MBLK**	TestCode: **TTBA**	Units: **mg/Kg-dry**	Prep Date: **11/11/2019**	RunNo: **83664**
Client ID: **PBS**	Batch ID: **32177**	TestNo: **LDNR 29-B**		Analysis Date: **11/13/2019**	SeqNo: **2093610**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
True Total Barium	< 50.0	50.0									

Sample ID: **LCS-32177**	SampType: **LCS**	TestCode: **TTBA**	Units: **mg/Kg-dry**	Prep Date: **11/11/2019**	RunNo: **83664**
Client ID: **LCSS**	Batch ID: **32177**	TestNo: **LDNR 29-B**		Analysis Date: **11/13/2019**	SeqNo: **2093611**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
True Total Barium	5,090	50.0	5,000	0	102	75	125				

Sample ID: **LCSD-32177**	SampType: **LCSD**	TestCode: **TTBA**	Units: **mg/Kg-dry**	Prep Date: **11/11/2019**	RunNo: **83664**
Client ID: **LCSS02**	Batch ID: **32177**	TestNo: **LDNR 29-B**		Analysis Date: **11/13/2019**	SeqNo: **2093612**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
True Total Barium	5,150	50.0	5,000	0	103	75	125	5,085	1.27	20	

Sample ID: **19101386-001AMS**	SampType: **MS**	TestCode: **TTBA**	Units: **mg/Kg-dry**	Prep Date: **11/11/2019**	RunNo: **83664**
Client ID: **ZZZZZZ**	Batch ID: **32177**	TestNo: **LDNR 29-B**		Analysis Date: **11/13/2019**	SeqNo: **2093614**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
True Total Barium	25,500	48.7	4,869	19,400	126	75	125				S

NOTES:
S - Analyte concentration in native sample was too high for accurate spike recovery(ies). The method is in control as indicated by the laboratory control sample (LCS).

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	M	Matrix Interference	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected	W	Sample container temperature is out of limit as s

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QC SUMMARY REPORT

WO#: **19101487**

25-Nov-19

Client: Environmental Resources Management

Project: Henning 0526033 **BatchID:** **32177**

Sample ID: **19101386-001AMSD** SampType: **MSD** TestCode: **TTBA** Units: **mg/Kg-dry** Prep Date: **11/11/2019** RunNo: **83664**

Client ID: **ZZZZZZ** Batch ID: **32177** TestNo: **LDNR 29-B** Analysis Date: **11/13/2019** SeqNo: **2093615**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
True Total Barium	23,900	46.4	4,643	19,400	97.4	75	125	25,520	6.48	20	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	M	Matrix Interference	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected	W	Sample container temperature is out of limit as s

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QC SUMMARY REPORT

WO#: **19101487**

25-Nov-19

Client: Environmental Resources Management
Project: Henning 0526033 **BatchID:** **32179**

Sample ID: **19110003-006ADUP**	SampType: **DUP**	TestCode: **ESP_S**	Units: **%**	Prep Date: **11/8/2019**	RunNo: **83654**
Client ID: **ZZZZZZ**	Batch ID: **32179**	TestNo: **LDNR 29-B**	**LDNR 29-B**	Analysis Date: **11/11/2019**	SeqNo: **2093169**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Exchangeable Sodium %	0.29	0.10						0.28	4.58	20	

Sample ID: **19110004-002ADUP**	SampType: **DUP**	TestCode: **ESP_S**	Units: **%**	Prep Date: **11/8/2019**	RunNo: **83654**
Client ID: **ZZZZZZ**	Batch ID: **32179**	TestNo: **LDNR 29-B**	**LDNR 29-B**	Analysis Date: **11/11/2019**	SeqNo: **2093179**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Exchangeable Sodium %	0.52	0.10						0.56	7.20	20	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	M	Matrix Interference	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected	W	Sample container temperature is out of limit as s

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QC SUMMARY REPORT

WO#: **19101487**

25-Nov-19

Client: Environmental Resources Management
Project: Henning 0526033 **BatchID:** **32180**

Sample ID: **LCS-32180**	SampType: **LCS**	TestCode: **CEC**	Units: **meq/100g**	Prep Date: **11/8/2019**	RunNo: **83654**
Client ID: **LCSS**	Batch ID: **32180**	TestNo: **LDNR 29-B**	**LDNR 29-B**	Analysis Date: **11/11/2019**	SeqNo: **2093113**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Cation Exchange Capacity	21.5	0.100	25.00	0	86.1	76	124				

Sample ID: **LCSD-32180**	SampType: **LCSD**	TestCode: **CEC**	Units: **meq/100g**	Prep Date: **11/8/2019**	RunNo: **83654**
Client ID: **LCSS02**	Batch ID: **32180**	TestNo: **LDNR 29-B**	**LDNR 29-B**	Analysis Date: **11/11/2019**	SeqNo: **2093114**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Cation Exchange Capacity	21.9	0.100	25.00	0	87.7	76	124	21.52	1.84	20	

Sample ID: **19110003-006ADUP**	SampType: **DUP**	TestCode: **CEC**	Units: **meq/100g**	Prep Date: **11/8/2019**	RunNo: **83654**
Client ID: **ZZZZZZ**	Batch ID: **32180**	TestNo: **LDNR 29-B**	**LDNR 29-B**	Analysis Date: **11/11/2019**	SeqNo: **2093135**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Cation Exchange Capacity	17.0	0.100						16.48	3.12	20	

Sample ID: **19110004-002ADUP**	SampType: **DUP**	TestCode: **CEC**	Units: **meq/100g**	Prep Date: **11/8/2019**	RunNo: **83654**
Client ID: **ZZZZZZ**	Batch ID: **32180**	TestNo: **LDNR 29-B**	**LDNR 29-B**	Analysis Date: **11/11/2019**	SeqNo: **2093145**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Cation Exchange Capacity	34.7	0.100						34.08	1.70	20	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	M	Matrix Interference	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected	W	Sample container temperature is out of limit as s

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QC SUMMARY REPORT

WO#: **19101487**

25-Nov-19

Client: Environmental Resources Management
Project: Henning 0526033 **BatchID:** **32294**

Sample ID: **MB-32294** SampType: **MBLK** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/19/2019** RunNo: **84016**
Client ID: **PBS** Batch ID: **32294** TestNo: **SW6010B** **SW3050B** Analysis Date: **11/22/2019** SeqNo: **2105136**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	< 1.00	1.00									
Barium	< 0.500	0.500									
Cadmium	< 0.250	0.250									
Chromium	< 0.500	0.500									
Lead	< 0.500	0.500									
Selenium	< 2.00	2.00									
Silver	< 0.250	0.250									
Zinc	< 0.500	0.500									

Sample ID: **LCS-32294** SampType: **LCS** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/19/2019** RunNo: **84016**
Client ID: **LCSS** Batch ID: **32294** TestNo: **SW6010B** **SW3050B** Analysis Date: **11/22/2019** SeqNo: **2105137**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	25.4	1.00	25.00	0	102	80	120				
Barium	24.1	0.500	25.00	0	96.4	80	120				
Cadmium	24.2	0.250	25.00	0	96.8	80	120				
Chromium	23.9	0.500	25.00	0	95.8	80	120				
Lead	24.0	0.500	25.00	0	96.1	80	120				
Selenium	22.9	2.00	25.00	0	91.7	80	120				
Silver	4.88	0.250	5.000	0	97.7	80	120				
Zinc	24.1	0.500	25.00	0	96.2	80	120				

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	M	Matrix Interference	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
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QC SUMMARY REPORT

WO#: **19101487**

25-Nov-19

Client: Environmental Resources Management

Project: Henning 0526033 **BatchID:** **32294**

Sample ID: **LCSD-32294** SampType: **LCSD** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/19/2019** RunNo: **84016**

Client ID: **LCSS02** Batch ID: **32294** TestNo: **SW6010B** **SW3050B** Analysis Date: **11/22/2019** SeqNo: **2105138**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	24.8	1.00	25.00	0	99.4	80	120	25.40	2.17	20	
Barium	24.2	0.500	25.00	0	96.8	80	120	24.09	0.435	20	
Cadmium	23.8	0.250	25.00	0	95.3	80	120	24.20	1.56	20	
Chromium	24.0	0.500	25.00	0	96.2	80	120	23.94	0.417	20	
Lead	23.6	0.500	25.00	0	94.4	80	120	24.02	1.72	20	
Selenium	23.8	2.00	25.00	0	95.3	80	120	22.94	3.83	20	
Silver	4.88	0.250	5.000	0	97.7	80	120	4.885	0	20	
Zinc	24.2	0.500	25.00	0	96.6	80	120	24.06	0.394	20	

Sample ID: **19110554-017AMS** SampType: **MS** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/19/2019** RunNo: **84016**

Client ID: **ZZZZZZ** Batch ID: **32294** TestNo: **SW6010B** **SW3050B** Analysis Date: **11/22/2019** SeqNo: **2105167**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	25.1	1.01	25.37	1.850	91.6	75	125				
Barium	293	0.507	25.37	296.7	-15.8	75	125				S
Cadmium	23.1	0.254	25.37	0.03529	90.8	75	125				
Chromium	29.0	0.507	25.37	2.576	104	75	125				
Lead	62.0	0.507	25.37	17.76	174	75	125				S
Selenium	29.8	2.03	25.37	0.3277	116	75	125				
Silver	4.62	0.254	5.074	0	91.0	75	125				
Zinc	27.5	0.507	25.37	2.506	98.6	75	125				

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	M	Matrix Interference	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected	W	Sample container temperature is out of limit as sp

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QC SUMMARY REPORT

WO#: **19101487**

25-Nov-19

Client: Environmental Resources Management

Project: Henning 0526033 **BatchID:** **32294**

Sample ID: **19110554-017AMSD** SampType: **MSD** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/19/2019** RunNo: **84016**

Client ID: **ZZZZZZ** Batch ID: **32294** TestNo: **SW6010B** **SW3050B** Analysis Date: **11/22/2019** SeqNo: **2105168**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	25.0	1.01	25.13	1.850	92.2	75	125	25.08	0.214	20	
Barium	288	0.503	25.13	296.7	-35.2	75	125	292.7	1.67	20	S
Cadmium	22.6	0.251	25.13	0.03529	89.8	75	125	23.07	2.04	20	
Chromium	28.5	0.503	25.13	2.576	103	75	125	28.96	1.68	20	
Lead	61.0	0.503	25.13	17.76	172	75	125	62.01	1.68	20	S
Selenium	29.4	2.01	25.13	0.3277	116	75	125	29.81	1.35	20	
Silver	4.53	0.251	5.027	0	90.1	75	125	4.617	1.93	20	
Zinc	27.0	0.503	25.13	2.506	97.6	75	125	27.53	1.83	20	

NOTES:

S - Spike recovery indicates matrix interference. The method is in control as indicated by the Lab Control Sample.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	M	Matrix Interference	ND	Not Detected at the Reporting Limit
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QC SUMMARY REPORT

WO#: **19101487**

25-Nov-19

Client: Environmental Resources Management

Project: Henning 0526033 **BatchID:** **R83466**

Sample ID: **19101389-001ADUP** SampType: **DUP** TestCode: **PMOIST_29B** Units: **wt%** Prep Date: RunNo: **83466**

Client ID: **ZZZZZZ** Batch ID: **R83466** TestNo: **LDNR 29-B** Analysis Date: **10/30/2019** SeqNo: **2088766**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Percent Moisture	14.6	1.00						14.30	2.08	20	

Qualifiers:

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H	Holding times for preparation or analysis exceeded	M	Matrix Interference	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
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QC SUMMARY REPORT

WO#: **19101487**

25-Nov-19

Client: Environmental Resources Management
Project: Henning 0526033 **BatchID:** **R83477**

Sample ID: **MBLK**	SampType: **MBLK**	TestCode: **9056_SPLP**	Units: **mg/L**	Prep Date:	RunNo: **83477**
Client ID: **PBS**	Batch ID: **R83477**	TestNo: **SW9056A**		Analysis Date: **11/5/2019**	SeqNo: **2089058**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	< 0.250	0.250									

Sample ID: **LCS**	SampType: **LCS**	TestCode: **9056_SPLP**	Units: **mg/L**	Prep Date:	RunNo: **83477**
Client ID: **LCSS**	Batch ID: **R83477**	TestNo: **SW9056A**		Analysis Date: **11/5/2019**	SeqNo: **2089059**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	9.85	0.250	10.00	0	98.5	80	120				

Sample ID: **LCSD**	SampType: **LCSD**	TestCode: **9056_SPLP**	Units: **mg/L**	Prep Date:	RunNo: **83477**
Client ID: **LCSS02**	Batch ID: **R83477**	TestNo: **SW9056A**		Analysis Date: **11/5/2019**	SeqNo: **2089060**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	9.91	0.250	10.00	0	99.1	80	120	9.849	0.572	15	

Sample ID: **19110097-004AMS**	SampType: **MS**	TestCode: **9056_SPLP**	Units: **mg/L**	Prep Date:	RunNo: **83477**
Client ID: **ZZZZZZ**	Batch ID: **R83477**	TestNo: **SW9056A**		Analysis Date: **11/5/2019**	SeqNo: **2089071**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	341	2.50	50.00	294.8	93.0	80	120				E

Qualifiers:

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H	Holding times for preparation or analysis exceeded	M	Matrix Interference	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
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QC SUMMARY REPORT

WO#: **19101487**

25-Nov-19

Client: Environmental Resources Management

Project: Henning 0526033 **BatchID:** **R83477**

Sample ID:	**19110097-004AMSD**	SampType:	**MSD**	TestCode:	**9056_SPLP**	Units:	**mg/L**	Prep Date:		RunNo:	**83477**
Client ID:	**ZZZZZZ**	Batch ID:	**R83477**	TestNo:	**SW9056A**			Analysis Date:	**11/5/2019**	SeqNo:	**2089072**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	338	2.50	50.00	294.8	87.2	80	120	341.3	0.850	15	E

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	M	Matrix Interference	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected	W	Sample container temperature is out of limit as s

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QC SUMMARY REPORT

WO#: **19101487**

25-Nov-19

Client: Environmental Resources Management
Project: Henning 0526033 **BatchID:** **R83490**

Sample ID: **MB-R83490**	SampType: **MBLK**	TestCode: **EC_S**	Units: **mmhos/cm**	Prep Date:	RunNo: **83490**
Client ID: **PBS**	Batch ID: **R83490**	TestNo: **LDNR 29-B**		Analysis Date: **11/6/2019**	SeqNo: **2089271**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Electrical Conductivity	< 0.10	0.10									

Sample ID: **LCS1-R83490**	SampType: **LCS1**	TestCode: **EC_S**	Units: **mmhos/cm**	Prep Date:	RunNo: **83490**
Client ID: **ZZZZZZ**	Batch ID: **R83490**	TestNo: **LDNR 29-B**		Analysis Date: **11/6/2019**	SeqNo: **2089272**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Electrical Conductivity	0.38	0.10	0.38	0	98.4	90.07	109.9				

Sample ID: **LCS2-R83490**	SampType: **LCS2**	TestCode: **EC_S**	Units: **mmhos/cm**	Prep Date:	RunNo: **83490**
Client ID: **ZZZZZZ**	Batch ID: **R83490**	TestNo: **LDNR 29-B**		Analysis Date: **11/6/2019**	SeqNo: **2089273**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Electrical Conductivity	50.2	0.10	53.00	0	94.7	90	110				

Sample ID: **19110003-006ADUP**	SampType: **DUP**	TestCode: **EC_S**	Units: **mmhos/cm**	Prep Date:	RunNo: **83490**
Client ID: **ZZZZZZ**	Batch ID: **R83490**	TestNo: **LDNR 29-B**		Analysis Date: **11/6/2019**	SeqNo: **2089289**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Electrical Conductivity	< 0.10	0.10						0	0	20	

Qualifiers:

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H	Holding times for preparation or analysis exceeded	M	Matrix Interference	ND	Not Detected at the Reporting Limit
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Sample Log-In Check List

Client Name: **ERM_HOUSTON** Work Order Number: **19101487** RcptNo: **1**

Logged by:	**Danielle Hollier**	**10/31/2019 3:50:00 PM**	Danielle Hollier
Completed By:	**Danielle Hollier**	**10/31/2019 5:14:00 PM**	Danielle Hollier
Reviewed By:	**Caitlin Duplantis**	**11/11/2019 3:10:30 PM**	Caitlin Duplantis

Chain of Custody

1.	Is Chain of Custody complete?	Yes ☑	No ☐	Not Present ☐
2.	How was the sample delivered?	Client		

Log In

3.	Coolers are present?	Yes ☐	No ☐	NA ☑
4.	Shipping container/cooler in good condition?	Yes ☑	No ☐	
	Custody seals intact on shipping container/cooler?	Yes ☐	No ☐	Not Present ☑
	No. Seal Date:	Signed By:		
5.	Was an attempt made to cool the samples?	Yes ☐	No ☐	NA ☑
6.	Were all samples received at a temperature of >0° C to 6.0°C	Yes ☐	No ☑	NA ☐
		Not required		
7.	Sample(s) in proper container(s)?	Yes ☑	No ☐	
8.	Sufficient sample volume for indicated test(s)?	Yes ☑	No ☐	
9.	Are samples (except VOA and ONG) properly preserved?	Yes ☑	No ☐	
10.	Was preservative added to bottles?	Yes ☐	No ☑	NA ☐
11.	Is the headspace in the VOA vials less than 1/4 inch or 6 mm?	Yes ☐	No ☐	No VOA Vials ☑
12.	Were any sample containers received broken?	Yes ☐	No ☑	
13.	Does paperwork match bottle labels? (Note discrepancies on chain of custody)	Yes ☑	No ☐	
14.	Are matrices correctly identified on Chain of Custody?	Yes ☑	No ☐	
15.	Is it clear what analyses were requested?	Yes ☑	No ☐	
16.	Were all holding times able to be met? (If no, notify customer for authorization.)	Yes ☑	No ☐	

Special Handling (if applicable)

17. Was client notified of all discrepancies with this order? Yes ☐ No ☐ NA ☑

Person Notified: Date:
By Whom: Via: ☐ eMail ☐ Phone ☐ Fax ☐ In Person
Regarding:
Client Instructions:

18. Additional remarks:
Improper error correction(s) made by client

Cooler Information

Cooler No	Temp ºC	Condition	Seal Intact	Seal No	Seal Date	Signed By

element™

Chain of Custody

Laboratory Number: 19101487

Client Information:	Billing Information:	PO Number:	Project Name/Number:	Page 1 of 1
Company Name: ERM			Henning 0526033	**Matrix Code**
Contact Name: Dave Angle		Quote Number:		DW = Drinking Water
Address: 840 West Sam Houston Parkway N., Suite 600	SAME		Sampler's Signature	WW = Waste Water
City, State Zip: Houston, Texas 77024		Required QC Level		GW = Ground Water
Phone Number: 281-433-3826 Ext:	Ext:	Bill Monthly ☐Yes ☐No	Shipping Method: UPS / FedEx / NOW DHL / Element / (Hand) / Mail	AQ = Aqueous OT = Other SL = Sludge SOL = Solid O = Oil SO = Soil F = Food SW = Swab NG = Natural Gas NGL = Natural Gas Liquid PW = Produced Water CF = Completion Fluid
Fax Number:				
E-mail Address: David.angle@erm.com				

Which Regulations Apply: ☐RCRA ☐Drinking Water ☐POTW ☐Distribution ☐NPDES ☐Special ☐USDA/FDA ☐State ☐RECAP/RISC ☐Other

Turn Time ☒Standard RUSH ☐1 Day ☐2 Day ☐Other (Rush turn times will incur a surcharge and must be pre-approved by lab.)

Sample ID/Description	Collection Information: Date	Time	Grab / Composite	Matrix	Container: Quantity	Container: Type P=Plastic, G=Glass, V=Vial	Pres. HCl, HNO_3, H_2SO_4, NaOH, $Na_2S_2O_3$	Requested Tests: EC	% Moisture	CEC/ESP/SAR	29B Metals	SPLP chloride	Comments
H-1 6-8	10-29-19	1450	G	S	1	P	—	X	X	X	X		
H-1 10-12	10-29-19	1550	G	S	1	P	—	X	X	X	X		
H-1 32-34	10-29-19	1645	G	S	1	P	—	X	X			X	
H-1 42-44	10-~~30~~-19	0855	G	S	1	P	—	X	X				
H-2 10-12	10-31-19	1510	G	S	1	P	—	X	X	X	X		
H-2 28-30	10-30-19	1555	G	S	1	P	—	X	X			X	

	Relinquished by	Date/Time	Received by	Date/Time	Field Notes:
1	Patrick Baudoin	10-31-19 1350		10-31-19 1550	
2		5 DH 10-31-19			Received at lab on ice? ☐Yes ☑No Temp:
3					

All samples submitted to Element Materials Technology for analysis are accepted on a custodial basis only. Ownership of the material remains with the client submitting the samples. Element Materials Technology reserves the right to return unused sample portions.

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629 Washington St. Suite 300, Columbus, IN 47201-6231 USA, P 812-375-0531, F 812-375-0731
328 Ley Road, Suite 100, Fort Wayne, IN 46825 USA, P 260-471-7000, F 260-471-7777
909 Executive Dr, Warsaw, IN 46580-2368 USA, P 574-267-3305, F 574-269-6569
3371 Cleveland Road, Suite 100A, South Bend, IN 46628-9780 USA, P 574-277-0707, F 574-273-5699
2417 W. Pinhook Rd, Lafayette, LA 70508-3344 USA, P 337-235-0483, F 337-233-6540

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December 05, 2019

Dave Angle
Environmental Resources Management
CityCentre Four
840 W. Sam Houston Pkwy North, Suite 600
Houston, TX 77024
TEL:
FAX: (281) 524-4625

RE: Henning Management 0526033 Order No.: 19110451

Dear Dave Angle:

Element Materials Technology Lafayette received 29 sample(s) on 11/12/2019 for the analyses presented in the following report.

In accordance with your instructions Element Lafayette conducted the analysis shown on the following pages on samples submitted by your company. The results related only to the items tested. Unless otherwise noted, all analyses were conducted using EPA approved methodologies and all test results meet all requirements of TNI. All relevant sampling information is on the attached Chain-of-Custody form.

All soil data, except for 29-B, are on a wet-weight basis unless otherwise indicated in the units field as –dry.

LELAP Certification No.: 01997. TCEQ Certification No.: T104704261. LDHH Certification No.: LA180028. ISDH Certification No.: C-LA-01. NDELCP Certification No.: R-226. A scope of accredited parameters is available upon request. A "#" by the test method or analyte indicates this parameter is outside the scope of accreditation.

Estimated uncertainty is available upon request. This report shall not be reproduced except in full, without the written approval of the laboratory.

If you have any questions regarding these test results, please feel free to call.

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Case Narrative

WO#: **19110451**
Date: **12/5/2019**

CLIENT: Environmental Resources Management
Project: Henning Management 0526033

Unless specified by the client, a duplicate or MS/MSD, wherever applicable, is randomly selected and analyzed from each analytical batch provided sample volume is sufficient. The sample chosen for duplicate or MS/MSD may or may not be a sample submitted in this workorder. A method blank and/or a lab control sample (LCS)/lab control sample duplicate (LCSD), wherever applicable, are processed as a quality control check for each analytical batch. When the matrix QC data is not available due to insufficient sample volume or when the results indicate possible matrix effect, the validity of the batch is determined by the method blank and LCS/LCSD.

The results of the laboratory internal quality control data are provided in the QC Summary Report section of the report for your review. Laboratory-related QC exceptions that may impact the validity of data are discussed in the case narrative. Sample-related QC exceptions are flagged either in the results page(s) or in the QC report page(s). End users should consider QC exceptions when evaluating sample data against data quality objectives.

Any other exceptions associated with this report will be footnoted in the results page(s) or the QC summary page(s).

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Analytical Report

(consolidated)

WO#: **19110451**

Date Reported: **12/5/2019**

CLIENT: Environmental Resources Management **Collection Date:** 10/31/2019 2:50:00 PM

Project: Henning Management 0526033

Lab ID: 19110451-001 **Matrix:** SOIL

Client Sample ID H-3 10-12'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXL**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	36.6	0.100		meq/100g	1	11/25/2019
29B SALTS				**LDNR 29-B**		Analyst: **BXL**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	0.30	0.10		mmhos/cm	1	11/15/2019 1:41:00 PM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXL**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	2.36	0.10		%	1	11/25/2019
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	3.09	0.10			1	11/19/2019
Soluble Calcium	0.59	0.02		meq/L	1	11/19/2019
Soluble Magnesium	0.31	0.05		meq/L	1	11/19/2019
Soluble Sodium	2.07	0.25		meq/L	1	11/19/2019
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.106	0.106		mg/Kg	1	11/19/2019 9:17:20 AM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	4.11	0.975		mg/Kg	1	11/19/2019 3:56:51 PM
Barium	72.1	0.487		mg/Kg	1	11/19/2019 3:56:51 PM
Cadmium	< 0.244	0.244		mg/Kg	1	11/19/2019 3:56:51 PM
Chromium	7.82	0.487		mg/Kg	1	11/19/2019 3:56:51 PM
Lead	5.14	0.487		mg/Kg	1	11/19/2019 3:56:51 PM
Strontium	14.8	0.487		mg/Kg	1	11/19/2019 3:56:51 PM
Zinc	22.8	0.487		mg/Kg	1	11/19/2019 3:56:51 PM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	135	45.5		mg/Kg-dry	1	11/22/2019 6:30:39 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

(consolidated)

WO#: **19110451**

Date Reported: **12/5/2019**

CLIENT: Environmental Resources Management **Collection Date:** 10/31/2019 2:50:00 PM

Project: Henning Management 0526033

Lab ID: 19110451-001 **Matrix:** SOIL

Client Sample ID H-3 10-12'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXL**
Percent Moisture	18.6	1.00		wt%	1	11/12/2019 3:35:00 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

(consolidated)

WO#: **19110451**

Date Reported: **12/5/2019**

CLIENT: Environmental Resources Management **Collection Date:** 10/31/2019 3:15:00 PM

Project: Henning Management 0526033

Lab ID: 19110451-002 **Matrix:** SOIL

Client Sample ID H-3 20-22'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
ELECTRICAL CONDUCTIVITY @ SATURATION				**LDNR 29-B**		Analyst: **BXL**
Electrical Conductivity	0.59	0.10		mmhos/cm	1	11/15/2019 1:41:00 PM
INORGANIC ANIONS, SPLP LEACHED BY SW1312/9056A				**SW9056A**		Analyst: **SGP**
Chloride	1.01	0.500		mg/L	2	11/19/2019 11:45:38 AM
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXL**
Percent Moisture	18.2	1.00		wt%	1	11/12/2019 3:35:00 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

(consolidated)

WO#: **19110451**

Date Reported: **12/5/2019**

CLIENT: Environmental Resources Management **Collection Date:** 10/31/2019 4:00:00 PM

Project: Henning Management 0526033

Lab ID: 19110451-003 **Matrix:** SOIL

Client Sample ID H-3 38-40'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
ELECTRICAL CONDUCTIVITY @ SATURATION				**LDNR 29-B**		Analyst: **BXL**
Electrical Conductivity	0.38	0.10		mmhos/cm	1	11/15/2019 1:41:00 PM
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXL**
Percent Moisture	19.0	1.00		wt%	1	11/12/2019 3:35:00 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

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WO#: **19110451**

Date Reported: **12/5/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/4/2019 1:35:00 PM

Project: Henning Management 0526033

Lab ID: 19110451-004 **Matrix:** SOIL

Client Sample ID H-4 4-6'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXL**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	29.4	0.100		meq/100g	1	11/25/2019
29B SALTS				**LDNR 29-B**		Analyst: **BXL**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	1.23	0.10		mmhos/cm	1	11/15/2019 1:41:00 PM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXL**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	5.48	0.10		%	1	11/25/2019
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	7.27	0.10			1	11/19/2019
Soluble Calcium	1.79	0.02		meq/L	1	11/19/2019
Soluble Magnesium	0.86	0.05		meq/L	1	11/19/2019
Soluble Sodium	8.36	0.25		meq/L	1	11/19/2019
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.108	0.108		mg/Kg	1	11/19/2019 9:19:38 AM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	2.42	0.963		mg/Kg	1	11/19/2019 4:00:15 PM
Barium	94.7	0.482		mg/Kg	1	11/19/2019 4:00:15 PM
Cadmium	< 0.241	0.241		mg/Kg	1	11/19/2019 4:00:15 PM
Chromium	6.73	0.482		mg/Kg	1	11/19/2019 4:00:15 PM
Lead	10.5	0.482		mg/Kg	1	11/19/2019 4:00:15 PM
Strontium	12.5	0.482		mg/Kg	1	11/19/2019 4:00:15 PM
Zinc	8.67	0.482		mg/Kg	1	11/19/2019 4:00:15 PM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	172	46.7		mg/Kg-dry	1	11/22/2019 6:35:07 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

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WO#: **19110451**

Date Reported: **12/5/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/4/2019 1:35:00 PM

Project: Henning Management 0526033

Lab ID: 19110451-004 **Matrix:** SOIL

Client Sample ID H-4 4-6'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXL**
Percent Moisture	17.2	1.00		wt%	1	11/12/2019 3:35:00 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

(consolidated)

WO#: **19110451**

Date Reported: **12/5/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/4/2019 2:05:00 PM

Project: Henning Management 0526033

Lab ID: 19110451-005 **Matrix:** SOIL

Client Sample ID H-4 16-18'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
ELECTRICAL CONDUCTIVITY @ SATURATION				**LDNR 29-B**		Analyst: **BXL**
Electrical Conductivity	0.66	0.10		mmhos/cm	1	11/15/2019 1:41:00 PM
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXL**
Percent Moisture	18.0	1.00		wt%	1	11/12/2019 3:35:00 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

(consolidated)

WO#: **19110451**

Date Reported: **12/5/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/4/2019 4:05:00 PM

Project: Henning Management 0526033

Lab ID: 19110451-006 **Matrix:** SOIL

Client Sample ID H-5 4-6'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXL**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	30.3	0.100		meq/100g	1	11/25/2019
29B SALTS				**LDNR 29-B**		Analyst: **BXL**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	4.65	0.10	*	mmhos/cm	1	11/15/2019 1:41:00 PM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXL**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	26.7	0.10	*	%	1	11/25/2019
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	30.0	0.10	*		1	11/19/2019
Soluble Calcium	1.86	0.02		meq/L	1	11/19/2019
Soluble Magnesium	0.71	0.05		meq/L	1	11/19/2019
Soluble Sodium	34.1	0.25		meq/L	1	11/19/2019
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.108	0.108		mg/Kg	1	11/19/2019 9:21:57 AM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	8.42	0.973		mg/Kg	1	11/19/2019 4:03:44 PM
Barium	101	0.487		mg/Kg	1	11/19/2019 4:03:44 PM
Cadmium	0.258	0.243		mg/Kg	1	11/19/2019 4:03:44 PM
Chromium	3.56	0.487		mg/Kg	1	11/19/2019 4:03:44 PM
Lead	16.6	0.487		mg/Kg	1	11/19/2019 4:03:44 PM
Strontium	40.8	0.487		mg/Kg	1	11/19/2019 4:03:44 PM
Zinc	6.89	0.487		mg/Kg	1	11/19/2019 4:03:44 PM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	161	49.0		mg/Kg-dry	1	11/22/2019 6:39:35 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

(consolidated)

WO#: **19110451**

Date Reported: **12/5/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/4/2019 4:05:00 PM

Project: Henning Management 0526033

Lab ID: 19110451-006 **Matrix:** SOIL

Client Sample ID H-5 4-6'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXL**
Percent Moisture	17.4	1.00		wt%	1	11/12/2019 3:35:00 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

(consolidated)

WO#: **19110451**

Date Reported: **12/5/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/4/2019 4:20:00 PM

Project: Henning Management 0526033

Lab ID: 19110451-007 **Matrix:** SOIL

Client Sample ID H-5 10-12'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXL**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	44.9	0.100		meq/100g	1	11/25/2019
29B SALTS				**LDNR 29-B**		Analyst: **BXL**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	11.7	0.10	*	mmhos/cm	1	11/15/2019 1:41:00 PM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXL**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	8.54	0.10		%	1	11/25/2019
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	11.8	0.10			1	11/19/2019
Soluble Calcium	36.2	0.02		meq/L	1	11/19/2019
Soluble Magnesium	12.7	0.05		meq/L	1	11/19/2019
Soluble Sodium	58.6	0.25		meq/L	1	11/19/2019
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.102	0.102		mg/Kg	1	11/19/2019 9:24:15 AM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	4.83	0.990		mg/Kg	1	11/19/2019 4:07:15 PM
Barium	70.8	0.495		mg/Kg	1	11/19/2019 4:07:15 PM
Cadmium	< 0.248	0.248		mg/Kg	1	11/19/2019 4:07:15 PM
Chromium	14.8	0.495		mg/Kg	1	11/19/2019 4:07:15 PM
Lead	11.3	0.495		mg/Kg	1	11/19/2019 4:07:15 PM
Strontium	34.2	0.495		mg/Kg	1	11/19/2019 4:07:15 PM
Zinc	53.8	0.495		mg/Kg	1	11/19/2019 4:07:15 PM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	260	46.3		mg/Kg-dry	1	11/22/2019 6:44:02 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

(consolidated)

WO#: **19110451**

Date Reported: **12/5/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/4/2019 4:20:00 PM

Project: Henning Management 0526033

Lab ID: 19110451-007 **Matrix:** SOIL

Client Sample ID H-5 10-12'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXL**
Percent Moisture	22.7	1.00		wt%	1	11/12/2019 3:35:00 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

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WO#: **19110451**

Date Reported: **12/5/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/4/2019 4:30:00 PM

Project: Henning Management 0526033

Lab ID: 19110451-008 **Matrix:** SOIL

Client Sample ID H-5 14-16'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
ELECTRICAL CONDUCTIVITY @ SATURATION				**LDNR 29-B**		Analyst: **BXL**
Electrical Conductivity	8.51	0.10	*	mmhos/cm	1	11/15/2019 1:41:00 PM
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXL**
Percent Moisture	22.5	1.00		wt%	1	11/12/2019 3:35:00 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

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WO#: **19110451**

Date Reported: **12/5/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/5/2019 9:20:00 AM

Project: Henning Management 0526033

Lab ID: 19110451-009 **Matrix:** SOIL

Client Sample ID H-6 6-8'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXL**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	28.1	0.100		meq/100g	1	11/25/2019
29B SALTS				**LDNR 29-B**		Analyst: **BXL**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	11.2	0.10	*	mmhos/cm	1	11/15/2019 1:41:00 PM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXL**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	8.77	0.10		%	1	11/25/2019
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	15.1	0.10	*		1	11/19/2019
Soluble Calcium	30.8	0.02		meq/L	1	11/19/2019
Soluble Magnesium	7.22	0.05		meq/L	1	11/19/2019
Soluble Sodium	65.7	0.25		meq/L	1	11/19/2019
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.102	0.102		mg/Kg	1	11/19/2019 9:26:34 AM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	7.01	0.999		mg/Kg	1	11/19/2019 4:10:44 PM
Barium	68.7	0.500		mg/Kg	1	11/19/2019 4:10:44 PM
Cadmium	0.385	0.250		mg/Kg	1	11/19/2019 4:10:44 PM
Chromium	5.85	0.500		mg/Kg	1	11/19/2019 4:10:44 PM
Lead	8.36	0.500		mg/Kg	1	11/19/2019 4:10:44 PM
Strontium	24.0	0.500		mg/Kg	1	11/19/2019 4:10:44 PM
Zinc	16.2	0.500		mg/Kg	1	11/19/2019 4:10:44 PM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	258	46.9		mg/Kg-dry	1	11/22/2019 6:57:31 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

Element Materials Technology Lafayette
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Analytical Report

(consolidated)

WO#: **19110451**

Date Reported: **12/5/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/5/2019 9:20:00 AM

Project: Henning Management 0526033

Lab ID: 19110451-009 **Matrix:** SOIL

Client Sample ID H-6 6-8'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXL**
Percent Moisture	17.8	1.00		wt%	1	11/12/2019 3:35:00 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

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WO#: **19110451**

Date Reported: **12/5/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/5/2019 9:30:00 AM

Project: Henning Management 0526033

Lab ID: 19110451-010 **Matrix:** SOIL

Client Sample ID H-6 10-12'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXL**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	44.3	0.100		meq/100g	1	11/25/2019
29B SALTS				**LDNR 29-B**		Analyst: **BXL**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	8.16	0.10	*	mmhos/cm	1	11/15/2019 1:41:00 PM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXL**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	10.5	0.10		%	1	11/25/2019
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	9.86	0.10			1	11/19/2019
Soluble Calcium	24.0	0.02		meq/L	1	11/19/2019
Soluble Magnesium	7.41	0.05		meq/L	1	11/19/2019
Soluble Sodium	39.1	0.25		meq/L	1	11/19/2019
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.109	0.109		mg/Kg	1	11/19/2019 9:28:52 AM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	12.7	0.960	*	mg/Kg	1	11/19/2019 4:14:16 PM
Barium	87.9	0.480		mg/Kg	1	11/19/2019 4:14:16 PM
Cadmium	0.403	0.240		mg/Kg	1	11/19/2019 4:14:16 PM
Chromium	14.8	0.480		mg/Kg	1	11/19/2019 4:14:16 PM
Lead	10.9	0.480		mg/Kg	1	11/19/2019 4:14:16 PM
Strontium	38.5	0.480		mg/Kg	1	11/19/2019 4:14:16 PM
Zinc	50.1	0.480		mg/Kg	1	11/19/2019 4:14:16 PM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	261	47.7		mg/Kg-dry	1	11/22/2019 7:01:58 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

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WO#: **19110451**

Date Reported: **12/5/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/5/2019 9:30:00 AM

Project: Henning Management 0526033

Lab ID: 19110451-010 **Matrix:** SOIL

Client Sample ID H-6 10-12'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXL**
Percent Moisture	21.9	1.00		wt%	1	11/12/2019 3:35:00 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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WO#: **19110451**

Date Reported: **12/5/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/5/2019 9:40:00 AM

Project: Henning Management 0526033

Lab ID: 19110451-011 **Matrix:** SOIL

Client Sample ID H-6 14-16'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
ELECTRICAL CONDUCTIVITY @ SATURATION				**LDNR 29-B**		Analyst: **BXL**
Electrical Conductivity	10.7	0.10	*	mmhos/cm	1	11/15/2019 1:41:00 PM
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXL**
Percent Moisture	20.9	1.00		wt%	1	11/12/2019 3:35:00 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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WO#: **19110451**

Date Reported: **12/5/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/5/2019 11:15:00 AM

Project: Henning Management 0526033

Lab ID: 19110451-012 **Matrix:** SOIL

Client Sample ID H-7 6-8'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXL**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	32.0	0.100		meq/100g	1	11/25/2019
29B SALTS				**LDNR 29-B**		Analyst: **BXL**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	1.16	0.10		mmhos/cm	1	11/15/2019 1:41:00 PM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXL**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	7.67	0.10		%	1	11/25/2019
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	8.17	0.10			1	11/19/2019
Soluble Calcium	1.21	0.02		meq/L	1	11/19/2019
Soluble Magnesium	0.70	0.05		meq/L	1	11/19/2019
Soluble Sodium	7.96	0.25		meq/L	1	11/19/2019
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.107	0.107		mg/Kg	1	11/19/2019 9:36:14 AM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	9.16	0.956		mg/Kg	1	11/19/2019 4:37:44 PM
Barium	52.9	0.478		mg/Kg	1	11/19/2019 4:37:44 PM
Cadmium	0.368	0.239		mg/Kg	1	11/19/2019 4:37:44 PM
Chromium	10.1	0.478		mg/Kg	1	11/19/2019 4:37:44 PM
Lead	10.9	0.478		mg/Kg	1	11/19/2019 4:37:44 PM
Strontium	16.9	0.478		mg/Kg	1	11/19/2019 4:37:44 PM
Zinc	29.5	0.478		mg/Kg	1	11/19/2019 4:37:44 PM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	106	49.4		mg/Kg-dry	1	11/22/2019 7:06:27 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

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WO#: **19110451**

Date Reported: **12/5/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/5/2019 11:15:00 AM

Project: Henning Management 0526033

Lab ID: 19110451-012 **Matrix:** SOIL

Client Sample ID H-7 6-8'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXL**
Percent Moisture	17.1	1.00		wt%	1	11/12/2019 3:35:00 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

(consolidated)

WO#: **19110451**

Date Reported: **12/5/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/5/2019 11:25:00 AM

Project: Henning Management 0526033

Lab ID: 19110451-013 **Matrix:** SOIL

Client Sample ID H-7 10-12'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXL**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	30.7	0.100		meq/100g	1	11/25/2019
29B SALTS				**LDNR 29-B**		Analyst: **BXL**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	1.73	0.10		mmhos/cm	1	11/15/2019 1:41:00 PM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXL**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	8.66	0.10		%	1	11/25/2019
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	7.22	0.10			1	11/19/2019
Soluble Calcium	2.74	0.02		meq/L	1	11/19/2019
Soluble Magnesium	1.46	0.05		meq/L	1	11/19/2019
Soluble Sodium	10.5	0.25		meq/L	1	11/19/2019
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.0988	0.0988		mg/Kg	1	11/19/2019 9:42:19 AM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	6.11	0.978		mg/Kg	1	11/19/2019 4:43:35 PM
Barium	71.6	0.489		mg/Kg	1	11/19/2019 4:43:35 PM
Cadmium	0.371	0.244		mg/Kg	1	11/19/2019 4:43:35 PM
Chromium	16.8	0.489		mg/Kg	1	11/19/2019 4:43:35 PM
Lead	9.28	0.489		mg/Kg	1	11/19/2019 4:43:35 PM
Strontium	60.8	0.489		mg/Kg	1	11/19/2019 4:43:35 PM
Zinc	53.1	0.489		mg/Kg	1	11/19/2019 4:43:35 PM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	225	46.8		mg/Kg-dry	1	11/22/2019 7:10:54 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

(consolidated)

WO#: **19110451**

Date Reported: **12/5/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/5/2019 11:25:00 AM

Project: Henning Management 0526033

Lab ID: 19110451-013 **Matrix:** SOIL

Client Sample ID H-7 10-12'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXL**
Percent Moisture	18.1	1.00		wt%	1	11/12/2019 3:35:00 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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WO#: **19110451**

Date Reported: **12/5/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/5/2019 11:35:00 AM

Project: Henning Management 0526033

Lab ID: 19110451-014 **Matrix:** SOIL

Client Sample ID H-7 14-16'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
ELECTRICAL CONDUCTIVITY @ SATURATION				**LDNR 29-B**		Analyst: **BXL**
Electrical Conductivity	2.64	0.10		mmhos/cm	1	11/15/2019 1:41:00 PM
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXL**
Percent Moisture	23.2	1.00		wt%	1	11/12/2019 3:35:00 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

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WO#: **19110451**

Date Reported: **12/5/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/5/2019 12:55:00 PM

Project: Henning Management 0526033

Lab ID: 19110451-015 **Matrix:** SOIL

Client Sample ID H-8 4-6'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXL**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	45.5	0.100		meq/100g	1	11/25/2019
29B SALTS				**LDNR 29-B**		Analyst: **BXL**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	3.04	0.10		mmhos/cm	1	11/15/2019 1:41:00 PM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXL**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	6.31	0.10		%	1	11/25/2019
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	9.27	0.10			1	11/19/2019
Soluble Calcium	4.87	0.02		meq/L	1	11/19/2019
Soluble Magnesium	2.53	0.05		meq/L	1	11/19/2019
Soluble Sodium	17.8	0.25		meq/L	1	11/19/2019
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.109	0.109		mg/Kg	1	11/19/2019 9:44:41 AM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	2.93	0.994		mg/Kg	1	11/19/2019 4:47:08 PM
Barium	251	0.497		mg/Kg	1	11/19/2019 4:47:08 PM
Cadmium	< 0.249	0.249		mg/Kg	1	11/19/2019 4:47:08 PM
Chromium	8.64	0.497		mg/Kg	1	11/19/2019 4:47:08 PM
Lead	6.84	0.497		mg/Kg	1	11/19/2019 4:47:08 PM
Strontium	24.4	0.497		mg/Kg	1	11/19/2019 4:47:08 PM
Zinc	14.0	0.497		mg/Kg	1	11/19/2019 4:47:08 PM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	341	49.0		mg/Kg-dry	1	11/22/2019 7:15:19 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

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WO#: **19110451**

Date Reported: **12/5/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/5/2019 12:55:00 PM

Project: Henning Management 0526033

Lab ID: 19110451-015 **Matrix:** SOIL

Client Sample ID H-8 4-6'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXL**
Percent Moisture	18.6	1.00		wt%	1	11/12/2019 3:35:00 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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WO#: **19110451**

Date Reported: **12/5/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/5/2019 1:00:00 PM

Project: Henning Management 0526033

Lab ID: 19110451-016 **Matrix:** SOIL

Client Sample ID H-8 6-8'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXL**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	33.7	0.100		meq/100g	1	11/25/2019
29B SALTS				**LDNR 29-B**		Analyst: **BXL**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	2.72	0.10		mmhos/cm	1	11/15/2019 1:41:00 PM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXL**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	6.99	0.10		%	1	11/25/2019
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	7.43	0.10			1	11/19/2019
Soluble Calcium	5.04	0.02		meq/L	1	11/19/2019
Soluble Magnesium	2.64	0.05		meq/L	1	11/19/2019
Soluble Sodium	14.6	0.25		meq/L	1	11/19/2019
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.108	0.108		mg/Kg	1	11/19/2019 9:46:59 AM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	2.52	0.965		mg/Kg	1	11/19/2019 4:50:38 PM
Barium	226	0.483		mg/Kg	1	11/19/2019 4:50:38 PM
Cadmium	< 0.241	0.241		mg/Kg	1	11/19/2019 4:50:38 PM
Chromium	6.80	0.483		mg/Kg	1	11/19/2019 4:50:38 PM
Lead	5.24	0.483		mg/Kg	1	11/19/2019 4:50:38 PM
Strontium	19.3	0.483		mg/Kg	1	11/19/2019 4:50:38 PM
Zinc	16.4	0.483		mg/Kg	1	11/19/2019 4:50:38 PM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	319	49.6		mg/Kg-dry	1	11/22/2019 7:19:46 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

(consolidated)

WO#: **19110451**

Date Reported: **12/5/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/5/2019 1:00:00 PM

Project: Henning Management 0526033

Lab ID: 19110451-016 **Matrix:** SOIL

Client Sample ID H-8 6-8'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXL**
Percent Moisture	15.6	1.00		wt%	1	11/12/2019 3:35:00 PM

Qualifiers:				
	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	H	Holding times for preparation or analysis exceeded	M	Matrix Interference
	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
	RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
	SDL	Sample detection limit	U	Analyte not detected
	W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

(consolidated)

WO#: **19110451**

Date Reported: **12/5/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/5/2019 1:10:00 PM

Project: Henning Management 0526033

Lab ID: 19110451-017 **Matrix:** SOIL

Client Sample ID H-8 10-12'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXL**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	28.4	0.100		meq/100g	1	11/25/2019
29B SALTS				**LDNR 29-B**		Analyst: **BXL**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	3.38	0.10		mmhos/cm	1	11/15/2019 1:41:00 PM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXL**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	7.68	0.10		%	1	11/25/2019
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	6.71	0.10			1	11/19/2019
Soluble Calcium	8.57	0.02		meq/L	1	11/19/2019
Soluble Magnesium	4.21	0.05		meq/L	1	11/19/2019
Soluble Sodium	17.0	0.25		meq/L	1	11/19/2019
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.104	0.104		mg/Kg	1	11/19/2019 9:49:18 AM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	7.61	0.964		mg/Kg	1	11/19/2019 4:54:02 PM
Barium	29.1	0.482		mg/Kg	1	11/19/2019 4:54:02 PM
Cadmium	0.598	0.241		mg/Kg	1	11/19/2019 4:54:02 PM
Chromium	7.51	0.482		mg/Kg	1	11/19/2019 4:54:02 PM
Lead	5.53	0.482		mg/Kg	1	11/19/2019 4:54:02 PM
Strontium	457	4.82		mg/Kg	10	11/20/2019 7:43:26 PM
Zinc	27.3	0.482		mg/Kg	1	11/19/2019 4:54:02 PM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	119	48.7		mg/Kg-dry	1	11/22/2019 7:24:11 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

(consolidated)

WO#: **19110451**

Date Reported: **12/5/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/5/2019 1:10:00 PM

Project: Henning Management 0526033

Lab ID: 19110451-017 **Matrix:** SOIL

Client Sample ID H-8 10-12'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXL**
Percent Moisture	18.1	1.00		wt%	1	11/12/2019 3:35:00 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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WO#: **19110451**

Date Reported: **12/5/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/5/2019 1:20:00 PM

Project: Henning Management 0526033

Lab ID: 19110451-018 **Matrix:** SOIL

Client Sample ID H-8 14-16'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
ELECTRICAL CONDUCTIVITY @ SATURATION				**LDNR 29-B**		Analyst: **BXL**
Electrical Conductivity	3.54	0.10		mmhos/cm	1	11/15/2019 1:41:00 PM
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXL**
Percent Moisture	20.9	1.00		wt%	1	11/12/2019 3:35:00 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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WO#: **19110451**

Date Reported: **12/5/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/5/2019 3:20:00 PM

Project: Henning Management 0526033

Lab ID: 19110451-019 **Matrix:** SOIL

Client Sample ID H-9 4-6'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXL**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	28.6	0.100		meq/100g	1	11/25/2019
29B SALTS				**LDNR 29-B**		Analyst: **BXL**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	0.26	0.10		mmhos/cm	1	11/15/2019 1:41:00 PM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXL**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	27.2	0.10	*	%	1	11/25/2019
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	2.56	0.10			1	11/19/2019
Soluble Calcium	0.46	0.02		meq/L	1	11/19/2019
Soluble Magnesium	0.48	0.05		meq/L	1	11/19/2019
Soluble Sodium	1.76	0.25		meq/L	1	11/19/2019
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.106	0.106		mg/Kg	1	11/19/2019 9:51:36 AM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	1.15	1.01		mg/Kg	1	11/22/2019 2:36:37 AM
Barium	59.7	0.507		mg/Kg	1	11/22/2019 2:36:37 AM
Cadmium	< 0.254	0.254		mg/Kg	1	11/22/2019 2:36:37 AM
Chromium	4.25	0.507		mg/Kg	1	11/22/2019 2:36:37 AM
Lead	6.91	0.507		mg/Kg	1	11/22/2019 2:36:37 AM
Strontium	17.1	0.507		mg/Kg	1	11/22/2019 2:36:37 AM
Zinc	8.34	0.507		mg/Kg	1	11/22/2019 2:36:37 AM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	85.1	48.1		mg/Kg-dry	1	11/22/2019 7:28:37 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

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WO#: **19110451**

Date Reported: **12/5/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/5/2019 3:20:00 PM

Project: Henning Management 0526033

Lab ID: 19110451-019 **Matrix:** SOIL

Client Sample ID H-9 4-6'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXL**
Percent Moisture	17.7	1.00		wt%	1	11/12/2019 3:35:00 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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WO#: **19110451**

Date Reported: **12/5/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/5/2019 3:30:00 PM

Project: Henning Management 0526033

Lab ID: 19110451-020 **Matrix:** SOIL

Client Sample ID H-9 8-10'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXL**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	33.0	0.100		meq/100g	1	11/25/2019
29B SALTS				**LDNR 29-B**		Analyst: **BXL**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	0.32	0.10		mmhos/cm	1	11/15/2019 1:41:00 PM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXL**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	19.9	0.10	*	%	1	11/25/2019
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	3.50	0.10			1	11/19/2019
Soluble Calcium	0.36	0.02		meq/L	1	11/19/2019
Soluble Magnesium	0.50	0.05		meq/L	1	11/19/2019
Soluble Sodium	2.29	0.25		meq/L	1	11/19/2019
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.104	0.104		mg/Kg	1	11/19/2019 9:53:54 AM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	4.80	1.02		mg/Kg	1	11/22/2019 2:54:01 AM
Barium	58.0	0.508		mg/Kg	1	11/22/2019 2:54:01 AM
Cadmium	< 0.254	0.254		mg/Kg	1	11/22/2019 2:54:01 AM
Chromium	7.16	0.508		mg/Kg	1	11/22/2019 2:54:01 AM
Lead	7.10	0.508		mg/Kg	1	11/22/2019 2:54:01 AM
Strontium	17.0	0.508		mg/Kg	1	11/22/2019 2:54:01 AM
Zinc	22.0	0.508		mg/Kg	1	11/22/2019 2:54:01 AM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	209	48.4		mg/Kg-dry	1	11/22/2019 7:33:03 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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WO#: **19110451**

Date Reported: **12/5/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/5/2019 3:30:00 PM

Project: Henning Management 0526033

Lab ID: 19110451-020 **Matrix:** SOIL

Client Sample ID H-9 8-10'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXL**
Percent Moisture	17.2	1.00		wt%	1	11/12/2019 3:35:00 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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WO#: **19110451**

Date Reported: **12/5/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/5/2019 3:35:00 PM

Project: Henning Management 0526033

Lab ID: 19110451-021 **Matrix:** SOIL

Client Sample ID H-9 10-12'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXL**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	24.8	0.100		meq/100g	1	11/25/2019
29B SALTS				**LDNR 29-B**		Analyst: **BXL**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	0.60	0.10		mmhos/cm	1	11/15/2019 2:00:00 PM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXL**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	12.4	0.10		%	1	11/25/2019
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	7.97	0.10			1	11/19/2019
Soluble Calcium	0.51	0.02		meq/L	1	11/19/2019
Soluble Magnesium	0.24	0.05		meq/L	1	11/19/2019
Soluble Sodium	4.89	0.25		meq/L	1	11/19/2019
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.108	0.108		mg/Kg	1	11/19/2019 9:56:12 AM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	1.90	1.00		mg/Kg	1	11/22/2019 2:59:48 AM
Barium	30.1	0.502		mg/Kg	1	11/22/2019 2:59:48 AM
Cadmium	< 0.251	0.251		mg/Kg	1	11/22/2019 2:59:48 AM
Chromium	8.06	0.502		mg/Kg	1	11/22/2019 2:59:48 AM
Lead	3.37	0.502		mg/Kg	1	11/22/2019 2:59:48 AM
Strontium	50.3	0.502		mg/Kg	1	11/22/2019 2:59:48 AM
Zinc	33.2	0.502		mg/Kg	1	11/22/2019 2:59:48 AM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	149	45.8		mg/Kg-dry	1	11/22/2019 7:37:28 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

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WO#: **19110451**

Date Reported: **12/5/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/5/2019 3:35:00 PM

Project: Henning Management 0526033

Lab ID: 19110451-021 **Matrix:** SOIL

Client Sample ID H-9 10-12'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXL**
Percent Moisture	19.4	1.00		wt%	1	11/12/2019 4:05:00 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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WO#: **19110451**

Date Reported: **12/5/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/6/2019 3:15:00 PM

Project: Henning Management 0526033

Lab ID: 19110451-022 **Matrix:** SOIL

Client Sample ID H-10 4-6'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXL**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	35.3	0.100		meq/100g	1	11/25/2019
29B SALTS				**LDNR 29-B**		Analyst: **BXL**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	1.09	0.10		mmhos/cm	1	11/15/2019 2:00:00 PM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXL**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	8.79	0.10		%	1	11/25/2019
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	8.18	0.10			1	11/19/2019
Soluble Calcium	1.10	0.02		meq/L	1	11/19/2019
Soluble Magnesium	0.62	0.05		meq/L	1	11/19/2019
Soluble Sodium	7.59	0.25		meq/L	1	11/19/2019
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.101	0.101		mg/Kg	1	11/19/2019 9:58:30 AM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	2.36	1.01		mg/Kg	1	11/22/2019 3:05:45 AM
Barium	27.2	0.506		mg/Kg	1	11/22/2019 3:05:45 AM
Cadmium	< 0.253	0.253		mg/Kg	1	11/22/2019 3:05:45 AM
Chromium	6.16	0.506		mg/Kg	1	11/22/2019 3:05:45 AM
Lead	6.39	0.506		mg/Kg	1	11/22/2019 3:05:45 AM
Strontium	17.0	0.506		mg/Kg	1	11/22/2019 3:05:45 AM
Zinc	11.8	0.506		mg/Kg	1	11/22/2019 3:05:45 AM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	458	46.9		mg/Kg-dry	1	11/22/2019 7:50:37 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

(consolidated)

WO#: **19110451**

Date Reported: **12/5/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/6/2019 3:15:00 PM

Project: Henning Management 0526033

Lab ID: 19110451-022 **Matrix:** SOIL

Client Sample ID H-10 4-6'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXL**
Percent Moisture	18.6	1.00		wt%	1	11/12/2019 4:05:00 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

(consolidated)

WO#: **19110451**

Date Reported: **12/5/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/6/2019 3:25:00 PM

Project: Henning Management 0526033

Lab ID: 19110451-023 **Matrix:** SOIL

Client Sample ID H-10 8-10'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXL**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	28.8	0.100		meq/100g	1	11/25/2019
29B SALTS				**LDNR 29-B**		Analyst: **BXL**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	1.21	0.10		mmhos/cm	1	11/15/2019 2:00:00 PM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXL**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	4.47	0.10		%	1	11/25/2019
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	4.83	0.10			1	11/19/2019
Soluble Calcium	2.34	0.02		meq/L	1	11/19/2019
Soluble Magnesium	1.31	0.05		meq/L	1	11/19/2019
Soluble Sodium	6.52	0.25		meq/L	1	11/19/2019
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.108	0.108		mg/Kg	1	11/19/2019 10:00:49 AM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	6.53	0.998		mg/Kg	1	12/4/2019 5:03:30 PM
Barium	392	0.499		mg/Kg	1	12/4/2019 5:03:30 PM
Cadmium	< 0.249	0.249		mg/Kg	1	12/4/2019 5:03:30 PM
Chromium	10.1	0.499		mg/Kg	1	12/4/2019 5:03:30 PM
Lead	9.55	0.499		mg/Kg	1	12/4/2019 5:03:30 PM
Strontium	22.9	0.499		mg/Kg	1	12/4/2019 5:03:30 PM
Zinc	33.4	0.499		mg/Kg	1	12/4/2019 5:03:30 PM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	131	45.7		mg/Kg-dry	1	12/3/2019 11:38:09 PM

Qualifiers:

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H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

(consolidated)

WO#: **19110451**

Date Reported: **12/5/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/6/2019 3:25:00 PM

Project: Henning Management 0526033

Lab ID: 19110451-023 **Matrix:** SOIL

Client Sample ID H-10 8-10'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXL**
Percent Moisture	18.1	1.00		wt%	1	11/12/2019 4:05:00 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

(consolidated)

WO#: **19110451**

Date Reported: **12/5/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/6/2019 4:25:00 PM

Project: Henning Management 0526033

Lab ID: 19110451-024 **Matrix:** SOIL

Client Sample ID H-10 32-34'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
ELECTRICAL CONDUCTIVITY @ SATURATION				**LDNR 29-B**		Analyst: **BXL**
Electrical Conductivity	1.88	0.10		mmhos/cm	1	11/15/2019 2:00:00 PM
INORGANIC ANIONS, SPLP LEACHED BY SW1312/9056A				**SW9056A**		Analyst: **SGP**
Chloride	9.96	1.25		mg/L	5	11/19/2019 11:59:22 AM
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXL**
Percent Moisture	19.6	1.00		wt%	1	11/12/2019 4:05:00 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.
H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit
RL	Reporting Limit
SDL	Sample detection limit
W	Sample container temperature is out of limit as specified at testcode
B	Analyte detected in the associated Method Blank
M	Matrix Interference
R	RPD outside accepted recovery limits
S	Spike Recovery outside accepted recovery limits
U	Analyte not detected

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Analytical Report

(consolidated)

WO#: **19110451**

Date Reported: **12/5/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/6/2019 4:40:00 PM

Project: Henning Management 0526033

Lab ID: 19110451-025 **Matrix:** SOIL

Client Sample ID H-10 38-40'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
ELECTRICAL CONDUCTIVITY @ SATURATION				**LDNR 29-B**		Analyst: **BXL**
Electrical Conductivity	1.99	0.10		mmhos/cm	1	11/15/2019 2:00:00 PM
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXL**
Percent Moisture	19.7	1.00		wt%	1	11/12/2019 4:05:00 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.
H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit
RL	Reporting Limit
SDL	Sample detection limit
W	Sample container temperature is out of limit as specified at testcode
B	Analyte detected in the associated Method Blank
M	Matrix Interference
R	RPD outside accepted recovery limits
S	Spike Recovery outside accepted recovery limits
U	Analyte not detected

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Analytical Report

(consolidated)

WO#: **19110451**

Date Reported: **12/5/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/8/2019 10:45:00 AM

Project: Henning Management 0526033

Lab ID: 19110451-026 **Matrix:** SOIL

Client Sample ID H-9 30-32'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
ELECTRICAL CONDUCTIVITY @ SATURATION				**LDNR 29-B**		Analyst: **BXL**
Electrical Conductivity	0.80	0.10		mmhos/cm	1	11/15/2019 2:00:00 PM
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXL**
Percent Moisture	16.3	1.00		wt%	1	11/12/2019 4:05:00 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.
H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit
RL	Reporting Limit
SDL	Sample detection limit
W	Sample container temperature is out of limit as specified at testcode
B	Analyte detected in the associated Method Blank
M	Matrix Interference
R	RPD outside accepted recovery limits
S	Spike Recovery outside accepted recovery limits
U	Analyte not detected

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Analytical Report

(consolidated)

WO#: **19110451**

Date Reported: **12/5/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/8/2019 11:30:00 AM

Project: Henning Management 0526033

Lab ID: 19110451-027 **Matrix:** SOIL

Client Sample ID H-9 48-50'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
ELECTRICAL CONDUCTIVITY @ SATURATION				**LDNR 29-B**		Analyst: **BXL**
Electrical Conductivity	15.6	0.10	*	mmhos/cm	1	11/15/2019 2:00:00 PM
INORGANIC ANIONS, SPLP LEACHED BY SW1312/9056A				**SW9056A**		Analyst: **SGP**
Chloride	105	2.50		mg/L	10	11/19/2019 12:13:06 PM
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXL**
Percent Moisture	18.6	1.00		wt%	1	11/12/2019 4:05:00 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

(consolidated)

WO#: **19110451**

Date Reported: **12/5/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/8/2019 11:35:00 AM

Project: Henning Management 0526033

Lab ID: 19110451-028 **Matrix:** SOIL

Client Sample ID H-9 50-52'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
ELECTRICAL CONDUCTIVITY @ SATURATION				**LDNR 29-B**		Analyst: **BXL**
Electrical Conductivity	25.4	0.10	*	mmhos/cm	1	11/15/2019 2:00:00 PM
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXL**
Percent Moisture	18.7	1.00		wt%	1	11/12/2019 4:05:00 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

(consolidated)

WO#: **19110451**

Date Reported: **12/5/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/8/2019 11:55:00 AM

Project: Henning Management 0526033

Lab ID: 19110451-029 **Matrix:** SOIL

Client Sample ID H-9 58-60'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
ELECTRICAL CONDUCTIVITY @ SATURATION				**LDNR 29-B**		Analyst: **BXL**
Electrical Conductivity	14.6	0.10	*	mmhos/cm	1	11/15/2019 2:00:00 PM
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXL**
Percent Moisture	33.1	1.00		wt%	1	11/12/2019 4:05:00 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
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QC SUMMARY REPORT

WO#: **19110451**

05-Dec-19

Client: Environmental Resources Management
Project: Henning Management 0526033 **BatchID:** **32260**

Sample ID: **MB-32260**	SampType: **MBLK**	TestCode: **HG_S_7471A**	Units: **mg/Kg**	Prep Date: **11/18/2019**	RunNo: **83838**
Client ID: **PBS**	Batch ID: **32260**	TestNo: **SW7471A**	**SW7471A**	Analysis Date: **11/19/2019**	SeqNo: **2099604**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	< 0.100	0.100									

Sample ID: **LCS-32260**	SampType: **LCS**	TestCode: **HG_S_7471A**	Units: **mg/Kg**	Prep Date: **11/18/2019**	RunNo: **83838**
Client ID: **LCSS**	Batch ID: **32260**	TestNo: **SW7471A**	**SW7471A**	Analysis Date: **11/19/2019**	SeqNo: **2099606**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	1.01	0.100	0.8330	0	121	80	120				S

Sample ID: **LCSD-32260**	SampType: **LCSD**	TestCode: **HG_S_7471A**	Units: **mg/Kg**	Prep Date: **11/18/2019**	RunNo: **83838**
Client ID: **LCSS02**	Batch ID: **32260**	TestNo: **SW7471A**	**SW7471A**	Analysis Date: **11/19/2019**	SeqNo: **2099609**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	1.00	0.100	0.8330	0	121	80	120	1.008	0.285	20	S

NOTES:
S - High recovery(ies) indicate high bias. Data deemed acceptable as the specific target analyte(s) were not observed in the field sample(s).

Sample ID: **19110308-001AMS**	SampType: **MS**	TestCode: **HG_S_7471A**	Units: **mg/Kg**	Prep Date: **11/18/2019**	RunNo: **83838**
Client ID: **ZZZZZZ**	Batch ID: **32260**	TestNo: **SW7471A**	**SW7471A**	Analysis Date: **11/19/2019**	SeqNo: **2099615**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	1.07	0.105	0.8736	0.04027	118	75	125				

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceed
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **19110451**

05-Dec-19

Client: Environmental Resources Management
Project: Henning Management 0526033 **BatchID:** **32260**

Sample ID: **19110308-001AMSD** SampType: **MSD** TestCode: **HG_S_7471A** Units: **mg/Kg** Prep Date: **11/18/2019** RunNo: **83838**
Client ID: **ZZZZZZ** Batch ID: **32260** TestNo: **SW7471A** **SW7471A** Analysis Date: **11/19/2019** SeqNo: **2099621**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	1.07	0.105	0.8726	0.04027	118	75	125	1.070	0.171	20	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceed
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **19110451**

05-Dec-19

Client: Environmental Resources Management
Project: Henning Management 0526033 **BatchID:** **32266**

Sample ID: **MB-32266** SampType: **MBLK** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/18/2019** RunNo: **83858**
Client ID: **PBS** Batch ID: **32266** TestNo: **SW6010B** **SW3050B** Analysis Date: **11/19/2019** SeqNo: **2099796**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	< 1.00	1.00									
Barium	< 0.500	0.500									
Cadmium	< 0.250	0.250									
Chromium	< 0.500	0.500									
Lead	< 0.500	0.500									
Strontium	< 0.500	0.500									
Zinc	< 0.500	0.500									

Sample ID: **LCS-32266** SampType: **LCS** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/18/2019** RunNo: **83858**
Client ID: **LCSS** Batch ID: **32266** TestNo: **SW6010B** **SW3050B** Analysis Date: **11/19/2019** SeqNo: **2099797**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	23.8	1.00	25.00	0	95.0	80	120				
Barium	24.6	0.500	25.00	0	98.5	80	120				
Cadmium	24.6	0.250	25.00	0	98.3	80	120				
Chromium	24.7	0.500	25.00	0	98.9	80	120				
Lead	24.7	0.500	25.00	0	98.8	80	120				
Strontium	24.9	0.500	25.00	0	99.5	80	120				
Zinc	24.6	0.500	25.00	0	98.6	80	120				

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceed
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
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QC SUMMARY REPORT

WO#: **19110451**

05-Dec-19

Client: Environmental Resources Management
Project: Henning Management 0526033 **BatchID:** **32266**

Sample ID: **LCSD-32266**	SampType: **LCSD**	TestCode: **6010_S**	Units: **mg/Kg**	Prep Date: **11/18/2019**	RunNo: **83858**
Client ID: **LCSS02**	Batch ID: **32266**	TestNo: **SW6010B**	**SW3050B**	Analysis Date: **11/19/2019**	SeqNo: **2099798**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	25.0	1.00	25.00	0	99.9	80	120	23.75	5.03	20	
Barium	24.8	0.500	25.00	0	99.0	80	120	24.62	0.567	20	
Cadmium	24.6	0.250	25.00	0	98.3	80	120	24.57	0	20	
Chromium	24.8	0.500	25.00	0	99.1	80	120	24.72	0.202	20	
Lead	24.5	0.500	25.00	0	98.0	80	120	24.69	0.813	20	
Strontium	24.8	0.500	25.00	0	99.4	80	120	24.86	0.101	20	
Zinc	24.7	0.500	25.00	0	98.8	80	120	24.64	0.223	20	

Sample ID: **19110308-001AMS**	SampType: **MS**	TestCode: **6010_S**	Units: **mg/Kg**	Prep Date: **11/18/2019**	RunNo: **83858**
Client ID: **ZZZZZZ**	Batch ID: **32266**	TestNo: **SW6010B**	**SW3050B**	Analysis Date: **11/19/2019**	SeqNo: **2099804**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Strontium	326	48.3	24.15	293.3	135	75	125				S

Sample ID: **19110308-001AMSD**	SampType: **MSD**	TestCode: **6010_S**	Units: **mg/Kg**	Prep Date: **11/18/2019**	RunNo: **83858**
Client ID: **ZZZZZZ**	Batch ID: **32266**	TestNo: **SW6010B**	**SW3050B**	Analysis Date: **11/19/2019**	SeqNo: **2099805**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Strontium	287	48.8	24.39	293.3	-26.2	75	125	326.0	12.8	20	S

NOTES:
S - Analyte concentration in native sample was too high for accurate spike recovery(ies). The method is in control as indicated by the laboratory control sample (LCS).

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceed
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **19110451**

05-Dec-19

Client: Environmental Resources Management
Project: Henning Management 0526033 **BatchID:** **32266**

Sample ID: **19110308-001AMS** SampType: **MS** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/18/2019** RunNo: **83858**
Client ID: **ZZZZZZ** Batch ID: **32266** TestNo: **SW6010B** **SW3050B** Analysis Date: **11/19/2019** SeqNo: **2099810**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	30.0	0.966	24.15	5.767	100	75	125				
Barium	1,420	0.483	24.15	1,147	1,150	75	125				S
Cadmium	23.9	0.241	24.15	0.3182	97.5	75	125				
Chromium	56.4	0.483	24.15	26.40	124	75	125				
Lead	32.3	0.483	24.15	10.98	88.2	75	125				
Zinc	60.5	0.483	24.15	40.11	84.3	75	125				

Sample ID: **19110308-001AMSD** SampType: **MSD** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/18/2019** RunNo: **83858**
Client ID: **ZZZZZZ** Batch ID: **32266** TestNo: **SW6010B** **SW3050B** Analysis Date: **11/19/2019** SeqNo: **2099811**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	30.0	0.976	24.39	5.767	99.5	75	125	29.95	0.307	20	
Barium	1,530	0.488	24.39	1,147	1,570	75	125	1,425	7.10	20	S
Cadmium	23.1	0.244	24.39	0.3182	93.6	75	125	23.87	3.09	20	
Chromium	55.7	0.488	24.39	26.40	120	75	125	56.40	1.32	20	
Lead	29.8	0.488	24.39	10.98	77.1	75	125	32.26	8.01	20	
Zinc	54.1	0.488	24.39	40.11	57.2	75	125	60.46	11.2	20	S

NOTES:
S - Spike recovery indicates matrix interference. The method is in control as indicated by the Lab Control Sample.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceed
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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Website: www.element.com

QC SUMMARY REPORT

WO#: **19110451**

05-Dec-19

Client: Environmental Resources Management
Project: Henning Management 0526033 **BatchID:** **32276**

Sample ID: **19110451-001ADUP** SampType: **DUP** TestCode: **SAR_S** Units: Prep Date: **11/18/2019** RunNo: **83860**
Client ID: **H-3 10-12'** Batch ID: **32276** TestNo: **LDNR 29-B** **LDNR 29-B** Analysis Date: **11/19/2019** SeqNo: **2101043**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sodium Adsorption Ratio	3.09	0.10						3.09	0.07	20	
Soluble Calcium	0.58	0.02						0.59	1.37	20	
Soluble Magnesium	0.30	0.05						0.31	4.15	20	
Soluble Sodium	2.05	0.25						2.07	1.10	20	

Sample ID: **19110451-021ADUP** SampType: **DUP** TestCode: **SAR_S** Units: Prep Date: **11/18/2019** RunNo: **83860**
Client ID: **H-9 10-12'** Batch ID: **32276** TestNo: **LDNR 29-B** **LDNR 29-B** Analysis Date: **11/19/2019** SeqNo: **2101057**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sodium Adsorption Ratio	8.01	0.10						7.97	0.43	20	
Soluble Calcium	0.51	0.02						0.51	0.29	20	
Soluble Magnesium	0.24	0.05						0.24	0.55	20	
Soluble Sodium	4.92	0.25						4.89	0.44	20	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceed
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **19110451**

05-Dec-19

Client: Environmental Resources Management
Project: Henning Management 0526033 **BatchID:** **32297**

Sample ID: **MB-32297**	SampType: **MBLK**	TestCode: **TTBA**	Units: **mg/Kg-dry**	Prep Date: **11/19/2019**	RunNo: **84016**
Client ID: **PBS**	Batch ID: **32297**	TestNo: **LDNR 29-B**		Analysis Date: **11/22/2019**	SeqNo: **2105178**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
True Total Barium	< 50.0	50.0									

Sample ID: **LCS-32297**	SampType: **LCS**	TestCode: **TTBA**	Units: **mg/Kg-dry**	Prep Date: **11/19/2019**	RunNo: **84016**
Client ID: **LCSS**	Batch ID: **32297**	TestNo: **LDNR 29-B**		Analysis Date: **11/22/2019**	SeqNo: **2105179**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
True Total Barium	4,840	50.0	5,000	0	96.9	75	125				

Sample ID: **LCSD-32297**	SampType: **LCSD**	TestCode: **TTBA**	Units: **mg/Kg-dry**	Prep Date: **11/19/2019**	RunNo: **84016**
Client ID: **LCSS02**	Batch ID: **32297**	TestNo: **LDNR 29-B**		Analysis Date: **11/22/2019**	SeqNo: **2105180**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
True Total Barium	4,860	50.0	5,000	0	97.3	75	125	4,842	0.464	20	

Sample ID: **19110399-033AMS**	SampType: **MS**	TestCode: **TTBA**	Units: **mg/Kg-dry**	Prep Date: **11/19/2019**	RunNo: **84016**
Client ID: **ZZZZZZ**	Batch ID: **32297**	TestNo: **LDNR 29-B**		Analysis Date: **11/22/2019**	SeqNo: **2105182**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
True Total Barium	4,650	48.2	4,817	84.03	94.8	75	125				

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceed
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **19110451**

05-Dec-19

Client: Environmental Resources Management
Project: Henning Management 0526033 **BatchID:** **32297**

Sample ID: **19110399-033AMSD** SampType: **MSD** TestCode: **TTBA** Units: **mg/Kg-dry** Prep Date: **11/19/2019** RunNo: **84016**
Client ID: **ZZZZZZ** Batch ID: **32297** TestNo: **LDNR 29-B** Analysis Date: **11/22/2019** SeqNo: **2105183**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
True Total Barium	4,630	49.5	4,946	84.03	92.0	75	125	4,653	0.391	20	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceed
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **19110451**

05-Dec-19

Client: Environmental Resources Management
Project: Henning Management 0526033 **BatchID:** **32314**

Sample ID: **MB-32314** SampType: **MBLK** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/20/2019** RunNo: **83956**
Client ID: **PBS** Batch ID: **32314** TestNo: **SW6010B** **SW3050B** Analysis Date: **11/22/2019** SeqNo: **2103250**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	< 1.00	1.00									
Barium	< 0.500	0.500									
Cadmium	< 0.250	0.250									
Chromium	< 0.500	0.500									
Lead	< 0.500	0.500									
Strontium	< 0.500	0.500									
Zinc	< 0.500	0.500									

Sample ID: **LCS-32314** SampType: **LCS** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/20/2019** RunNo: **83956**
Client ID: **LCSS** Batch ID: **32314** TestNo: **SW6010B** **SW3050B** Analysis Date: **11/22/2019** SeqNo: **2103251**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	22.7	1.00	25.00	0	90.9	80	120				
Barium	24.3	0.500	25.00	0	97.4	80	120				
Cadmium	24.5	0.250	25.00	0	97.9	80	120				
Chromium	24.4	0.500	25.00	0	97.8	80	120				
Lead	23.4	0.500	25.00	0	93.7	80	120				
Strontium	25.7	0.500	25.00	0	103	80	120				
Zinc	24.1	0.500	25.00	0	96.4	80	120				

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceed
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **19110451**

05-Dec-19

Client: Environmental Resources Management
Project: Henning Management 0526033 **BatchID:** **32314**

Sample ID: **LCSD-32314** SampType: **LCSD** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/20/2019** RunNo: **83956**
Client ID: **LCSS02** Batch ID: **32314** TestNo: **SW6010B** **SW3050B** Analysis Date: **11/22/2019** SeqNo: **2103255**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	23.2	1.00	25.00	0	92.9	80	120	22.72	2.18	20	
Barium	24.0	0.500	25.00	0	95.9	80	120	24.34	1.53	20	
Cadmium	24.0	0.250	25.00	0	96.2	80	120	24.48	1.77	20	
Chromium	24.0	0.500	25.00	0	96.0	80	120	24.45	1.82	20	
Lead	22.9	0.500	25.00	0	91.5	80	120	23.44	2.40	20	
Strontium	25.5	0.500	25.00	0	102	80	120	25.74	1.09	20	
Zinc	23.7	0.500	25.00	0	94.9	80	120	24.09	1.48	20	

Sample ID: **19110451-019AMS** SampType: **MS** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/20/2019** RunNo: **83956**
Client ID: **H-9 4-6'** Batch ID: **32314** TestNo: **SW6010B** **SW3050B** Analysis Date: **11/22/2019** SeqNo: **2103257**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	24.0	1.00	25.06	1.146	91.0	75	125				
Barium	71.6	0.501	25.06	59.73	47.2	75	125				S
Cadmium	23.3	0.251	25.06	0.09633	92.7	75	125				
Chromium	30.0	0.501	25.06	4.249	103	75	125				
Lead	29.4	0.501	25.06	6.911	89.7	75	125				
Strontium	42.7	0.501	25.06	17.07	102	75	125				
Zinc	36.6	0.501	25.06	8.335	113	75	125				

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceed
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **19110451**

05-Dec-19

Client: Environmental Resources Management

Project: Henning Management 0526033 **BatchID:** **32314**

Sample ID: **19110451-019AMSD** SampType: **MSD** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/20/2019** RunNo: **83956**

Client ID: **H-9 4-6'** Batch ID: **32314** TestNo: **SW6010B** **SW3050B** Analysis Date: **11/22/2019** SeqNo: **2103258**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	22.9	1.01	25.35	1.146	85.7	75	125	23.96	4.63	20	
Barium	72.3	0.507	25.35	59.73	49.4	75	125	71.56	0.969	20	S
Cadmium	23.5	0.254	25.35	0.09633	92.4	75	125	23.31	0.857	20	
Chromium	30.2	0.507	25.35	4.249	102	75	125	29.95	0.676	20	
Lead	29.8	0.507	25.35	6.911	90.3	75	125	29.38	1.42	20	
Strontium	43.0	0.507	25.35	17.07	102	75	125	42.69	0.615	20	
Zinc	37.0	0.507	25.35	8.335	113	75	125	36.59	0.974	20	

NOTES:

S - Spike recovery indicates matrix interference. The method is in control as indicated by the Lab Control Sample.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceed
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **19110451**

05-Dec-19

Client: Environmental Resources Management

Project: Henning Management 0526033 **BatchID:** **32330**

Sample ID:	**19110451-001ADUP**	SampType:	**DUP**	TestCode:	**ESP_S**	Units:	**%**	Prep Date:	**11/21/2019**	RunNo:	**84017**
Client ID:	**H-3 10-12'**	Batch ID:	**32330**	TestNo:	**LDNR 29-B**	**LDNR 29-B**		Analysis Date:	**11/25/2019**	SeqNo:	**2105275**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Exchangeable Sodium %	2.36	0.10						2.36	0	20	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceed
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **19110451**

05-Dec-19

Client: Environmental Resources Management
Project: Henning Management 0526033 **BatchID:** **32331**

Sample ID: **LCS-32331**	SampType: **LCS**	TestCode: **CEC**	Units: **meq/100g**	Prep Date: **11/21/2019**	RunNo: **84017**
Client ID: **LCSS**	Batch ID: **32331**	TestNo: **LDNR 29-B**	**LDNR 29-B**	Analysis Date: **11/25/2019**	SeqNo: **2105218**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Cation Exchange Capacity	22.3	0.100	25.00	0	89.1	76	124				

Sample ID: **LCSD-32331**	SampType: **LCSD**	TestCode: **CEC**	Units: **meq/100g**	Prep Date: **11/21/2019**	RunNo: **84017**
Client ID: **LCSS02**	Batch ID: **32331**	TestNo: **LDNR 29-B**	**LDNR 29-B**	Analysis Date: **11/25/2019**	SeqNo: **2105219**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Cation Exchange Capacity	22.3	0.100	25.00	0	89.1	76	124	22.26	0.0391	20	

Sample ID: **19110451-001ADUP**	SampType: **DUP**	TestCode: **CEC**	Units: **meq/100g**	Prep Date: **11/21/2019**	RunNo: **84017**
Client ID: **H-3 10-12'**	Batch ID: **32331**	TestNo: **LDNR 29-B**	**LDNR 29-B**	Analysis Date: **11/25/2019**	SeqNo: **2105221**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Cation Exchange Capacity	36.8	0.100						36.59	0.474	20	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceed
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **19110451**

05-Dec-19

Client: Environmental Resources Management
Project: Henning Management 0526033 **BatchID:** **32332**

Sample ID: **19110451-021ADUP** SampType: **DUP** TestCode: **ESP_S** Units: **%** Prep Date: **11/21/2019** RunNo: **84017**
Client ID: **H-9 10-12'** Batch ID: **32332** TestNo: **LDNR 29-B** **LDNR 29-B** Analysis Date: **11/25/2019** SeqNo: **2105289**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Exchangeable Sodium %	12.4	0.10						12.42	0.35	20	

Sample ID: **19110518-001ADUP** SampType: **DUP** TestCode: **ESP_S** Units: **%** Prep Date: **11/21/2019** RunNo: **84017**
Client ID: **ZZZZZZ** Batch ID: **32332** TestNo: **LDNR 29-B** **LDNR 29-B** Analysis Date: **11/25/2019** SeqNo: **2105298**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Exchangeable Sodium %	0.53	0.10						0.63	17.3	20	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceed
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **19110451**

05-Dec-19

Client: Environmental Resources Management
Project: Henning Management 0526033 **BatchID:** **32333**

Sample ID: **19110451-021ADUP** SampType: **DUP** TestCode: **CEC** Units: **meq/100g** Prep Date: **11/21/2019** RunNo: **84017**
Client ID: **H-9 10-12'** Batch ID: **32333** TestNo: **LDNR 29-B** **LDNR 29-B** Analysis Date: **11/25/2019** SeqNo: **2105235**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Cation Exchange Capacity	25.1	0.100						24.79	1.15	20	

Sample ID: **LCS-32333** SampType: **LCS** TestCode: **CEC** Units: **meq/100g** Prep Date: **11/21/2019** RunNo: **84017**
Client ID: **LCSS** Batch ID: **32333** TestNo: **LDNR 29-B** **LDNR 29-B** Analysis Date: **11/25/2019** SeqNo: **2105238**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Cation Exchange Capacity	21.8	0.100	25.00	0	87.0	76	124				

Sample ID: **LCSD-32333** SampType: **LCSD** TestCode: **CEC** Units: **meq/100g** Prep Date: **11/21/2019** RunNo: **84017**
Client ID: **LCSS02** Batch ID: **32333** TestNo: **LDNR 29-B** **LDNR 29-B** Analysis Date: **11/25/2019** SeqNo: **2105239**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Cation Exchange Capacity	21.4	0.100	25.00	0	85.4	76	124	21.75	1.82	20	

Sample ID: **19110518-001ADUP** SampType: **DUP** TestCode: **CEC** Units: **meq/100g** Prep Date: **11/21/2019** RunNo: **84017**
Client ID: **ZZZZZZ** Batch ID: **32333** TestNo: **LDNR 29-B** **LDNR 29-B** Analysis Date: **11/25/2019** SeqNo: **2105246**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Cation Exchange Capacity	20.4	0.100						20.00	1.81	20	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceed
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **19110451**

05-Dec-19

Client: Environmental Resources Management

Project: Henning Management 0526033 **BatchID:** **32425**

Sample ID: **MB-32425** SampType: **MBLK** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **12/3/2019** RunNo: **84247**

Client ID: **PBS** Batch ID: **32425** TestNo: **SW6010B** **SW3050B** Analysis Date: **12/4/2019** SeqNo: **2111382**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	< 1.00	1.00									
Barium	< 0.500	0.500									
Cadmium	< 0.250	0.250									
Chromium	< 0.500	0.500									
Lead	< 0.500	0.500									
Strontium	< 0.500	0.500									
Zinc	< 0.500	0.500									

Sample ID: **LCS-32425** SampType: **LCS** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **12/3/2019** RunNo: **84247**

Client ID: **LCSS** Batch ID: **32425** TestNo: **SW6010B** **SW3050B** Analysis Date: **12/4/2019** SeqNo: **2111383**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	24.6	1.00	25.00	0	98.4	80	120				
Barium	25.0	0.500	25.00	0	100	80	120				
Cadmium	24.7	0.250	25.00	0	98.9	80	120				
Chromium	24.9	0.500	25.00	0	99.6	80	120				
Lead	24.8	0.500	25.00	0	99.2	80	120				
Strontium	25.1	0.500	25.00	0	101	80	120				
Zinc	24.8	0.500	25.00	0	99.0	80	120				

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceed
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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Website: www.element.com

QC SUMMARY REPORT

WO#: **19110451**

05-Dec-19

Client: Environmental Resources Management

Project: Henning Management 0526033 **BatchID:** **32425**

Sample ID: **LCSD-32425** SampType: **LCSD** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **12/3/2019** RunNo: **84247**

Client ID: **LCSS02** Batch ID: **32425** TestNo: **SW6010B** **SW3050B** Analysis Date: **12/4/2019** SeqNo: **2111384**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	24.2	1.00	25.00	0	96.7	80	120	24.60	1.72	20	
Barium	24.5	0.500	25.00	0	97.8	80	120	24.99	2.14	20	
Cadmium	24.2	0.250	25.00	0	97.0	80	120	24.73	1.96	20	
Chromium	24.4	0.500	25.00	0	97.5	80	120	24.90	2.11	20	
Lead	24.4	0.500	25.00	0	97.8	80	120	24.80	1.42	20	
Strontium	24.9	0.500	25.00	0	99.6	80	120	25.13	0.960	20	
Zinc	24.3	0.500	25.00	0	97.2	80	120	24.76	1.88	20	

Sample ID: **19110959-001AMS** SampType: **MS** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **12/3/2019** RunNo: **84247**

Client ID: **ZZZZZZ** Batch ID: **32425** TestNo: **SW6010B** **SW3050B** Analysis Date: **12/4/2019** SeqNo: **2111390**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	24.8	0.979	24.47	2.325	92.0	75	125				
Barium	58.1	0.489	24.47	24.10	139	75	125				S
Cadmium	22.3	0.245	24.47	0.09107	90.7	75	125				
Chromium	32.1	0.489	24.47	6.116	106	75	125				
Lead	28.0	0.489	24.47	6.677	87.2	75	125				
Strontium	42.5	0.489	24.47	17.79	101	75	125				
Zinc	44.6	0.489	24.47	15.81	118	75	125				

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceed
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **19110451**

05-Dec-19

Client: Environmental Resources Management

Project: Henning Management 0526033 **BatchID:** **32425**

Sample ID: **19110959-001AMSD** SampType: **MSD** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **12/3/2019** RunNo: **84247**

Client ID: **ZZZZZZ** Batch ID: **32425** TestNo: **SW6010B** **SW3050B** Analysis Date: **12/4/2019** SeqNo: **2111391**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	24.5	0.993	24.84	2.325	89.3	75	125	24.83	1.35	20	
Barium	58.5	0.497	24.84	24.10	139	75	125	58.09	0.728	20	S
Cadmium	22.5	0.248	24.84	0.09107	90.4	75	125	22.29	1.14	20	
Chromium	32.3	0.497	24.84	6.116	106	75	125	32.08	0.754	20	
Lead	28.2	0.497	24.84	6.677	86.6	75	125	28.01	0.612	20	
Strontium	42.8	0.497	24.84	17.79	101	75	125	42.48	0.761	20	
Zinc	44.9	0.497	24.84	15.81	117	75	125	44.57	0.817	20	

NOTES:

S - Spike recovery indicates matrix interference. The method is in control as indicated by the Lab Control Sample.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceed
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
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QC SUMMARY REPORT

WO#: **19110451**

05-Dec-19

Client: Environmental Resources Management
Project: Henning Management 0526033 **BatchID:** **32427**

Sample ID: **MB-32427**	SampType: **MBLK**	TestCode: **TTBA**	Units: **mg/Kg-dry**	Prep Date: **12/3/2019**	RunNo: **84211**
Client ID: **PBS**	Batch ID: **32427**	TestNo: **LDNR 29-B**		Analysis Date: **12/3/2019**	SeqNo: **2110607**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
True Total Barium	< 50.0	50.0									

Sample ID: **LCS-32427**	SampType: **LCS**	TestCode: **TTBA**	Units: **mg/Kg-dry**	Prep Date: **12/3/2019**	RunNo: **84211**
Client ID: **LCSS**	Batch ID: **32427**	TestNo: **LDNR 29-B**		Analysis Date: **12/3/2019**	SeqNo: **2110608**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
True Total Barium	4,650	50.0	5,000	0	93.1	75	125				

Sample ID: **LCSD-32427**	SampType: **LCSD**	TestCode: **TTBA**	Units: **mg/Kg-dry**	Prep Date: **12/3/2019**	RunNo: **84211**
Client ID: **LCSS02**	Batch ID: **32427**	TestNo: **LDNR 29-B**		Analysis Date: **12/3/2019**	SeqNo: **2110609**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
True Total Barium	5,080	50.0	5,000	0	102	75	125	4,654	8.65	20	

Sample ID: **19110959-019AMS**	SampType: **MS**	TestCode: **TTBA**	Units: **mg/Kg-dry**	Prep Date: **12/3/2019**	RunNo: **84211**
Client ID: **ZZZZZZ**	Batch ID: **32427**	TestNo: **LDNR 29-B**		Analysis Date: **12/3/2019**	SeqNo: **2110611**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
True Total Barium	5,120	48.6	4,864	159.9	102	75	125				

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceed
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **19110451**

05-Dec-19

Client: Environmental Resources Management
Project: Henning Management 0526033 **BatchID:** **32427**

Sample ID: **19110959-019AMSD** SampType: **MSD** TestCode: **TTBA** Units: **mg/Kg-dry** Prep Date: **12/3/2019** RunNo: **84211**
Client ID: **ZZZZZZ** Batch ID: **32427** TestNo: **LDNR 29-B** Analysis Date: **12/3/2019** SeqNo: **2110612**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
True Total Barium	5,020	48.6	4,859	159.9	100	75	125	5,117	1.92	20	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceed
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **19110451**

05-Dec-19

Client: Environmental Resources Management
Project: Henning Management 0526033 **BatchID:** **32427**

Sample ID: **19110451-023ADUP** SampType: **DUP** TestCode: **TTBA** Units: **mg/Kg-dry** Prep Date: **12/3/2019** RunNo: **84240**
Client ID: **H-10 8-10'** Batch ID: **32427** TestNo: **LDNR 29-B** Analysis Date: **12/3/2019** SeqNo: **2111246**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
True Total Barium	146	46.7						93.93	43.2	20	R

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceed
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **19110451**

05-Dec-19

Client: Environmental Resources Management
Project: Henning Management 0526033 **BatchID:** **R83758**

Sample ID: **MB-R83758**	SampType: **MBLK**	TestCode: **EC_S**	Units: **mmhos/cm**	Prep Date:	RunNo: **83758**
Client ID: **PBS**	Batch ID: **R83758**	TestNo: **LDNR 29-B**		Analysis Date: **11/15/2019**	SeqNo: **2097144**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Electrical Conductivity	< 0.10	0.10									

Sample ID: **LCS1-R83758**	SampType: **LCS1**	TestCode: **EC_S**	Units: **mmhos/cm**	Prep Date:	RunNo: **83758**
Client ID: **ZZZZZZ**	Batch ID: **R83758**	TestNo: **LDNR 29-B**		Analysis Date: **11/15/2019**	SeqNo: **2097145**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Electrical Conductivity	0.39	0.10	0.38	0	102	90.07	109.9				

Sample ID: **LCS2-R83758**	SampType: **LCS2**	TestCode: **EC_S**	Units: **mmhos/cm**	Prep Date:	RunNo: **83758**
Client ID: **ZZZZZZ**	Batch ID: **R83758**	TestNo: **LDNR 29-B**		Analysis Date: **11/15/2019**	SeqNo: **2097146**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Electrical Conductivity	53.0	0.10	53.00	0	100	90	110				

Sample ID: **19110451-001ADUP**	SampType: **DUP**	TestCode: **EC_S**	Units: **mmhos/cm**	Prep Date:	RunNo: **83758**
Client ID: **H-3 10-12'**	Batch ID: **R83758**	TestNo: **LDNR 29-B**		Analysis Date: **11/15/2019**	SeqNo: **2097148**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Electrical Conductivity	0.31	0.10						0.30	0.33	20	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceed
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **19110451**

05-Dec-19

Client: Environmental Resources Management
Project: Henning Management 0526033 **BatchID:** **R83760**

Sample ID: **MB-R83760**	SampType: **MBLK**	TestCode: **EC_S**	Units: **mmhos/cm**	Prep Date:	RunNo: **83760**
Client ID: **PBS**	Batch ID: **R83760**	TestNo: **LDNR 29-B**		Analysis Date: **11/15/2019**	SeqNo: **2097170**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Electrical Conductivity	< 0.10	0.10									

Sample ID: **LCS1-R83760**	SampType: **LCS1**	TestCode: **EC_S**	Units: **mmhos/cm**	Prep Date:	RunNo: **83760**
Client ID: **ZZZZZZ**	Batch ID: **R83760**	TestNo: **LDNR 29-B**		Analysis Date: **11/15/2019**	SeqNo: **2097171**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Electrical Conductivity	0.40	0.10	0.38	0	104	90.07	109.9				

Sample ID: **LCS2-R83760**	SampType: **LCS2**	TestCode: **EC_S**	Units: **mmhos/cm**	Prep Date:	RunNo: **83760**
Client ID: **ZZZZZZ**	Batch ID: **R83760**	TestNo: **LDNR 29-B**		Analysis Date: **11/15/2019**	SeqNo: **2097172**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Electrical Conductivity	53.1	0.10	53.00	0	100	90	110				

Sample ID: **19110451-021ADUP**	SampType: **DUP**	TestCode: **EC_S**	Units: **mmhos/cm**	Prep Date:	RunNo: **83760**
Client ID: **H-9 10-12'**	Batch ID: **R83760**	TestNo: **LDNR 29-B**		Analysis Date: **11/15/2019**	SeqNo: **2097174**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Electrical Conductivity	0.59	0.10						0.60	0.67	20	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceed
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **19110451**

05-Dec-19

Client: Environmental Resources Management
Project: Henning Management 0526033 **BatchID:** **R83769**

Sample ID: **19110451-001ADUP** SampType: **DUP** TestCode: **PMOIST_29B** Units: **wt%** Prep Date: RunNo: **83769**
Client ID: **H-3 10-12'** Batch ID: **R83769** TestNo: **LDNR 29-B** Analysis Date: **11/12/2019** SeqNo: **2097288**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Percent Moisture	17.6	1.00						18.60	5.52	20	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceed
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **19110451**

05-Dec-19

Client: Environmental Resources Management
Project: Henning Management 0526033 **BatchID:** **R83770**

Sample ID: **19110451-021ADUP** SampType: **DUP** TestCode: **PMOIST_29B** Units: **wt%** Prep Date: RunNo: **83770**
Client ID: **H-9 10-12'** Batch ID: **R83770** TestNo: **LDNR 29-B** Analysis Date: **11/12/2019** SeqNo: **2097309**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Percent Moisture	18.6	1.00						19.40	4.21	20	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceed
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **19110451**

05-Dec-19

Client: Environmental Resources Management
Project: Henning Management 0526033 **BatchID:** **R83867**

Sample ID: **MBLK**	SampType: **MBLK**	TestCode: **9056_SPLP**	Units: **mg/L**	Prep Date:	RunNo: **83867**
Client ID: **PBS**	Batch ID: **R83867**	TestNo: **SW9056A**		Analysis Date: **11/19/2019**	SeqNo: **2100088**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	< 0.250	0.250									

Sample ID: **LCS**	SampType: **LCS**	TestCode: **9056_SPLP**	Units: **mg/L**	Prep Date:	RunNo: **83867**
Client ID: **LCSS**	Batch ID: **R83867**	TestNo: **SW9056A**		Analysis Date: **11/19/2019**	SeqNo: **2100089**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	9.86	0.250	10.00	0	98.6	80	120				

Sample ID: **LCSD**	SampType: **LCSD**	TestCode: **9056_SPLP**	Units: **mg/L**	Prep Date:	RunNo: **83867**
Client ID: **LCSS02**	Batch ID: **R83867**	TestNo: **SW9056A**		Analysis Date: **11/19/2019**	SeqNo: **2100090**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	10.1	0.250	10.00	0	101	80	120	9.865	2.43	15	

Sample ID: **19110591-005FMS**	SampType: **MS**	TestCode: **9056_SPLP**	Units: **mg/L**	Prep Date:	RunNo: **83867**
Client ID: **ZZZZZZ**	Batch ID: **R83867**	TestNo: **SW9056A**		Analysis Date: **11/19/2019**	SeqNo: **2100104**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	118	2.50	50.00	69.23	98.2	80	120				

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceed
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **19110451**

05-Dec-19

Client: Environmental Resources Management

Project: Henning Management 0526033 **BatchID:** **R83867**

Sample ID: **19110591-005FMSD** SampType: **MSD** TestCode: **9056_SPLP** Units: **mg/L** Prep Date: RunNo: **83867**

Client ID: **ZZZZZZ** Batch ID: **R83867** TestNo: **SW9056A** Analysis Date: **11/19/2019** SeqNo: **2100105**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	118	2.50	50.00	69.23	98.1	80	120	118.3	0.0169	15	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceed
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
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Sample Log-In Check List

Client Name: **ERM_HOUSTON** Work Order Number: **19110451** RcptNo: **1**

Logged by:	**Danielle Hollier**	**11/12/2019 10:00:00 AM**
Completed By:	**Danielle Hollier**	**11/12/2019 12:18:18 PM**
Reviewed By:	**Caitlin Duplantis**	**11/18/2019 2:51:24 PM**

Chain of Custody

1. Is Chain of Custody complete? Yes ☐ No ☑ Not Present ☐
2. How was the sample delivered? FedEx
   Tracking No.: 7808 5259 3934

Log In

3. Coolers are present? Yes ☑ No ☐ NA ☐
4. Shipping container/cooler in good condition? Yes ☑ No ☐
   Custody seals intact on shipping container/cooler? Yes ☐ No ☐ Not Present ☑
   No. Seal Date: Signed By:
5. Was an attempt made to cool the samples? Yes ☐ No ☐ NA ☑
6. Were all samples received at a temperature of >0° C to 6.0°C Yes ☐ No ☑ NA ☐
   Not required
7. Sample(s) in proper container(s)? Yes ☑ No ☐
8. Sufficient sample volume for indicated test(s)? Yes ☑ No ☐
9. Are samples (except VOA and ONG) properly preserved? Yes ☑ No ☐
10. Was preservative added to bottles? Yes ☐ No ☑ NA ☐
11. Is the headspace in the VOA vials less than 1/4 inch or 6 mm? Yes ☐ No ☐ No VOA Vials ☑
12. Were any sample containers received broken? Yes ☐ No ☑
13. Does paperwork match bottle labels? Yes ☑ No ☐
    (Note discrepancies on chain of custody)
14. Are matrices correctly identified on Chain of Custody? Yes ☑ No ☐
15. Is it clear what analyses were requested? Yes ☑ No ☐
16. Were all holding times able to be met? Yes ☑ No ☐
    (If no, notify customer for authorization.)

Special Handling (if applicable)

17. Was client notified of all discrepancies with this order? Yes ☐ No ☑ NA ☐

Person Notified: Date:
By Whom: Via: ☐ eMail ☐ Phone ☐ Fax ☐ In Person
Regarding:
Client Instructions:

18. Additional remarks:
    Incomplete custody signature(s) prior to receipt by Element personnel

Cooler Information

Cooler No	Temp ºC	Condition	Seal Intact	Seal No	Seal Date	Signed By

element™

Chain of Custody

Laboratory Number: 19110451

Page 1 of 4

Client Information:	Billing Information:	PO Number:	Project Name/Number:
Company Name: ERM	SAME		Henning Management 0526033
Contact Name: Dave Angle		Quote Number:	
Address: 840 W. Sam Houston Pkwy N. Suite 600		Required QC Level	Sampler's Signature: [signature]
City, State Zip: Houston, TX 77024			
Phone Number: 832.786.2478 Ext:	Ext:	Bill Monthly ☐Yes ☐No	Shipping Method: UPS / FedEx / NOW DHL / Element / Hand / Mail
Fax Number:			
E-mail Address: david.angle@erm.com			

Matrix Code
DW = Drinking Water
WW = Waste Water
GW = Ground Water
AQ = Aqueous
OT = Other
SL = Sludge SOL = Solid
O = Oil SO = Soil
F = Food SW = Swab
NG = Natural Gas
NGL = Natural Gas Liquid
PW = Produced Water
CF = Completion Fluid

Which Regulations Apply: ☐RCRA ☐POTW ☐NPDES ☐USDA/FDA ☐RECAP/RISC ☐Drinking Water ☐Distribution ☐Special ☐State ☐Other

Turn Time ☒Standard RUSH ☐1 Day ☐2 Day ☐Other (Rush turn times will incur a surcharge and must be pre-approved by lab.)

Sample ID/Description	Collection Information: Date	Time	Grab / Composite	Matrix	Container: Quantity	Container: Type P=Plastic, G=Glass, V=Vial	Pres.: HCl, HNO_3, H_2SO_4, NaOH, $Na_2S_2O_3$	Requested Tests: EC	% Moisture	CEC/ESP/SAR	8RCRA Metals	SPLP CJ	Comments
H-3 10-12'	10/31/19	1450	G	SO	1	P	None	X	X	X	X		Metals: As, Ba, TTBa, Cd, Cr, Sr, Zn, Pb, Hg
H-3 20-22'		1515						X	X			X	
H-3 38-40'		1600						X	X				
H-4 4-6'	11/4/19	1335	G	SO	1	P	None	X	X	X	X		
H-4 16-18'		1405						X	X				
H-5 4-6'		1605						X	X	X	X		
H-5 10-12'		1620						X	X	X	X		
H-5 14-16		1630						X	X				
H-6 6-8'	11/5/19	920	G	SO	1	P	None	X	X	X	X		

7889525939364

	Relinquished by	Date/Time	Received by	Date/Time
1	[signature]	11/9/19 1600		
2				
3	FedEx	11-12-19 1000	[signature]	11-12-19 1000

Field Notes:

Received at lab on ice? ☐Yes ☑No Temp:

All samples submitted to Element Materials Technology for analysis are accepted on a custodial basis only. Ownership of the material remains with the client submitting the samples. Element Materials Technology reserves the right to return unused sample portions.

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909 Executive Dr, Warsaw, IN 46580 USA, P 574-267-3305, F 574-269-6569
3371 Cleveland Road, Suite 100A, South Bend, IN 46628 USA, P 574-277-0707, F 574-273-5699
2417 W. Pinhook Rd, Lafayette, LA 70508 USA, P 337-235-0483, F 337-233-6540

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Chain of Custody

Laboratory Number: 19110451

Page 2 of 4

Client Information:		Billing Information:	PO Number:	Project Name/Number:
Company Name:	ERM	SAME		HENNING Management 0526033
Contact Name:	Dave Angle		Quote Number:	Sampler's Signature
Address:	840 W. Sam Houston Pkwy N. Suite 600		Required QC Level	
City, State Zip:	Houston, TX 77024			
Phone Number:	832.786.4981 Ext:	Ext:	Bill Monthly ☐Yes ☐No	Shipping Method: UPS / FedEx / NOW / DHL / Element / Hand / Mail
Fax Number:				
E-mail Address:	david.angle@erm.com			

Matrix Code
DW = Drinking Water
WW = Waste Water
GW = Ground Water
AQ = Aqueous
OT = Other
SL = Sludge SOL = Solid
O = Oil SO = Soil
F = Food SW = Swab
NG = Natural Gas
NGL = Natural Gas Liquid
PW = Produced Water
CF = Completion Fluid

Which Regulations Apply: ☐RCRA ☐POTW ☐NPDES ☐USDA/FDA ☐RECAP/RISC ☐Drinking Water ☐Distribution ☐Special ☐State ☐Other

Turn Time ☒Standard RUSH ☐1 Day ☐2 Day ☐Other (Rush turn times will incur a surcharge and must be pre-approved by lab.)

Sample ID/Description	Date	Time	Grab / Composite	Matrix	Quantity	Type P=Plastic, G=Glass, V=Vial	Pres. HCl, HNO₃, H₂SO₄, NaOH, Na₂S₂O₃	EC	CEC/ESP/SAR	29B Metals	SPLP Cl	% moisture	Comments
H-6 10-12'	11/5/19	0930	G	SO	1	P	None	X	X	X		X	Metals As, Ba, TTBa Cd, Cr, Sr Zn Pb, Hg
H-6 14-16'	↓	0940	↓	↓	↓	↓	↓	X				X	
H-7 6-8'	↓	1115	↓	↓	↓	↓	↓	X	X	X		X	
H-7 10-12'	↓	1125	↓	↓	↓	↓	↓	X	X	X		X	
H-7 14-16'	↓	1135	↓	↓	↓	↓	↓	X				X	
H-8 4-6'	↓	1255	↓	↓	↓	↓	↓	X	X	X		X	← limited vol.
H-8 6-8'	↓	1300	↓	↓	↓	↓	↓	X	X	X		X	← limited vol.
H-8 10-12'	↓	1310	↓	↓	↓	↓	↓	X	X	X		X	~~limited vol.~~
H-8 14-16'	↓	1320	↓	↓	↓	↓	↓	X				X	

	Relinquished by	Date/Time	Received by	Date/Time
1	[signature]	11/9/19 1100		
2				
3	Fed Ex	11-12-19 1000	[signature]	11-12-19 1000

Field Notes:

Received at lab on ice? ☐Yes ☒No Temp:

All samples submitted to Element Materials Technology for analysis are accepted on a custodial basis only. Ownership of the material remains with the client submitting the samples. Element Materials Technology reserves the right to return unused sample portions. Radley NO 780032593934

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2417 W. Pinhook Rd, Lafayette, LA 70508 USA, P 337-235-0483, F 337-233-6540

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Chain of Custody

Laboratory Number: 19110451

Page 3 of 4

Client Information:	Billing Information:	PO Number:	Project Name/Number:
Company Name: ERM	SAME		Henning Management 0526033
Contact Name: Dave Angle		Quote Number:	
Address: 840 W. Sam Houston Pkwy N. Suite 600		Required QC Level	Sampler's Signature
City, State Zip: Houston, TX 77024			
Phone Number: 832.786.4781 Ext:	Ext:	Bill Monthly ☐Yes ☐No	Shipping Method: UPS / FedEx / NOW DHL / Element / Hand / Mail
Fax Number:			
E-mail Address: david.angle@erm.com			

Matrix Code
DW = Drinking Water
WW = Waste Water
GW = Ground Water
AQ = Aqueous
OT = Other
SL = Sludge SOL = Solid
O = Oil SO = Soil
F = Food SW = Swab
NG = Natural Gas
NGL = Natural Gas Liquid
PW = Produced Water
CF = Completion Fluid

Which Regulations Apply:
☐RCRA ☐Drinking Water
☐POTW ☐Distribution
☐NPDES ☐Special
☐USDA/FDA ☐State
☐RECAP/RISC ☐Other

Turn Time
☒Standard
RUSH
☐1 Day
☐2 Day
☐Other
(Rush turn times will incur a surcharge and must be pre-approved by lab.)

Sample ID/Description	Collection Information: Date	Time	Grab / Composite	Matrix	Container: Quantity	Container: Type P=Plastic, G=Glass, V=Vial	Pres.: HCl, HNO_3, H_2SO_4, NaOH, $Na_2S_2O_3$	Requested Tests: EC	CEC/ESP/SAR	% Moisture	RCRA Metals	SPLP C1	Comments
H-9 4-6'	11/5/19	1520	G	SO	1	P	None	X	X	X	X		Metals: As, Ba, TTBa Cd, Cr, Sr Zn, Pb, Hg
H-9 8-10'		1530						X	X	X	X		
H-9 10-12'		1535						X	X	X	X		
H-10 4-6'	11/6/19	1515						X	X	X	X		
H-10 8-10'		1525						X	X	X	X		
H-10 32-34'		1625						X		X	X	X	
H-10 38-40'		1640						X		X	X		
H-9 30-32'	11/8/19	1045						X		X	X		
H-9 48-50'		1130						X		X	X	X	

	Relinquished by	Date/Time	Received by	Date/Time
1	Matthew Travis	11/9/19 1100		
2				
3	Fed Ex	11-12-19 1600		11-12-19 1000

Field Notes:

Received at lab on ice? ☐Yes ☒No Temp:

All samples submitted to Element Materials Technology for analysis are accepted on a custodial basis only. Ownership of the material remains with the client submitting the samples. Element Materials Technology reserves the right to return unused sample portions.

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Chain of Custody

Laboratory Number: 19110451

Page 4 of 4

Client Information:	Billing Information:	PO Number:	Project Name/Number: HENNING Management
Company Name: ERM	SAME		
Contact Name: Dave Angle		Quote Number:	0526033
Address: 840 W. Sam Houston Pkwy N. Suite 600		Required QC Level	Sampler's Signature
City, State Zip: Houston, TX 77024			
Phone Number: 832.786.4781 Ext:	Ext:	Bill Monthly	Shipping Method:
Fax Number:		☐Yes	UPS / FedEx / NOW
E-mail Address: david.angle@erm.com		☐No	DHL / Element / Hand / Mail

Matrix Code
DW = Drinking Water
WW = Waste Water
GW = Ground Water
AQ = Aqueous
OT = Other
SL = Sludge SOL = Solid
O = Oil SO = Soil
F = Food SW = Swab
NG = Natural Gas
NGL = Natural Gas Liquid
PW = Produced Water
CF = Completion Fluid

Which Regulations Apply:
☐RCRA ☐Drinking Water
☐POTW ☐Distribution
☐NPDES ☐Special
☐USDA/FDA ☐State
☐RECAP/RISC ☐Other

Turn Time
☒Standard
RUSH
☐1 Day
☐2 Day
☐Other

(Rush turn times will incur a surcharge and must be pre-approved by lab.)

Sample ID/Description	Date	Time	Grab / Composite	Matrix	Container Quantity	Type P=Plastic, G=Glass, V=Vial	Pres. HCl, HNO_3, H_2SO_4, NaOH, $Na_2S_2O_3$	EC	CEC/ESP/SAR	% moisture	29B Metals	SPLP Cl						Comments
H-9 50-52'	11/8/19	1135	G	SO	1	P	None	X		X								Metals: As, Ba, TTBa Cd, Cr, Sr Zn, Pb, Hg
H-9 58-60'	↓	1155	↓	↓	↓	↓	↓	X		X								

	Relinquished by	Date/Time	Received by	Date/Time
1	[signature]	11/9/19 1100		
2				
3	Fed Ex	11-12-19 1000	[signature]	11-12-19 1000

Field Notes:

Received at lab on ice? ☐Yes ☒No Temp:

All samples submitted to Element Materials Technology for analysis are accepted on a custodial basis only. Ownership of the material remains with the client submitting the samples. Element Materials Technology reserves the right to return unused sample portions.

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2417 W. Pinhook Rd Lafayette, LA 70508 USA P 337-235-0483 F 337-233-6540

Element Materials Technology Lafayette
2417 W. Pinhook Road
Lafayette, LA 70508-3344
TEL: (337) 235-0483 FAX: (337) 233-6540
Website: www.element.com

November 27, 2019

Dave Angle
Environmental Resources Management
CityCentre Four
840 W. Sam Houston Pkwy North, Suite 600
Houston, TX 77024
TEL:
FAX: (281) 524-4625

RE: Henning/0526033 Order No.: 19110648

Dear Dave Angle:

Element Materials Technology Lafayette received 14 sample(s) on 11/15/2019 for the analyses presented in the following report.

In accordance with your instructions Element Lafayette conducted the analysis shown on the following pages on samples submitted by your company. The results related only to the items tested. Unless otherwise noted, all analyses were conducted using EPA approved methodologies and all test results meet all requirements of TNI. All relevant sampling information is on the attached Chain-of-Custody form.

All soil data, except for 29-B, are on a wet-weight basis unless otherwise indicated in the units field as –dry.

LELAP Certification No.: 01997. TCEQ Certification No.: T104704261. LDHH Certification No.: LA180028. ISDH Certification No.: C-LA-01. NDELCP Certification No.: R-226. A scope of accredited parameters is available upon request. A "#" by the test method or analyte indicates this parameter is outside the scope of accreditation.

Estimated uncertainty is available upon request. This report shall not be reproduced except in full, without the written approval of the laboratory.

If you have any questions regarding these test results, please feel free to call.

Cristina Thibeaux
Customer Service Supervisor
2417 W. Pinhook Road
Lafayette, LA 70508-3344

Element Materials Technology Lafayette
2417 W. Pinhook Road
Lafayette, LA 70508-3344
TEL: (337) 235-0483 FAX: (337) 233-6540
Website: www.element.com

Case Narrative

WO#: **19110648**
Date: **11/27/2019**

CLIENT: Environmental Resources Management
Project: Henning/0526033

Unless specified by the client, a duplicate or MS/MSD, wherever applicable, is randomly selected and analyzed from each analytical batch provided sample volume is sufficient. The sample chosen for duplicate or MS/MSD may or may not be a sample submitted in this workorder. A method blank and/or a lab control sample (LCS)/lab control sample duplicate (LCSD), wherever applicable, are processed as a quality control check for each analytical batch. When the matrix QC data is not available due to insufficient sample volume or when the results indicate possible matrix effect, the validity of the batch is determined by the method blank and LCS/LCSD.

The results of the laboratory internal quality control data are provided in the QC Summary Report section of the report for your review. Laboratory-related QC exceptions that may impact the validity of data are discussed in the case narrative. Sample-related QC exceptions are flagged either in the results page(s) or in the QC report page(s). End users should consider QC exceptions when evaluating sample data against data quality objectives.

Any other exceptions associated with this report will be footnoted in the results page(s) or the QC summary page(s).

Element Materials Technology Lafayette
2417 W. Pinhook Road
Lafayette, LA 70508-3344
TEL: (337) 235-0483 FAX: (337) 233-6540
Website: www.element.com

Analytical Report

(consolidated)

WO#: **19110648**

Date Reported: **11/27/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/14/2019 10:50:00 AM

Project: Henning/0526033

Lab ID: 19110648-001 **Matrix:** SOIL

Client Sample ID H-13 0-2

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXL**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	28.8	0.100		meq/100g	1	11/25/2019
29B SALTS				**LDNR 29-B**		Analyst: **BXL**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	1.77	0.10		mmhos/cm	1	11/19/2019 12:11:00 PM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXL**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	4.51	0.10		%	1	11/25/2019
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	7.05	0.10			1	11/19/2019
Soluble Calcium	3.93	0.02		meq/L	1	11/19/2019
Soluble Magnesium	1.15	0.05		meq/L	1	11/19/2019
Soluble Sodium	11.2	0.25		meq/L	1	11/19/2019
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.108	0.108		mg/Kg	1	11/19/2019 11:54:12 AM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	1.67	1.01		mg/Kg	1	11/22/2019 4:28:36 AM
Barium	52.0	0.507		mg/Kg	1	11/22/2019 4:28:36 AM
Cadmium	< 0.253	0.253		mg/Kg	1	11/22/2019 4:28:36 AM
Chromium	7.77	0.507		mg/Kg	1	11/22/2019 4:28:36 AM
Lead	7.93	0.507		mg/Kg	1	11/22/2019 4:28:36 AM
Selenium	< 2.03	2.03		mg/Kg	1	11/22/2019 4:28:36 AM
Silver	< 0.253	0.253		mg/Kg	1	11/22/2019 4:28:36 AM
Zinc	4.97	0.507		mg/Kg	1	11/22/2019 4:28:36 AM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

Element Materials Technology Lafayette
2417 W. Pinhook Road
Lafayette, LA 70508-3344
TEL: (337) 235-0483 FAX: (337) 233-6540
Website: www.element.com

Analytical Report

(consolidated)

WO#: **19110648**

Date Reported: **11/27/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/14/2019 10:50:00 AM

Project: Henning/0526033

Lab ID: 19110648-001 **Matrix:** SOIL

Client Sample ID H-13 0-2

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	1,450	50.0		mg/Kg-dry	1	11/26/2019 9:55:47 AM
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **JMI**
Percent Moisture	18.7	1.00		wt%	1	11/15/2019 1:20:00 PM

Qualifiers:				
	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	H	Holding times for preparation or analysis exceeded	M	Matrix Interference
	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
	RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
	SDL	Sample detection limit	U	Analyte not detected
	W	Sample container temperature is out of limit as specified at testcode		

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Website: www.element.com

Analytical Report

(consolidated)

WO#: **19110648**

Date Reported: **11/27/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/14/2019 11:00:00 AM

Project: Henning/0526033

Lab ID: 19110648-002 **Matrix:** SOIL

Client Sample ID H-13 4-6

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXL**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	44.9	0.100		meq/100g	1	11/25/2019
29B SALTS				**LDNR 29-B**		Analyst: **BXL**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	3.51	0.10		mmhos/cm	1	11/19/2019 12:11:00 PM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXL**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	7.59	0.10		%	1	11/25/2019
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	11.5	0.10			1	11/19/2019
Soluble Calcium	5.65	0.02		meq/L	1	11/19/2019
Soluble Magnesium	1.96	0.05		meq/L	1	11/19/2019
Soluble Sodium	22.4	0.25		meq/L	1	11/19/2019
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.100	0.100		mg/Kg	1	11/19/2019 11:56:30 AM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	1.45	1.01		mg/Kg	1	11/22/2019 4:34:07 AM
Barium	155	0.507		mg/Kg	1	11/22/2019 4:34:07 AM
Cadmium	< 0.253	0.253		mg/Kg	1	11/22/2019 4:34:07 AM
Chromium	4.02	0.507		mg/Kg	1	11/22/2019 4:34:07 AM
Lead	5.40	0.507		mg/Kg	1	11/22/2019 4:34:07 AM
Selenium	< 2.03	2.03		mg/Kg	1	11/22/2019 4:34:07 AM
Silver	< 0.253	0.253		mg/Kg	1	11/22/2019 4:34:07 AM
Zinc	8.41	0.507		mg/Kg	1	11/22/2019 4:34:07 AM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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TEL: (337) 235-0483 FAX: (337) 233-6540
Website: www.element.com

Analytical Report

(consolidated)

WO#: **19110648**

Date Reported: **11/27/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/14/2019 11:00:00 AM

Project: Henning/0526033

Lab ID: 19110648-002 **Matrix:** SOIL

Client Sample ID H-13 4-6

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	507	47.3		mg/Kg-dry	1	11/26/2019 10:00:15 AM
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **JMI**
Percent Moisture	19.5	1.00		wt%	1	11/15/2019 1:20:00 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Website: www.element.com

Analytical Report

(consolidated)

WO#: **19110648**

Date Reported: **11/27/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/14/2019 11:10:00 AM

Project: Henning/0526033

Lab ID: 19110648-003 **Matrix:** SOIL

Client Sample ID H-13 8-10

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXL**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	38.6	0.100		meq/100g	1	11/25/2019
29B SALTS				**LDNR 29-B**		Analyst: **BXL**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	2.78	0.10		mmhos/cm	1	11/19/2019 12:11:00 PM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXL**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	2.80	0.10		%	1	11/25/2019
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	4.38	0.10			1	11/19/2019
Soluble Calcium	9.06	0.02		meq/L	1	11/19/2019
Soluble Magnesium	3.17	0.05		meq/L	1	11/19/2019
Soluble Sodium	10.8	0.25		meq/L	1	11/19/2019
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.106	0.106		mg/Kg	1	11/19/2019 12:03:56 PM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	2.10	1.00		mg/Kg	1	11/22/2019 4:52:25 AM
Barium	60.5	0.501		mg/Kg	1	11/22/2019 4:52:25 AM
Cadmium	< 0.251	0.251		mg/Kg	1	11/22/2019 4:52:25 AM
Chromium	6.70	0.501		mg/Kg	1	11/22/2019 4:52:25 AM
Lead	3.90	0.501		mg/Kg	1	11/22/2019 4:52:25 AM
Selenium	< 2.00	2.00		mg/Kg	1	11/22/2019 4:52:25 AM
Silver	< 0.251	0.251		mg/Kg	1	11/22/2019 4:52:25 AM
Zinc	14.9	0.501		mg/Kg	1	11/22/2019 4:52:25 AM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

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WO#: **19110648**

Date Reported: **11/27/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/14/2019 11:10:00 AM

Project: Henning/0526033

Lab ID: 19110648-003 **Matrix:** SOIL

Client Sample ID H-13 8-10

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	248	48.8		mg/Kg-dry	1	11/26/2019 10:04:45 AM
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **JMI**
Percent Moisture	17.9	1.00		wt%	1	11/15/2019 1:20:00 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

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WO#: **19110648**

Date Reported: **11/27/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/14/2019 11:55:00 AM

Project: Henning/0526033

Lab ID: 19110648-004 **Matrix:** SOIL

Client Sample ID H-13 12-14

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
ELECTRICAL CONDUCTIVITY @ SATURATION				**LDNR 29-B**		Analyst: **BXL**
Electrical Conductivity	2.54	0.10		mmhos/cm	1	11/19/2019 12:11:00 PM
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **JMI**
Percent Moisture	22.7	1.00		wt%	1	11/15/2019 1:20:00 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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WO#: **19110648**

Date Reported: **11/27/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/14/2019 1:10:00 PM

Project: Henning/0526033

Lab ID: 19110648-005 **Matrix:** SOIL

Client Sample ID H-13 38-40

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
ELECTRICAL CONDUCTIVITY @ SATURATION				**LDNR 29-B**		Analyst: **BXL**
Electrical Conductivity	0.66	0.10		mmhos/cm	1	11/19/2019 12:11:00 PM
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **JMI**
Percent Moisture	19.9	1.00		wt%	1	11/15/2019 1:20:00 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

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WO#: **19110648**

Date Reported: **11/27/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/12/2019 9:30:00 AM

Project: Henning/0526033

Lab ID: 19110648-006 **Matrix:** SOIL

Client Sample ID H-11 4-6

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXL**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	40.3	0.100		meq/100g	1	11/25/2019
29B SALTS				**LDNR 29-B**		Analyst: **BXL**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	1.34	0.10		mmhos/cm	1	11/19/2019 12:11:00 PM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXL**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	8.50	0.10		%	1	11/25/2019
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	8.76	0.10			1	11/19/2019
Soluble Calcium	1.44	0.02		meq/L	1	11/19/2019
Soluble Magnesium	0.61	0.05		meq/L	1	11/19/2019
Soluble Sodium	8.87	0.25		meq/L	1	11/19/2019
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.106	0.106		mg/Kg	1	11/19/2019 12:06:14 PM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	< 1.01	1.01		mg/Kg	1	11/22/2019 4:58:25 AM
Barium	192	0.503		mg/Kg	1	11/22/2019 4:58:25 AM
Cadmium	< 0.251	0.251		mg/Kg	1	11/22/2019 4:58:25 AM
Chromium	21.9	0.503		mg/Kg	1	11/22/2019 4:58:25 AM
Lead	6.60	0.503		mg/Kg	1	11/22/2019 4:58:25 AM
Selenium	< 2.01	2.01		mg/Kg	1	11/22/2019 4:58:25 AM
Silver	< 0.251	0.251		mg/Kg	1	11/22/2019 4:58:25 AM
Zinc	17.5	0.503		mg/Kg	1	11/22/2019 4:58:25 AM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

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WO#: **19110648**

Date Reported: **11/27/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/12/2019 9:30:00 AM

Project: Henning/0526033

Lab ID: 19110648-006 **Matrix:** SOIL

Client Sample ID H-11 4-6

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	519	47.8		mg/Kg-dry	1	11/26/2019 10:09:14 AM
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **JMI**
Percent Moisture	19.6	1.00		wt%	1	11/15/2019 1:20:00 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

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WO#: **19110648**

Date Reported: **11/27/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/12/2019 9:40:00 AM

Project: Henning/0526033

Lab ID: 19110648-007 **Matrix:** SOIL

Client Sample ID H-11 8-10

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXL**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	37.2	0.100		meq/100g	1	11/25/2019
29B SALTS				**LDNR 29-B**		Analyst: **BXL**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	0.85	0.10		mmhos/cm	1	11/19/2019 12:11:00 PM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXL**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	6.95	0.10		%	1	11/25/2019
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	6.73	0.10			1	11/19/2019
Soluble Calcium	0.98	0.02		meq/L	1	11/19/2019
Soluble Magnesium	0.49	0.05		meq/L	1	11/19/2019
Soluble Sodium	5.77	0.25		meq/L	1	11/19/2019
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.102	0.102		mg/Kg	1	11/19/2019 12:08:32 PM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	5.11	1.01		mg/Kg	1	11/22/2019 5:04:21 AM
Barium	27.6	0.503		mg/Kg	1	11/22/2019 5:04:21 AM
Cadmium	< 0.252	0.252		mg/Kg	1	11/22/2019 5:04:21 AM
Chromium	12.0	0.503		mg/Kg	1	11/22/2019 5:04:21 AM
Lead	6.83	0.503		mg/Kg	1	11/22/2019 5:04:21 AM
Selenium	< 2.01	2.01		mg/Kg	1	11/22/2019 5:04:21 AM
Silver	< 0.252	0.252		mg/Kg	1	11/22/2019 5:04:21 AM
Zinc	34.7	0.503		mg/Kg	1	11/22/2019 5:04:21 AM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

(consolidated)

WO#: **19110648**

Date Reported: **11/27/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/12/2019 9:40:00 AM

Project: Henning/0526033

Lab ID: 19110648-007 **Matrix:** SOIL

Client Sample ID H-11 8-10

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	220	48.3		mg/Kg-dry	1	11/26/2019 10:13:43 AM
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **JMI**
Percent Moisture	18.0	1.00		wt%	1	11/15/2019 1:20:00 PM

Qualifiers:				
	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	H	Holding times for preparation or analysis exceeded	M	Matrix Interference
	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
	RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
	SDL	Sample detection limit	U	Analyte not detected
	W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

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WO#: **19110648**

Date Reported: **11/27/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/12/2019 10:55:00 AM

Project: Henning/0526033

Lab ID: 19110648-008 **Matrix:** SOIL

Client Sample ID H-11 38-40

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
ELECTRICAL CONDUCTIVITY @ SATURATION				**LDNR 29-B**		Analyst: **BXL**
Electrical Conductivity	6.96	0.10	*	mmhos/cm	1	11/19/2019 12:11:00 PM
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **JMI**
Percent Moisture	18.3	1.00		wt%	1	11/15/2019 1:20:00 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

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WO#: **19110648**

Date Reported: **11/27/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/12/2019 11:45:00 AM

Project: Henning/0526033

Lab ID: 19110648-009 **Matrix:** SOIL

Client Sample ID H-11 58-60

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
ELECTRICAL CONDUCTIVITY @ SATURATION				**LDNR 29-B**		Analyst: **BXL**
Electrical Conductivity	0.78	0.10		mmhos/cm	1	11/19/2019 12:11:00 PM
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **JMI**
Percent Moisture	24.4	1.00		wt%	1	11/15/2019 1:20:00 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

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WO#: **19110648**

Date Reported: **11/27/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/13/2019 12:05:00 PM

Project: Henning/0526033

Lab ID: 19110648-010 **Matrix:** SOIL

Client Sample ID H-12 4-6

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXL**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	33.8	0.100		meq/100g	1	11/25/2019
29B SALTS				**LDNR 29-B**		Analyst: **BXL**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	3.07	0.10		mmhos/cm	1	11/19/2019 12:11:00 PM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXL**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	13.3	0.10		%	1	11/25/2019
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	15.8	0.10	*		1	11/19/2019
Soluble Calcium	2.77	0.02		meq/L	1	11/19/2019
Soluble Magnesium	1.11	0.05		meq/L	1	11/19/2019
Soluble Sodium	22.0	0.25		meq/L	1	11/19/2019
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.106	0.106		mg/Kg	1	11/19/2019 12:10:51 PM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	1.85	1.01		mg/Kg	1	11/22/2019 5:47:27 PM
Barium	38.4	0.507		mg/Kg	1	11/22/2019 5:47:27 PM
Cadmium	< 0.254	0.254		mg/Kg	1	11/22/2019 5:47:27 PM
Chromium	4.86	0.507		mg/Kg	1	11/22/2019 5:47:27 PM
Lead	5.79	0.507		mg/Kg	1	11/22/2019 5:47:27 PM
Selenium	< 2.03	2.03		mg/Kg	1	11/22/2019 5:47:27 PM
Silver	< 0.254	0.254		mg/Kg	1	11/22/2019 5:47:27 PM
Zinc	9.83	0.507		mg/Kg	1	11/22/2019 5:47:27 PM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

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WO#: **19110648**

Date Reported: **11/27/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/13/2019 12:05:00 PM

Project: Henning/0526033

Lab ID: 19110648-010 **Matrix:** SOIL

Client Sample ID H-12 4-6

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	312	48.8		mg/Kg-dry	1	11/26/2019 10:18:11 AM
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **JMI**
Percent Moisture	18.2	1.00		wt%	1	11/15/2019 1:20:00 PM

Qualifiers:				
	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	H	Holding times for preparation or analysis exceeded	M	Matrix Interference
	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
	RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
	SDL	Sample detection limit	U	Analyte not detected
	W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

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WO#: **19110648**

Date Reported: **11/27/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/13/2019 12:15:00 PM

Project: Henning/0526033

Lab ID: 19110648-011 **Matrix:** SOIL

Client Sample ID H-12 8-10

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXL**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	35.6	0.100		meq/100g	1	11/25/2019
29B SALTS				**LDNR 29-B**		Analyst: **BXL**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	3.60	0.10		mmhos/cm	1	11/19/2019 12:11:00 PM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXL**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	7.23	0.10		%	1	11/25/2019
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	8.01	0.10			1	11/19/2019
Soluble Calcium	7.94	0.02		meq/L	1	11/19/2019
Soluble Magnesium	3.26	0.05		meq/L	1	11/19/2019
Soluble Sodium	19.0	0.25		meq/L	1	11/19/2019
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.106	0.106		mg/Kg	1	11/19/2019 12:13:10 PM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	3.61	1.01		mg/Kg	1	11/26/2019 5:45:57 AM
Barium	75.1	0.503		mg/Kg	1	11/26/2019 5:45:57 AM
Cadmium	< 0.251	0.251		mg/Kg	1	11/26/2019 5:45:57 AM
Chromium	13.0	0.503		mg/Kg	1	11/26/2019 5:45:57 AM
Lead	7.77	0.503		mg/Kg	1	11/26/2019 5:45:57 AM
Selenium	< 2.01	2.01		mg/Kg	1	11/26/2019 5:45:57 AM
Silver	< 0.251	0.251		mg/Kg	1	11/26/2019 5:45:57 AM
Zinc	33.7	0.503		mg/Kg	1	11/26/2019 5:45:57 AM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

(consolidated)

WO#: **19110648**

Date Reported: **11/27/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/13/2019 12:15:00 PM

Project: Henning/0526033

Lab ID: 19110648-011 **Matrix:** SOIL

Client Sample ID H-12 8-10

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	589	46.1		mg/Kg-dry	1	11/26/2019 10:22:39 AM
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **JMI**
Percent Moisture	17.3	1.00		wt%	1	11/15/2019 1:20:00 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

(consolidated)

WO#: **19110648**

Date Reported: **11/27/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/13/2019 1:30:00 PM

Project: Henning/0526033

Lab ID: 19110648-012 **Matrix:** SOIL

Client Sample ID H-12 38-40

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
ELECTRICAL CONDUCTIVITY @ SATURATION				**LDNR 29-B**		Analyst: **BXL**
Electrical Conductivity	5.93	0.10	*	mmhos/cm	1	11/19/2019 12:11:00 PM
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **JMI**
Percent Moisture	19.0	1.00		wt%	1	11/15/2019 1:20:00 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

(consolidated)

WO#: **19110648**

Date Reported: **11/27/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/13/2019 1:55:00 PM

Project: Henning/0526033

Lab ID: 19110648-013 **Matrix:** SOIL

Client Sample ID H-12 48-50

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
ELECTRICAL CONDUCTIVITY @ SATURATION				**LDNR 29-B**		Analyst: **BXL**
Electrical Conductivity	30.8	0.10	*	mmhos/cm	1	11/19/2019 12:11:00 PM
INORGANIC ANIONS, SPLP LEACHED BY SW1312/9056A				**SW9056A**		Analyst: **SGP**
Chloride	254	5.00		mg/L	20	11/25/2019 12:38:08 PM
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **JMI**
Percent Moisture	21.0	1.00		wt%	1	11/15/2019 1:20:00 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

(consolidated)

WO#: **19110648**

Date Reported: **11/27/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/13/2019 2:05:00 PM

Project: Henning/0526033

Lab ID: 19110648-014 **Matrix:** SOIL

Client Sample ID H-12 52-54

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
ELECTRICAL CONDUCTIVITY @ SATURATION				**LDNR 29-B**		Analyst: **BXL**
Electrical Conductivity	47.0	0.10	*	mmhos/cm	1	11/19/2019 12:11:00 PM
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **JMI**
Percent Moisture	20.9	1.00		wt%	1	11/15/2019 1:20:00 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **19110648**

27-Nov-19

Client: Environmental Resources Management
Project: Henning/0526033 **BatchID:** **32262**

Sample ID:	**MB-32262**	SampType:	**MBLK**	TestCode:	**HG_S_7471A**	Units:	**mg/Kg**	Prep Date:	**11/18/2019**	RunNo:	**83838**
Client ID:	**PBS**	Batch ID:	**32262**	TestNo:	**SW7471A**	**SW7471A**		Analysis Date:	**11/19/2019**	SeqNo:	**2099491**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	< 0.100	0.100									

Sample ID:	**LCS-32262**	SampType:	**LCS**	TestCode:	**HG_S_7471A**	Units:	**mg/Kg**	Prep Date:	**11/18/2019**	RunNo:	**83838**
Client ID:	**LCSS**	Batch ID:	**32262**	TestNo:	**SW7471A**	**SW7471A**		Analysis Date:	**11/19/2019**	SeqNo:	**2099494**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.992	0.100	0.8330	0	119	80	120				

Sample ID:	**LCSD-32262**	SampType:	**LCSD**	TestCode:	**HG_S_7471A**	Units:	**mg/Kg**	Prep Date:	**11/18/2019**	RunNo:	**83838**
Client ID:	**LCSS02**	Batch ID:	**32262**	TestNo:	**SW7471A**	**SW7471A**		Analysis Date:	**11/19/2019**	SeqNo:	**2099496**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.995	0.100	0.8330	0	119	80	120	0.9924	0.246	20	

Sample ID:	**19110554-017AMS**	SampType:	**MS**	TestCode:	**HG_S_7471A**	Units:	**mg/Kg**	Prep Date:	**11/18/2019**	RunNo:	**83838**
Client ID:	**ZZZZZZ**	Batch ID:	**32262**	TestNo:	**SW7471A**	**SW7471A**		Analysis Date:	**11/19/2019**	SeqNo:	**2099507**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	1.10	0.105	0.8744	0.03649	122	75	125				

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceed
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **19110648**

27-Nov-19

Client: Environmental Resources Management

Project: Henning/0526033 **BatchID:** **32262**

Sample ID:	**19110554-017AMSD**	SampType:	**MSD**	TestCode:	**HG_S_7471A**	Units:	**mg/Kg**	Prep Date:	**11/18/2019**	RunNo:	**83838**
Client ID:	**ZZZZZZ**	Batch ID:	**32262**	TestNo:	**SW7471A**	**SW7471A**		Analysis Date:	**11/19/2019**	SeqNo:	**2099508**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	1.11	0.105	0.8750	0.03649	122	75	125	1.105	0.0899	20	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceed
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **19110648**

27-Nov-19

Client: Environmental Resources Management

Project: Henning/0526033 **BatchID:** **32277**

Sample ID: **19110518-001ADUP** SampType: **DUP** TestCode: **SAR_S** Units: Prep Date: **11/18/2019** RunNo: **83860**
Client ID: **ZZZZZZ** Batch ID: **32277** TestNo: **LDNR 29-B** **LDNR 29-B** Analysis Date: **11/19/2019** SeqNo: **2101066**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sodium Adsorption Ratio	1.19	0.10						0.97	20.7	20	R
Soluble Calcium	1.25	0.02						0.93	29.2	20	R
Soluble Magnesium	0.77	0.05						0.58	29.5	20	R
Soluble Sodium	1.20	0.25						0.84	35.2	20	R

NOTES:
R - High RPD due to low analyte concentration. In this range, high RPD's may be expected. The method is in control as indicated by the LCS/LCSD.

Sample ID: **19110648-003ADUP** SampType: **DUP** TestCode: **SAR_S** Units: Prep Date: **11/18/2019** RunNo: **83860**
Client ID: **H-13 8-10** Batch ID: **32277** TestNo: **LDNR 29-B** **LDNR 29-B** Analysis Date: **11/19/2019** SeqNo: **2101070**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sodium Adsorption Ratio	4.36	0.10						4.38	0.40	20	
Soluble Calcium	9.14	0.02						9.06	0.88	20	
Soluble Magnesium	3.17	0.05						3.17	0.05	20	
Soluble Sodium	10.8	0.25						10.84	0.08	20	

Sample ID: **19110677-006ADUP** SampType: **DUP** TestCode: **SAR_S** Units: Prep Date: **11/18/2019** RunNo: **83860**
Client ID: **ZZZZZZ** Batch ID: **32277** TestNo: **LDNR 29-B** **LDNR 29-B** Analysis Date: **11/19/2019** SeqNo: **2101079**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sodium Adsorption Ratio	14.4	0.10						14.41	0.15	20	*
Soluble Calcium	2.11	0.02						2.09	0.76	20	
Soluble Magnesium	0.84	0.05						0.84	0.69	20	
Soluble Sodium	17.5	0.25						17.43	0.52	20	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceed
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **19110648**

27-Nov-19

Client: Environmental Resources Management

Project: Henning/0526033 **BatchID:** **32277**

Sample ID:	**19110677-006ADUP**	SampType:	**DUP**	TestCode:	**SAR_S**	Units:		Prep Date:	**11/18/2019**	RunNo:	**83860**
Client ID:	**ZZZZZZ**	Batch ID:	**32277**	TestNo:	**LDNR 29-B**	**LDNR 29-B**		Analysis Date:	**11/19/2019**	SeqNo:	**2101079**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceed
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **19110648**

27-Nov-19

Client: Environmental Resources Management
Project: Henning/0526033 **BatchID:** **32294**

Sample ID: **MB-32294** SampType: **MBLK** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/19/2019** RunNo: **84016**
Client ID: **PBS** Batch ID: **32294** TestNo: **SW6010B** **SW3050B** Analysis Date: **11/22/2019** SeqNo: **2105136**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	< 1.00	1.00									
Barium	< 0.500	0.500									
Cadmium	< 0.250	0.250									
Chromium	< 0.500	0.500									
Lead	< 0.500	0.500									
Selenium	< 2.00	2.00									
Silver	< 0.250	0.250									
Zinc	< 0.500	0.500									

Sample ID: **LCS-32294** SampType: **LCS** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/19/2019** RunNo: **84016**
Client ID: **LCSS** Batch ID: **32294** TestNo: **SW6010B** **SW3050B** Analysis Date: **11/22/2019** SeqNo: **2105137**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	25.4	1.00	25.00	0	102	80	120				
Barium	24.1	0.500	25.00	0	96.4	80	120				
Cadmium	24.2	0.250	25.00	0	96.8	80	120				
Chromium	23.9	0.500	25.00	0	95.8	80	120				
Lead	24.0	0.500	25.00	0	96.1	80	120				
Selenium	22.9	2.00	25.00	0	91.7	80	120				
Silver	4.88	0.250	5.000	0	97.7	80	120				
Zinc	24.1	0.500	25.00	0	96.2	80	120				

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceed
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **19110648**

27-Nov-19

Client: Environmental Resources Management

Project: Henning/0526033 **BatchID:** **32294**

Sample ID: **LCSD-32294** SampType: **LCSD** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/19/2019** RunNo: **84016**

Client ID: **LCSS02** Batch ID: **32294** TestNo: **SW6010B** **SW3050B** Analysis Date: **11/22/2019** SeqNo: **2105138**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	24.8	1.00	25.00	0	99.4	80	120	25.40	2.17	20	
Barium	24.2	0.500	25.00	0	96.8	80	120	24.09	0.435	20	
Cadmium	23.8	0.250	25.00	0	95.3	80	120	24.20	1.56	20	
Chromium	24.0	0.500	25.00	0	96.2	80	120	23.94	0.417	20	
Lead	23.6	0.500	25.00	0	94.4	80	120	24.02	1.72	20	
Selenium	23.8	2.00	25.00	0	95.3	80	120	22.94	3.83	20	
Silver	4.88	0.250	5.000	0	97.7	80	120	4.885	0	20	
Zinc	24.2	0.500	25.00	0	96.6	80	120	24.06	0.394	20	

Sample ID: **19110554-017AMS** SampType: **MS** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/19/2019** RunNo: **84016**

Client ID: **ZZZZZZ** Batch ID: **32294** TestNo: **SW6010B** **SW3050B** Analysis Date: **11/22/2019** SeqNo: **2105167**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	25.1	1.01	25.37	1.850	91.6	75	125				
Barium	293	0.507	25.37	296.7	-15.8	75	125				S
Cadmium	23.1	0.254	25.37	0.03529	90.8	75	125				
Chromium	29.0	0.507	25.37	2.576	104	75	125				
Lead	62.0	0.507	25.37	17.76	174	75	125				S
Selenium	29.8	2.03	25.37	0.3277	116	75	125				
Silver	4.62	0.254	5.074	0	91.0	75	125				
Zinc	27.5	0.507	25.37	2.506	98.6	75	125				

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceed
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **19110648**

27-Nov-19

Client: Environmental Resources Management

Project: Henning/0526033 **BatchID:** **32294**

Sample ID: **19110554-017AMSD** SampType: **MSD** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/19/2019** RunNo: **84016**

Client ID: **ZZZZZZ** Batch ID: **32294** TestNo: **SW6010B** **SW3050B** Analysis Date: **11/22/2019** SeqNo: **2105168**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	25.0	1.01	25.13	1.850	92.2	75	125	25.08	0.214	20	
Barium	288	0.503	25.13	296.7	-35.2	75	125	292.7	1.67	20	S
Cadmium	22.6	0.251	25.13	0.03529	89.8	75	125	23.07	2.04	20	
Chromium	28.5	0.503	25.13	2.576	103	75	125	28.96	1.68	20	
Lead	61.0	0.503	25.13	17.76	172	75	125	62.01	1.68	20	S
Selenium	29.4	2.01	25.13	0.3277	116	75	125	29.81	1.35	20	
Silver	4.53	0.251	5.027	0	90.1	75	125	4.617	1.93	20	
Zinc	27.0	0.503	25.13	2.506	97.6	75	125	27.53	1.83	20	

NOTES:

S - Spike recovery indicates matrix interference. The method is in control as indicated by the Lab Control Sample.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceed
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **19110648**

27-Nov-19

Client: Environmental Resources Management
Project: Henning/0526033 **BatchID:** **32313**

Sample ID: **MB-32313**	SampType: **MBLK**	TestCode: **TTBA**	Units: **mg/Kg-dry**	Prep Date: **11/20/2019**	RunNo: **84067**
Client ID: **PBS**	Batch ID: **32313**	TestNo: **LDNR 29-B**		Analysis Date: **11/26/2019**	SeqNo: **2106859**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
True Total Barium	< 50.0	50.0									

Sample ID: **LCS-32313**	SampType: **LCS**	TestCode: **TTBA**	Units: **mg/Kg-dry**	Prep Date: **11/20/2019**	RunNo: **84067**
Client ID: **LCSS**	Batch ID: **32313**	TestNo: **LDNR 29-B**		Analysis Date: **11/26/2019**	SeqNo: **2106860**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
True Total Barium	4,840	50.0	5,000	0	96.8	75	125				

Sample ID: **LCSD-32313**	SampType: **LCSD**	TestCode: **TTBA**	Units: **mg/Kg-dry**	Prep Date: **11/20/2019**	RunNo: **84067**
Client ID: **LCSS02**	Batch ID: **32313**	TestNo: **LDNR 29-B**		Analysis Date: **11/26/2019**	SeqNo: **2106861**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
True Total Barium	4,840	50.0	5,000	0	96.8	75	125	4,842	0.0620	20	

Sample ID: **19110514-004AMS**	SampType: **MS**	TestCode: **TTBA**	Units: **mg/Kg-dry**	Prep Date: **11/20/2019**	RunNo: **84067**
Client ID: **ZZZZZZ**	Batch ID: **32313**	TestNo: **LDNR 29-B**		Analysis Date: **11/26/2019**	SeqNo: **2106863**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
True Total Barium	4,910	49.3	4,931	161.4	96.3	75	125				

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceed
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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Website: www.element.com

QC SUMMARY REPORT

WO#: **19110648**

27-Nov-19

Client: Environmental Resources Management
Project: Henning/0526033 **BatchID:** **32313**

Sample ID: **19110514-004AMSD** SampType: **MSD** TestCode: **TTBA** Units: **mg/Kg-dry** Prep Date: **11/20/2019** RunNo: **84067**
Client ID: **ZZZZZZ** Batch ID: **32313** TestNo: **LDNR 29-B** Analysis Date: **11/26/2019** SeqNo: **2106864**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
True Total Barium	4,660	48.8	4,878	161.4	92.1	75	125	4,911	5.33	20	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceed
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **19110648**

27-Nov-19

Client: Environmental Resources Management
Project: Henning/0526033 **BatchID:** **32314**

Sample ID: **MB-32314** SampType: **MBLK** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/20/2019** RunNo: **83956**
Client ID: **PBS** Batch ID: **32314** TestNo: **SW6010B** **SW3050B** Analysis Date: **11/22/2019** SeqNo: **2103250**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	< 1.00	1.00									
Barium	< 0.500	0.500									
Cadmium	< 0.250	0.250									
Chromium	< 0.500	0.500									
Lead	< 0.500	0.500									
Selenium	< 2.00	2.00									
Silver	< 0.250	0.250									
Zinc	< 0.500	0.500									

Sample ID: **LCS-32314** SampType: **LCS** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/20/2019** RunNo: **83956**
Client ID: **LCSS** Batch ID: **32314** TestNo: **SW6010B** **SW3050B** Analysis Date: **11/22/2019** SeqNo: **2103251**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	22.7	1.00	25.00	0	90.9	80	120				
Barium	24.3	0.500	25.00	0	97.4	80	120				
Cadmium	24.5	0.250	25.00	0	97.9	80	120				
Chromium	24.4	0.500	25.00	0	97.8	80	120				
Lead	23.4	0.500	25.00	0	93.7	80	120				
Selenium	24.5	2.00	25.00	0	98.0	80	120				
Silver	5.06	0.250	5.000	0	101	80	120				
Zinc	24.1	0.500	25.00	0	96.4	80	120				

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceed
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **19110648**

27-Nov-19

Client: Environmental Resources Management
Project: Henning/0526033 **BatchID:** **32314**

Sample ID: **LCSD-32314** SampType: **LCSD** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/20/2019** RunNo: **83956**
Client ID: **LCSS02** Batch ID: **32314** TestNo: **SW6010B** **SW3050B** Analysis Date: **11/22/2019** SeqNo: **2103255**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	23.2	1.00	25.00	0	92.9	80	120	22.72	2.18	20	
Barium	24.0	0.500	25.00	0	95.9	80	120	24.34	1.53	20	
Cadmium	24.0	0.250	25.00	0	96.2	80	120	24.48	1.77	20	
Chromium	24.0	0.500	25.00	0	96.0	80	120	24.45	1.82	20	
Lead	22.9	0.500	25.00	0	91.5	80	120	23.44	2.40	20	
Selenium	23.5	2.00	25.00	0	93.9	80	120	24.49	4.21	20	
Silver	4.92	0.250	5.000	0	98.5	80	120	5.055	2.61	20	
Zinc	23.7	0.500	25.00	0	94.9	80	120	24.09	1.48	20	

Sample ID: **19110451-019AMS** SampType: **MS** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/20/2019** RunNo: **83956**
Client ID: **ZZZZZZ** Batch ID: **32314** TestNo: **SW6010B** **SW3050B** Analysis Date: **11/22/2019** SeqNo: **2103257**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	24.0	1.00	25.06	1.146	91.0	75	125				
Barium	71.6	0.501	25.06	59.73	47.2	75	125				S
Cadmium	23.3	0.251	25.06	0.09633	92.7	75	125				
Chromium	30.0	0.501	25.06	4.249	103	75	125				
Lead	29.4	0.501	25.06	6.911	89.7	75	125				
Selenium	29.6	2.00	25.06	0	118	75	125				
Silver	4.70	0.251	5.012	0	93.7	75	125				
Zinc	36.6	0.501	25.06	8.335	113	75	125				

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceed
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **19110648**

27-Nov-19

Client: Environmental Resources Management

Project: Henning/0526033 **BatchID:** **32314**

Sample ID: **19110451-019AMSD** SampType: **MSD** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/20/2019** RunNo: **83956**

Client ID: **ZZZZZZ** Batch ID: **32314** TestNo: **SW6010B** **SW3050B** Analysis Date: **11/22/2019** SeqNo: **2103258**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	22.9	1.01	25.35	1.146	85.7	75	125	23.96	4.63	20	
Barium	72.3	0.507	25.35	59.73	49.4	75	125	71.56	0.969	20	S
Cadmium	23.5	0.254	25.35	0.09633	92.4	75	125	23.31	0.857	20	
Chromium	30.2	0.507	25.35	4.249	102	75	125	29.95	0.676	20	
Lead	29.8	0.507	25.35	6.911	90.3	75	125	29.38	1.42	20	
Selenium	32.1	2.03	25.35	0	127	75	125	29.60	8.14	20	S
Silver	4.76	0.254	5.071	0	93.8	75	125	4.696	1.29	20	
Zinc	37.0	0.507	25.35	8.335	113	75	125	36.59	0.974	20	

NOTES:

S - Spike recovery indicates matrix interference. The method is in control as indicated by the Lab Control Sample.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceed
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
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QC SUMMARY REPORT

WO#: **19110648**

27-Nov-19

Client: Environmental Resources Management
Project: Henning/0526033 **BatchID:** **32334**

Sample ID: **19110648-003ADUP**	SampType: **DUP**	TestCode: **ESP_S**	Units: **%**	Prep Date: **11/21/2019**	RunNo: **84017**
Client ID: **H-13 8-10**	Batch ID: **32334**	TestNo: **LDNR 29-B**	**LDNR 29-B**	Analysis Date: **11/25/2019**	SeqNo: **2105302**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Exchangeable Sodium %	2.93	0.10						2.80	4.48	20	

Sample ID: **19110677-006ADUP**	SampType: **DUP**	TestCode: **ESP_S**	Units: **%**	Prep Date: **11/21/2019**	RunNo: **84017**
Client ID: **ZZZZZZ**	Batch ID: **32334**	TestNo: **LDNR 29-B**	**LDNR 29-B**	Analysis Date: **11/25/2019**	SeqNo: **2105311**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Exchangeable Sodium %	12.0	0.10						11.83	1.03	20	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceed
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **19110648**

27-Nov-19

Client: Environmental Resources Management
Project: Henning/0526033 **BatchID:** **32335**

Sample ID: **19110648-003ADUP** SampType: **DUP** TestCode: **CEC** Units: **meq/100g** Prep Date: **11/21/2019** RunNo: **84017**
Client ID: **H-13 8-10** Batch ID: **32335** TestNo: **LDNR 29-B** **LDNR 29-B** Analysis Date: **11/25/2019** SeqNo: **2105250**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Cation Exchange Capacity	38.4	0.100						38.58	0.384	20	

Sample ID: **LCS-32335** SampType: **LCS** TestCode: **CEC** Units: **meq/100g** Prep Date: **11/21/2019** RunNo: **84017**
Client ID: **LCSS** Batch ID: **32335** TestNo: **LDNR 29-B** **LDNR 29-B** Analysis Date: **11/25/2019** SeqNo: **2105255**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Cation Exchange Capacity	20.9	0.100	25.00	0	83.4	76	124				

Sample ID: **LCSD-32335** SampType: **LCSD** TestCode: **CEC** Units: **meq/100g** Prep Date: **11/21/2019** RunNo: **84017**
Client ID: **LCSS02** Batch ID: **32335** TestNo: **LDNR 29-B** **LDNR 29-B** Analysis Date: **11/25/2019** SeqNo: **2105256**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Cation Exchange Capacity	21.3	0.100	25.00	0	85.4	76	124	20.85	2.31	20	

Sample ID: **19110677-006ADUP** SampType: **DUP** TestCode: **CEC** Units: **meq/100g** Prep Date: **11/21/2019** RunNo: **84017**
Client ID: **ZZZZZZ** Batch ID: **32335** TestNo: **LDNR 29-B** **LDNR 29-B** Analysis Date: **11/25/2019** SeqNo: **2105261**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Cation Exchange Capacity	30.7	0.100						30.79	0.396	20	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceed
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **19110648**

27-Nov-19

Client: Environmental Resources Management
Project: Henning/0526033 **BatchID:** **R83825**

Sample ID: **MB-R83825**	SampType: **MBLK**	TestCode: **EC_S**	Units: **mmhos/cm**	Prep Date:	RunNo: **83825**
Client ID: **PBS**	Batch ID: **R83825**	TestNo: **LDNR 29-B**		Analysis Date: **11/19/2019**	SeqNo: **2099535**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Electrical Conductivity	< 0.10	0.10									

Sample ID: **LCS1-R83825**	SampType: **LCS1**	TestCode: **EC_S**	Units: **mmhos/cm**	Prep Date:	RunNo: **83825**
Client ID: **ZZZZZZ**	Batch ID: **R83825**	TestNo: **LDNR 29-B**		Analysis Date: **11/19/2019**	SeqNo: **2099537**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Electrical Conductivity	0.42	0.10	0.38	0	109	90.07	109.9				

Sample ID: **LCS2-R83825**	SampType: **LCS2**	TestCode: **EC_S**	Units: **mmhos/cm**	Prep Date:	RunNo: **83825**
Client ID: **ZZZZZZ**	Batch ID: **R83825**	TestNo: **LDNR 29-B**		Analysis Date: **11/19/2019**	SeqNo: **2099538**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Electrical Conductivity	56.5	0.10	53.00	0	107	90	110				

Sample ID: **19110648-003ADUP**	SampType: **DUP**	TestCode: **EC_S**	Units: **mmhos/cm**	Prep Date:	RunNo: **83825**
Client ID: **H-13 8-10**	Batch ID: **R83825**	TestNo: **LDNR 29-B**		Analysis Date: **11/19/2019**	SeqNo: **2099545**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Electrical Conductivity	2.86	0.10						2.78	2.94	20	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceed
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **19110648**

27-Nov-19

Client: Environmental Resources Management

Project: Henning/0526033 **BatchID:** **R83835**

Sample ID: **19110648-003ADUP** SampType: **DUP** TestCode: **PMOIST_29B** Units: **wt%** Prep Date: RunNo: **83835**

Client ID: **H-13 8-10** Batch ID: **R83835** TestNo: **LDNR 29-B** Analysis Date: **11/15/2019** SeqNo: **2099262**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Percent Moisture	17.8	1.00						17.90	0.56	20	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceed
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
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QC SUMMARY REPORT

WO#: **19110648**

27-Nov-19

Client: Environmental Resources Management
Project: Henning/0526033 **BatchID:** **R84023**

Sample ID: **MBLK**	SampType: **MBLK**	TestCode: **9056_SPLP**	Units: **mg/L**	Prep Date:	RunNo: **84023**
Client ID: **PBS**	Batch ID: **R84023**	TestNo: **SW9056A**		Analysis Date: **11/25/2019**	SeqNo: **2105365**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	< 0.250	0.250									

Sample ID: **LCS**	SampType: **LCS**	TestCode: **9056_SPLP**	Units: **mg/L**	Prep Date:	RunNo: **84023**
Client ID: **LCSS**	Batch ID: **R84023**	TestNo: **SW9056A**		Analysis Date: **11/25/2019**	SeqNo: **2105366**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	9.91	0.250	10.00	0	99.1	80	120				

Sample ID: **LCSD**	SampType: **LCSD**	TestCode: **9056_SPLP**	Units: **mg/L**	Prep Date:	RunNo: **84023**
Client ID: **LCSS02**	Batch ID: **R84023**	TestNo: **SW9056A**		Analysis Date: **11/25/2019**	SeqNo: **2105367**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	9.96	0.250	10.00	0	99.6	80	120	9.905	0.530	15	

Sample ID: **19110935-001EMS**	SampType: **MS**	TestCode: **9056_SPLP**	Units: **mg/L**	Prep Date:	RunNo: **84023**
Client ID: **ZZZZZZ**	Batch ID: **R84023**	TestNo: **SW9056A**		Analysis Date: **11/25/2019**	SeqNo: **2105370**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	14,800	250	5,000	10,090	93.3	80	120				

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceed
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **19110648**

27-Nov-19

Client: Environmental Resources Management

Project: Henning/0526033 **BatchID:** **R84023**

Sample ID: **19110935-001EMSD** SampType: **MSD** TestCode: **9056_SPLP** Units: **mg/L** Prep Date: RunNo: **84023**

Client ID: **ZZZZZZ** Batch ID: **R84023** TestNo: **SW9056A** Analysis Date: **11/25/2019** SeqNo: **2105371**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	14,900	250	5,000	10,090	95.9	80	120	14,760	0.893	15	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceed
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
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Sample Log-In Check List

Client Name: **ERM_HOUSTON** Work Order Number: **19110648** RcptNo: **1**

Logged by:	**Tammy Thibodeaux**	**11/15/2019 12:30:00 PM**	Tammy M Thibodeaux
Completed By:	**Tammy Thibodeaux**	**11/15/2019 12:52:10 PM**	Tammy M Thibodeaux
Reviewed By:	**Caitlin Duplantis**	**11/25/2019 4:29:06 PM**	Caitlin Duplantis

Chain of Custody

1.	Is Chain of Custody complete?	Yes ☑	No ☐	Not Present ☐
2.	How was the sample delivered?	Client		

Log In

3.	Coolers are present?	Yes ☑	No ☐	NA ☐
4.	Shipping container/cooler in good condition?	Yes ☑	No ☐	
	Custody seals intact on shipping container/cooler?	Yes ☐	No ☐	Not Present ☑
	No. Seal Date:	Signed By:		
5.	Was an attempt made to cool the samples?	Yes ☐	No ☐	NA ☑
6.	Were all samples received at a temperature of >0° C to 6.0°C	Yes ☐	No ☑	NA ☐
		Not required		
7.	Sample(s) in proper container(s)?	Yes ☑	No ☐	
8.	Sufficient sample volume for indicated test(s)?	Yes ☑	No ☐	
9.	Are samples (except VOA and ONG) properly preserved?	Yes ☑	No ☐	
10.	Was preservative added to bottles?	Yes ☐	No ☑	NA ☐
11.	Is the headspace in the VOA vials less than 1/4 inch or 6 mm?	Yes ☐	No ☐	No VOA Vials ☑
12.	Were any sample containers received broken?	Yes ☐	No ☑	
13.	Does paperwork match bottle labels? (Note discrepancies on chain of custody)	Yes ☑	No ☐	
14.	Are matrices correctly identified on Chain of Custody?	Yes ☑	No ☐	
15.	Is it clear what analyses were requested?	Yes ☑	No ☐	
16.	Were all holding times able to be met? (If no, notify customer for authorization.)	Yes ☑	No ☐	

Special Handling (if applicable)

17. Was client notified of all discrepancies with this order? Yes ☐ No ☐ NA ☑

Person Notified: Date:
By Whom: Via: ☐ eMail ☐ Phone ☐ Fax ☐ In Person
Regarding:
Client Instructions:

18. Additional remarks:

Cooler Information

Cooler No	Temp ºC	Condition	Seal Intact	Seal No	Seal Date	Signed By

element

Chain of Custody

Laboratory Number: 19110648

Page 1 of 2

Client Information:	Billing Information:	PO Number:	Project Name/Number:
Company Name: ERM		0526033	Hemming/0526033
Contact Name: Dave Angle		Quote Number:	
Address: 840 W. Sam Houston Parkway North, Suite 600	SAME		Sampler's Signature
City, State Zip: Houston, TX 77024		Required QC Level	
Phone Number: 281 600 1000 Ext:	Ext:	Bill Monthly ☐Yes ☐No	Shipping Method: UPS / FedEx / NOW DHL / Element / (Hand) / Mail
Fax Number:			
E-mail Address: David.Angle@erm.com			

Matrix Code

DW = Drinking Water
WW = Waste Water
GW = Ground Water
AQ = Aqueous
OT = Other
SL = Sludge SOL = Solid
O = Oil SO = Soil
F = Food SW = Swab
NG = Natural Gas
NGL = Natural Gas Liquid
PW = Produced Water
CF = Completion Fluid

Which Regulations Apply:
☐RCRA ☐Drinking Water
☐POTW ☐Distribution
☐NPDES ☐Special
☐USDA/FDA ☐State
☐RECAP/RISC ☐Other

Turn Time
☒Standard
RUSH
☐1 Day
☐2 Day
☐Other
(Rush turn times will incur a surcharge and must be pre-approved by lab.)

Sample ID/Description	Collection Information: Date	Time	Grab / Composite	Matrix	Container: Quantity	Container: Type P=Plastic, G=Glass, V=Vial	Pres.: HCl, HNO_3, H_2SO_4, NaOH, $Na_2S_2O_3$	Requested Tests: EC	% Moisture	CEC/ESP/SAR	29B Metals	Comments
H-13 0-2	11/14/19	1050	G	S	1	P	None	X	X	X	X	
H-13 4-6	11/14/19	1100	G	S	1	"	"	X	X	X	X	
H-13 8-10	11/14/19	1110	G	S	1	"	"	X	X	X	X	
H-13 12-14	11/14/19	1155	G	S	1	"	"	X	X			
H-13 38-40	11/14/19	1310	G	S	1	"	"	X	X			

	Relinquished by	Date/Time	Received by	Date/Time
1		11/15/19 1230		11/15/19 1230
2				
3				

Field Notes:

Received at lab on ice?
☐Yes ☒No Temp:

All samples submitted to Element Materials Technology for analysis are accepted on a custodial basis only. Ownership of the material remains with the client submitting the samples. Element Materials Technology reserves the right to return unused sample portions.

9301 Innovation Drive, Suite 115, Daleville, IN 47334-0569 USA, P 765-378-4103, F 765-378-4109
629 Washington St. Suite 300, Columbus, IN 47201-6231 USA, P 812-375-0531, F 812-375-0731
328 Ley Road, Suite 100, Fort Wayne, IN 46825 USA, P 260-471-7000, F 260-471-7777
909 Executive Dr, Warsaw, IN 46580-2368 USA, P 574-267-3305, F 574-269-6569
3371 Cleveland Road, Suite 100A, South Bend, IN 46628-9780 USA, P 574-277-0707, F 574-273-5699
2417 W. Pinhook Rd, Lafayette, LA 70508-3344 USA, P 337-235-0483, F 337-233-6540

element™

Chain of Custody

Laboratory Number: 19110648

Page 2 of 2

Client Information:	Billing Information:	PO Number:	Project Name/Number:
Company Name:			Hennig / 0526033
Contact Name:		Quote Number:	Sampler's Signature
Address:	SAME / SAME	Required QC Level	
City, State Zip:			Shipping Method: UPS / FedEx / NOW / DHL / Element / Hand / Mail
Phone Number: Ext:	Ext:	Bill Monthly ☐Yes ☐No	
Fax Number:			
E-mail Address:			

Matrix Code

DW = Drinking Water
WW = Waste Water
GW = Ground Water
AQ = Aqueous
OT = Other
SL = Sludge SOL = Solid
O = Oil SO = Soil
F = Food SW = Swab
NG = Natural Gas
NGL = Natural Gas Liquid
PW = Produced Water
CF = Completion Fluid

Which Regulations Apply:
☐RCRA ☐Drinking Water
☐POTW ☐Distribution
☐NPDES ☐Special
☐USDA/FDA ☐State
☐RECAP/RISC ☐Other

Turn Time
☒Standard
RUSH
☐1 Day
☐2 Day
☐Other
(Rush turn times will incur a surcharge and must be pre-approved by lab.)

Sample ID/Description	Collection Information: Date	Time	Grab / Composite	Matrix	Container: Quantity	Container: Type P=Plastic, G=Glass, V=Vial	Pres.: HCl, HNO_3, H_2SO_4, NaOH, $Na_2S_2O_3$	Requested Tests: EC	% Moisture	EC/ESP/SAR	29B Metals	SPLP Chlorides	Comments
H-11 4-6	11/12/19	0930	G	S	1	P	None	X	X	X	X		
H-11 8-10	11/12/19	0940	G	S	1	|	|	X	X	X	X		
H-11 38-40	11/12/19	1055	G	S	1	|	|	X	X				
H-11 58-60	11/12/19	1145	G	S	1	|	|	X	X				
H-12 4-6	11/13/19	1205	G	S	1	|	|	X	X	X	X		
H-12 8-10	11/13/19	1215	G	S	1	|	|	X	X	X	X		
H-12 38-40	11/13/19	1330	G	S	1	|	|	X	X				
H-12 48-50	11/13/19	1355	G	S	1	|	|	X	X			X	
H-12 52-54	11/13/19	1405	G	S	1	|	|	X	X				

	Relinquished by	Date/Time	Received by	Date/Time
1		11/15/19 1230		11/15/19 1230
2				
3				

Field Notes:

Received at lab on ice?
☐Yes ☒No Temp:

All samples submitted to Element Materials Technology for analysis are accepted on a custodial basis only. Ownership of the material remains with the client submitting the samples. Element Materials Technology reserves the right to return unused sample portions.

9301 Innovation Drive, Suite 115
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P 812-375-0531
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328 Ley Road, Suite 100
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F 260-471-7777

909 Executive Dr
Warsaw, IN
46580-2368 USA
P 574-267-3305
F 574-269-6569

3371 Cleveland Road, Suite 100A
South Bend, IN
46628-9780 USA
P 574-277-0707
F 574-273-5699

2417 W. Pinhook Rd
Lafayette, LA
70508-3344 USA
P 337-235-0483
F 337-233-6540

Element Materials Technology Lafayette
2417 W. Pinhook Road
Lafayette, LA 70508-3344
TEL: (337) 235-0483 FAX: (337) 233-6540
Website: www.element.com

December 09, 2019

Dave Angle
Environmental Resources Management
CityCentre Four
840 W. Sam Houston Pkwy North, Suite 600
Houston, TX 77024
TEL:
FAX: (281) 524-4625

RE: Henning Management/0526033 Order No.: 19110959

Dear Dave Angle:

Element Materials Technology Lafayette received 31 sample(s) on 11/22/2019 for the analyses presented in the following report.

In accordance with your instructions Element Lafayette conducted the analysis shown on the following pages on samples submitted by your company. The results related only to the items tested. Unless otherwise noted, all analyses were conducted using EPA approved methodologies and all test results meet all requirements of TNI. All relevant sampling information is on the attached Chain-of-Custody form.

All soil data, except for 29-B, are on a wet-weight basis unless otherwise indicated in the units field as –dry.

LELAP Certification No.: 01997. TCEQ Certification No.: T104704261. LDHH Certification No.: LA180028. ISDH Certification No.: C-LA-01. NDELCP Certification No.: R-226. A scope of accredited parameters is available upon request. A "#" by the test method or analyte indicates this parameter is outside the scope of accreditation.

Estimated uncertainty is available upon request. This report shall not be reproduced except in full, without the written approval of the laboratory.

If you have any questions regarding these test results, please feel free to call.

Cristina Thibeaux
Customer Service Supervisor
2417 W. Pinhook Road
Lafayette, LA 70508-3344

Element Materials Technology Lafayette
2417 W. Pinhook Road
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Website: www.element.com

Case Narrative

WO#: **19110959**
Date: **12/9/2019**

CLIENT: Environmental Resources Management
Project: Henning Management/0526033

Unless specified by the client, a duplicate or MS/MSD, wherever applicable, is randomly selected and analyzed from each analytical batch provided sample volume is sufficient. The sample chosen for duplicate or MS/MSD may or may not be a sample submitted in this workorder. A method blank and/or a lab control sample (LCS)/lab control sample duplicate (LCSD), wherever applicable, are processed as a quality control check for each analytical batch. When the matrix QC data is not available due to insufficient sample volume or when the results indicate possible matrix effect, the validity of the batch is determined by the method blank and LCS/LCSD.

The results of the laboratory internal quality control data are provided in the QC Summary Report section of the report for your review. Laboratory-related QC exceptions that may impact the validity of data are discussed in the case narrative. Sample-related QC exceptions are flagged either in the results page(s) or in the QC report page(s). End users should consider QC exceptions when evaluating sample data against data quality objectives.

Any other exceptions associated with this report will be footnoted in the results page(s) or the QC summary page(s).

Element Materials Technology Lafayette
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Lafayette, LA 70508-3344
TEL: (337) 235-0483 FAX: (337) 233-6540
Website: www.element.com

Analytical Report

(consolidated)

WO#: **19110959**

Date Reported: **12/9/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/18/2019 1:35:00 PM

Project: Henning Management/0526033

Lab ID: 19110959-001 **Matrix:** SOIL

Client Sample ID H-14 8-10'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **MRM**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	34.3	0.100		meq/100g	1	12/5/2019
29B SALTS				**LDNR 29-B**		Analyst: **MRM**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	5.32	0.10	*	mmhos/cm	1	12/3/2019 4:18:00 PM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **MRM**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	5.56	0.10		%	1	12/5/2019
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	7.05	0.10			1	12/5/2019
Soluble Calcium	15.9	0.02		meq/L	1	12/5/2019
Soluble Magnesium	4.49	0.05		meq/L	1	12/5/2019
Soluble Sodium	22.5	0.25		meq/L	1	12/5/2019
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.108	0.108		mg/Kg	1	11/25/2019 2:50:23 PM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	2.32	0.959		mg/Kg	1	12/4/2019 5:20:30 PM
Barium	24.1	0.479		mg/Kg	1	12/4/2019 5:20:30 PM
Cadmium	< 0.240	0.240		mg/Kg	1	12/4/2019 5:20:30 PM
Chromium	6.12	0.479		mg/Kg	1	12/4/2019 5:20:30 PM
Lead	6.68	0.479		mg/Kg	1	12/4/2019 5:20:30 PM
Strontium	17.8	0.479		mg/Kg	1	12/4/2019 5:20:30 PM
Zinc	15.8	0.479		mg/Kg	1	12/4/2019 5:20:30 PM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	234	48.1		mg/Kg-dry	1	12/3/2019 10:55:45 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

Element Materials Technology Lafayette
2417 W. Pinhook Road
Lafayette, LA 70508-3344
TEL: (337) 235-0483 FAX: (337) 233-6540
Website: www.element.com

Analytical Report

(consolidated)

WO#: **19110959**

Date Reported: **12/9/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/18/2019 1:35:00 PM

Project: Henning Management/0526033

Lab ID: 19110959-001 **Matrix:** SOIL

Client Sample ID H-14 8-10'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXL**
Percent Moisture	17.5	1.00		wt%	1	11/25/2019 2:15:00 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

(consolidated)

WO#: **19110959**

Date Reported: **12/9/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/18/2019 1:55:00 PM

Project: Henning Management/0526033

Lab ID: 19110959-002 **Matrix:** SOIL

Client Sample ID H-14 16-18'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
ELECTRICAL CONDUCTIVITY @ SATURATION				**LDNR 29-B**		Analyst: **MRM**
Electrical Conductivity	5.48	0.10	*	mmhos/cm	1	12/3/2019 4:18:00 PM
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXL**
Percent Moisture	22.2	1.00		wt%	1	11/25/2019 2:15:00 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

(consolidated)

WO#: **19110959**

Date Reported: **12/9/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/18/2019 2:50:00 PM

Project: Henning Management/0526033

Lab ID: 19110959-003 **Matrix:** SOIL

Client Sample ID H-14 38-40'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
ELECTRICAL CONDUCTIVITY @ SATURATION				**LDNR 29-B**		Analyst: **MRM**
Electrical Conductivity	1.01	0.10		mmhos/cm	1	12/3/2019 4:18:00 PM
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXL**
Percent Moisture	18.5	1.00		wt%	1	11/25/2019 2:15:00 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.
H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit
RL	Reporting Limit
SDL	Sample detection limit
W	Sample container temperature is out of limit as specified at testcode
B	Analyte detected in the associated Method Blank
M	Matrix Interference
R	RPD outside accepted recovery limits
S	Spike Recovery outside accepted recovery limits
U	Analyte not detected

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Analytical Report

(consolidated)

WO#: **19110959**

Date Reported: **12/9/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/19/2019 11:15:00 AM

Project: Henning Management/0526033

Lab ID: 19110959-004 **Matrix:** SOIL

Client Sample ID H-15 4-6'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **MRM**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	34.1	0.100		meq/100g	1	12/5/2019
29B SALTS				**LDNR 29-B**		Analyst: **MRM**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	3.47	0.10		mmhos/cm	1	12/3/2019 4:18:00 PM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **MRM**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	13.5	0.10		%	1	12/5/2019
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	12.5	0.10	*		1	12/5/2019
Soluble Calcium	3.77	0.02		meq/L	1	12/5/2019
Soluble Magnesium	1.84	0.05		meq/L	1	12/5/2019
Soluble Sodium	20.9	0.25		meq/L	1	12/5/2019
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.100	0.100		mg/Kg	1	11/25/2019 3:00:30 PM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	2.20	0.992		mg/Kg	1	12/4/2019 5:49:38 PM
Barium	286	0.496		mg/Kg	1	12/4/2019 5:49:38 PM
Cadmium	< 0.248	0.248		mg/Kg	1	12/4/2019 5:49:38 PM
Chromium	7.40	0.496		mg/Kg	1	12/4/2019 5:49:38 PM
Lead	7.53	0.496		mg/Kg	1	12/4/2019 5:49:38 PM
Strontium	35.5	0.496		mg/Kg	1	12/4/2019 5:49:38 PM
Zinc	14.2	0.496		mg/Kg	1	12/4/2019 5:49:38 PM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	526	48.3		mg/Kg-dry	1	12/3/2019 10:58:30 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

Element Materials Technology Lafayette
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Analytical Report

(consolidated)

WO#: **19110959**

Date Reported: **12/9/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/19/2019 11:15:00 AM

Project: Henning Management/0526033

Lab ID: 19110959-004 **Matrix:** SOIL

Client Sample ID H-15 4-6'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXL**
Percent Moisture	15.8	1.00		wt%	1	11/25/2019 2:15:00 PM

Qualifiers:				
	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	H	Holding times for preparation or analysis exceeded	M	Matrix Interference
	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
	RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
	SDL	Sample detection limit	U	Analyte not detected
	W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

(consolidated)

WO#: **19110959**

Date Reported: **12/9/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/19/2019 11:20:00 AM

Project: Henning Management/0526033

Lab ID: 19110959-005 **Matrix:** SOIL

Client Sample ID H-15 6-8'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **MRM**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	31.4	0.100		meq/100g	1	12/5/2019
29B SALTS				**LDNR 29-B**		Analyst: **MRM**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	3.61	0.10		mmhos/cm	1	12/3/2019 4:18:00 PM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **MRM**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	13.5	0.10		%	1	12/5/2019
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	12.6	0.10	*		1	12/5/2019
Soluble Calcium	3.85	0.02		meq/L	1	12/5/2019
Soluble Magnesium	1.90	0.05		meq/L	1	12/5/2019
Soluble Sodium	21.4	0.25		meq/L	1	12/5/2019
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.102	0.102		mg/Kg	1	11/25/2019 3:02:48 PM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	2.30	0.974		mg/Kg	1	12/4/2019 5:53:20 PM
Barium	224	0.487		mg/Kg	1	12/4/2019 5:53:20 PM
Cadmium	< 0.244	0.244		mg/Kg	1	12/4/2019 5:53:20 PM
Chromium	14.0	0.487		mg/Kg	1	12/4/2019 5:53:20 PM
Lead	5.17	0.487		mg/Kg	1	12/4/2019 5:53:20 PM
Strontium	38.9	0.487		mg/Kg	1	12/4/2019 5:53:20 PM
Zinc	65.2	0.487		mg/Kg	1	12/4/2019 5:53:20 PM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	404	45.9		mg/Kg-dry	1	12/3/2019 11:01:10 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Website: www.element.com

Analytical Report

(consolidated)

WO#: **19110959**

Date Reported: **12/9/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/19/2019 11:20:00 AM

Project: Henning Management/0526033

Lab ID: 19110959-005 **Matrix:** SOIL

Client Sample ID H-15 6-8'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXL**
Percent Moisture	14.7	1.00		wt%	1	11/25/2019 2:15:00 PM

Qualifiers:				
	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	H	Holding times for preparation or analysis exceeded	M	Matrix Interference
	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
	RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
	SDL	Sample detection limit	U	Analyte not detected
	W	Sample container temperature is out of limit as specified at testcode		

Element Materials Technology Lafayette
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Website: www.element.com

Analytical Report

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WO#: **19110959**

Date Reported: **12/9/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/19/2019 11:25:00 AM

Project: Henning Management/0526033

Lab ID: 19110959-006 **Matrix:** SOIL

Client Sample ID H-15 8-10'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **MRM**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	28.4	0.100		meq/100g	1	12/5/2019
29B SALTS				**LDNR 29-B**		Analyst: **MRM**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	5.19	0.10	*	mmhos/cm	1	12/3/2019 4:18:00 PM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **MRM**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	13.4	0.10		%	1	12/5/2019
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	10.7	0.10			1	12/5/2019
Soluble Calcium	8.69	0.02		meq/L	1	12/5/2019
Soluble Magnesium	4.35	0.05		meq/L	1	12/5/2019
Soluble Sodium	27.3	0.25		meq/L	1	12/5/2019
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.103	0.103		mg/Kg	1	11/25/2019 3:05:06 PM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	3.49	0.976		mg/Kg	1	12/4/2019 5:56:49 PM
Barium	92.0	0.488		mg/Kg	1	12/4/2019 5:56:49 PM
Cadmium	< 0.244	0.244		mg/Kg	1	12/4/2019 5:56:49 PM
Chromium	9.95	0.488		mg/Kg	1	12/4/2019 5:56:49 PM
Lead	5.18	0.488		mg/Kg	1	12/4/2019 5:56:49 PM
Strontium	23.0	0.488		mg/Kg	1	12/4/2019 5:56:49 PM
Zinc	27.3	0.488		mg/Kg	1	12/4/2019 5:56:49 PM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	388	48.0		mg/Kg-dry	1	12/3/2019 11:03:49 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

(consolidated)

WO#: **19110959**

Date Reported: **12/9/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/19/2019 11:25:00 AM

Project: Henning Management/0526033

Lab ID: 19110959-006 **Matrix:** SOIL

Client Sample ID H-15 8-10'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXL**
Percent Moisture	16.0	1.00		wt%	1	11/25/2019 2:15:00 PM

Qualifiers:				
	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	H	Holding times for preparation or analysis exceeded	M	Matrix Interference
	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
	RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
	SDL	Sample detection limit	U	Analyte not detected
	W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

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WO#: **19110959**

Date Reported: **12/9/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/19/2019 11:30:00 AM

Project: Henning Management/0526033

Lab ID: 19110959-007 **Matrix:** SOIL

Client Sample ID H-15 10-12'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **MRM**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	26.7	0.100		meq/100g	1	12/5/2019
29B SALTS				**LDNR 29-B**		Analyst: **MRM**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	6.47	0.10	*	mmhos/cm	1	12/3/2019 4:18:00 PM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **MRM**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	12.0	0.10		%	1	12/5/2019
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	11.4	0.10			1	12/5/2019
Soluble Calcium	11.6	0.02		meq/L	1	12/5/2019
Soluble Magnesium	6.16	0.05		meq/L	1	12/5/2019
Soluble Sodium	33.9	0.25		meq/L	1	12/5/2019
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.101	0.101		mg/Kg	1	11/25/2019 3:07:24 PM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	7.13	0.973		mg/Kg	1	12/4/2019 6:00:18 PM
Barium	64.4	0.487		mg/Kg	1	12/4/2019 6:00:18 PM
Cadmium	< 0.243	0.243		mg/Kg	1	12/4/2019 6:00:18 PM
Chromium	8.57	0.487		mg/Kg	1	12/4/2019 6:00:18 PM
Lead	8.42	0.487		mg/Kg	1	12/4/2019 6:00:18 PM
Strontium	22.9	0.487		mg/Kg	1	12/4/2019 6:00:18 PM
Zinc	29.7	0.487		mg/Kg	1	12/4/2019 6:00:18 PM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	163	48.2		mg/Kg-dry	1	12/3/2019 11:06:43 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

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WO#: **19110959**

Date Reported: **12/9/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/19/2019 11:30:00 AM

Project: Henning Management/0526033

Lab ID: 19110959-007 **Matrix:** SOIL

Client Sample ID H-15 10-12'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXL**
Percent Moisture	16.0	1.00		wt%	1	11/25/2019 2:15:00 PM

Qualifiers:				
	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	H	Holding times for preparation or analysis exceeded	M	Matrix Interference
	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
	RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
	SDL	Sample detection limit	U	Analyte not detected
	W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

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WO#: **19110959**

Date Reported: **12/9/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/19/2019 11:35:00 AM

Project: Henning Management/0526033

Lab ID: 19110959-008 **Matrix:** SOIL

Client Sample ID H-15 12-14'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
ELECTRICAL CONDUCTIVITY @ SATURATION				**LDNR 29-B**		Analyst: **MRM**
Electrical Conductivity	6.97	0.10	*	mmhos/cm	1	12/3/2019 4:18:00 PM
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXL**
Percent Moisture	19.6	1.00		wt%	1	11/25/2019 2:15:00 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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WO#: **19110959**

Date Reported: **12/9/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/19/2019 12:40:00 PM

Project: Henning Management/0526033

Lab ID: 19110959-009 **Matrix:** SOIL

Client Sample ID H-15 38-40'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
ELECTRICAL CONDUCTIVITY @ SATURATION				**LDNR 29-B**		Analyst: **MRM**
Electrical Conductivity	1.82	0.10		mmhos/cm	1	12/3/2019 4:18:00 PM
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXL**
Percent Moisture	18.8	1.00		wt%	1	11/25/2019 2:15:00 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.
H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit
RL	Reporting Limit
SDL	Sample detection limit
W	Sample container temperature is out of limit as specified at testcode
B	Analyte detected in the associated Method Blank
M	Matrix Interference
R	RPD outside accepted recovery limits
S	Spike Recovery outside accepted recovery limits
U	Analyte not detected

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Analytical Report

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WO#: **19110959**

Date Reported: **12/9/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/20/2019 8:25:00 AM

Project: Henning Management/0526033

Lab ID: 19110959-010 **Matrix:** SOIL

Client Sample ID H-16 0-2'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **MRM**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	31.0	0.100		meq/100g	1	12/5/2019
29B SALTS				**LDNR 29-B**		Analyst: **MRM**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	1.13	0.10		mmhos/cm	1	12/3/2019 4:18:00 PM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **MRM**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	5.51	0.10		%	1	12/5/2019
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	6.74	0.10			1	12/5/2019
Soluble Calcium	1.60	0.02		meq/L	1	12/5/2019
Soluble Magnesium	0.56	0.05		meq/L	1	12/5/2019
Soluble Sodium	7.01	0.25		meq/L	1	12/5/2019
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	0.132	0.101		mg/Kg	1	11/25/2019 3:09:42 PM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	3.02	0.975		mg/Kg	1	12/4/2019 6:04:02 PM
Barium	186	0.488		mg/Kg	1	12/4/2019 6:04:02 PM
Cadmium	< 0.244	0.244		mg/Kg	1	12/4/2019 6:04:02 PM
Chromium	7.90	0.488		mg/Kg	1	12/4/2019 6:04:02 PM
Lead	9.42	0.488		mg/Kg	1	12/4/2019 6:04:02 PM
Strontium	40.5	0.488		mg/Kg	1	12/4/2019 6:04:02 PM
Zinc	18.6	0.488		mg/Kg	1	12/4/2019 6:04:02 PM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	5,100	47.5		mg/Kg-dry	1	12/3/2019 11:09:27 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

(consolidated)

WO#: **19110959**

Date Reported: **12/9/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/20/2019 8:25:00 AM

Project: Henning Management/0526033

Lab ID: 19110959-010 **Matrix:** SOIL

Client Sample ID H-16 0-2'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXL**
Percent Moisture	15.9	1.00		wt%	1	11/25/2019 2:15:00 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

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WO#: **19110959**

Date Reported: **12/9/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/20/2019 8:35:00 AM

Project: Henning Management/0526033

Lab ID: 19110959-011 **Matrix:** SOIL

Client Sample ID H-16 4-6'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **MRM**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	41.4	0.100		meq/100g	1	12/5/2019
29B SALTS				**LDNR 29-B**		Analyst: **MRM**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	3.91	0.10		mmhos/cm	1	12/3/2019 4:18:00 PM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **MRM**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	8.77	0.10		%	1	12/5/2019
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	9.33	0.10			1	12/5/2019
Soluble Calcium	7.03	0.02		meq/L	1	12/5/2019
Soluble Magnesium	2.89	0.05		meq/L	1	12/5/2019
Soluble Sodium	20.8	0.25		meq/L	1	12/5/2019
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.109	0.109		mg/Kg	1	11/25/2019 3:12:22 PM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	2.53	0.963		mg/Kg	1	12/4/2019 6:07:37 PM
Barium	339	0.481		mg/Kg	1	12/4/2019 6:07:37 PM
Cadmium	< 0.241	0.241		mg/Kg	1	12/4/2019 6:07:37 PM
Chromium	7.13	0.481		mg/Kg	1	12/4/2019 6:07:37 PM
Lead	7.36	0.481		mg/Kg	1	12/4/2019 6:07:37 PM
Strontium	22.2	0.481		mg/Kg	1	12/4/2019 6:07:37 PM
Zinc	12.5	0.481		mg/Kg	1	12/4/2019 6:07:37 PM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	584	47.8		mg/Kg-dry	1	12/3/2019 11:12:07 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

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WO#: **19110959**

Date Reported: **12/9/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/20/2019 8:35:00 AM

Project: Henning Management/0526033

Lab ID: 19110959-011 **Matrix:** SOIL

Client Sample ID H-16 4-6'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXL**
Percent Moisture	17.1	1.00		wt%	1	11/25/2019 2:15:00 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

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WO#: **19110959**

Date Reported: **12/9/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/20/2019 8:50:00 AM

Project: Henning Management/0526033

Lab ID: 19110959-012 **Matrix:** SOIL

Client Sample ID H-16 10-12'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **MRM**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	22.6	0.100		meq/100g	1	12/5/2019
29B SALTS				**LDNR 29-B**		Analyst: **MRM**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	14.7	0.10	*	mmhos/cm	1	12/3/2019 4:18:00 PM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **MRM**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	20.8	0.10	*	%	1	12/5/2019
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	20.2	0.10	*		1	12/5/2019
Soluble Calcium	25.1	0.02		meq/L	1	12/5/2019
Soluble Magnesium	9.88	0.05		meq/L	1	12/5/2019
Soluble Sodium	84.7	0.25		meq/L	1	12/5/2019
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.103	0.103		mg/Kg	1	11/25/2019 3:14:40 PM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	8.65	0.973		mg/Kg	1	12/4/2019 6:11:02 PM
Barium	57.7	0.487		mg/Kg	1	12/4/2019 6:11:02 PM
Cadmium	0.321	0.243		mg/Kg	1	12/4/2019 6:11:02 PM
Chromium	12.5	0.487		mg/Kg	1	12/4/2019 6:11:02 PM
Lead	11.0	0.487		mg/Kg	1	12/4/2019 6:11:02 PM
Strontium	97.6	4.87		mg/Kg	10	12/4/2019 6:59:42 PM
Zinc	84.7	0.487		mg/Kg	1	12/4/2019 6:11:02 PM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	205	49.4		mg/Kg-dry	1	12/3/2019 11:15:02 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

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WO#: **19110959**

Date Reported: **12/9/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/20/2019 8:50:00 AM

Project: Henning Management/0526033

Lab ID: 19110959-012 **Matrix:** SOIL

Client Sample ID H-16 10-12'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXL**
Percent Moisture	17.6	1.00		wt%	1	11/25/2019 2:15:00 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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TEL: (337) 235-0483 FAX: (337) 233-6540
Website: www.element.com

Analytical Report

(consolidated)

WO#: **19110959**

Date Reported: **12/9/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/20/2019 9:00:00 AM

Project: Henning Management/0526033

Lab ID: 19110959-013 **Matrix:** SOIL

Client Sample ID H-16 14-16'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
ELECTRICAL CONDUCTIVITY @ SATURATION				**LDNR 29-B**		Analyst: **MRM**
Electrical Conductivity	16.5	0.10	*	mmhos/cm	1	12/3/2019 4:18:00 PM
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXL**
Percent Moisture	21.3	1.00		wt%	1	11/25/2019 2:15:00 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

(consolidated)

WO#: **19110959**

Date Reported: **12/9/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/20/2019 9:05:00 AM

Project: Henning Management/0526033

Lab ID: 19110959-014 **Matrix:** SOIL

Client Sample ID H-16 16-18'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
ELECTRICAL CONDUCTIVITY @ SATURATION				**LDNR 29-B**		Analyst: **MRM**
Electrical Conductivity	26.0	0.10	*	mmhos/cm	1	12/3/2019 4:18:00 PM
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXL**
Percent Moisture	21.7	1.00		wt%	1	11/25/2019 2:15:00 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

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WO#: **19110959**

Date Reported: **12/9/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/20/2019 9:50:00 AM

Project: Henning Management/0526033

Lab ID: 19110959-015 **Matrix:** SOIL

Client Sample ID H-16 34-36'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
ELECTRICAL CONDUCTIVITY @ SATURATION				**LDNR 29-B**		Analyst: **MRM**
Electrical Conductivity	13.4	0.10	*	mmhos/cm	1	12/3/2019 4:18:00 PM
INORGANIC ANIONS, SPLP LEACHED BY SW1312/9056A				**SW9056A**		Analyst: **SGP**
Chloride	92.6	2.50		mg/L	10	12/6/2019 9:29:25 AM
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXL**
Percent Moisture	18.9	1.00		wt%	1	11/25/2019 2:15:00 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

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WO#: **19110959**

Date Reported: **12/9/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/20/2019 10:00:00 AM

Project: Henning Management/0526033

Lab ID: 19110959-016 **Matrix:** SOIL

Client Sample ID H-16 38-40'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
ELECTRICAL CONDUCTIVITY @ SATURATION				**LDNR 29-B**		Analyst: **MRM**
Electrical Conductivity	22.7	0.10	*	mmhos/cm	1	12/3/2019 4:18:00 PM
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXL**
Percent Moisture	22.0	1.00		wt%	1	11/25/2019 2:15:00 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

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WO#: **19110959**

Date Reported: **12/9/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/20/2019 2:20:00 PM

Project: Henning Management/0526033

Lab ID: 19110959-017 **Matrix:** SOIL

Client Sample ID H-17 4-6'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **MRM**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	25.3	0.100		meq/100g	1	12/5/2019
29B SALTS				**LDNR 29-B**		Analyst: **MRM**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	1.59	0.10		mmhos/cm	1	12/3/2019 4:18:00 PM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **MRM**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	22.3	0.10	*	%	1	12/5/2019
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	18.6	0.10	*		1	12/5/2019
Soluble Calcium	0.52	0.02		meq/L	1	12/5/2019
Soluble Magnesium	0.22	0.05		meq/L	1	12/5/2019
Soluble Sodium	11.3	0.25		meq/L	1	12/5/2019
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.102	0.102		mg/Kg	1	11/25/2019 3:16:58 PM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	5.21	0.996		mg/Kg	1	12/4/2019 6:14:13 PM
Barium	140	0.498		mg/Kg	1	12/4/2019 6:14:13 PM
Cadmium	< 0.249	0.249		mg/Kg	1	12/4/2019 6:14:13 PM
Chromium	7.93	0.498		mg/Kg	1	12/4/2019 6:14:13 PM
Lead	28.3	0.498		mg/Kg	1	12/4/2019 6:14:13 PM
Strontium	76.5	4.98		mg/Kg	10	12/4/2019 7:03:06 PM
Zinc	11.7	0.498		mg/Kg	1	12/4/2019 6:14:13 PM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	218	45.8		mg/Kg-dry	1	12/3/2019 11:23:29 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

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WO#: **19110959**

Date Reported: **12/9/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/20/2019 2:20:00 PM

Project: Henning Management/0526033

Lab ID: 19110959-017 **Matrix:** SOIL

Client Sample ID H-17 4-6'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXL**
Percent Moisture	14.1	1.00		wt%	1	11/25/2019 2:15:00 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
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WO#: **19110959**

Date Reported: **12/9/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/20/2019 2:25:00 PM

Project: Henning Management/0526033

Lab ID: 19110959-018 **Matrix:** SOIL

Client Sample ID H-17 6-8'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **MRM**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	20.1	0.100		meq/100g	1	12/5/2019
29B SALTS				**LDNR 29-B**		Analyst: **MRM**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	3.12	0.10		mmhos/cm	1	12/3/2019 4:18:00 PM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **MRM**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	22.5	0.10	*	%	1	12/5/2019
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	20.0	0.10	*		1	12/5/2019
Soluble Calcium	1.58	0.02		meq/L	1	12/5/2019
Soluble Magnesium	0.71	0.05		meq/L	1	12/5/2019
Soluble Sodium	21.4	0.25		meq/L	1	12/5/2019
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.103	0.103		mg/Kg	1	11/25/2019 3:19:17 PM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	1.20	0.994		mg/Kg	1	12/4/2019 6:17:52 PM
Barium	69.4	0.497		mg/Kg	1	12/4/2019 6:17:52 PM
Cadmium	< 0.248	0.248		mg/Kg	1	12/4/2019 6:17:52 PM
Chromium	2.12	0.497		mg/Kg	1	12/4/2019 6:17:52 PM
Lead	2.93	0.497		mg/Kg	1	12/4/2019 6:17:52 PM
Strontium	35.4	0.497		mg/Kg	1	12/4/2019 6:17:52 PM
Zinc	5.14	0.497		mg/Kg	1	12/4/2019 6:17:52 PM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	174	46.3		mg/Kg-dry	1	12/3/2019 11:26:25 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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WO#: **19110959**

Date Reported: **12/9/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/20/2019 2:25:00 PM

Project: Henning Management/0526033

Lab ID: 19110959-018 **Matrix:** SOIL

Client Sample ID H-17 6-8'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXL**
Percent Moisture	12.8	1.00		wt%	1	11/25/2019 2:15:00 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

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WO#: **19110959**

Date Reported: **12/9/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/20/2019 2:30:00 PM

Project: Henning Management/0526033

Lab ID: 19110959-019 **Matrix:** SOIL

Client Sample ID H-17 8-10'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **MRM**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	21.1	0.100		meq/100g	1	12/5/2019
29B SALTS				**LDNR 29-B**		Analyst: **MRM**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	3.17	0.10		mmhos/cm	1	12/3/2019 4:18:00 PM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **MRM**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	22.8	0.10	*	%	1	12/5/2019
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	17.8	0.10	*		1	12/5/2019
Soluble Calcium	1.92	0.02		meq/L	1	12/5/2019
Soluble Magnesium	0.85	0.05		meq/L	1	12/5/2019
Soluble Sodium	20.9	0.25		meq/L	1	12/5/2019
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.0994	0.0994		mg/Kg	1	11/25/2019 3:21:35 PM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	1.48	0.992		mg/Kg	1	12/4/2019 6:21:41 PM
Barium	131	0.496		mg/Kg	1	12/4/2019 6:21:41 PM
Cadmium	< 0.248	0.248		mg/Kg	1	12/4/2019 6:21:41 PM
Chromium	5.04	0.496		mg/Kg	1	12/4/2019 6:21:41 PM
Lead	7.12	0.496		mg/Kg	1	12/4/2019 6:21:41 PM
Strontium	52.0	0.496		mg/Kg	1	12/4/2019 6:21:41 PM
Zinc	12.7	0.496		mg/Kg	1	12/4/2019 6:21:41 PM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	160	47.4		mg/Kg-dry	1	12/3/2019 11:44:08 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

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WO#: **19110959**

Date Reported: **12/9/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/20/2019 2:30:00 PM

Project: Henning Management/0526033

Lab ID: 19110959-019 **Matrix:** SOIL

Client Sample ID H-17 8-10'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXL**
Percent Moisture	12.7	1.00		wt%	1	11/25/2019 2:15:00 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

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WO#: **19110959**

Date Reported: **12/9/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/20/2019 2:35:00 PM

Project: Henning Management/0526033

Lab ID: 19110959-020 **Matrix:** SOIL

Client Sample ID H-17 10-12'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **MRM**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	36.0	0.100		meq/100g	1	12/5/2019
29B SALTS				**LDNR 29-B**		Analyst: **MRM**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	3.75	0.10		mmhos/cm	1	12/3/2019 4:18:00 PM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **MRM**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	12.0	0.10		%	1	12/5/2019
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	12.1	0.10	*		1	12/5/2019
Soluble Calcium	4.55	0.02		meq/L	1	12/5/2019
Soluble Magnesium	2.06	0.05		meq/L	1	12/5/2019
Soluble Sodium	21.9	0.25		meq/L	1	12/5/2019
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.109	0.109		mg/Kg	1	11/25/2019 3:28:57 PM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	5.69	0.992		mg/Kg	1	12/4/2019 6:34:40 PM
Barium	304	0.496		mg/Kg	1	12/4/2019 6:34:40 PM
Cadmium	< 0.248	0.248		mg/Kg	1	12/4/2019 6:34:40 PM
Chromium	24.3	0.496		mg/Kg	1	12/4/2019 6:34:40 PM
Lead	6.40	0.496		mg/Kg	1	12/4/2019 6:34:40 PM
Strontium	32.0	0.496		mg/Kg	1	12/4/2019 6:34:40 PM
Zinc	36.6	0.496		mg/Kg	1	12/4/2019 6:34:40 PM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	390	49.1		mg/Kg-dry	1	12/3/2019 11:57:58 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

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WO#: **19110959**

Date Reported: **12/9/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/20/2019 2:35:00 PM

Project: Henning Management/0526033

Lab ID: 19110959-020 **Matrix:** SOIL

Client Sample ID H-17 10-12'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXL**
Percent Moisture	15.5	1.00		wt%	1	11/25/2019 2:15:00 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.
H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit
RL	Reporting Limit
SDL	Sample detection limit
W	Sample container temperature is out of limit as specified at testcode
B	Analyte detected in the associated Method Blank
M	Matrix Interference
R	RPD outside accepted recovery limits
S	Spike Recovery outside accepted recovery limits
U	Analyte not detected

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Analytical Report

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WO#: **19110959**

Date Reported: **12/9/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/20/2019 2:40:00 PM

Project: Henning Management/0526033

Lab ID: 19110959-021 **Matrix:** SOIL

Client Sample ID H-17 12-14'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
ELECTRICAL CONDUCTIVITY @ SATURATION				**LDNR 29-B**		Analyst: **MRM**
Electrical Conductivity	3.76	0.10		mmhos/cm	1	12/3/2019 4:35:00 PM
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXL**
Percent Moisture	20.2	1.00		wt%	1	11/25/2019 2:55:00 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.
H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit
RL	Reporting Limit
SDL	Sample detection limit
W	Sample container temperature is out of limit as specified at testcode
B	Analyte detected in the associated Method Blank
M	Matrix Interference
R	RPD outside accepted recovery limits
S	Spike Recovery outside accepted recovery limits
U	Analyte not detected

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Analytical Report

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WO#: **19110959**

Date Reported: **12/9/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/20/2019 2:45:00 PM

Project: Henning Management/0526033

Lab ID: 19110959-022 **Matrix:** SOIL

Client Sample ID H-17 14-16'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
ELECTRICAL CONDUCTIVITY @ SATURATION				**LDNR 29-B**		Analyst: **MRM**
Electrical Conductivity	3.06	0.10		mmhos/cm	1	12/3/2019 4:35:00 PM
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXL**
Percent Moisture	17.0	1.00		wt%	1	11/25/2019 2:55:00 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

Element Materials Technology Lafayette
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Analytical Report

(consolidated)

WO#: **19110959**

Date Reported: **12/9/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/20/2019 3:45:00 PM

Project: Henning Management/0526033

Lab ID: 19110959-023 **Matrix:** SOIL

Client Sample ID H-17 38-40'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
ELECTRICAL CONDUCTIVITY @ SATURATION				**LDNR 29-B**		Analyst: **MRM**
Electrical Conductivity	0.81	0.10		mmhos/cm	1	12/3/2019 4:35:00 PM
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXL**
Percent Moisture	16.7	1.00		wt%	1	11/25/2019 2:55:00 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

(consolidated)

WO#: **19110959**

Date Reported: **12/9/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/21/2019 9:35:00 AM

Project: Henning Management/0526033

Lab ID: 19110959-024 **Matrix:** SOIL

Client Sample ID H-18 4-6'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **MRM**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	32.2	0.100		meq/100g	1	12/5/2019
29B SALTS				**LDNR 29-B**		Analyst: **MRM**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	1.45	0.10		mmhos/cm	1	12/3/2019 4:35:00 PM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **MRM**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	13.6	0.10		%	1	12/5/2019
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	13.6	0.10	*		1	12/5/2019
Soluble Calcium	0.63	0.02		meq/L	1	12/5/2019
Soluble Magnesium	0.42	0.05		meq/L	1	12/5/2019
Soluble Sodium	9.87	0.25		meq/L	1	12/5/2019
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.101	0.101		mg/Kg	1	11/25/2019 3:31:15 PM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	3.54	0.965		mg/Kg	1	12/4/2019 6:38:09 PM
Barium	51.0	0.483		mg/Kg	1	12/4/2019 6:38:09 PM
Cadmium	< 0.241	0.241		mg/Kg	1	12/4/2019 6:38:09 PM
Chromium	7.76	0.483		mg/Kg	1	12/4/2019 6:38:09 PM
Lead	14.2	0.483		mg/Kg	1	12/4/2019 6:38:09 PM
Strontium	17.5	0.483		mg/Kg	1	12/4/2019 6:38:09 PM
Zinc	18.6	0.483		mg/Kg	1	12/4/2019 6:38:09 PM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	119	47.2		mg/Kg-dry	1	12/4/2019 12:06:35 AM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

(consolidated)

WO#: **19110959**

Date Reported: **12/9/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/21/2019 9:35:00 AM

Project: Henning Management/0526033

Lab ID: 19110959-024 **Matrix:** SOIL

Client Sample ID H-18 4-6'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXL**
Percent Moisture	15.7	1.00		wt%	1	11/25/2019 2:55:00 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

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WO#: **19110959**

Date Reported: **12/9/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/21/2019 9:45:00 AM

Project: Henning Management/0526033

Lab ID: 19110959-025 **Matrix:** SOIL

Client Sample ID H-18 8-10'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **MRM**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	22.6	0.100		meq/100g	1	12/5/2019
29B SALTS				**LDNR 29-B**		Analyst: **MRM**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	6.76	0.10	*	mmhos/cm	1	12/3/2019 4:35:00 PM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **MRM**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	8.40	0.10		%	1	12/5/2019
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	7.16	0.10			1	12/5/2019
Soluble Calcium	16.7	0.02		meq/L	1	12/5/2019
Soluble Magnesium	11.2	0.05		meq/L	1	12/5/2019
Soluble Sodium	26.8	0.25		meq/L	1	12/5/2019
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.108	0.108		mg/Kg	1	11/25/2019 3:33:33 PM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	1.34	0.988		mg/Kg	1	12/4/2019 6:41:33 PM
Barium	25.4	0.494		mg/Kg	1	12/4/2019 6:41:33 PM
Cadmium	< 0.247	0.247		mg/Kg	1	12/4/2019 6:41:33 PM
Chromium	6.82	0.494		mg/Kg	1	12/4/2019 6:41:33 PM
Lead	4.22	0.494		mg/Kg	1	12/4/2019 6:41:33 PM
Strontium	9.99	0.494		mg/Kg	1	12/4/2019 6:41:33 PM
Zinc	10.8	0.494		mg/Kg	1	12/4/2019 6:41:33 PM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	155	48.4		mg/Kg-dry	1	12/4/2019 12:12:08 AM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

(consolidated)

WO#: **19110959**

Date Reported: **12/9/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/21/2019 9:45:00 AM

Project: Henning Management/0526033

Lab ID: 19110959-025 **Matrix:** SOIL

Client Sample ID H-18 8-10'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXL**
Percent Moisture	14.0	1.00		wt%	1	11/25/2019 2:55:00 PM

Qualifiers:				
	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	H	Holding times for preparation or analysis exceeded	M	Matrix Interference
	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
	RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
	SDL	Sample detection limit	U	Analyte not detected
	W	Sample container temperature is out of limit as specified at testcode		

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WO#: **19110959**

Date Reported: **12/9/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/21/2019 10:00:00 AM

Project: Henning Management/0526033

Lab ID: 19110959-026 **Matrix:** SOIL

Client Sample ID H-18 14-16'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
ELECTRICAL CONDUCTIVITY @ SATURATION				**LDNR 29-B**		Analyst: **MRM**
Electrical Conductivity	8.06	0.10	*	mmhos/cm	1	12/3/2019 4:35:00 PM
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXL**
Percent Moisture	19.9	1.00		wt%	1	11/25/2019 2:55:00 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

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WO#: **19110959**

Date Reported: **12/9/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/21/2019 11:10:00 AM

Project: Henning Management/0526033

Lab ID: 19110959-027 **Matrix:** SOIL

Client Sample ID H-18 42-44'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
ELECTRICAL CONDUCTIVITY @ SATURATION				**LDNR 29-B**		Analyst: **MRM**
Electrical Conductivity	1.81	0.10		mmhos/cm	1	12/3/2019 4:35:00 PM
INORGANIC ANIONS, SPLP LEACHED BY SW1312/9056A				**SW9056A**		Analyst: **SGP**
Chloride	19.3	1.25		mg/L	5	12/6/2019 10:10:37 AM
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXL**
Percent Moisture	14.9	1.00		wt%	1	11/25/2019 2:55:00 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

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WO#: **19110959**

Date Reported: **12/9/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/21/2019 11:50:00 AM

Project: Henning Management/0526033

Lab ID: 19110959-028 **Matrix:** SOIL

Client Sample ID H-18 58-60'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
ELECTRICAL CONDUCTIVITY @ SATURATION				**LDNR 29-B**		Analyst: **MRM**
Electrical Conductivity	0.82	0.10		mmhos/cm	1	12/3/2019 4:35:00 PM
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXL**
Percent Moisture	17.6	1.00		wt%	1	11/25/2019 2:55:00 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

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WO#: **19110959**

Date Reported: **12/9/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/22/2019 7:50:00 AM

Project: Henning Management/0526033

Lab ID: 19110959-029 **Matrix:** SOIL

Client Sample ID H-19 4-6'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **MRM**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	33.6	0.100		meq/100g	1	12/5/2019
29B SALTS				**LDNR 29-B**		Analyst: **MRM**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	4.27	0.10	*	mmhos/cm	1	12/3/2019 4:35:00 PM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **MRM**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	7.59	0.10		%	1	12/5/2019
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	7.93	0.10			1	12/5/2019
Soluble Calcium	9.51	0.02		meq/L	1	12/5/2019
Soluble Magnesium	4.54	0.05		meq/L	1	12/5/2019
Soluble Sodium	21.0	0.25		meq/L	1	12/5/2019
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.105	0.105		mg/Kg	1	11/25/2019 3:51:17 PM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	2.56	0.998		mg/Kg	1	12/4/2019 6:44:58 PM
Barium	28.8	0.499		mg/Kg	1	12/4/2019 6:44:58 PM
Cadmium	< 0.249	0.249		mg/Kg	1	12/4/2019 6:44:58 PM
Chromium	5.61	0.499		mg/Kg	1	12/4/2019 6:44:58 PM
Lead	6.79	0.499		mg/Kg	1	12/4/2019 6:44:58 PM
Strontium	16.5	0.499		mg/Kg	1	12/4/2019 6:44:58 PM
Zinc	11.2	0.499		mg/Kg	1	12/4/2019 6:44:58 PM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	314	48.3		mg/Kg-dry	1	12/4/2019 12:16:13 AM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

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WO#: **19110959**

Date Reported: **12/9/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/22/2019 7:50:00 AM

Project: Henning Management/0526033

Lab ID: 19110959-029 **Matrix:** SOIL

Client Sample ID H-19 4-6'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXL**
Percent Moisture	17.4	1.00		wt%	1	11/25/2019 2:55:00 PM

Qualifiers:				
	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	H	Holding times for preparation or analysis exceeded	M	Matrix Interference
	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
	RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
	SDL	Sample detection limit	U	Analyte not detected
	W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

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WO#: **19110959**

Date Reported: **12/9/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/22/2019 8:00:00 AM

Project: Henning Management/0526033

Lab ID: 19110959-030 **Matrix:** SOIL

Client Sample ID H-19 8-10'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **MRM**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	50.8	0.100		meq/100g	1	12/5/2019
29B SALTS				**LDNR 29-B**		Analyst: **MRM**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	3.60	0.10		mmhos/cm	1	12/3/2019 4:35:00 PM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **MRM**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	5.86	0.10		%	1	12/5/2019
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	5.32	0.10			1	12/5/2019
Soluble Calcium	7.98	0.02		meq/L	1	12/5/2019
Soluble Magnesium	5.89	0.05		meq/L	1	12/5/2019
Soluble Sodium	14.0	0.25		meq/L	1	12/5/2019
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.105	0.105		mg/Kg	1	11/25/2019 4:06:14 PM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	2.55	0.983		mg/Kg	1	12/4/2019 6:48:29 PM
Barium	46.0	0.491		mg/Kg	1	12/4/2019 6:48:29 PM
Cadmium	< 0.246	0.246		mg/Kg	1	12/4/2019 6:48:29 PM
Chromium	12.7	0.491		mg/Kg	1	12/4/2019 6:48:29 PM
Lead	9.74	0.491		mg/Kg	1	12/4/2019 6:48:29 PM
Strontium	26.3	0.491		mg/Kg	1	12/4/2019 6:48:29 PM
Zinc	44.6	0.491		mg/Kg	1	12/4/2019 6:48:29 PM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	277	49.6		mg/Kg-dry	1	12/4/2019 12:19:57 AM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

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WO#: **19110959**

Date Reported: **12/9/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/22/2019 8:00:00 AM

Project: Henning Management/0526033

Lab ID: 19110959-030 **Matrix:** SOIL

Client Sample ID H-19 8-10'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXL**
Percent Moisture	18.1	1.00		wt%	1	11/25/2019 2:55:00 PM

Qualifiers:				
	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	H	Holding times for preparation or analysis exceeded	M	Matrix Interference
	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
	RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
	SDL	Sample detection limit	U	Analyte not detected
	W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

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WO#: **19110959**

Date Reported: **12/9/2019**

CLIENT: Environmental Resources Management **Collection Date:** 11/22/2019 9:15:00 AM

Project: Henning Management/0526033

Lab ID: 19110959-031 **Matrix:** SOIL

Client Sample ID H-19 38-40'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
ELECTRICAL CONDUCTIVITY @ SATURATION				**LDNR 29-B**		Analyst: **MRM**
Electrical Conductivity	2.93	0.10		mmhos/cm	1	12/3/2019 4:35:00 PM
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXL**
Percent Moisture	15.7	1.00		wt%	1	11/25/2019 2:55:00 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **19110959**

09-Dec-19

Client: Environmental Resources Management
Project: Henning Management/0526033 **BatchID:** **32357**

Sample ID: **MB-32357** SampType: **MBLK** TestCode: **HG_S_7471A** Units: **mg/Kg** Prep Date: **11/25/2019** RunNo: **84034**
Client ID: **PBS** Batch ID: **32357** TestNo: **SW7471A** **SW7471A** Analysis Date: **11/25/2019** SeqNo: **2105808**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	< 0.100	0.100									

Sample ID: **19110959-025AMS** SampType: **MS** TestCode: **HG_S_7471A** Units: **mg/Kg** Prep Date: **11/25/2019** RunNo: **84034**
Client ID: **H-18 8-10'** Batch ID: **32357** TestNo: **SW7471A** **SW7471A** Analysis Date: **11/25/2019** SeqNo: **2105837**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	1.11	0.106	0.8816	0	126	75	125				S

NOTES:
MS/MSD recoveries were outside of QC limits. PDS/PDSD recoveries were within the acceptance limits. The method is in control as indicated by the Lab Control Sample(s).

Sample ID: **19110959-025AMSD** SampType: **MSD** TestCode: **HG_S_7471A** Units: **mg/Kg** Prep Date: **11/25/2019** RunNo: **84034**
Client ID: **H-18 8-10'** Batch ID: **32357** TestNo: **SW7471A** **SW7471A** Analysis Date: **11/25/2019** SeqNo: **2105838**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	1.12	0.106	0.8855	0	126	75	125	1.109	0.704	20	S

Sample ID: **LCS-32357** SampType: **LCS** TestCode: **HG_S_7471A** Units: **mg/Kg** Prep Date: **11/25/2019** RunNo: **84034**
Client ID: **LCSS** Batch ID: **32357** TestNo: **SW7471A** **SW7471A** Analysis Date: **11/25/2019** SeqNo: **2105866**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.939	0.100	0.8330	0	113	80	120				

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceed
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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Website: www.element.com

QC SUMMARY REPORT

WO#: **19110959**

09-Dec-19

Client: Environmental Resources Management

Project: Henning Management/0526033 **BatchID:** **32357**

Sample ID: **LCSD-32357** SampType: **LCSD** TestCode: **HG_S_7471A** Units: **mg/Kg** Prep Date: **11/25/2019** RunNo: **84034**

Client ID: **LCSS02** Batch ID: **32357** TestNo: **SW7471A** **SW7471A** Analysis Date: **11/25/2019** SeqNo: **2105869**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.938	0.100	0.8330	0	113	80	120	0.9386	0.0967	20	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceed
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **19110959**

09-Dec-19

Client: Environmental Resources Management
Project: Henning Management/0526033 **BatchID:** **32358**

Sample ID: **MB-32358**	SampType: **MBLK**	TestCode: **HG_S_7471A**	Units: **mg/Kg**	Prep Date: **11/25/2019**	RunNo: **84034**
Client ID: **PBS**	Batch ID: **32358**	TestNo: **SW7471A**	**SW7471A**	Analysis Date: **11/25/2019**	SeqNo: **2105839**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	< 0.100	0.100									

Sample ID: **LCS-32358**	SampType: **LCS**	TestCode: **HG_S_7471A**	Units: **mg/Kg**	Prep Date: **11/25/2019**	RunNo: **84034**
Client ID: **LCSS**	Batch ID: **32358**	TestNo: **SW7471A**	**SW7471A**	Analysis Date: **11/25/2019**	SeqNo: **2105840**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.963	0.100	0.8330	0	116	80	120				

Sample ID: **LCSD-32358**	SampType: **LCSD**	TestCode: **HG_S_7471A**	Units: **mg/Kg**	Prep Date: **11/25/2019**	RunNo: **84034**
Client ID: **LCSS02**	Batch ID: **32358**	TestNo: **SW7471A**	**SW7471A**	Analysis Date: **11/25/2019**	SeqNo: **2105841**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.967	0.100	0.8330	0	116	80	120	0.9632	0.386	20	

Sample ID: **19110959-029AMS**	SampType: **MS**	TestCode: **HG_S_7471A**	Units: **mg/Kg**	Prep Date: **11/25/2019**	RunNo: **84034**
Client ID: **H-19 4-6'**	Batch ID: **32358**	TestNo: **SW7471A**	**SW7471A**	Analysis Date: **11/25/2019**	SeqNo: **2105846**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	1.09	0.104	0.8688	0	125	75	125				S

NOTES:
MS/MSD recoveries were outside of QC limits. PDS/PDSD recoveries were within the acceptance limits. The method is in control as indicated by the Lab Control Sample(s).

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceed
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **19110959**

09-Dec-19

Client: Environmental Resources Management

Project: Henning Management/0526033 **BatchID:** **32358**

Sample ID: **19110959-029AMSD** SampType: **MSD** TestCode: **HG_S_7471A** Units: **mg/Kg** Prep Date: **11/25/2019** RunNo: **84034**

Client ID: **H-19 4-6'** Batch ID: **32358** TestNo: **SW7471A** **SW7471A** Analysis Date: **11/25/2019** SeqNo: **2105847**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	1.09	0.104	0.8623	0	126	75	125	1.088	0.0902	20	S

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceed
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **19110959**

09-Dec-19

Client: Environmental Resources Management
Project: Henning Management/0526033 **BatchID:** **32408**

Sample ID: **MB-32408**	SampType: **MBLK**	TestCode: **TTBA**	Units: **mg/Kg-dry**	Prep Date: **12/2/2019**	RunNo: **84211**
Client ID: **PBS**	Batch ID: **32408**	TestNo: **LDNR 29-B**		Analysis Date: **12/3/2019**	SeqNo: **2110574**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
True Total Barium	< 50.0	50.0									

Sample ID: **LCS-32408**	SampType: **LCS**	TestCode: **TTBA**	Units: **mg/Kg-dry**	Prep Date: **12/2/2019**	RunNo: **84211**
Client ID: **LCSS**	Batch ID: **32408**	TestNo: **LDNR 29-B**		Analysis Date: **12/3/2019**	SeqNo: **2110575**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
True Total Barium	5,200	50.0	5,000	0	104	75	125				

Sample ID: **LCSD-32408**	SampType: **LCSD**	TestCode: **TTBA**	Units: **mg/Kg-dry**	Prep Date: **12/2/2019**	RunNo: **84211**
Client ID: **LCSS02**	Batch ID: **32408**	TestNo: **LDNR 29-B**		Analysis Date: **12/3/2019**	SeqNo: **2110576**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
True Total Barium	5,270	50.0	5,000	0	105	75	125	5,205	1.24	20	

Sample ID: **19110641-001AMS**	SampType: **MS**	TestCode: **TTBA**	Units: **mg/Kg-dry**	Prep Date: **12/2/2019**	RunNo: **84211**
Client ID: **ZZZZZZ**	Batch ID: **32408**	TestNo: **LDNR 29-B**		Analysis Date: **12/3/2019**	SeqNo: **2110580**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
True Total Barium	87,800	47.3	4,730	85,550	47.5	75	125				S

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceed
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **19110959**

09-Dec-19

Client: Environmental Resources Management

Project: Henning Management/0526033 **BatchID:** **32408**

Sample ID: **19110641-001AMSD** SampType: **MSD** TestCode: **TTBA** Units: **mg/Kg-dry** Prep Date: **12/2/2019** RunNo: **84211**

Client ID: **ZZZZZZ** Batch ID: **32408** TestNo: **LDNR 29-B** Analysis Date: **12/3/2019** SeqNo: **2110581**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
True Total Barium	83,500	46.8	4,682	85,550	-44.3	75	125	87,800	5.05	20	S

NOTES:

S - Spike recovery indicates matrix interference. The method is in control as indicated by the Lab Control Sample.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceed
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **19110959**

09-Dec-19

Client: Environmental Resources Management

Project: Henning Management/0526033 **BatchID:** **32425**

Sample ID: **MB-32425** SampType: **MBLK** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **12/3/2019** RunNo: **84247**

Client ID: **PBS** Batch ID: **32425** TestNo: **SW6010B** **SW3050B** Analysis Date: **12/4/2019** SeqNo: **2111382**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	< 1.00	1.00									
Barium	< 0.500	0.500									
Cadmium	< 0.250	0.250									
Chromium	< 0.500	0.500									
Lead	< 0.500	0.500									
Strontium	< 0.500	0.500									
Zinc	< 0.500	0.500									

Sample ID: **LCS-32425** SampType: **LCS** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **12/3/2019** RunNo: **84247**

Client ID: **LCSS** Batch ID: **32425** TestNo: **SW6010B** **SW3050B** Analysis Date: **12/4/2019** SeqNo: **2111383**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	24.6	1.00	25.00	0	98.4	80	120				
Barium	25.0	0.500	25.00	0	100	80	120				
Cadmium	24.7	0.250	25.00	0	98.9	80	120				
Chromium	24.9	0.500	25.00	0	99.6	80	120				
Lead	24.8	0.500	25.00	0	99.2	80	120				
Strontium	25.1	0.500	25.00	0	101	80	120				
Zinc	24.8	0.500	25.00	0	99.0	80	120				

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceed
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **19110959**

09-Dec-19

Client: Environmental Resources Management
Project: Henning Management/0526033 **BatchID:** **32425**

Sample ID: **LCSD-32425** SampType: **LCSD** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **12/3/2019** RunNo: **84247**
Client ID: **LCSS02** Batch ID: **32425** TestNo: **SW6010B** **SW3050B** Analysis Date: **12/4/2019** SeqNo: **2111384**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	24.2	1.00	25.00	0	96.7	80	120	24.60	1.72	20	
Barium	24.5	0.500	25.00	0	97.8	80	120	24.99	2.14	20	
Cadmium	24.2	0.250	25.00	0	97.0	80	120	24.73	1.96	20	
Chromium	24.4	0.500	25.00	0	97.5	80	120	24.90	2.11	20	
Lead	24.4	0.500	25.00	0	97.8	80	120	24.80	1.42	20	
Strontium	24.9	0.500	25.00	0	99.6	80	120	25.13	0.960	20	
Zinc	24.3	0.500	25.00	0	97.2	80	120	24.76	1.88	20	

Sample ID: **19110959-001AMS** SampType: **MS** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **12/3/2019** RunNo: **84247**
Client ID: **H-14 8-10'** Batch ID: **32425** TestNo: **SW6010B** **SW3050B** Analysis Date: **12/4/2019** SeqNo: **2111390**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	24.8	0.979	24.47	2.325	92.0	75	125				
Barium	58.1	0.489	24.47	24.10	139	75	125				S
Cadmium	22.3	0.245	24.47	0.09107	90.7	75	125				
Chromium	32.1	0.489	24.47	6.116	106	75	125				
Lead	28.0	0.489	24.47	6.677	87.2	75	125				
Strontium	42.5	0.489	24.47	17.79	101	75	125				
Zinc	44.6	0.489	24.47	15.81	118	75	125				

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceed
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **19110959**

09-Dec-19

Client: Environmental Resources Management

Project: Henning Management/0526033 **BatchID:** **32425**

Sample ID: **19110959-001AMSD** SampType: **MSD** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **12/3/2019** RunNo: **84247**

Client ID: **H-14 8-10'** Batch ID: **32425** TestNo: **SW6010B** **SW3050B** Analysis Date: **12/4/2019** SeqNo: **2111391**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	24.5	0.993	24.84	2.325	89.3	75	125	24.83	1.35	20	
Barium	58.5	0.497	24.84	24.10	139	75	125	58.09	0.728	20	S
Cadmium	22.5	0.248	24.84	0.09107	90.4	75	125	22.29	1.14	20	
Chromium	32.3	0.497	24.84	6.116	106	75	125	32.08	0.754	20	
Lead	28.2	0.497	24.84	6.677	86.6	75	125	28.01	0.612	20	
Strontium	42.8	0.497	24.84	17.79	101	75	125	42.48	0.761	20	
Zinc	44.9	0.497	24.84	15.81	117	75	125	44.57	0.817	20	

NOTES:

S - Spike recovery indicates matrix interference. The method is in control as indicated by the Lab Control Sample.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceed
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
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QC SUMMARY REPORT

WO#: **19110959**

09-Dec-19

Client: Environmental Resources Management
Project: Henning Management/0526033 **BatchID:** **32427**

Sample ID: **19110451-023ADUP** SampType: **DUP** TestCode: **TTBA** Units: **mg/Kg-dry** Prep Date: **12/3/2019** RunNo: **84240**
Client ID: **ZZZZZZ** Batch ID: **32427** TestNo: **LDNR 29-B** Analysis Date: **12/3/2019** SeqNo: **2111246**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
True Total Barium	146	46.7						93.93	43.2	20	R

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceed
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **19110959**

09-Dec-19

Client: Environmental Resources Management
Project: Henning Management/0526033 **BatchID:** **32427**

Sample ID: **MB-32427**	SampType: **MBLK**	TestCode: **TTBA**	Units: **mg/Kg-dry**	Prep Date: **12/3/2019**	RunNo: **84211**
Client ID: **PBS**	Batch ID: **32427**	TestNo: **LDNR 29-B**		Analysis Date: **12/3/2019**	SeqNo: **2110607**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
True Total Barium	< 50.0	50.0									

Sample ID: **LCS-32427**	SampType: **LCS**	TestCode: **TTBA**	Units: **mg/Kg-dry**	Prep Date: **12/3/2019**	RunNo: **84211**
Client ID: **LCSS**	Batch ID: **32427**	TestNo: **LDNR 29-B**		Analysis Date: **12/3/2019**	SeqNo: **2110608**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
True Total Barium	4,650	50.0	5,000	0	93.1	75	125				

Sample ID: **LCSD-32427**	SampType: **LCSD**	TestCode: **TTBA**	Units: **mg/Kg-dry**	Prep Date: **12/3/2019**	RunNo: **84211**
Client ID: **LCSS02**	Batch ID: **32427**	TestNo: **LDNR 29-B**		Analysis Date: **12/3/2019**	SeqNo: **2110609**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
True Total Barium	5,080	50.0	5,000	0	102	75	125	4,654	8.65	20	

Sample ID: **19110959-019AMS**	SampType: **MS**	TestCode: **TTBA**	Units: **mg/Kg-dry**	Prep Date: **12/3/2019**	RunNo: **84211**
Client ID: **H-17 8-10'**	Batch ID: **32427**	TestNo: **LDNR 29-B**		Analysis Date: **12/3/2019**	SeqNo: **2110611**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
True Total Barium	5,120	48.6	4,864	159.9	102	75	125				

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceed
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **19110959**

09-Dec-19

Client: Environmental Resources Management
Project: Henning Management/0526033 **BatchID:** **32427**

Sample ID: **19110959-019AMSD** SampType: **MSD** TestCode: **TTBA** Units: **mg/Kg-dry** Prep Date: **12/3/2019** RunNo: **84211**
Client ID: **H-17 8-10'** Batch ID: **32427** TestNo: **LDNR 29-B** Analysis Date: **12/3/2019** SeqNo: **2110612**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
True Total Barium	5,020	48.6	4,859	159.9	100	75	125	5,117	1.92	20	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceed
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **19110959**

09-Dec-19

Client: Environmental Resources Management

Project: Henning Management/0526033 **BatchID:** **32445**

Sample ID: **19110959-011ADUP** SampType: **DUP** TestCode: **ESP_S** Units: **%** Prep Date: **12/4/2019** RunNo: **84286**

Client ID: **H-16 4-6'** Batch ID: **32445** TestNo: **LDNR 29-B** **LDNR 29-B** Analysis Date: **12/5/2019** SeqNo: **2112646**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Exchangeable Sodium %	9.94	0.10						8.77	12.5	20	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceed
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

Element Materials Technology Lafayette
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QC SUMMARY REPORT

WO#: **19110959**

09-Dec-19

Client: Environmental Resources Management
Project: Henning Management/0526033 **BatchID:** **32446**

Sample ID: **19110959-011ADUP** SampType: **DUP** TestCode: **CEC** Units: **meq/100g** Prep Date: **12/4/2019** RunNo: **84286**
Client ID: **H-16 4-6'** Batch ID: **32446** TestNo: **LDNR 29-B** **LDNR 29-B** Analysis Date: **12/5/2019** SeqNo: **2112631**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Cation Exchange Capacity	36.2	0.100						41.39	13.4	20	

Sample ID: **lcs-32446** SampType: **LCS** TestCode: **CEC** Units: **meq/100g** Prep Date: **12/4/2019** RunNo: **84286**
Client ID: **LCSS** Batch ID: **32446** TestNo: **LDNR 29-B** **LDNR 29-B** Analysis Date: **12/5/2019** SeqNo: **2112637**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Cation Exchange Capacity	22.0	0.100	25.00	0	88.1	76	124				

Sample ID: **lcsd-32446** SampType: **LCSD** TestCode: **CEC** Units: **meq/100g** Prep Date: **12/4/2019** RunNo: **84286**
Client ID: **LCSS02** Batch ID: **32446** TestNo: **LDNR 29-B** **LDNR 29-B** Analysis Date: **12/5/2019** SeqNo: **2112638**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Cation Exchange Capacity	21.7	0.100	25.00	0	86.9	76	124	22.03	1.42	20	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceed
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **19110959**

09-Dec-19

Client: Environmental Resources Management
Project: Henning Management/0526033 **BatchID:** **32454**

Sample ID: **19110959-011ADUP** SampType: **DUP** TestCode: **SAR_S** Units: Prep Date: **12/4/2019** RunNo: **84271**
Client ID: **H-16 4-6'** Batch ID: **32454** TestNo: **LDNR 29-B** **LDNR 29-B** Analysis Date: **12/5/2019** SeqNo: **2112091**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sodium Adsorption Ratio	9.33	0.10						9.33	0.05	20	
Soluble Calcium	6.95	0.02						7.03	1.21	20	
Soluble Magnesium	2.87	0.05						2.89	0.57	20	
Soluble Sodium	20.7	0.25						20.77	0.46	20	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceed
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **19110959**

09-Dec-19

Client: Environmental Resources Management

Project: Henning Management/0526033 **BatchID:** **R84165**

Sample ID: **19110959-011ADUP** SampType: **DUP** TestCode: **PMOIST_29B** Units: **wt%** Prep Date: RunNo: **84165**

Client ID: **H-16 4-6'** Batch ID: **R84165** TestNo: **LDNR 29-B** Analysis Date: **11/25/2019** SeqNo: **2108953**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Percent Moisture	16.9	1.00						17.10	1.18	20	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceed
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **19110959**

09-Dec-19

Client: Environmental Resources Management

Project: Henning Management/0526033 **BatchID:** **R84166**

Sample ID: **19110969-002ADUP** SampType: **DUP** TestCode: **PMOIST_29B** Units: **wt%** Prep Date: RunNo: **84166**

Client ID: **ZZZZZZ** Batch ID: **R84166** TestNo: **LDNR 29-B** Analysis Date: **11/25/2019** SeqNo: **2108976**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Percent Moisture	17.5	1.00						17.50	0	20	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceed
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **19110959**

09-Dec-19

Client: Environmental Resources Management
Project: Henning Management/0526033 **BatchID:** **R84193**

Sample ID: **MB-R84193**	SampType: **MBLK**	TestCode: **EC_S**	Units: **mmhos/cm**	Prep Date:	RunNo: **84193**
Client ID: **PBS**	Batch ID: **R84193**	TestNo: **LDNR 29-B**		Analysis Date: **12/3/2019**	SeqNo: **2109885**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Electrical Conductivity	< 0.10	0.10									

Sample ID: **LCS1-R84193**	SampType: **LCS1**	TestCode: **EC_S**	Units: **mmhos/cm**	Prep Date:	RunNo: **84193**
Client ID: **ZZZZZZ**	Batch ID: **R84193**	TestNo: **LDNR 29-B**		Analysis Date: **12/3/2019**	SeqNo: **2109886**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Electrical Conductivity	0.40	0.10	0.38	0	104	90.07	109.9				

Sample ID: **LCS2-R84193**	SampType: **LCS2**	TestCode: **EC_S**	Units: **mmhos/cm**	Prep Date:	RunNo: **84193**
Client ID: **ZZZZZZ**	Batch ID: **R84193**	TestNo: **LDNR 29-B**		Analysis Date: **12/3/2019**	SeqNo: **2109887**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Electrical Conductivity	49.4	0.10	53.00	0	93.2	90	110				

Sample ID: **19110959-011ADUP**	SampType: **DUP**	TestCode: **EC_S**	Units: **mmhos/cm**	Prep Date:	RunNo: **84193**
Client ID: **H-16 4-6'**	Batch ID: **R84193**	TestNo: **LDNR 29-B**		Analysis Date: **12/3/2019**	SeqNo: **2109899**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Electrical Conductivity	3.92	0.10						3.91	0.26	20	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceed
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **19110959**

09-Dec-19

Client: Environmental Resources Management
Project: Henning Management/0526033 **BatchID:** **R84194**

Sample ID: **MB-R84194** SampType: **MBLK** TestCode: **EC_S** Units: **mmhos/cm** Prep Date: RunNo: **84194**
Client ID: **PBS** Batch ID: **R84194** TestNo: **LDNR 29-B** Analysis Date: **12/3/2019** SeqNo: **2109966**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Electrical Conductivity	< 0.10	0.10									

Sample ID: **LCS1-R84194** SampType: **LCS1** TestCode: **EC_S** Units: **mmhos/cm** Prep Date: RunNo: **84194**
Client ID: **ZZZZZZ** Batch ID: **R84194** TestNo: **LDNR 29-B** Analysis Date: **12/3/2019** SeqNo: **2109967**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Electrical Conductivity	0.38	0.10	0.38	0	99.2	90.07	109.9				

Sample ID: **LCS2-R84194** SampType: **LCS2** TestCode: **EC_S** Units: **mmhos/cm** Prep Date: RunNo: **84194**
Client ID: **ZZZZZZ** Batch ID: **R84194** TestNo: **LDNR 29-B** Analysis Date: **12/3/2019** SeqNo: **2109968**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Electrical Conductivity	48.5	0.10	53.00	0	91.5	90	110				

Sample ID: **19110969-002ADUP** SampType: **DUP** TestCode: **EC_S** Units: **mmhos/cm** Prep Date: RunNo: **84194**
Client ID: **ZZZZZZ** Batch ID: **R84194** TestNo: **LDNR 29-B** Analysis Date: **12/3/2019** SeqNo: **2109982**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Electrical Conductivity	4.22	0.10						4.48	5.98	20	*

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceed
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **19110959**

09-Dec-19

Client: Environmental Resources Management
Project: Henning Management/0526033 **BatchID:** **R84306**

Sample ID: **MBLK**	SampType: **MBLK**	TestCode: **9056_SPLP**	Units: **mg/L**	Prep Date:	RunNo: **84306**
Client ID: **PBS**	Batch ID: **R84306**	TestNo: **SW9056A**		Analysis Date: **12/6/2019**	SeqNo: **2113623**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	< 0.250	0.250									

Sample ID: **LCS**	SampType: **LCS**	TestCode: **9056_SPLP**	Units: **mg/L**	Prep Date:	RunNo: **84306**
Client ID: **LCSS**	Batch ID: **R84306**	TestNo: **SW9056A**		Analysis Date: **12/6/2019**	SeqNo: **2113624**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	9.95	0.250	10.00	0	99.5	80	120				

Sample ID: **LCSD**	SampType: **LCSD**	TestCode: **9056_SPLP**	Units: **mg/L**	Prep Date:	RunNo: **84306**
Client ID: **LCSS02**	Batch ID: **R84306**	TestNo: **SW9056A**		Analysis Date: **12/6/2019**	SeqNo: **2113625**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	9.88	0.250	10.00	0	98.8	80	120	9.955	0.778	15	

Sample ID: **19110959-015AMS**	SampType: **MS**	TestCode: **9056_SPLP**	Units: **mg/L**	Prep Date:	RunNo: **84306**
Client ID: **H-16 34-36'**	Batch ID: **R84306**	TestNo: **SW9056A**		Analysis Date: **12/6/2019**	SeqNo: **2113628**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	139	2.50	50.00	92.55	92.6	80	120				

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceed
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **19110959**

09-Dec-19

Client: Environmental Resources Management
Project: Henning Management/0526033 **BatchID:** **R84306**

Sample ID: **19110959-015AMSD** SampType: **MSD** TestCode: **9056_SPLP** Units: **mg/L** Prep Date: RunNo: **84306**
Client ID: **H-16 34-36'** Batch ID: **R84306** TestNo: **SW9056A** Analysis Date: **12/6/2019** SeqNo: **2113629**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	140	2.50	50.00	92.55	94.2	80	120	138.9	0.566	15	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceed
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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Sample Log-In Check List

Client Name: **ERM_HOUSTON** Work Order Number: **19110959** RcptNo: **1**

Logged by:	**Tammy Thibodeaux**	**11/22/2019 3:30:00 PM**	Tammy M Thibodeaux
Completed By:	**Tammy Thibodeaux**	**11/22/2019 4:08:33 PM**	Tammy M Thibodeaux
Reviewed By:	**Caitlin Duplantis**	**11/26/2019 2:29:26 PM**	Caitlin Duplantis

Chain of Custody

1.	Is Chain of Custody complete?	Yes ☑	No ☐	Not Present ☐
2.	How was the sample delivered?	Element		

Log In

3.	Coolers are present?	Yes ☑	No ☐	NA ☐
4.	Shipping container/cooler in good condition?	Yes ☑	No ☐	
	Custody seals intact on shipping container/cooler?	Yes ☐	No ☐	Not Present ☑
	No. Seal Date:	Signed By:		
5.	Was an attempt made to cool the samples?	Yes ☑	No ☐	NA ☐
6.	Were all samples received at a temperature of >0° C to 6.0°C	Yes ☐	No ☑	NA ☐
		Not required		
7.	Sample(s) in proper container(s)?	Yes ☑	No ☐	
8.	Sufficient sample volume for indicated test(s)?	Yes ☑	No ☐	
9.	Are samples (except VOA and ONG) properly preserved?	Yes ☑	No ☐	
10.	Was preservative added to bottles?	Yes ☐	No ☑	NA ☐
11.	Is the headspace in the VOA vials less than 1/4 inch or 6 mm?	Yes ☐	No ☐	No VOA Vials ☑
12.	Were any sample containers received broken?	Yes ☐	No ☑	
13.	Does paperwork match bottle labels? (Note discrepancies on chain of custody)	Yes ☑	No ☐	
14.	Are matrices correctly identified on Chain of Custody?	Yes ☑	No ☐	
15.	Is it clear what analyses were requested?	Yes ☑	No ☐	
16.	Were all holding times able to be met? (If no, notify customer for authorization.)	Yes ☑	No ☐	

Special Handling (if applicable)

17. Was client notified of all discrepancies with this order? Yes ☐ No ☐ NA ☑

Person Notified: Date:
By Whom: Via: ☐ eMail ☐ Phone ☐ Fax ☐ In Person
Regarding:
Client Instructions:

18. Additional remarks:
Improper error correction(s) made by client.

Cooler Information

Cooler No	Temp ºC	Condition	Seal Intact	Seal No	Seal Date	Signed By

element™

Chain of Custody

Laboratory Number: 19110959

Client Information:	Billing Information:	PO Number:	Project Name/Number:	Page 1 of 4
Company Name: ERM	SAME		HENNING MANAGEMENT 0526033	**Matrix Code**
Contact Name: DAVE ANGLE		Quote Number:		DW = Drinking Water
Address: 840 W SAM HOUSTON PKWY N #600			Sampler's Signature	WW = Waste Water
HOUSTON, TX 77024		Required QC Level		GW = Ground Water
City, State Zip:				AQ = Aqueous
Phone Number: 832-786-4781 Ext:	Ext:	Bill Monthly ☐Yes ☐No	Shipping Method: UPS / FedEx / NOW DHL / Element / Hand / Mail	OT = Other
Fax Number:				SL = Sludge SOL = Solid
E-mail Address: DAVID.ANGLE@ERM.COM				O = Oil SO = Soil
				F = Food SW = Swab
				NG = Natural Gas
				NGL = Natural Gas Liquid
				PW = Produced Water
				CF = Completion Fluid

Which Regulations Apply: ☐RCRA ☐Drinking Water ☐POTW ☐Distribution ☐NPDES ☐Special ☐USDA/FDA ☐State ☐RECAP/RISC ☐Other

Turn Time ☒Standard RUSH ☐1 Day ☐2 Day ☐Other (Rush turn times will incur a surcharge and must be pre-approved by lab.)

Sample ID/Description	Collection Information: Date	Time	Grab / Composite	Matrix	Container: Quantity	Container: Type P=Plastic, G=Glass, V=Vial	Pres.: HCl, HNO_3, H_2SO_4, NaOH, $Na_2S_2O_3$	EC	% Moisture	298 METALS	CEC/ESP/SAR	SALP Cl							Comments
H-14 8-10'	11/18/19	1335	GRAB	SOIL	1	P	NONE	X	X	X	X								METALS As, Ba, TTBa, Cd, Cr, Sr, Zn, Hg, Pb
H-14 16-18'		1355						X	X										
H-14 38-40'		1450						X	X										
H-15 4-6'	11/19/19	1115						X	X	X	X								
H-15 6-8'		1120						X	X	X	X								
H-15 8-10'		1125						X	X	X	X								
H-15 10-12'		1130						X	X	X	X								
H-15 12-14'		1135						X	X										
H-15 38-40'		1240						X	X										

	Relinquished by	Date/Time	Received by	Date/Time
1		11/22/19 1140		11/22/19 1140
2		11/22/19 1530		11/20/19 1530
3				

Field Notes:

Received at lab on ice? ☐Yes ☒No Temp:

All samples submitted to Element Materials Technology for analysis are accepted on a custodial basis only. Ownership of the material remains with the client submitting the samples. Element Materials Technology reserves the right to return unused sample portions.

9301 Innovation Drive, Suite 115, Daleville, IN 47334-0569 USA, P 765-378-4103, F 765-378-4109

629 Washington St. Suite 300, Columbus, IN 47201-6231 USA, P 812-375-0531, F 812-375-0731

2121 East Washington Boulevard, Fort Wayne, IN 46803-1328 USA, P 260-471-7000, F 260-471-7777

909 Executive Dr, Warsaw, IN 46580-2368 USA, P 574-267-3305, F 574-269-6569

3371 Cleveland Road, Suite 100A, South Bend, IN 46628-9780 USA, P 574-277-0707, F 574-273-5699

2417 W. Pinhook Rd, Lafayette, LA 70508-3344 USA, P 337-235-0483, F 337-233-6540

element

Chain of Custody

Laboratory Number: 911095A

Client Information:	Billing Information:	PO Number:	Project Name/Number:	Page 2 of 4
Company Name: ERM	SAME		HENNING MANAGEMENT 0526033	**Matrix Code**
Contact Name: DAVE ARGILE		Quote Number:		DW = Drinking Water WW = Waste Water GW = Ground Water AQ = Aqueous OT = Other SL = Sludge SOL = Solid O = Oil SO = Soil F = Food SW = Swab NG = Natural Gas NGL = Natural Gas Liquid PW = Produced Water CF = Completion Fluid
Address: 840 W Sam Houston Pkwy N #600			Sampler's Signature	
Houston, TX 77024		Required QC Level		
City, State Zip:				
Phone Number: 832-786-4781 Ext:	Ext:	Bill Monthly ☐Yes ☐No	Shipping Method: UPS / FedEx / NOW DHL / Element / Hand / Mail	
Fax Number:				
E-mail Address: DAVID.ARGILE@ERM.COM				

Which Regulations Apply: ☐RCRA ☐Drinking Water ☐POTW ☐Distribution ☐NPDES ☐Special ☐USDA/FDA ☐State ☐RECAP/RISC ☐Other

Turn Time ☒Standard RUSH ☐1 Day ☐2 Day ☐Other (Rush turn times will incur a surcharge and must be pre-approved by lab.)

Sample ID/Description	Collection Information: Date	Time	Grab / Composite	Matrix	Container: Quantity	Container: Type P=Plastic, G=Glass, V=Vial	Pres.: HCl, HNO_3, H_2SO_4, NaOH, $Na_2S_2O_3$	Requested Tests: EC	% MOISTURE	29B METALS	CEC/ESP/SAR	SAR Cl						Comments
H-16 0-2'	11/20/19	0825	GRAB	SOIL	1	P	NONE	X	X	X	X							METALS
H-16 4-6'		0835						X	X	X	X							As, Ba, TTBa,
H-16 10-12'		0850						X	X	X	X							Cd, Cr, Sr, Zn,
H-16 14-16'		0900						X	X									Hg, Pb
H-16 16-18'		0905						X	X									
H-16 34-36'		0950						X	X			X						
H-16 38-40'		1000						X	X									
H-17 4-6'		1420						X	X	X	X							
H-17 6-8'		1425						X	X	X	X							

	Relinquished by	Date/Time	Received by	Date/Time	Field Notes:
1		11/22/19 1140		11/22/19 1140	
2					Received at lab on ice?
3		11/22/19 1530		11/22/19 1530	☒Yes ☒No Temp:

All samples submitted to Element Materials Technology for analysis are accepted on a custodial basis only. Ownership of the material remains with the client submitting the samples. Element Materials Technology reserves the right to return unused sample portions. 11/22/19 RD

9301 Innovation Drive, Suite 115, Daleville, IN 47334-0569 USA, P 765-378-4103, F 765-378-4109
629 Washington St. Suite 300, Columbus, IN 47201-6231 USA, P 812-375-0531, F 812-375-0731
2121 East Washington Boulevard, Fort Wayne, IN 46803-1328 USA, P 260-471-7000, F 260-471-7777
909 Executive Dr, Warsaw, IN 46580-2368 USA, P 574-267-3305, F 574-269-6569
3371 Cleveland Road, Suite 100A, South Bend, IN 46628-9780 USA, P 574-277-0707, F 574-273-5699
2417 W. Pinhook Rd, Lafayette, LA 70508-3344 USA, P 337-235-0483, F 337-233-6540

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Chain of Custody

Laboratory Number: 19110959

Page 3 of 4

Client Information:	Billing Information:	PO Number:	Project Name/Number:
Company Name: ERM	SAME		HOUSTON MANAGEMENT 0526033
Contact Name: DAVE ANGLES		Quote Number:	
Address: 840 W SAM HOUSTON PKWY N #600		Required QC Level	Sampler's Signature
City, State Zip: HOUSTON, TX 77024			
Phone Number: 832-786-4781 Ext:	Ext:	Bill Monthly ☐Yes ☐No	Shipping Method: UPS / FedEx / NOW DHL / (Element) / Hand / Mail
Fax Number:			
E-mail Address: DAVID.ANGLES@ERM.COM			

Matrix Code

DW = Drinking Water
WW = Waste Water
GW = Ground Water
AQ = Aqueous
OT = Other
SL = Sludge SOL = Solid
O = Oil SO = Soil
F = Food SW = Swab
NG = Natural Gas
NGL = Natural Gas Liquid
PW = Produced Water
CF = Completion Fluid

Which Regulations Apply:
☐RCRA ☐Drinking Water
☐POTW ☐Distribution
☐NPDES ☐Special
☐USDA/FDA ☐State
☐RECAP/RISC ☐Other

Turn Time
☒Standard
RUSH
☐1 Day
☐2 Day
☐Other
(Rush turn times will incur a surcharge and must be pre-approved by lab.)

Sample ID/Description	Collection Information: Date	Time	Grab / Composite	Matrix	Container: Quantity	Container: Type P=Plastic, G=Glass, V=Vial	Pres.: HCl, HNO_3, H_2SO_4, NaOH, $Na_2S_2O_3$	Requested Tests: EC	% MOISTURE	25B METALS	CEC/ESP/SAR	SPLP CL	Comments
H-17 8-10'	11/20/19	1430	GRAB	SOIL	1	P	NONE	X	X	X	X		METALS: As, Ba, TTBa, Cd, Cr, Sr, Zn, Hg, Pb
H-17 10-12'		1435						X	X	X	X		
H-17 12-14'		1440						X	X				
H-17 14-16'		1445						X	X				
H-17 38-40'		1545						X	X				
H-18 4-6'	11/21/19	0935						X	X	X	X		
H-18 8-10'		0945						X	X	X	X		
H-18 14-16'		1000						X	X				
H-18 42-44'		1110						X	X			X	

	Relinquished by	Date/Time	Received by	Date/Time
1		11/21/19 1140		11/22/19 1140
2				
3		11/22/19 1530		11/22/19 1530

Field Notes:

Received at lab on ice?
☐Yes ☒No Temp:

All samples submitted to Element Materials Technology for analysis are accepted on a custodial basis only. Ownership of the material remains with the client submitting the samples. Element Materials Technology reserves the right to return unused sample portions.

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element

Chain of Custody

Laboratory Number: 19110959

Page 4 of 4

Client Information:	Billing Information:	PO Number:	Project Name/Number:
Company Name: ERM	SAME		HERMINY MANAGEMENT 0526033
Contact Name: DAVE ANGLE		Quote Number:	
Address: 840 W SAM HOUSTON PKWY #600		Required QC Level	Sampler's Signature
City, State Zip: HOUSTON, TX 77024			
Phone Number: 832-786-4781 Ext:	Ext:	Bill Monthly ☐Yes ☐No	Shipping Method: UPS / FedEx / NOW DHL / Element / Hand / Mail
Fax Number:			
E-mail Address: DAVID.ANGLE@ERM.COM			

Matrix Code
DW = Drinking Water
WW = Waste Water
GW = Ground Water
AQ = Aqueous
OT = Other
SL = Sludge SOL = Solid
O = Oil SO = Soil
F = Food SW = Swab
NG = Natural Gas
NGL = Natural Gas Liquid
PW = Produced Water
CF = Completion Fluid

Which Regulations Apply:
☐RCRA ☐Drinking Water
☐POTW ☐Distribution
☐NPDES ☐Special
☐USDA/FDA ☐State
☐RECAP/RISC ☐Other

Turn Time
☒Standard
RUSH
☐1 Day
☐2 Day
☐Other
(Rush turn times will incur a surcharge and must be pre-approved by lab.)

Sample ID/Description	Collection Information: Date	Time	Grab / Composite	Matrix	Container: Quantity	Container: Type P=Plastic, G=Glass, V=Vial	Pres.: HCl, HNO_3, H_2SO_4, NaOH, $Na_2S_2O_3$	Requested Tests: EC	% MOISTURE	29B METALS	CEC/ESP/SAR	SAR & Cl	Comments
H-18 58-60'	11/21/19	1150	GRAB	SOIL	1	P	NONE	X	X				METALS Ag, Ba, TTBr, Cd, Cr, Sr, Zn, Hg, Pb
H-19 4-6'	11/22/19	0750						X	X	X	X		
H-19 8-10'		0800						X	X	X	X		
H-19 38-40'		0815						X	X				

	Relinquished by	Date/Time	Received by	Date/Time
1		11/22/19 1140		11/22/19 1140
2				
3		11/22/19 1530		11/22/19 1530

Field Notes:

Received at lab on ice? ☐Yes ☒No Temp:

All samples submitted to Element Materials Technology for analysis are accepted on a custodial basis only. Ownership of the material remains with the client submitting the samples. Element Materials Technology reserves the right to return unused sample portions.

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Element Materials Technology Lafayette
2417 W. Pinhook Road
Lafayette, LA 70508-3344
TEL: (337) 235-0483 FAX: (337) 233-6540
Website: www.element.com

April 28, 2021

Dave Angle
Environmental Resources Management
CityCentre Four
840 W. Sam Houston Pkwy North, Suite 600
Houston, TX 77024
TEL:
FAX

RE: Henning/0526033

Order No.: 21040438

Dear Dave Angle:

Element Materials Technology Lafayette received 49 sample(s) on 4/12/2021 for the analyses presented in the following report.

In accordance with your instructions, Element Lafayette either conducted or subcontracted these analyses. Subcontracted analyses will be identified in the accompanying case narrative. All relevant sampling information can be found on the attached Chain-of-Custody form. Unless otherwise noted, all analyses were conducted using EPA approved methodologies and all test results meet the applicable requirements of TNI. Reported results relate only to the items tested.

Where applicable, all soil data, except for 29-B, are reported on a wet-weight basis unless otherwise indicated in the units field as –dry.

LELAP Certification No.: 01997. TCEQ Certification No.: T104704261. LDHH Certification No.: LA023. ISDH Certification No.: C-LA-01. NDELCP Certification No.: R-226. A scope of accredited parameters is available upon request. A "#" by the test method or analyte indicates this parameter is outside the scope of accreditation. PA registration No.: 68-05967.

Estimated uncertainty is available upon request. This report shall not be reproduced, except in full, without the written approval of the laboratory.

If you have any questions regarding these test results, please feel free to call.

Cristina Thibeaux
Customer Service Supervisor
2417 W. Pinhook Road
Lafayette, LA 70508-3344

Element Materials Technology Lafayette
2417 W. Pinhook Road
Lafayette, LA 70508-3344
TEL: (337) 235-0483 FAX: (337) 233-6540
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Case Narrative

WO#: **21040438**
Date: **4/28/2021**

CLIENT: Environmental Resources Management
Project: Henning/0526033

Unless specified by the client, a duplicate or MS/MSD, wherever applicable, is randomly selected and analyzed from each analytical batch provided sample volume is sufficient. The sample chosen for duplicate or MS/MSD may or may not be a sample submitted in this workorder. A method blank and/or a lab control sample (LCS)/lab control sample duplicate (LCSD), wherever applicable, are processed as a quality control check for each analytical batch. When the matrix QC data is not available due to insufficient sample volume or when the results indicate possible matrix effect, the validity of the batch is determined by the method blank and LCS/LCSD.

The results of the laboratory internal quality control data are provided in the QC Summary Report section of the report for your review. Laboratory-related QC exceptions that may impact the validity of data are discussed in the case narrative. Sample-related QC exceptions are flagged either in the results page(s) or in the QC report page(s). End users should consider QC exceptions when evaluating sample data against data quality objectives.

Any other exceptions associated with this report will be footnoted in the results page(s) or the QC summary page(s).

Element Materials Technology Lafayette
2417 W. Pinhook Road
Lafayette, LA 70508-3344
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Website: www.element.com

Analytical Report

(consolidated)

WO#: **21040438**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 3/29/2021 1:20:00 PM

Project: Henning/0526033

Lab ID: 21040438-001 **Matrix:** SOIL

Client Sample ID H-20 4-6'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	35.2	0.100		meq/100g	1	4/22/2021
29B SALTS				**LDNR 29-B**		Analyst: **JMI**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	1.66	0.10		mmhos/cm	1	4/16/2021 1:20:00 PM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	6.64	0.10		%	1	4/22/2021
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	6.42	0.10			1	4/20/2021
Soluble Calcium	2.28	0.02		meq/L	1	4/20/2021
Soluble Magnesium	1.10	0.05		meq/L	1	4/20/2021
Soluble Sodium	8.35	0.25		meq/L	1	4/20/2021
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.0992	0.0992		mg/Kg	1	4/26/2021 1:26:54 PM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	1.29	1.05		mg/Kg	1	4/21/2021 4:00:07 PM
Barium	18.6	0.523		mg/Kg	1	4/21/2021 4:00:07 PM
Cadmium	< 0.261	0.261		mg/Kg	1	4/21/2021 4:00:07 PM
Chromium	7.15	0.523		mg/Kg	1	4/21/2021 4:00:07 PM
Lead	5.21	0.523		mg/Kg	1	4/21/2021 4:00:07 PM
Strontium	16.0	0.523		mg/Kg	1	4/21/2021 4:00:07 PM
Zinc	22.6	0.523		mg/Kg	1	4/21/2021 4:00:07 PM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	317	47.6		mg/Kg-dry	1	4/21/2021 5:20:55 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

Element Materials Technology Lafayette
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Website: www.element.com

Analytical Report

(consolidated)

WO#: **21040438**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 3/29/2021 1:20:00 PM

Project: Henning/0526033

Lab ID: 21040438-001 **Matrix:** SOIL

Client Sample ID H-20 4-6'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXB**
Percent Moisture	18.4	1.00		wt%	1	4/12/2021 11:30:00 AM

Qualifiers:				
	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	H	Holding times for preparation or analysis exceeded	M	Matrix Interference
	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
	RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
	SDL	Sample detection limit	U	Analyte not detected
	W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

(consolidated)

WO#: **21040438**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 3/29/2021 1:30:00 PM

Project: Henning/0526033

Lab ID: 21040438-002 **Matrix:** SOIL

Client Sample ID H-20 8-10'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	31.0	0.100		meq/100g	1	4/22/2021
29B SALTS				**LDNR 29-B**		Analyst: **JMI**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	0.84	0.10		mmhos/cm	1	4/16/2021 1:20:00 PM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	9.80	0.10		%	1	4/22/2021
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	4.62	0.10			1	4/20/2021
Soluble Calcium	1.07	0.02		meq/L	1	4/20/2021
Soluble Magnesium	0.60	0.05		meq/L	1	4/20/2021
Soluble Sodium	4.21	0.25		meq/L	1	4/20/2021
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.0990	0.0990		mg/Kg	1	4/26/2021 1:36:44 PM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	5.98	1.01		mg/Kg	1	4/21/2021 4:02:14 PM
Barium	579	0.507		mg/Kg	1	4/21/2021 4:02:14 PM
Cadmium	< 0.253	0.253		mg/Kg	1	4/21/2021 4:02:14 PM
Chromium	11.3	0.507		mg/Kg	1	4/21/2021 4:02:14 PM
Lead	7.26	0.507		mg/Kg	1	4/21/2021 4:02:14 PM
Strontium	19.2	0.507		mg/Kg	1	4/21/2021 4:02:14 PM
Zinc	4.68	0.507		mg/Kg	1	4/21/2021 4:02:14 PM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	184	46.2		mg/Kg-dry	1	4/21/2021 5:23:03 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Website: www.element.com

Analytical Report

(consolidated)

WO#: **21040438**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 3/29/2021 1:30:00 PM

Project: Henning/0526033

Lab ID: 21040438-002 **Matrix:** SOIL

Client Sample ID H-20 8-10'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXB**
Percent Moisture	17.0	1.00		wt%	1	4/12/2021 11:30:00 AM

Qualifiers:				
	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	H	Holding times for preparation or analysis exceeded	M	Matrix Interference
	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
	RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
	SDL	Sample detection limit	U	Analyte not detected
	W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

(consolidated)

WO#: **21040438**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 3/29/2021 1:55:00 PM

Project: Henning/0526033

Lab ID: 21040438-003 **Matrix:** SOIL

Client Sample ID H-20 18-20'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
ELECTRICAL CONDUCTIVITY @ SATURATION				**LDNR 29-B**		Analyst: **JMI**
Electrical Conductivity	1.03	0.10		mmhos/cm	1	4/16/2021 1:20:00 PM
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXB**
Percent Moisture	23.7	1.00		wt%	1	4/12/2021 11:30:00 AM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

(consolidated)

WO#: **21040438**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 3/29/2021 2:20:00 PM

Project: Henning/0526033

Lab ID: 21040438-004 **Matrix:** SOIL

Client Sample ID H-20 28-30'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
ELECTRICAL CONDUCTIVITY @ SATURATION				**LDNR 29-B**		Analyst: **JMI**
Electrical Conductivity	0.72	0.10		mmhos/cm	1	4/16/2021 1:20:00 PM
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXB**
Percent Moisture	14.4	1.00		wt%	1	4/12/2021 11:30:00 AM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

(consolidated)

WO#: **21040438**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 3/29/2021 2:45:00 PM

Project: Henning/0526033

Lab ID: 21040438-005 **Matrix:** SOIL

Client Sample ID H-20 38-40'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
ELECTRICAL CONDUCTIVITY @ SATURATION				**LDNR 29-B**		Analyst: **JMI**
Electrical Conductivity	1.23	0.10		mmhos/cm	1	4/16/2021 1:20:00 PM
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXB**
Percent Moisture	19.7	1.00		wt%	1	4/12/2021 11:30:00 AM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

Element Materials Technology Lafayette
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Lafayette, LA 70508-3344
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Analytical Report

(consolidated)

WO#: **21040438**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 3/30/2021 12:20:00 PM

Project: Henning/0526033

Lab ID: 21040438-006 **Matrix:** SOIL

Client Sample ID H-21 0-2'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	29.2	0.100		meq/100g	1	4/22/2021
29B SALTS				**LDNR 29-B**		Analyst: **JMI**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	2.06	0.10		mmhos/cm	1	4/16/2021 1:20:00 PM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	23.8	0.10	*	%	1	4/22/2021
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	12.9	0.10	*		1	4/20/2021
Soluble Calcium	1.27	0.02		meq/L	1	4/20/2021
Soluble Magnesium	0.54	0.05		meq/L	1	4/20/2021
Soluble Sodium	12.3	0.25		meq/L	1	4/20/2021
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.0997	0.0997		mg/Kg	1	4/26/2021 1:39:00 PM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	2.51	0.982		mg/Kg	1	4/21/2021 4:04:22 PM
Barium	110	0.491		mg/Kg	1	4/21/2021 4:04:22 PM
Cadmium	< 0.245	0.245		mg/Kg	1	4/21/2021 4:04:22 PM
Chromium	4.70	0.491		mg/Kg	1	4/21/2021 4:04:22 PM
Lead	6.93	0.491		mg/Kg	1	4/21/2021 4:04:22 PM
Strontium	62.8	0.491		mg/Kg	1	4/21/2021 4:04:22 PM
Zinc	7.21	0.491		mg/Kg	1	4/21/2021 4:04:22 PM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	349	48.4		mg/Kg-dry	1	4/21/2021 5:25:10 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

Element Materials Technology Lafayette
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Analytical Report

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WO#: **21040438**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 3/30/2021 12:20:00 PM

Project: Henning/0526033

Lab ID: 21040438-006 **Matrix:** SOIL

Client Sample ID H-21 0-2'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXB**
Percent Moisture	19.1	1.00		wt%	1	4/12/2021 11:30:00 AM

Qualifiers:				
	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	H	Holding times for preparation or analysis exceeded	M	Matrix Interference
	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
	RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
	SDL	Sample detection limit	U	Analyte not detected
	W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

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WO#: **21040438**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 3/30/2021 12:35:00 PM

Project: Henning/0526033

Lab ID: 21040438-007 **Matrix:** SOIL

Client Sample ID H-21 8-10'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	29.6	0.100		meq/100g	1	4/22/2021
29B SALTS				**LDNR 29-B**		Analyst: **JMI**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	4.20	0.10	*	mmhos/cm	1	4/16/2021 1:20:00 PM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	53.9	0.10	*	%	1	4/22/2021
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	27.2	0.10	*		1	4/20/2021
Soluble Calcium	1.38	0.02		meq/L	1	4/20/2021
Soluble Magnesium	0.54	0.05		meq/L	1	4/20/2021
Soluble Sodium	26.6	0.25		meq/L	1	4/20/2021
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.0992	0.0992		mg/Kg	1	4/26/2021 1:41:16 PM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	4.31	1.00		mg/Kg	1	4/21/2021 4:06:29 PM
Barium	91.4	0.500		mg/Kg	1	4/21/2021 4:06:29 PM
Cadmium	< 0.250	0.250		mg/Kg	1	4/21/2021 4:06:29 PM
Chromium	6.10	0.500		mg/Kg	1	4/21/2021 4:06:29 PM
Lead	6.67	0.500		mg/Kg	1	4/21/2021 4:06:29 PM
Strontium	106	0.500		mg/Kg	1	4/21/2021 4:06:29 PM
Zinc	17.3	0.500		mg/Kg	1	4/21/2021 4:06:29 PM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	128	47.1		mg/Kg-dry	1	4/21/2021 5:27:18 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

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WO#: **21040438**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 3/30/2021 12:35:00 PM

Project: Henning/0526033

Lab ID: 21040438-007 **Matrix:** SOIL

Client Sample ID H-21 8-10'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXB**
Percent Moisture	22.9	1.00		wt%	1	4/12/2021 11:30:00 AM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

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WO#: **21040438**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 3/30/2021 12:40:00 PM

Project: Henning/0526033

Lab ID: 21040438-008 **Matrix:** SOIL

Client Sample ID H-21 10-12'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
ELECTRICAL CONDUCTIVITY @ SATURATION				**LDNR 29-B**		Analyst: **JMI**
Electrical Conductivity	3.32	0.10		mmhos/cm	1	4/16/2021 1:20:00 PM
29B METALS MERCURY IN SOIL OR SLUDGE				**SW7471A**	**SW7471A**	Analyst: **BXB**
Mercury	< 0.0986	0.0986		mg/Kg	1	4/26/2021 1:48:32 PM
INORGANIC ANIONS, SPLP LEACHED BY SW1312/9056A				**SW9056A**	**SW 1312M**	Analyst: **SGP**
Chloride	56.8	1.25		mg/L	5	4/23/2021 12:02:42 PM
29B METALS METALS IN SOIL OR SLUDGE BY ICP				**SW6010B**	**SW3050B**	Analyst: **STS**
Arsenic	5.48	0.999		mg/Kg	1	4/21/2021 4:08:37 PM
Barium	183	0.500		mg/Kg	1	4/21/2021 4:08:37 PM
Cadmium	< 0.250	0.250		mg/Kg	1	4/21/2021 4:08:37 PM
Chromium	10.8	0.500		mg/Kg	1	4/21/2021 4:08:37 PM
Lead	8.19	0.500		mg/Kg	1	4/21/2021 4:08:37 PM
Strontium	98.6	0.500		mg/Kg	1	4/21/2021 4:08:37 PM
Zinc	36.4	0.500		mg/Kg	1	4/21/2021 4:08:37 PM
SPLP SODIUM BY SW1312/6010 ICP METALS, SPLP LEACHED				**SW6010B**		Analyst: **STS**
Sodium	88.8	50.0		mg/L	1	4/26/2021 8:42:40 PM
29B METALS TRUE TOTAL BARIUM				**LDNR 29-B**		Analyst: **STS**
True Total Barium	120	48.8		mg/Kg-dry	1	4/21/2021 5:35:50 PM
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXB**
Percent Moisture	20.3	1.00		wt%	1	4/12/2021 11:30:00 AM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

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WO#: **21040438**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 3/30/2021 12:50:00 PM

Project: Henning/0526033

Lab ID: 21040438-009 **Matrix:** SOIL

Client Sample ID H-21 14-16'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
ELECTRICAL CONDUCTIVITY @ SATURATION				**LDNR 29-B**		Analyst: **JMI**
Electrical Conductivity	3.41	0.10		mmhos/cm	1	4/16/2021 1:20:00 PM
INORGANIC ANIONS, SPLP LEACHED BY SW1312/9056A				**SW9056A**	**SW 1312M**	Analyst: **SGP**
Chloride	66.1	1.25		mg/L	5	4/23/2021 12:16:30 PM
SPLP SODIUM BY SW1312/6010 **ICP METALS, SPLP LEACHED**				**SW6010B**		Analyst: **STS**
Sodium	56.0	5.00		mg/L	1	4/26/2021 8:49:02 PM
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXB**
Percent Moisture	23.4	1.00		wt%	1	4/12/2021 11:30:00 AM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

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WO#: **21040438**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 4/1/2021 12:15:00 PM

Project: Henning/0526033

Lab ID: 21040438-010 **Matrix:** SOIL

Client Sample ID H-22 0-2'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	26.0	0.100		meq/100g	1	4/22/2021
29B SALTS				**LDNR 29-B**		Analyst: **JMI**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	1.70	0.10		mmhos/cm	1	4/16/2021 1:20:00 PM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	2.77	0.10		%	1	4/22/2021
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	3.87	0.10			1	4/20/2021
Soluble Calcium	3.92	0.02		meq/L	1	4/20/2021
Soluble Magnesium	1.71	0.05		meq/L	1	4/20/2021
Soluble Sodium	6.50	0.25		meq/L	1	4/20/2021
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.0987	0.0987		mg/Kg	1	4/26/2021 1:50:49 PM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	< 1.00	1.00		mg/Kg	1	4/21/2021 4:14:58 PM
Barium	53.1	0.502		mg/Kg	1	4/21/2021 4:14:58 PM
Cadmium	< 0.251	0.251		mg/Kg	1	4/21/2021 4:14:58 PM
Chromium	6.47	0.502		mg/Kg	1	4/21/2021 4:14:58 PM
Lead	5.87	0.502		mg/Kg	1	4/21/2021 4:14:58 PM
Strontium	22.6	0.502		mg/Kg	1	4/21/2021 4:14:58 PM
Zinc	7.93	0.502		mg/Kg	1	4/21/2021 4:14:58 PM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	3,790	49.8		mg/Kg-dry	1	4/21/2021 5:37:58 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

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WO#: **21040438**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 4/1/2021 12:15:00 PM

Project: Henning/0526033

Lab ID: 21040438-010 **Matrix:** SOIL

Client Sample ID H-22 0-2'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXB**
Percent Moisture	14.4	1.00		wt%	1	4/12/2021 11:30:00 AM

Qualifiers:				
	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	H	Holding times for preparation or analysis exceeded	M	Matrix Interference
	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
	RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
	SDL	Sample detection limit	U	Analyte not detected
	W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

(consolidated)

WO#: **21040438**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 4/1/2021 12:20:00 PM

Project: Henning/0526033

Lab ID: 21040438-011 **Matrix:** SOIL

Client Sample ID H-22 4-6'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	26.1	0.100		meq/100g	1	4/22/2021
29B SALTS				**LDNR 29-B**		Analyst: **JMI**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	2.86	0.10		mmhos/cm	1	4/16/2021 1:20:00 PM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	8.00	0.10		%	1	4/22/2021
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	6.83	0.10			1	4/20/2021
Soluble Calcium	4.90	0.02		meq/L	1	4/20/2021
Soluble Magnesium	2.33	0.05		meq/L	1	4/20/2021
Soluble Sodium	13.0	0.25		meq/L	1	4/20/2021
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.0995	0.0995		mg/Kg	1	4/26/2021 1:53:06 PM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	2.20	1.03		mg/Kg	1	4/21/2021 4:17:06 PM
Barium	42.6	0.513		mg/Kg	1	4/21/2021 4:17:06 PM
Cadmium	< 0.257	0.257		mg/Kg	1	4/21/2021 4:17:06 PM
Chromium	6.24	0.513		mg/Kg	1	4/21/2021 4:17:06 PM
Lead	8.07	0.513		mg/Kg	1	4/21/2021 4:17:06 PM
Strontium	17.9	0.513		mg/Kg	1	4/21/2021 4:17:06 PM
Zinc	9.97	0.513		mg/Kg	1	4/21/2021 4:17:06 PM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	236	49.8		mg/Kg-dry	1	4/21/2021 5:40:06 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

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WO#: **21040438**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 4/1/2021 12:20:00 PM

Project: Henning/0526033

Lab ID: 21040438-011 **Matrix:** SOIL

Client Sample ID H-22 4-6'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXB**
Percent Moisture	18.3	1.00		wt%	1	4/12/2021 11:30:00 AM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

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WO#: **21040438**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 4/1/2021 12:30:00 PM

Project: Henning/0526033

Lab ID: 21040438-012 **Matrix:** SOIL

Client Sample ID H-22 8-10'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	29.1	0.100		meq/100g	1	4/22/2021
29B SALTS				**LDNR 29-B**		Analyst: **JMI**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	1.76	0.10		mmhos/cm	1	4/16/2021 1:20:00 PM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	7.31	0.10		%	1	4/22/2021
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	5.12	0.10			1	4/20/2021
Soluble Calcium	3.08	0.02		meq/L	1	4/20/2021
Soluble Magnesium	1.53	0.05		meq/L	1	4/20/2021
Soluble Sodium	7.78	0.25		meq/L	1	4/20/2021
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.0988	0.0988		mg/Kg	1	4/26/2021 1:55:22 PM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	5.00	1.01		mg/Kg	1	4/21/2021 4:19:14 PM
Barium	43.0	0.507		mg/Kg	1	4/21/2021 4:19:14 PM
Cadmium	< 0.254	0.254		mg/Kg	1	4/21/2021 4:19:14 PM
Chromium	9.36	0.507		mg/Kg	1	4/21/2021 4:19:14 PM
Lead	9.47	0.507		mg/Kg	1	4/21/2021 4:19:14 PM
Strontium	14.4	0.507		mg/Kg	1	4/21/2021 4:19:14 PM
Zinc	30.7	0.507		mg/Kg	1	4/21/2021 4:19:14 PM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	90.4	48.5		mg/Kg-dry	1	4/21/2021 5:42:13 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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WO#: **21040438**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 4/1/2021 12:30:00 PM

Project: Henning/0526033

Lab ID: 21040438-012 **Matrix:** SOIL

Client Sample ID H-22 8-10'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXB**
Percent Moisture	17.5	1.00		wt%	1	4/12/2021 11:30:00 AM

Qualifiers:				
	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	H	Holding times for preparation or analysis exceeded	M	Matrix Interference
	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
	RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
	SDL	Sample detection limit	U	Analyte not detected
	W	Sample container temperature is out of limit as specified at testcode		

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WO#: **21040438**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 4/1/2021 12:45:00 PM

Project: Henning/0526033

Lab ID: 21040438-013 **Matrix:** SOIL

Client Sample ID H-22 14-16'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
ELECTRICAL CONDUCTIVITY @ SATURATION				**LDNR 29-B**		Analyst: **JMI**
Electrical Conductivity	1.14	0.10		mmhos/cm	1	4/16/2021 1:20:00 PM
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXB**
Percent Moisture	22.2	1.00		wt%	1	4/12/2021 11:30:00 AM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

Element Materials Technology Lafayette
2417 W. Pinhook Road
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Analytical Report

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WO#: **21040438**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 4/1/2021 1:20:00 PM

Project: Henning/0526033

Lab ID: 21040438-014 **Matrix:** SOIL

Client Sample ID H-22 28-30'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
ELECTRICAL CONDUCTIVITY @ SATURATION				**LDNR 29-B**		Analyst: **JMI**
Electrical Conductivity	0.78	0.10		mmhos/cm	1	4/16/2021 1:20:00 PM
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXB**
Percent Moisture	13.3	1.00		wt%	1	4/12/2021 11:30:00 AM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.
H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit
RL	Reporting Limit
SDL	Sample detection limit
W	Sample container temperature is out of limit as specified at testcode
B	Analyte detected in the associated Method Blank
M	Matrix Interference
R	RPD outside accepted recovery limits
S	Spike Recovery outside accepted recovery limits
U	Analyte not detected

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Analytical Report

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WO#: **21040438**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 4/1/2021 1:50:00 PM

Project: Henning/0526033

Lab ID: 21040438-015 **Matrix:** SOIL

Client Sample ID H-22 40-42'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
ELECTRICAL CONDUCTIVITY @ SATURATION				**LDNR 29-B**		Analyst: **JMI**
Electrical Conductivity	1.34	0.10		mmhos/cm	1	4/16/2021 1:20:00 PM
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXB**
Percent Moisture	20.8	1.00		wt%	1	4/12/2021 11:30:00 AM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.
H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit
RL	Reporting Limit
SDL	Sample detection limit
W	Sample container temperature is out of limit as specified at testcode
B	Analyte detected in the associated Method Blank
M	Matrix Interference
R	RPD outside accepted recovery limits
S	Spike Recovery outside accepted recovery limits
U	Analyte not detected

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Analytical Report

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WO#: **21040438**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 4/5/2021 3:15:00 PM

Project: Henning/0526033

Lab ID: 21040438-016 **Matrix:** SOIL

Client Sample ID H-23 0-2'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	22.5	0.100		meq/100g	1	4/22/2021
29B SALTS				**LDNR 29-B**		Analyst: **JMI**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	0.75	0.10		mmhos/cm	1	4/16/2021 1:20:00 PM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	4.68	0.10		%	1	4/22/2021
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	3.19	0.10			1	4/20/2021
Soluble Calcium	1.44	0.02		meq/L	1	4/20/2021
Soluble Magnesium	1.13	0.05		meq/L	1	4/20/2021
Soluble Sodium	3.61	0.25		meq/L	1	4/20/2021
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.0998	0.0998		mg/Kg	1	4/26/2021 1:57:39 PM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	4.22	1.05		mg/Kg	1	4/21/2021 4:21:22 PM
Barium	76.9	0.523		mg/Kg	1	4/21/2021 4:21:22 PM
Cadmium	< 0.261	0.261		mg/Kg	1	4/21/2021 4:21:22 PM
Chromium	11.2	0.523		mg/Kg	1	4/21/2021 4:21:22 PM
Lead	15.8	0.523		mg/Kg	1	4/21/2021 4:21:22 PM
Strontium	14.7	0.523		mg/Kg	1	4/21/2021 4:21:22 PM
Zinc	8.48	0.523		mg/Kg	1	4/21/2021 4:21:22 PM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	243	47.6		mg/Kg-dry	1	4/21/2021 7:52:14 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

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WO#: **21040438**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 4/5/2021 3:15:00 PM

Project: Henning/0526033

Lab ID: 21040438-016 **Matrix:** SOIL

Client Sample ID H-23 0-2'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXB**
Percent Moisture	19.6	1.00		wt%	1	4/12/2021 11:30:00 AM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

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WO#: **21040438**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 4/5/2021 3:20:00 PM

Project: Henning/0526033

Lab ID: 21040438-017 **Matrix:** SOIL

Client Sample ID H-23 4-6'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	27.5	0.100		meq/100g	1	4/22/2021
29B SALTS				**LDNR 29-B**		Analyst: **JMI**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	0.74	0.10		mmhos/cm	1	4/16/2021 1:20:00 PM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	7.30	0.10		%	1	4/22/2021
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	4.59	0.10			1	4/20/2021
Soluble Calcium	0.92	0.02		meq/L	1	4/20/2021
Soluble Magnesium	0.64	0.05		meq/L	1	4/20/2021
Soluble Sodium	4.06	0.25		meq/L	1	4/20/2021
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.0988	0.0988		mg/Kg	1	4/26/2021 1:59:59 PM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	2.56	1.06		mg/Kg	1	4/21/2021 4:23:30 PM
Barium	104	0.531		mg/Kg	1	4/21/2021 4:23:30 PM
Cadmium	< 0.265	0.265		mg/Kg	1	4/21/2021 4:23:30 PM
Chromium	5.94	0.531		mg/Kg	1	4/21/2021 4:23:30 PM
Lead	4.17	0.531		mg/Kg	1	4/21/2021 4:23:30 PM
Strontium	25.3	0.531		mg/Kg	1	4/21/2021 4:23:30 PM
Zinc	13.9	0.531		mg/Kg	1	4/21/2021 4:23:30 PM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	187	48.4		mg/Kg-dry	1	4/21/2021 7:58:36 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

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WO#: **21040438**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 4/5/2021 3:20:00 PM

Project: Henning/0526033

Lab ID: 21040438-017 **Matrix:** SOIL

Client Sample ID H-23 4-6'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXB**
Percent Moisture	16.1	1.00		wt%	1	4/12/2021 11:30:00 AM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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WO#: **21040438**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 4/5/2021 3:35:00 PM

Project: Henning/0526033

Lab ID: 21040438-018 **Matrix:** SOIL

Client Sample ID H-23 10-12'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	38.0	0.100		meq/100g	1	4/22/2021
29B SALTS				**LDNR 29-B**		Analyst: **JMI**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	0.48	0.10		mmhos/cm	1	4/16/2021 1:20:00 PM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	6.14	0.10		%	1	4/22/2021
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	2.89	0.10			1	4/20/2021
Soluble Calcium	0.86	0.02		meq/L	1	4/20/2021
Soluble Magnesium	0.57	0.05		meq/L	1	4/20/2021
Soluble Sodium	2.43	0.25		meq/L	1	4/20/2021
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.0994	0.0994		mg/Kg	1	4/26/2021 2:02:16 PM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	< 1.00	1.00		mg/Kg	1	4/21/2021 4:25:38 PM
Barium	16.1	0.502		mg/Kg	1	4/21/2021 4:25:38 PM
Cadmium	< 0.251	0.251		mg/Kg	1	4/21/2021 4:25:38 PM
Chromium	9.69	0.502		mg/Kg	1	4/21/2021 4:25:38 PM
Lead	7.00	0.502		mg/Kg	1	4/21/2021 4:25:38 PM
Strontium	21.8	0.502		mg/Kg	1	4/21/2021 4:25:38 PM
Zinc	20.0	0.502		mg/Kg	1	4/21/2021 4:25:38 PM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	218	48.5		mg/Kg-dry	1	4/21/2021 8:00:43 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

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WO#: **21040438**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 4/5/2021 3:35:00 PM

Project: Henning/0526033

Lab ID: 21040438-018 **Matrix:** SOIL

Client Sample ID H-23 10-12'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXB**
Percent Moisture	23.5	1.00		wt%	1	4/12/2021 11:30:00 AM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

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WO#: **21040438**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 4/5/2021 3:45:00 PM

Project: Henning/0526033

Lab ID: 21040438-019 **Matrix:** SOIL

Client Sample ID H-23 14-16'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
ELECTRICAL CONDUCTIVITY @ SATURATION				**LDNR 29-B**		Analyst: **JMI**
Electrical Conductivity	0.58	0.10		mmhos/cm	1	4/16/2021 1:20:00 PM
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXB**
Percent Moisture	22.3	1.00		wt%	1	4/12/2021 11:30:00 AM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.
H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit
RL	Reporting Limit
SDL	Sample detection limit
W	Sample container temperature is out of limit as specified at testcode
B	Analyte detected in the associated Method Blank
M	Matrix Interference
R	RPD outside accepted recovery limits
S	Spike Recovery outside accepted recovery limits
U	Analyte not detected

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Analytical Report

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WO#: **21040438**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 4/5/2021 4:20:00 PM

Project: Henning/0526033

Lab ID: 21040438-020 **Matrix:** SOIL

Client Sample ID H-23 28-30'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
ELECTRICAL CONDUCTIVITY @ SATURATION				**LDNR 29-B**		Analyst: **JMI**
Electrical Conductivity	1.00	0.10		mmhos/cm	1	4/16/2021 1:20:00 PM
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXB**
Percent Moisture	16.2	1.00		wt%	1	4/12/2021 11:30:00 AM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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WO#: **21040438**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 4/5/2021 4:30:00 PM

Project: Henning/0526033

Lab ID: 21040438-021 **Matrix:** SOIL

Client Sample ID H-23 32-34'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
ELECTRICAL CONDUCTIVITY @ SATURATION				**LDNR 29-B**		Analyst: **JMI**
Electrical Conductivity	1.25	0.10		mmhos/cm	1	4/20/2021 2:00:00 PM
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXB**
Percent Moisture	20.9	1.00		wt%	1	4/13/2021 7:30:00 AM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.
H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit
RL	Reporting Limit
SDL	Sample detection limit
W	Sample container temperature is out of limit as specified at testcode
B	Analyte detected in the associated Method Blank
M	Matrix Interference
R	RPD outside accepted recovery limits
S	Spike Recovery outside accepted recovery limits
U	Analyte not detected

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Analytical Report

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WO#: **21040438**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 4/6/2021 12:15:00 PM

Project: Henning/0526033

Lab ID: 21040438-022 **Matrix:** SOIL

Client Sample ID H-24 0-2'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	21.7	0.100		meq/100g	1	4/22/2021
29B SALTS				**LDNR 29-B**		Analyst: **JMI**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	1.25	0.10		mmhos/cm	1	4/20/2021 2:00:00 PM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	3.93	0.10		%	1	4/22/2021
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	5.19	0.10			1	4/20/2021
Soluble Calcium	2.87	0.02		meq/L	1	4/20/2021
Soluble Magnesium	0.79	0.05		meq/L	1	4/20/2021
Soluble Sodium	7.02	0.25		meq/L	1	4/20/2021
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	0.265	0.0998		mg/Kg	1	4/26/2021 2:04:33 PM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	1.16	1.01		mg/Kg	1	4/21/2021 4:27:46 PM
Barium	294	0.505		mg/Kg	1	4/21/2021 4:27:46 PM
Cadmium	< 0.252	0.252		mg/Kg	1	4/21/2021 4:27:46 PM
Chromium	5.23	0.505		mg/Kg	1	4/21/2021 4:27:46 PM
Lead	7.70	0.505		mg/Kg	1	4/21/2021 4:27:46 PM
Strontium	36.9	0.505		mg/Kg	1	4/21/2021 4:27:46 PM
Zinc	5.72	0.505		mg/Kg	1	4/21/2021 4:27:46 PM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	8,310	47.2		mg/Kg-dry	1	4/21/2021 8:02:50 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

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WO#: **21040438**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 4/6/2021 12:15:00 PM

Project: Henning/0526033

Lab ID: 21040438-022 **Matrix:** SOIL

Client Sample ID H-24 0-2'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXB**
Percent Moisture	17.2	1.00		wt%	1	4/13/2021 7:30:00 AM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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WO#: **21040438**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 4/6/2021 12:20:00 PM

Project: Henning/0526033

Lab ID: 21040438-023 **Matrix:** SOIL

Client Sample ID H-24 4-6'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	28.5	0.100		meq/100g	1	4/22/2021
29B SALTS				**LDNR 29-B**		Analyst: **JMI**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	2.06	0.10		mmhos/cm	1	4/20/2021 2:00:00 PM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	9.08	0.10		%	1	4/22/2021
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	7.65	0.10			1	4/20/2021
Soluble Calcium	3.15	0.02		meq/L	1	4/20/2021
Soluble Magnesium	1.34	0.05		meq/L	1	4/20/2021
Soluble Sodium	11.4	0.25		meq/L	1	4/20/2021
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.0984	0.0984		mg/Kg	1	4/26/2021 2:07:08 PM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	1.22	1.09		mg/Kg	1	4/21/2021 4:29:54 PM
Barium	14.1	0.543		mg/Kg	1	4/21/2021 4:29:54 PM
Cadmium	< 0.272	0.272		mg/Kg	1	4/21/2021 4:29:54 PM
Chromium	4.36	0.543		mg/Kg	1	4/21/2021 4:29:54 PM
Lead	6.73	0.543		mg/Kg	1	4/21/2021 4:29:54 PM
Strontium	17.5	0.543		mg/Kg	1	4/21/2021 4:29:54 PM
Zinc	6.72	0.543		mg/Kg	1	4/21/2021 4:29:54 PM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	523	47.1		mg/Kg-dry	1	4/21/2021 8:04:59 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

Element Materials Technology Lafayette
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Analytical Report

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WO#: **21040438**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 4/6/2021 12:20:00 PM

Project: Henning/0526033

Lab ID: 21040438-023 **Matrix:** SOIL

Client Sample ID H-24 4-6'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXB**
Percent Moisture	16.8	1.00		wt%	1	4/13/2021 7:30:00 AM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

(consolidated)

WO#: **21040438**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 4/6/2021 12:30:00 PM

Project: Henning/0526033

Lab ID: 21040438-024 **Matrix:** SOIL

Client Sample ID H-24 8-10'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	29.3	0.100		meq/100g	1	4/22/2021
29B SALTS				**LDNR 29-B**		Analyst: **JMI**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	1.22	0.10		mmhos/cm	1	4/20/2021 2:00:00 PM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	5.27	0.10		%	1	4/22/2021
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	5.31	0.10			1	4/20/2021
Soluble Calcium	2.09	0.02		meq/L	1	4/20/2021
Soluble Magnesium	0.90	0.05		meq/L	1	4/20/2021
Soluble Sodium	6.49	0.25		meq/L	1	4/20/2021
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.0992	0.0992		mg/Kg	1	4/26/2021 2:09:25 PM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	1.14	1.07		mg/Kg	1	4/21/2021 4:32:02 PM
Barium	120	0.534		mg/Kg	1	4/21/2021 4:32:02 PM
Cadmium	< 0.267	0.267		mg/Kg	1	4/21/2021 4:32:02 PM
Chromium	6.41	0.534		mg/Kg	1	4/21/2021 4:32:02 PM
Lead	10.1	0.534		mg/Kg	1	4/21/2021 4:32:02 PM
Strontium	15.7	0.534		mg/Kg	1	4/21/2021 4:32:02 PM
Zinc	19.1	0.534		mg/Kg	1	4/21/2021 4:32:02 PM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	154	46.8		mg/Kg-dry	1	4/21/2021 8:07:06 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

(consolidated)

WO#: **21040438**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 4/6/2021 12:30:00 PM

Project: Henning/0526033

Lab ID: 21040438-024 **Matrix:** SOIL

Client Sample ID H-24 8-10'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXB**
Percent Moisture	15.9	1.00		wt%	1	4/13/2021 7:30:00 AM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

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WO#: **21040438**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 4/6/2021 12:40:00 PM

Project: Henning/0526033

Lab ID: 21040438-025 **Matrix:** SOIL

Client Sample ID H-24 12-14'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
ELECTRICAL CONDUCTIVITY @ SATURATION				**LDNR 29-B**		Analyst: **JMI**
Electrical Conductivity	2.07	0.10		mmhos/cm	1	4/20/2021 2:00:00 PM
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXB**
Percent Moisture	23.9	1.00		wt%	1	4/13/2021 7:30:00 AM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.
H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit
RL	Reporting Limit
SDL	Sample detection limit
W	Sample container temperature is out of limit as specified at testcode
B	Analyte detected in the associated Method Blank
M	Matrix Interference
R	RPD outside accepted recovery limits
S	Spike Recovery outside accepted recovery limits
U	Analyte not detected

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WO#: **21040438**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 4/6/2021 1:20:00 PM

Project: Henning/0526033

Lab ID: 21040438-026 **Matrix:** SOIL

Client Sample ID H-24 28-30'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
ELECTRICAL CONDUCTIVITY @ SATURATION				**LDNR 29-B**		Analyst: **JMI**
Electrical Conductivity	0.54	0.10		mmhos/cm	1	4/20/2021 2:00:00 PM
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXB**
Percent Moisture	15.0	1.00		wt%	1	4/13/2021 7:30:00 AM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.
H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit
RL	Reporting Limit
SDL	Sample detection limit
W	Sample container temperature is out of limit as specified at testcode
B	Analyte detected in the associated Method Blank
M	Matrix Interference
R	RPD outside accepted recovery limits
S	Spike Recovery outside accepted recovery limits
U	Analyte not detected

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Analytical Report

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WO#: **21040438**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 4/6/2021 2:00:00 PM

Project: Henning/0526033

Lab ID: 21040438-027 **Matrix:** SOIL

Client Sample ID H-24 44-46'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
ELECTRICAL CONDUCTIVITY @ SATURATION				**LDNR 29-B**		Analyst: **JMI**
Electrical Conductivity	1.16	0.10		mmhos/cm	1	4/20/2021 2:00:00 PM
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXB**
Percent Moisture	20.5	1.00		wt%	1	4/13/2021 7:30:00 AM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.
H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit
RL	Reporting Limit
SDL	Sample detection limit
W	Sample container temperature is out of limit as specified at testcode
B	Analyte detected in the associated Method Blank
M	Matrix Interference
R	RPD outside accepted recovery limits
S	Spike Recovery outside accepted recovery limits
U	Analyte not detected

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Analytical Report

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WO#: **21040438**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 4/7/2021 11:30:00 AM

Project: Henning/0526033

Lab ID: 21040438-028 **Matrix:** SOIL

Client Sample ID H-25 0-2'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	26.6	0.100		meq/100g	1	4/22/2021
29B SALTS				**LDNR 29-B**		Analyst: **JMI**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	2.54	0.10		mmhos/cm	1	4/20/2021 2:00:00 PM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	5.77	0.10		%	1	4/22/2021
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	5.43	0.10			1	4/20/2021
Soluble Calcium	6.44	0.02		meq/L	1	4/20/2021
Soluble Magnesium	3.37	0.05		meq/L	1	4/20/2021
Soluble Sodium	12.0	0.25		meq/L	1	4/20/2021
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.0989	0.0989		mg/Kg	1	4/26/2021 2:16:42 PM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	2.10	1.07		mg/Kg	1	4/21/2021 4:34:09 PM
Barium	126	0.535		mg/Kg	1	4/21/2021 4:34:09 PM
Cadmium	< 0.268	0.268		mg/Kg	1	4/21/2021 4:34:09 PM
Chromium	6.41	0.535		mg/Kg	1	4/21/2021 4:34:09 PM
Lead	9.27	0.535		mg/Kg	1	4/21/2021 4:34:09 PM
Strontium	13.5	0.535		mg/Kg	1	4/21/2021 4:34:09 PM
Zinc	6.91	0.535		mg/Kg	1	4/21/2021 4:34:09 PM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	260	48.6		mg/Kg-dry	1	4/21/2021 8:09:13 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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WO#: **21040438**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 4/7/2021 11:30:00 AM

Project: Henning/0526033

Lab ID: 21040438-028 **Matrix:** SOIL

Client Sample ID H-25 0-2'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXB**
Percent Moisture	15.4	1.00		wt%	1	4/13/2021 7:30:00 AM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

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WO#: **21040438**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 4/7/2021 11:40:00 AM

Project: Henning/0526033

Lab ID: 21040438-029 **Matrix:** SOIL

Client Sample ID H-25 4-6'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	23.8	0.100		meq/100g	1	4/22/2021
29B SALTS				**LDNR 29-B**		Analyst: **JMI**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	1.06	0.10		mmhos/cm	1	4/20/2021 2:00:00 PM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	10.6	0.10		%	1	4/22/2021
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	5.07	0.10			1	4/20/2021
Soluble Calcium	1.56	0.02		meq/L	1	4/20/2021
Soluble Magnesium	0.87	0.05		meq/L	1	4/20/2021
Soluble Sodium	5.60	0.25		meq/L	1	4/20/2021
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.0987	0.0987		mg/Kg	1	4/26/2021 2:18:58 PM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	1.05	1.01		mg/Kg	1	4/22/2021 3:20:10 PM
Barium	25.7	0.506		mg/Kg	1	4/22/2021 3:20:10 PM
Cadmium	< 0.253	0.253		mg/Kg	1	4/22/2021 3:20:10 PM
Chromium	6.01	0.506		mg/Kg	1	4/22/2021 3:20:10 PM
Lead	5.32	0.506		mg/Kg	1	4/22/2021 3:20:10 PM
Strontium	13.3	0.506		mg/Kg	1	4/22/2021 3:20:10 PM
Zinc	7.19	0.506		mg/Kg	1	4/22/2021 3:20:10 PM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	241	48.2		mg/Kg-dry	1	4/21/2021 8:15:37 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 4/7/2021 11:40:00 AM

Project: Henning/0526033

Lab ID: 21040438-029 **Matrix:** SOIL

Client Sample ID H-25 4-6'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXB**
Percent Moisture	17.4	1.00		wt%	1	4/13/2021 7:30:00 AM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

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WO#: **21040438**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 4/7/2021 11:45:00 AM

Project: Henning/0526033

Lab ID: 21040438-030 **Matrix:** SOIL

Client Sample ID H-25 6-8'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	34.6	0.100		meq/100g	1	4/27/2021
29B SALTS				**LDNR 29-B**		Analyst: **JMI**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	0.75	0.10		mmhos/cm	1	4/20/2021 2:00:00 PM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	4.92	0.10		%	1	4/27/2021
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	4.32	0.10			1	4/20/2021
Soluble Calcium	1.13	0.02		meq/L	1	4/20/2021
Soluble Magnesium	0.69	0.05		meq/L	1	4/20/2021
Soluble Sodium	4.12	0.25		meq/L	1	4/20/2021
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.0998	0.0998		mg/Kg	1	4/26/2021 2:21:14 PM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	1.33	1.03		mg/Kg	1	4/22/2021 3:26:33 PM
Barium	17.9	0.516		mg/Kg	1	4/22/2021 3:26:33 PM
Cadmium	< 0.258	0.258		mg/Kg	1	4/22/2021 3:26:33 PM
Chromium	4.73	0.516		mg/Kg	1	4/22/2021 3:26:33 PM
Lead	5.91	0.516		mg/Kg	1	4/22/2021 3:26:33 PM
Strontium	14.4	0.516		mg/Kg	1	4/22/2021 3:26:33 PM
Zinc	8.93	0.516		mg/Kg	1	4/22/2021 3:26:33 PM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	213	47.2		mg/Kg-dry	1	4/21/2021 8:17:44 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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WO#: **21040438**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 4/7/2021 11:45:00 AM

Project: Henning/0526033

Lab ID: 21040438-030 **Matrix:** SOIL

Client Sample ID H-25 6-8'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXB**
Percent Moisture	17.9	1.00		wt%	1	4/13/2021 7:30:00 AM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

Element Materials Technology Lafayette
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Analytical Report

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WO#: **21040438**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 4/7/2021 11:50:00 AM

Project: Henning/0526033

Lab ID: 21040438-031 **Matrix:** SOIL

Client Sample ID H-25 8-10'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	32.8	0.100		meq/100g	1	4/27/2021
29B SALTS				**LDNR 29-B**		Analyst: **JMI**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	0.76	0.10		mmhos/cm	1	4/20/2021 2:00:00 PM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	7.72	0.10		%	1	4/27/2021
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	3.51	0.10			1	4/20/2021
Soluble Calcium	1.50	0.02		meq/L	1	4/20/2021
Soluble Magnesium	0.86	0.05		meq/L	1	4/20/2021
Soluble Sodium	3.81	0.25		meq/L	1	4/20/2021
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.0988	0.0988		mg/Kg	1	4/26/2021 2:23:30 PM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	4.19	1.09		mg/Kg	1	4/22/2021 3:28:41 PM
Barium	16.9	0.545		mg/Kg	1	4/22/2021 3:28:41 PM
Cadmium	< 0.272	0.272		mg/Kg	1	4/22/2021 3:28:41 PM
Chromium	7.63	0.545		mg/Kg	1	4/22/2021 3:28:41 PM
Lead	8.23	0.545		mg/Kg	1	4/22/2021 3:28:41 PM
Strontium	17.1	0.545		mg/Kg	1	4/22/2021 3:28:41 PM
Zinc	22.6	0.545		mg/Kg	1	4/22/2021 3:28:41 PM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	81.8	46.3		mg/Kg-dry	1	4/21/2021 8:19:51 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

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WO#: **21040438**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 4/7/2021 11:50:00 AM

Project: Henning/0526033

Lab ID: 21040438-031 **Matrix:** SOIL

Client Sample ID H-25 8-10'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXB**
Percent Moisture	25.0	1.00		wt%	1	4/13/2021 7:30:00 AM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

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WO#: **21040438**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 4/7/2021 11:55:00 AM

Project: Henning/0526033

Lab ID: 21040438-032 **Matrix:** SOIL

Client Sample ID H-25 10-12'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	19.2	0.100		meq/100g	1	4/27/2021
29B SALTS				**LDNR 29-B**		Analyst: **JMI**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	0.81	0.10		mmhos/cm	1	4/20/2021 2:00:00 PM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	8.23	0.10		%	1	4/27/2021
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	3.62	0.10			1	4/20/2021
Soluble Calcium	1.65	0.02		meq/L	1	4/20/2021
Soluble Magnesium	0.85	0.05		meq/L	1	4/20/2021
Soluble Sodium	4.04	0.25		meq/L	1	4/20/2021
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.0994	0.0994		mg/Kg	1	4/26/2021 2:25:48 PM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	2.36	1.00		mg/Kg	1	4/22/2021 3:30:49 PM
Barium	36.2	0.500		mg/Kg	1	4/22/2021 3:30:49 PM
Cadmium	< 0.250	0.250		mg/Kg	1	4/22/2021 3:30:49 PM
Chromium	6.48	0.500		mg/Kg	1	4/22/2021 3:30:49 PM
Lead	5.91	0.500		mg/Kg	1	4/22/2021 3:30:49 PM
Strontium	207	0.500		mg/Kg	1	4/22/2021 3:30:49 PM
Zinc	20.0	0.500		mg/Kg	1	4/22/2021 3:30:49 PM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	116	45.5		mg/Kg-dry	1	4/21/2021 8:21:59 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

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WO#: **21040438**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 4/7/2021 11:55:00 AM

Project: Henning/0526033

Lab ID: 21040438-032 **Matrix:** SOIL

Client Sample ID H-25 10-12'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXB**
Percent Moisture	18.4	1.00		wt%	1	4/13/2021 7:30:00 AM

Qualifiers:				
	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	H	Holding times for preparation or analysis exceeded	M	Matrix Interference
	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
	RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
	SDL	Sample detection limit	U	Analyte not detected
	W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

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WO#: **21040438**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 4/7/2021 12:30:00 PM

Project: Henning/0526033

Lab ID: 21040438-033 **Matrix:** SOIL

Client Sample ID H-25 24-26'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
ELECTRICAL CONDUCTIVITY @ SATURATION				**LDNR 29-B**		Analyst: **JMI**
Electrical Conductivity	0.61	0.10		mmhos/cm	1	4/20/2021 2:00:00 PM
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXB**
Percent Moisture	15.0	1.00		wt%	1	4/13/2021 7:30:00 AM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.
H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit
RL	Reporting Limit
SDL	Sample detection limit
W	Sample container temperature is out of limit as specified at testcode
B	Analyte detected in the associated Method Blank
M	Matrix Interference
R	RPD outside accepted recovery limits
S	Spike Recovery outside accepted recovery limits
U	Analyte not detected

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Analytical Report

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WO#: **21040438**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 4/7/2021 1:10:00 PM

Project: Henning/0526033

Lab ID: 21040438-034 **Matrix:** SOIL

Client Sample ID H-25 40-42'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
ELECTRICAL CONDUCTIVITY @ SATURATION				**LDNR 29-B**		Analyst: **JMI**
Electrical Conductivity	0.82	0.10		mmhos/cm	1	4/20/2021 2:00:00 PM
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXB**
Percent Moisture	19.1	1.00		wt%	1	4/13/2021 7:30:00 AM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.
H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit
RL	Reporting Limit
SDL	Sample detection limit
W	Sample container temperature is out of limit as specified at testcode
B	Analyte detected in the associated Method Blank
M	Matrix Interference
R	RPD outside accepted recovery limits
S	Spike Recovery outside accepted recovery limits
U	Analyte not detected

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Analytical Report

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WO#: **21040438**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 4/8/2021 12:15:00 PM

Project: Henning/0526033

Lab ID: 21040438-035 **Matrix:** SOIL

Client Sample ID H-26 0-2'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	24.3	0.100		meq/100g	1	4/27/2021
29B SALTS				**LDNR 29-B**		Analyst: **JMI**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	2.00	0.10		mmhos/cm	1	4/20/2021 2:00:00 PM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	8.80	0.10		%	1	4/27/2021
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	5.12	0.10			1	4/20/2021
Soluble Calcium	3.84	0.02		meq/L	1	4/20/2021
Soluble Magnesium	2.80	0.05		meq/L	1	4/20/2021
Soluble Sodium	9.34	0.25		meq/L	1	4/20/2021
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.0998	0.0998		mg/Kg	1	4/26/2021 2:28:04 PM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	1.80	1.07		mg/Kg	1	4/22/2021 3:32:56 PM
Barium	125	0.533		mg/Kg	1	4/22/2021 3:32:56 PM
Cadmium	< 0.266	0.266		mg/Kg	1	4/22/2021 3:32:56 PM
Chromium	6.01	0.533		mg/Kg	1	4/22/2021 3:32:56 PM
Lead	7.11	0.533		mg/Kg	1	4/22/2021 3:32:56 PM
Strontium	15.8	0.533		mg/Kg	1	4/22/2021 3:32:56 PM
Zinc	7.87	0.533		mg/Kg	1	4/22/2021 3:32:56 PM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	97.3	48.8		mg/Kg-dry	1	4/21/2021 8:24:06 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

(consolidated)

WO#: **21040438**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 4/8/2021 12:15:00 PM

Project: Henning/0526033

Lab ID: 21040438-035 **Matrix:** SOIL

Client Sample ID H-26 0-2'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXB**
Percent Moisture	16.2	1.00		wt%	1	4/13/2021 7:30:00 AM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

(consolidated)

WO#: **21040438**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 4/8/2021 12:25:00 PM

Project: Henning/0526033

Lab ID: 21040438-036 **Matrix:** SOIL

Client Sample ID H-26 4-6'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	19.4	0.100		meq/100g	1	4/27/2021
29B SALTS				**LDNR 29-B**		Analyst: **JMI**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	1.42	0.10		mmhos/cm	1	4/20/2021 2:00:00 PM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	7.67	0.10		%	1	4/27/2021
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	5.40	0.10			1	4/20/2021
Soluble Calcium	2.20	0.02		meq/L	1	4/20/2021
Soluble Magnesium	1.59	0.05		meq/L	1	4/20/2021
Soluble Sodium	7.43	0.25		meq/L	1	4/20/2021
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.0986	0.0986		mg/Kg	1	4/26/2021 2:38:00 PM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	< 1.07	1.07		mg/Kg	1	4/22/2021 3:35:04 PM
Barium	10.4	0.534		mg/Kg	1	4/22/2021 3:35:04 PM
Cadmium	< 0.267	0.267		mg/Kg	1	4/22/2021 3:35:04 PM
Chromium	4.47	0.534		mg/Kg	1	4/22/2021 3:35:04 PM
Lead	3.72	0.534		mg/Kg	1	4/22/2021 3:35:04 PM
Strontium	12.8	0.534		mg/Kg	1	4/22/2021 3:35:04 PM
Zinc	7.59	0.534		mg/Kg	1	4/22/2021 3:35:04 PM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	442	46.1		mg/Kg-dry	1	4/21/2021 8:26:14 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
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Analytical Report

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WO#: **21040438**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 4/8/2021 12:25:00 PM

Project: Henning/0526033

Lab ID: 21040438-036 **Matrix:** SOIL

Client Sample ID H-26 4-6'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXB**
Percent Moisture	15.4	1.00		wt%	1	4/13/2021 7:30:00 AM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

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WO#: **21040438**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 4/8/2021 12:30:00 PM

Project: Henning/0526033

Lab ID: 21040438-037 **Matrix:** SOIL

Client Sample ID H-26 6-8'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	25.7	0.100		meq/100g	1	4/27/2021
29B SALTS				**LDNR 29-B**		Analyst: **JMI**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	1.85	0.10		mmhos/cm	1	4/20/2021 2:00:00 PM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	5.80	0.10		%	1	4/27/2021
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	3.66	0.10			1	4/20/2021
Soluble Calcium	5.52	0.02		meq/L	1	4/20/2021
Soluble Magnesium	3.35	0.05		meq/L	1	4/20/2021
Soluble Sodium	7.71	0.25		meq/L	1	4/20/2021
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.0984	0.0984		mg/Kg	1	4/26/2021 2:52:46 PM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	5.62	1.02		mg/Kg	1	4/22/2021 3:37:12 PM
Barium	30.4	0.509		mg/Kg	1	4/22/2021 3:37:12 PM
Cadmium	< 0.255	0.255		mg/Kg	1	4/22/2021 3:37:12 PM
Chromium	5.15	0.509		mg/Kg	1	4/22/2021 3:37:12 PM
Lead	7.81	0.509		mg/Kg	1	4/22/2021 3:37:12 PM
Strontium	14.3	0.509		mg/Kg	1	4/22/2021 3:37:12 PM
Zinc	13.0	0.509		mg/Kg	1	4/22/2021 3:37:12 PM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	129	48.3		mg/Kg-dry	1	4/21/2021 8:28:21 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

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WO#: **21040438**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 4/8/2021 12:30:00 PM

Project: Henning/0526033

Lab ID: 21040438-037 **Matrix:** SOIL

Client Sample ID H-26 6-8'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXB**
Percent Moisture	16.5	1.00		wt%	1	4/13/2021 7:30:00 AM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

Element Materials Technology Lafayette
2417 W. Pinhook Road
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Website: www.element.com

Analytical Report

(consolidated)

WO#: **21040438**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 4/8/2021 12:35:00 PM

Project: Henning/0526033

Lab ID: 21040438-038 **Matrix:** SOIL

Client Sample ID H-26 8-10'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	26.8	0.100		meq/100g	1	4/27/2021
29B SALTS				**LDNR 29-B**		Analyst: **JMI**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	0.64	0.10		mmhos/cm	1	4/20/2021 2:00:00 PM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	5.52	0.10		%	1	4/27/2021
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	2.61	0.10			1	4/20/2021
Soluble Calcium	1.55	0.02		meq/L	1	4/20/2021
Soluble Magnesium	1.02	0.05		meq/L	1	4/20/2021
Soluble Sodium	2.96	0.25		meq/L	1	4/20/2021
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.0994	0.0994		mg/Kg	1	4/26/2021 2:55:03 PM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	6.36	1.05		mg/Kg	1	4/22/2021 3:39:19 PM
Barium	43.9	0.524		mg/Kg	1	4/22/2021 3:39:19 PM
Cadmium	< 0.262	0.262		mg/Kg	1	4/22/2021 3:39:19 PM
Chromium	10.7	0.524		mg/Kg	1	4/22/2021 3:39:19 PM
Lead	4.90	0.524		mg/Kg	1	4/22/2021 3:39:19 PM
Strontium	17.6	0.524		mg/Kg	1	4/22/2021 3:39:19 PM
Zinc	33.4	0.524		mg/Kg	1	4/22/2021 3:39:19 PM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	365	49.5		mg/Kg-dry	1	4/21/2021 8:30:28 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

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WO#: **21040438**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 4/8/2021 12:35:00 PM

Project: Henning/0526033

Lab ID: 21040438-038 **Matrix:** SOIL

Client Sample ID H-26 8-10'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXB**
Percent Moisture	15.8	1.00		wt%	1	4/13/2021 7:30:00 AM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

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WO#: **21040438**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 4/8/2021 12:40:00 PM

Project: Henning/0526033

Lab ID: 21040438-039 **Matrix:** SOIL

Client Sample ID H-26 10-12'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	29.6	0.100		meq/100g	1	4/27/2021
29B SALTS				**LDNR 29-B**		Analyst: **JMI**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	0.66	0.10		mmhos/cm	1	4/20/2021 2:00:00 PM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	4.30	0.10		%	1	4/27/2021
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	2.88	0.10			1	4/20/2021
Soluble Calcium	1.42	0.02		meq/L	1	4/20/2021
Soluble Magnesium	0.93	0.05		meq/L	1	4/20/2021
Soluble Sodium	3.12	0.25		meq/L	1	4/20/2021
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.0991	0.0991		mg/Kg	1	4/26/2021 2:57:20 PM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	2.48	1.03		mg/Kg	1	4/22/2021 3:47:50 PM
Barium	37.7	0.515		mg/Kg	1	4/22/2021 3:47:50 PM
Cadmium	< 0.257	0.257		mg/Kg	1	4/22/2021 3:47:50 PM
Chromium	10.2	0.515		mg/Kg	1	4/22/2021 3:47:50 PM
Lead	4.50	0.515		mg/Kg	1	4/22/2021 3:47:50 PM
Strontium	16.9	0.515		mg/Kg	1	4/22/2021 3:47:50 PM
Zinc	26.4	0.515		mg/Kg	1	4/22/2021 3:47:50 PM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	338	47.6		mg/Kg-dry	1	4/21/2021 8:32:36 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

(consolidated)

WO#: **21040438**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 4/8/2021 12:40:00 PM

Project: Henning/0526033

Lab ID: 21040438-039 **Matrix:** SOIL

Client Sample ID H-26 10-12'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXB**
Percent Moisture	16.9	1.00		wt%	1	4/13/2021 7:30:00 AM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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WO#: **21040438**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 4/8/2021 1:10:00 PM

Project: Henning/0526033

Lab ID: 21040438-040 **Matrix:** SOIL

Client Sample ID H-26 22-24'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
ELECTRICAL CONDUCTIVITY @ SATURATION				**LDNR 29-B**		Analyst: **JMI**
Electrical Conductivity	0.58	0.10		mmhos/cm	1	4/20/2021 2:00:00 PM
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXB**
Percent Moisture	15.8	1.00		wt%	1	4/13/2021 7:30:00 AM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.
H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit
RL	Reporting Limit
SDL	Sample detection limit
W	Sample container temperature is out of limit as specified at testcode
B	Analyte detected in the associated Method Blank
M	Matrix Interference
R	RPD outside accepted recovery limits
S	Spike Recovery outside accepted recovery limits
U	Analyte not detected

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Analytical Report

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WO#: **21040438**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 4/8/2021 1:30:00 PM

Project: Henning/0526033

Lab ID: 21040438-041 **Matrix:** SOIL

Client Sample ID H-26 30-32'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
ELECTRICAL CONDUCTIVITY @ SATURATION				**LDNR 29-B**		Analyst: **JMI**
Electrical Conductivity	0.75	0.10		mmhos/cm	1	4/16/2021 1:35:00 PM
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXB**
Percent Moisture	17.6	1.00		wt%	1	4/13/2021 9:15:00 AM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

(consolidated)

WO#: **21040438**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 4/8/2021 3:00:00 PM

Project: Henning/0526033

Lab ID: 21040438-042 **Matrix:** SOIL

Client Sample ID H-26 48-49'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
ELECTRICAL CONDUCTIVITY @ SATURATION				**LDNR 29-B**		Analyst: **JMI**
Electrical Conductivity	0.69	0.10		mmhos/cm	1	4/16/2021 1:35:00 PM
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXB**
Percent Moisture	20.8	1.00		wt%	1	4/13/2021 9:15:00 AM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.
H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit
RL	Reporting Limit
SDL	Sample detection limit
W	Sample container temperature is out of limit as specified at testcode
B	Analyte detected in the associated Method Blank
M	Matrix Interference
R	RPD outside accepted recovery limits
S	Spike Recovery outside accepted recovery limits
U	Analyte not detected

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Analytical Report

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WO#: **21040438**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 4/9/2021 10:15:00 AM

Project: Henning/0526033

Lab ID: 21040438-043 **Matrix:** SOIL

Client Sample ID H-27 0-2'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	28.3	0.100		meq/100g	1	4/27/2021
29B SALTS				**LDNR 29-B**		Analyst: **JMI**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	2.18	0.10		mmhos/cm	1	4/16/2021 1:35:00 PM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	6.68	0.10		%	1	4/27/2021
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	6.50	0.10			1	4/20/2021
Soluble Calcium	3.49	0.02		meq/L	1	4/20/2021
Soluble Magnesium	2.27	0.05		meq/L	1	4/20/2021
Soluble Sodium	11.0	0.25		meq/L	1	4/20/2021
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.0997	0.0997		mg/Kg	1	4/26/2021 2:59:37 PM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	1.69	1.06		mg/Kg	1	4/22/2021 3:49:58 PM
Barium	39.9	0.529		mg/Kg	1	4/22/2021 3:49:58 PM
Cadmium	< 0.265	0.265		mg/Kg	1	4/22/2021 3:49:58 PM
Chromium	4.62	0.529		mg/Kg	1	4/22/2021 3:49:58 PM
Lead	7.84	0.529		mg/Kg	1	4/22/2021 3:49:58 PM
Strontium	14.6	0.529		mg/Kg	1	4/22/2021 3:49:58 PM
Zinc	4.33	0.529		mg/Kg	1	4/22/2021 3:49:58 PM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	124	48.2		mg/Kg-dry	1	4/21/2021 8:34:44 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

(consolidated)

WO#: **21040438**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 4/9/2021 10:15:00 AM

Project: Henning/0526033

Lab ID: 21040438-043 **Matrix:** SOIL

Client Sample ID H-27 0-2'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXB**
Percent Moisture	14.3	1.00		wt%	1	4/13/2021 9:15:00 AM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

(consolidated)

WO#: **21040438**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 4/9/2021 10:25:00 AM

Project: Henning/0526033

Lab ID: 21040438-044 **Matrix:** SOIL

Client Sample ID H-27 4-6'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	21.4	0.100		meq/100g	1	4/27/2021
29B SALTS				**LDNR 29-B**		Analyst: **JMI**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	3.20	0.10		mmhos/cm	1	4/16/2021 1:35:00 PM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	14.6	0.10		%	1	4/27/2021
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	7.82	0.10			1	4/20/2021
Soluble Calcium	5.60	0.02		meq/L	1	4/20/2021
Soluble Magnesium	4.02	0.05		meq/L	1	4/20/2021
Soluble Sodium	17.1	0.25		meq/L	1	4/20/2021
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.0997	0.0997		mg/Kg	1	4/26/2021 3:01:54 PM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	3.57	1.02		mg/Kg	1	4/22/2021 3:52:06 PM
Barium	133	0.508		mg/Kg	1	4/22/2021 3:52:06 PM
Cadmium	< 0.254	0.254		mg/Kg	1	4/22/2021 3:52:06 PM
Chromium	5.93	0.508		mg/Kg	1	4/22/2021 3:52:06 PM
Lead	9.79	0.508		mg/Kg	1	4/22/2021 3:52:06 PM
Strontium	17.5	0.508		mg/Kg	1	4/22/2021 3:52:06 PM
Zinc	7.55	0.508		mg/Kg	1	4/22/2021 3:52:06 PM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	281	49.3		mg/Kg-dry	1	4/21/2021 8:42:55 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

(consolidated)

WO#: **21040438**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 4/9/2021 10:25:00 AM

Project: Henning/0526033

Lab ID: 21040438-044 **Matrix:** SOIL

Client Sample ID H-27 4-6'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXB**
Percent Moisture	18.1	1.00		wt%	1	4/13/2021 9:15:00 AM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

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WO#: **21040438**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 4/9/2021 10:30:00 AM

Project: Henning/0526033

Lab ID: 21040438-045 **Matrix:** SOIL

Client Sample ID H-27 6-8'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	27.7	0.100		meq/100g	1	4/27/2021
29B SALTS				**LDNR 29-B**		Analyst: **JMI**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	1.20	0.10		mmhos/cm	1	4/16/2021 1:35:00 PM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	9.55	0.10		%	1	4/27/2021
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	6.75	0.10			1	4/20/2021
Soluble Calcium	1.24	0.02		meq/L	1	4/20/2021
Soluble Magnesium	0.84	0.05		meq/L	1	4/20/2021
Soluble Sodium	6.88	0.25		meq/L	1	4/20/2021
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.0994	0.0994		mg/Kg	1	4/26/2021 3:04:10 PM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	1.37	1.00		mg/Kg	1	4/22/2021 3:54:14 PM
Barium	6.51	0.501		mg/Kg	1	4/22/2021 3:54:14 PM
Cadmium	< 0.250	0.250		mg/Kg	1	4/22/2021 3:54:14 PM
Chromium	3.17	0.501		mg/Kg	1	4/22/2021 3:54:14 PM
Lead	4.88	0.501		mg/Kg	1	4/22/2021 3:54:14 PM
Strontium	11.2	0.501		mg/Kg	1	4/22/2021 3:54:14 PM
Zinc	7.58	0.501		mg/Kg	1	4/22/2021 3:54:14 PM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	520	48.0		mg/Kg-dry	1	4/21/2021 8:45:04 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

(consolidated)

WO#: **21040438**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 4/9/2021 10:30:00 AM

Project: Henning/0526033

Lab ID: 21040438-045 **Matrix:** SOIL

Client Sample ID H-27 6-8'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXB**
Percent Moisture	19.7	1.00		wt%	1	4/13/2021 9:15:00 AM

Qualifiers:				
	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	H	Holding times for preparation or analysis exceeded	M	Matrix Interference
	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
	RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
	SDL	Sample detection limit	U	Analyte not detected
	W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

(consolidated)

WO#: **21040438**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 4/9/2021 10:35:00 AM

Project: Henning/0526033

Lab ID: 21040438-046 **Matrix:** SOIL

Client Sample ID H-27 8-10'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	18.1	0.100		meq/100g	1	4/27/2021
29B SALTS				**LDNR 29-B**		Analyst: **JMI**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	1.76	0.10		mmhos/cm	1	4/16/2021 1:35:00 PM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	11.8	0.10		%	1	4/27/2021
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	6.18	0.10			1	4/20/2021
Soluble Calcium	2.69	0.02		meq/L	1	4/20/2021
Soluble Magnesium	1.82	0.05		meq/L	1	4/20/2021
Soluble Sodium	9.29	0.25		meq/L	1	4/20/2021
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.0988	0.0988		mg/Kg	1	4/26/2021 3:06:27 PM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	< 1.05	1.05		mg/Kg	1	4/22/2021 3:56:22 PM
Barium	200	0.523		mg/Kg	1	4/22/2021 3:56:22 PM
Cadmium	< 0.262	0.262		mg/Kg	1	4/22/2021 3:56:22 PM
Chromium	3.70	0.523		mg/Kg	1	4/22/2021 3:56:22 PM
Lead	4.80	0.523		mg/Kg	1	4/22/2021 3:56:22 PM
Strontium	15.6	0.523		mg/Kg	1	4/22/2021 3:56:22 PM
Zinc	8.77	0.523		mg/Kg	1	4/22/2021 3:56:22 PM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	190	47.3		mg/Kg-dry	1	4/21/2021 8:47:13 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

(consolidated)

WO#: **21040438**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 4/9/2021 10:35:00 AM

Project: Henning/0526033

Lab ID: 21040438-046 **Matrix:** SOIL

Client Sample ID H-27 8-10'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXB**
Percent Moisture	19.0	1.00		wt%	1	4/13/2021 9:15:00 AM

Qualifiers:				
	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	H	Holding times for preparation or analysis exceeded	M	Matrix Interference
	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
	RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
	SDL	Sample detection limit	U	Analyte not detected
	W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

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WO#: **21040438**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 4/9/2021 10:55:00 AM

Project: Henning/0526033

Lab ID: 21040438-047 **Matrix:** SOIL

Client Sample ID H-27 16-18'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
ELECTRICAL CONDUCTIVITY @ SATURATION				**LDNR 29-B**		Analyst: **JMI**
Electrical Conductivity	0.54	0.10		mmhos/cm	1	4/16/2021 1:35:00 PM
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXB**
Percent Moisture	17.4	1.00		wt%	1	4/13/2021 9:15:00 AM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.
H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit
RL	Reporting Limit
SDL	Sample detection limit
W	Sample container temperature is out of limit as specified at testcode
B	Analyte detected in the associated Method Blank
M	Matrix Interference
R	RPD outside accepted recovery limits
S	Spike Recovery outside accepted recovery limits
U	Analyte not detected

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Analytical Report

(consolidated)

WO#: **21040438**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 4/9/2021 11:40:00 AM

Project: Henning/0526033

Lab ID: 21040438-048 **Matrix:** SOIL

Client Sample ID H-27 34-36'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
ELECTRICAL CONDUCTIVITY @ SATURATION				**LDNR 29-B**		Analyst: **JMI**
Electrical Conductivity	1.01	0.10		mmhos/cm	1	4/16/2021 1:35:00 PM
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXB**
Percent Moisture	18.7	1.00		wt%	1	4/13/2021 9:15:00 AM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.
H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit
RL	Reporting Limit
SDL	Sample detection limit
W	Sample container temperature is out of limit as specified at testcode
B	Analyte detected in the associated Method Blank
M	Matrix Interference
R	RPD outside accepted recovery limits
S	Spike Recovery outside accepted recovery limits
U	Analyte not detected

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Analytical Report

(consolidated)

WO#: **21040438**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 4/9/2021 12:20:00 PM

Project: Henning/0526033

Lab ID: 21040438-049 **Matrix:** SOIL

Client Sample ID H-27 50-51'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
ELECTRICAL CONDUCTIVITY @ SATURATION				**LDNR 29-B**		Analyst: **JMI**
Electrical Conductivity	1.61	0.10		mmhos/cm	1	4/16/2021 1:35:00 PM
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXB**
Percent Moisture	20.9	1.00		wt%	1	4/13/2021 9:15:00 AM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.
H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit
RL	Reporting Limit
SDL	Sample detection limit
W	Sample container temperature is out of limit as specified at testcode
B	Analyte detected in the associated Method Blank
M	Matrix Interference
R	RPD outside accepted recovery limits
S	Spike Recovery outside accepted recovery limits
U	Analyte not detected

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QC SUMMARY REPORT

WO#: **21040438**

28-Apr-21

Client: Environmental Resources Management
Project: Henning/0526033 **BatchID:** **39306**

Sample ID	**MB-39306**	SampType:	**MBLK**	TestCode:	**6010_S**	Units:	**mg/Kg**	Prep Date:	**4/14/2021**	RunNo:	**98931**
Client ID:	**PBS**	Batch ID:	**39306**	TestNo:	**SW6010B**	**SW3050B**		Analysis Date:	**4/21/2021**	SeqNo:	**2411577**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	< 1.00	1.00									
Barium	< 0.500	0.500									
Cadmium	< 0.250	0.250									
Chromium	< 0.500	0.500									
Lead	< 0.500	0.500									
Strontium	< 0.500	0.500									
Zinc	< 0.500	0.500									

Sample ID	**LCS-39306**	SampType:	**LCS**	TestCode:	**6010_S**	Units:	**mg/Kg**	Prep Date:	**4/14/2021**	RunNo:	**98931**
Client ID:	**LCSS**	Batch ID:	**39306**	TestNo:	**SW6010B**	**SW3050B**		Analysis Date:	**4/21/2021**	SeqNo:	**2411578**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	26.8	1.00	25.00	0	107	80	120				
Barium	28.1	0.500	25.00	0	112	80	120				
Cadmium	27.3	0.250	25.00	0	109	80	120				
Chromium	27.9	0.500	25.00	0	112	80	120				
Lead	27.9	0.500	25.00	0	112	80	120				
Strontium	27.5	0.500	25.00	0	110	80	120				
Zinc	27.0	0.500	25.00	0	108	80	120				

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceede
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **21040438**

28-Apr-21

Client: Environmental Resources Management
Project: Henning/0526033 **BatchID:** **39306**

Sample ID	**LCSD-39306**	SampType:	**LCSD**	TestCode:	**6010_S**	Units:	**mg/Kg**	Prep Date:	**4/14/2021**	RunNo:	**98931**
Client ID:	**LCSS02**	Batch ID:	**39306**	TestNo:	**SW6010B**	**SW3050B**		Analysis Date:	**4/21/2021**	SeqNo:	**2411579**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	26.8	1.00	25.00	0	107	80	120	26.84	0.263	20	
Barium	28.0	0.500	25.00	0	112	80	120	28.08	0.146	20	
Cadmium	27.3	0.250	25.00	0	109	80	120	27.30	0.190	20	
Chromium	27.9	0.500	25.00	0	112	80	120	27.90	0.0340	20	
Lead	27.7	0.500	25.00	0	111	80	120	27.89	0.521	20	
Strontium	27.5	0.500	25.00	0	110	80	120	27.52	0.198	20	
Zinc	27.0	0.500	25.00	0	108	80	120	26.98	0.165	20	

Sample ID	**21040422-012AMS**	SampType:	**MS**	TestCode:	**6010_S**	Units:	**mg/Kg**	Prep Date:	**4/14/2021**	RunNo:	**98931**
Client ID:	**ZZZZZZ**	Batch ID:	**39306**	TestNo:	**SW6010B**	**SW3050B**		Analysis Date:	**4/21/2021**	SeqNo:	**2411581**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	26.3	1.05	26.25	1.640	93.9	75	125				
Barium	124	0.525	26.25	97.47	100	75	125				
Cadmium	25.5	0.262	26.25	0.03029	97.2	75	125				
Chromium	31.7	0.525	26.25	3.503	107	75	125				
Lead	30.1	0.525	26.25	4.627	97.0	75	125				
Strontium	33.5	0.525	26.25	6.569	103	75	125				
Zinc	28.4	0.525	26.25	1.720	102	75	125				

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceede
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **21040438**

28-Apr-21

Client: Environmental Resources Management

Project: Henning/0526033 **BatchID:** **39306**

Sample ID	**21040422-012AMSD**	SampType:	**MSD**	TestCode:	**6010_S**	Units:	**mg/Kg**	Prep Date:	**4/14/2021**	RunNo:	**98931**
Client ID:	**ZZZZZZ**	Batch ID:	**39306**	TestNo:	**SW6010B**	**SW3050B**		Analysis Date:	**4/21/2021**	SeqNo:	**2411585**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	24.9	1.04	25.97	1.640	89.5	75	125	26.30	5.56	20	
Barium	119	0.519	25.97	97.47	84.6	75	125	123.8	3.57	20	
Cadmium	24.4	0.260	25.97	0.03029	94.0	75	125	25.54	4.41	20	
Chromium	30.5	0.519	25.97	3.503	104	75	125	31.69	3.77	20	
Lead	28.9	0.519	25.97	4.627	93.6	75	125	30.09	3.90	20	
Strontium	32.2	0.519	25.97	6.569	98.7	75	125	33.51	3.95	20	
Zinc	27.4	0.519	25.97	1.720	98.9	75	125	28.37	3.48	20	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceede
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **21040438**

28-Apr-21

Client: Environmental Resources Management
Project: Henning/0526033 **BatchID:** **39307**

Sample ID	**MB-39307**	SampType:	**MBLK**	TestCode:	**6010_S**	Units:	**mg/Kg**	Prep Date:	**4/14/2021**	RunNo:	**98967**
Client ID:	**PBS**	Batch ID:	**39307**	TestNo:	**SW6010B**	**SW3050B**		Analysis Date:	**4/22/2021**	SeqNo:	**2412661**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	< 1.00	1.00									
Barium	< 0.500	0.500									
Cadmium	< 0.250	0.250									
Chromium	< 0.500	0.500									
Lead	< 0.500	0.500									
Strontium	< 0.500	0.500									
Zinc	< 0.500	0.500									

Sample ID	**LCS-39307**	SampType:	**LCS**	TestCode:	**6010_S**	Units:	**mg/Kg**	Prep Date:	**4/14/2021**	RunNo:	**98967**
Client ID:	**LCSS**	Batch ID:	**39307**	TestNo:	**SW6010B**	**SW3050B**		Analysis Date:	**4/22/2021**	SeqNo:	**2412662**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	25.9	1.00	25.00	0	103	80	120				
Barium	27.1	0.500	25.00	0	108	80	120				
Cadmium	25.4	0.250	25.00	0	102	80	120				
Chromium	26.4	0.500	25.00	0	105	80	120				
Lead	25.6	0.500	25.00	0	103	80	120				
Strontium	26.2	0.500	25.00	0	105	80	120				
Zinc	25.1	0.500	25.00	0	100	80	120				

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceede
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **21040438**

28-Apr-21

Client: Environmental Resources Management
Project: Henning/0526033 **BatchID:** **39307**

Sample ID	**LCSD-39307**	SampType:	**LCSD**	TestCode:	**6010_S**	Units:	**mg/Kg**	Prep Date:	**4/14/2021**	RunNo:	**98967**
Client ID:	**LCSS02**	Batch ID:	**39307**	TestNo:	**SW6010B**	**SW3050B**		Analysis Date:	**4/22/2021**	SeqNo:	**2412663**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	24.9	1.00	25.00	0	99.4	80	120	25.85	3.92	20	
Barium	25.8	0.500	25.00	0	103	80	120	27.07	4.70	20	
Cadmium	24.6	0.250	25.00	0	98.2	80	120	25.45	3.54	20	
Chromium	25.4	0.500	25.00	0	102	80	120	26.37	3.59	20	
Lead	24.6	0.500	25.00	0	98.3	80	120	25.65	4.31	20	
Strontium	25.3	0.500	25.00	0	101	80	120	26.22	3.53	20	
Zinc	23.9	0.500	25.00	0	95.4	80	120	25.10	5.08	20	

Sample ID	**21040438-029AMS**	SampType:	**MS**	TestCode:	**6010_S**	Units:	**mg/Kg**	Prep Date:	**4/14/2021**	RunNo:	**98967**
Client ID:	**H-25 4-6'**	Batch ID:	**39307**	TestNo:	**SW6010B**	**SW3050B**		Analysis Date:	**4/22/2021**	SeqNo:	**2412674**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	21.8	1.02	25.39	1.045	81.6	75	125				
Barium	74.6	0.508	25.39	25.67	193	75	125				S
Cadmium	22.0	0.254	25.39	0.02478	86.5	75	125				
Chromium	30.1	0.508	25.39	6.007	95.1	75	125				
Lead	27.0	0.508	25.39	5.317	85.6	75	125				
Strontium	37.2	0.508	25.39	13.30	94.1	75	125				
Zinc	30.9	0.508	25.39	7.190	93.4	75	125				

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceede
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **21040438**

28-Apr-21

Client: Environmental Resources Management

Project: Henning/0526033 **BatchID:** **39307**

Sample ID	**21040438-029AMSD**	SampType:	**MSD**	TestCode:	**6010_S**	Units:	**mg/Kg**	Prep Date:	**4/14/2021**	RunNo:	**98967**
Client ID:	**H-25 4-6'**	Batch ID:	**39307**	TestNo:	**SW6010B**	**SW3050B**		Analysis Date:	**4/22/2021**	SeqNo:	**2412675**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	21.5	1.02	25.43	1.045	80.6	75	125	21.76	1.04	20	
Barium	74.5	0.509	25.43	25.67	192	75	125	74.62	0.173	20	S
Cadmium	21.8	0.254	25.43	0.02478	85.8	75	125	21.98	0.648	20	
Chromium	30.1	0.509	25.43	6.007	94.7	75	125	30.15	0.167	20	
Lead	27.1	0.509	25.43	5.317	85.6	75	125	27.04	0.135	20	
Strontium	37.1	0.509	25.43	13.30	93.6	75	125	37.19	0.267	20	
Zinc	30.9	0.509	25.43	7.190	93.4	75	125	30.90	0.142	20	

NOTES:

S - Spike recovery indicates matrix interference. The method is in control as indicated by the Lab Control Sample.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceede
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **21040438**

28-Apr-21

Client: Environmental Resources Management
Project: Henning/0526033 **BatchID:** **39312**

Sample ID	**MB-39312**	SampType:	**MBLK**	TestCode:	**TTBA**	Units:	**mg/Kg-dry**	Prep Date:	**4/14/2021**	RunNo:	**98931**
Client ID:	**PBS**	Batch ID:	**39312**	TestNo:	**LDNR 29-B**			Analysis Date:	**4/21/2021**	SeqNo:	**2411610**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
True Total Barium	< 50.0	50.0									

Sample ID	**LCS-39312**	SampType:	**LCS**	TestCode:	**TTBA**	Units:	**mg/Kg-dry**	Prep Date:	**4/14/2021**	RunNo:	**98931**
Client ID:	**LCSS**	Batch ID:	**39312**	TestNo:	**LDNR 29-B**			Analysis Date:	**4/21/2021**	SeqNo:	**2411611**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
True Total Barium	5,190	50.0	5,000	0	104	75	125				

Sample ID	**LCSD-39312**	SampType:	**LCSD**	TestCode:	**TTBA**	Units:	**mg/Kg-dry**	Prep Date:	**4/14/2021**	RunNo:	**98931**
Client ID:	**LCSS02**	Batch ID:	**39312**	TestNo:	**LDNR 29-B**			Analysis Date:	**4/21/2021**	SeqNo:	**2411612**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
True Total Barium	5,180	50.0	5,000	0	104	75	125	5,187	0.0443	20	

Sample ID	**21040430-001AMS**	SampType:	**MS**	TestCode:	**TTBA**	Units:	**mg/Kg-dry**	Prep Date:	**4/14/2021**	RunNo:	**98931**
Client ID:	**ZZZZZZ**	Batch ID:	**39312**	TestNo:	**LDNR 29-B**			Analysis Date:	**4/21/2021**	SeqNo:	**2411614**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
True Total Barium	5,730	48.5	4,850	1,101	95.4	75	125				

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceede
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **21040438**

28-Apr-21

Client: Environmental Resources Management
Project: Henning/0526033 **BatchID:** **39312**

Sample ID	**21040430-001AMSD**	SampType:	**MSD**	TestCode:	**TTBA**	Units:	**mg/Kg-dry**	Prep Date:	**4/14/2021**	RunNo:	**98931**
Client ID:	**ZZZZZZ**	Batch ID:	**39312**	TestNo:	**LDNR 29-B**			Analysis Date:	**4/21/2021**	SeqNo:	**2411615**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
True Total Barium	5,900	49.0	4,902	1,101	97.8	75	125	5,727	2.91	20	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceede
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **21040438**

28-Apr-21

Client: Environmental Resources Management
Project: Henning/0526033 **BatchID:** **39313**

Sample ID	**MB-39313**	SampType:	**MBLK**	TestCode:	**TTBA**	Units:	**mg/Kg-dry**	Prep Date:	**4/14/2021**	RunNo:	**98931**
Client ID:	**PBS**	Batch ID:	**39313**	TestNo:	**LDNR 29-B**			Analysis Date:	**4/21/2021**	SeqNo:	**2411668**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
True Total Barium	< 50.0	50.0									

Sample ID	**LCS-39313**	SampType:	**LCS**	TestCode:	**TTBA**	Units:	**mg/Kg-dry**	Prep Date:	**4/14/2021**	RunNo:	**98931**
Client ID:	**LCSS**	Batch ID:	**39313**	TestNo:	**LDNR 29-B**			Analysis Date:	**4/21/2021**	SeqNo:	**2411669**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
True Total Barium	5,120	50.0	5,000	0	102	75	125				

Sample ID	**LCSD-39313**	SampType:	**LCSD**	TestCode:	**TTBA**	Units:	**mg/Kg-dry**	Prep Date:	**4/14/2021**	RunNo:	**98931**
Client ID:	**LCSS02**	Batch ID:	**39313**	TestNo:	**LDNR 29-B**			Analysis Date:	**4/21/2021**	SeqNo:	**2411672**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
True Total Barium	5,120	50.0	5,000	0	102	75	125	5,115	0.0713	20	

Sample ID	**21040438-016AMS**	SampType:	**MS**	TestCode:	**TTBA**	Units:	**mg/Kg-dry**	Prep Date:	**4/14/2021**	RunNo:	**98931**
Client ID:	**H-23 0-2'**	Batch ID:	**39313**	TestNo:	**LDNR 29-B**			Analysis Date:	**4/21/2021**	SeqNo:	**2411674**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
True Total Barium	5,170	48.4	4,836	243.0	102	75	125				

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceede
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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Website: www.element.com

QC SUMMARY REPORT

WO#: **21040438**

28-Apr-21

Client: Environmental Resources Management
Project: Henning/0526033 **BatchID:** **39313**

Sample ID **21040438-016AMSD** SampType: **MSD** TestCode: **TTBA** Units: **mg/Kg-dry** Prep Date: **4/14/2021** RunNo: **98931**
Client ID: **H-23 0-2'** Batch ID: **39313** TestNo: **LDNR 29-B** Analysis Date: **4/21/2021** SeqNo: **2411675**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
True Total Barium	5,210	48.7	4,869	243.0	102	75	125	5,168	0.865	20	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceede
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **21040438**

28-Apr-21

Client: Environmental Resources Management
Project: Henning/0526033 **BatchID:** **39367**

Sample ID **21040438-001Adup** SampType: **DUP** TestCode: **SAR_S** Units: Prep Date: **4/20/2021** RunNo: **98928**
Client ID: **H-20 4-6'** Batch ID: **39367** TestNo: **LDNR 29-B** **LDNR 29-B** Analysis Date: **4/20/2021** SeqNo: **2413606**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sodium Adsorption Ratio	6.43	0.10						6.42	0.24	20	
Soluble Calcium	2.26	0.02						2.28	1.01	20	
Soluble Magnesium	1.08	0.05						1.10	1.96	20	
Soluble Sodium	8.31	0.25						8.35	0.42	20	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceede
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
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QC SUMMARY REPORT

WO#: **21040438**

28-Apr-21

Client: Environmental Resources Management
Project: Henning/0526033 **BatchID:** **39379**

Sample ID	**21040438-001Adup**	SampType:	**DUP**	TestCode:	**ESP_S**	Units:	**%**	Prep Date:	**4/20/2021**	RunNo:	**99004**
Client ID:	**H-20 4-6'**	Batch ID:	**39379**	TestNo:	**LDNR 29-B**	**LDNR 29-B**		Analysis Date:	**4/22/2021**	SeqNo:	**2414024**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Exchangeable Sodium %	6.43	0.10						6.64	3.21	20	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceede
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **21040438**

28-Apr-21

Client: Environmental Resources Management
Project: Henning/0526033 **BatchID:** **39380**

Sample ID	**21040438-001Adup**	SampType:	**DUP**	TestCode:	**CEC**	Units:	**meq/100g**	Prep Date:	**4/20/2021**	RunNo:	**99004**
Client ID:	**H-20 4-6'**	Batch ID:	**39380**	TestNo:	**LDNR 29-B**	**LDNR 29-B**		Analysis Date:	**4/22/2021**	SeqNo:	**2413988**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Cation Exchange Capacity	34.6	0.100						35.21	1.78	20	

Sample ID	**lcs-39380**	SampType:	**LCS**	TestCode:	**CEC**	Units:	**meq/100g**	Prep Date:	**4/20/2021**	RunNo:	**99004**
Client ID:	**LCSS**	Batch ID:	**39380**	TestNo:	**LDNR 29-B**	**LDNR 29-B**		Analysis Date:	**4/22/2021**	SeqNo:	**2413998**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Cation Exchange Capacity	21.7	0.100	25.00	0	86.7	76	124				

Sample ID	**lcsd-39380**	SampType:	**LCSD**	TestCode:	**CEC**	Units:	**meq/100g**	Prep Date:	**4/20/2021**	RunNo:	**99004**
Client ID:	**LCSS02**	Batch ID:	**39380**	TestNo:	**LDNR 29-B**	**LDNR 29-B**		Analysis Date:	**4/22/2021**	SeqNo:	**2413999**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Cation Exchange Capacity	21.2	0.100	25.00	0	84.7	76	124	21.67	2.33	20	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceede
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
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QC SUMMARY REPORT

WO#: **21040438**

28-Apr-21

Client: Environmental Resources Management
Project: Henning/0526033 **BatchID:** **39385**

Sample ID	**21040441-001Adup**	SampType:	**DUP**	TestCode:	**SAR_S**	Units:		Prep Date:	**4/20/2021**	RunNo:	**98928**
Client ID:	**ZZZZZZ**	Batch ID:	**39385**	TestNo:	**LDNR 29-B**	**LDNR 29-B**		Analysis Date:	**4/20/2021**	SeqNo:	**2413646**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sodium Adsorption Ratio	3.22	0.10						3.25	1.16	20	
Soluble Calcium	2.37	0.02						2.47	3.77	20	
Soluble Magnesium	0.75	0.05						0.79	4.67	20	
Soluble Sodium	4.02	0.25						4.15	3.15	20	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceede
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
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QC SUMMARY REPORT

WO#: **21040438**

28-Apr-21

Client: Environmental Resources Management
Project: Henning/0526033 **BatchID:** **39392**

Sample ID	**MB-39392**	SampType:	**MBLK**	TestCode:	**HG_S_7471A**	Units:	**mg/Kg**	Prep Date:	**4/23/2021**	RunNo:	**99040**
Client ID:	**PBS**	Batch ID:	**39392**	TestNo:	**SW7471A**	**SW7471A**		Analysis Date:	**4/26/2021**	SeqNo:	**2416455**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	< 0.100	0.100									

Sample ID	**21040438-001AMS**	SampType:	**MS**	TestCode:	**HG_S_7471A**	Units:	**mg/Kg**	Prep Date:	**4/23/2021**	RunNo:	**99040**
Client ID:	**H-20 4-6'**	Batch ID:	**39392**	TestNo:	**SW7471A**	**SW7471A**		Analysis Date:	**4/26/2021**	SeqNo:	**2416460**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	1.02	0.0991	0.8258	0.02313	121	75	125				

Sample ID	**21040438-001AMSD**	SampType:	**MSD**	TestCode:	**HG_S_7471A**	Units:	**mg/Kg**	Prep Date:	**4/23/2021**	RunNo:	**99040**
Client ID:	**H-20 4-6'**	Batch ID:	**39392**	TestNo:	**SW7471A**	**SW7471A**		Analysis Date:	**4/26/2021**	SeqNo:	**2416461**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	1.04	0.0991	0.8252	0.02313	124	75	125	1.024	1.93	20	

Sample ID	**LCSD-39392**	SampType:	**LCSD**	TestCode:	**HG_S_7471A**	Units:	**mg/Kg**	Prep Date:	**4/23/2021**	RunNo:	**99040**
Client ID:	**LCSS02**	Batch ID:	**39392**	TestNo:	**SW7471A**	**SW7471A**		Analysis Date:	**4/26/2021**	SeqNo:	**2416543**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.919	0.100	0.8330	0	110	80	120	0.9998	8.42	20	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceede
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **21040438**

28-Apr-21

Client: Environmental Resources Management
Project: Henning/0526033 **BatchID:** **39392**

Sample ID	**LCS-39392**	SampType:	**LCS**	TestCode:	**HG_S_7471A**	Units:	**mg/Kg**	Prep Date:	**4/23/2021**	RunNo:	**99040**
Client ID:	**LCSS**	Batch ID:	**39392**	TestNo:	**SW7471A**	**SW7471A**		Analysis Date:	**4/28/2021**	SeqNo:	**2416561**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.928	0.100	0.8330	0	111	80	120				

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceede
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
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QC SUMMARY REPORT

WO#: **21040438**

28-Apr-21

Client: Environmental Resources Management
Project: Henning/0526033 **BatchID:** **39393**

Sample ID	**MB-39393**	SampType:	**MBLK**	TestCode:	**HG_S_7471A**	Units:	**mg/Kg**	Prep Date:	**4/23/2021**	RunNo:	**99072**
Client ID:	**PBS**	Batch ID:	**39393**	TestNo:	**SW7471A**	**SW7471A**		Analysis Date:	**4/26/2021**	SeqNo:	**2416605**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	< 0.100	0.100									

Sample ID	**LCS-39393**	SampType:	**LCS**	TestCode:	**HG_S_7471A**	Units:	**mg/Kg**	Prep Date:	**4/23/2021**	RunNo:	**99072**
Client ID:	**LCSS**	Batch ID:	**39393**	TestNo:	**SW7471A**	**SW7471A**		Analysis Date:	**4/26/2021**	SeqNo:	**2416606**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.971	0.100	0.8330	0	117	80	120				

Sample ID	**21040438-036AMS**	SampType:	**MS**	TestCode:	**HG_S_7471A**	Units:	**mg/Kg**	Prep Date:	**4/23/2021**	RunNo:	**99072**
Client ID:	**H-26 4-6'**	Batch ID:	**39393**	TestNo:	**SW7471A**	**SW7471A**		Analysis Date:	**4/26/2021**	SeqNo:	**2416612**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	1.05	0.0991	0.8254	0	127	75	125				S

Sample ID	**21040438-036AMSD**	SampType:	**MSD**	TestCode:	**HG_S_7471A**	Units:	**mg/Kg**	Prep Date:	**4/23/2021**	RunNo:	**99072**
Client ID:	**H-26 4-6'**	Batch ID:	**39393**	TestNo:	**SW7471A**	**SW7471A**		Analysis Date:	**4/26/2021**	SeqNo:	**2416613**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	1.07	0.0993	0.8269	0	129	75	125	1.047	1.72	20	S

NOTES:
S - Spike recoveries were outside of QC limits in MS/MSD and PDS/PDSD, suggesting matrix effect. The method is in control as indicated by the Lab Control Sample(s).

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceede
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **21040438**

28-Apr-21

Client: Environmental Resources Management
Project: Henning/0526033 **BatchID:** **39393**

Sample ID	**LCSD-39393**	SampType:	**LCSD**	TestCode:	**HG_S_7471A**	Units:	**mg/Kg**	Prep Date:	**4/23/2021**	RunNo:	**99072**
Client ID:	**LCSS02**	Batch ID:	**39393**	TestNo:	**SW7471A**	**SW7471A**		Analysis Date:	**4/28/2021**	SeqNo:	**2416682**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.920	0.100	0.8330	0	110	80	120	0.9713	5.40	20	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceede
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **21040438**

28-Apr-21

Client: Environmental Resources Management
Project: Henning/0526033 **BatchID:** **39426**

Sample ID	**21040441-001Adup**	SampType:	**DUP**	TestCode:	**ESP_S**	Units:	**%**	Prep Date:	**4/23/2021**	RunNo:	**99056**
Client ID:	**ZZZZZZ**	Batch ID:	**39426**	TestNo:	**LDNR 29-B**	**LDNR 29-B**		Analysis Date:	**4/27/2021**	SeqNo:	**2416044**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Exchangeable Sodium %	2.76	0.10						2.77	0.36	20	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceede
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **21040438**

28-Apr-21

Client: Environmental Resources Management
Project: Henning/0526033 **BatchID:** **39427**

Sample ID	**lcs-39427**	SampType:	**LCS**	TestCode:	**CEC**	Units:	**meq/100g**	Prep Date:	**4/23/2021**	RunNo:	**99056**
Client ID:	**LCSS**	Batch ID:	**39427**	TestNo:	**LDNR 29-B**	**LDNR 29-B**		Analysis Date:	**4/27/2021**	SeqNo:	**2415959**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Cation Exchange Capacity	22.1	0.100	25.00	0	88.4	76	124				

Sample ID	**lcsd-39427**	SampType:	**LCSD**	TestCode:	**CEC**	Units:	**meq/100g**	Prep Date:	**4/23/2021**	RunNo:	**99056**
Client ID:	**LCSS02**	Batch ID:	**39427**	TestNo:	**LDNR 29-B**	**LDNR 29-B**		Analysis Date:	**4/27/2021**	SeqNo:	**2415960**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Cation Exchange Capacity	22.4	0.100	25.00	0	89.7	76	124	22.11	1.39	20	

Sample ID	**21040441-001Adup**	SampType:	**DUP**	TestCode:	**CEC**	Units:	**meq/100g**	Prep Date:	**4/23/2021**	RunNo:	**99056**
Client ID:	**ZZZZZZ**	Batch ID:	**39427**	TestNo:	**LDNR 29-B**	**LDNR 29-B**		Analysis Date:	**4/27/2021**	SeqNo:	**2415966**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Cation Exchange Capacity	34.4	0.100						34.19	0.729	20	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceede
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **21040438**

28-Apr-21

Client: Environmental Resources Management
Project: Henning/0526033 **BatchID:** **39445**

Sample ID	**MB-39445**	SampType:	**MBLK**	TestCode:	**6010_SPLP**	Units:	**mg/L**	Prep Date:	**4/26/2021**	RunNo:	**99038**
Client ID:	**PBW**	Batch ID:	**39445**	TestNo:	**SW6010B**			Analysis Date:	**4/26/2021**	SeqNo:	**2415394**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sodium	< 10.0	10.0									

Sample ID	**LCS-39445**	SampType:	**LCS**	TestCode:	**6010_SPLP**	Units:	**mg/L**	Prep Date:	**4/26/2021**	RunNo:	**99038**
Client ID:	**LCSW**	Batch ID:	**39445**	TestNo:	**SW6010B**			Analysis Date:	**4/26/2021**	SeqNo:	**2415395**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sodium	47.2	10.0	50.00	0	94.3	80	120				

Sample ID	**LCSD-39445**	SampType:	**LCSD**	TestCode:	**6010_SPLP**	Units:	**mg/L**	Prep Date:	**4/26/2021**	RunNo:	**99038**
Client ID:	**LCSS02**	Batch ID:	**39445**	TestNo:	**SW6010B**			Analysis Date:	**4/26/2021**	SeqNo:	**2415398**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sodium	48.5	10.0	50.00	0	96.9	80	120	47.17	2.73	20	

Sample ID	**21040438-008AMS**	SampType:	**MS**	TestCode:	**6010_SPLP**	Units:	**mg/L**	Prep Date:	**4/26/2021**	RunNo:	**99038**
Client ID:	**H-21 10-12'**	Batch ID:	**39445**	TestNo:	**SW6010B**			Analysis Date:	**4/26/2021**	SeqNo:	**2415400**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sodium	508	100	500.0	88.77	83.8	75	125				

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceede
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **21040438**

28-Apr-21

Client: Environmental Resources Management
Project: Henning/0526033 **BatchID:** **39445**

Sample ID **21040438-008AMSD** SampType: **MSD** TestCode: **6010_SPLP** Units: **mg/L** Prep Date: **4/26/2021** RunNo: **99038**
Client ID: **H-21 10-12'** Batch ID: **39445** TestNo: **SW6010B** Analysis Date: **4/26/2021** SeqNo: **2415401**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sodium	537	100	500.0	88.77	89.6	75	125	507.8	5.58	20	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceede
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **21040438**

28-Apr-21

Client: Environmental Resources Management
Project: Henning/0526033 **BatchID:** **R98786**

Sample ID **21040430-001Adup** SampType: **DUP** TestCode: **PMOIST_29B** Units: **wt%** Prep Date: RunNo: **98786**
Client ID: **ZZZZZZ** Batch ID: **R98786** TestNo: **LDNR 29-B** Analysis Date: **4/12/2021** SeqNo: **2407902**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Percent Moisture	31.7	1.00						31.30	1.27	20	

Sample ID **21040438-001Adup** SampType: **DUP** TestCode: **PMOIST_29B** Units: **wt%** Prep Date: RunNo: **98786**
Client ID: **H-20 4-6'** Batch ID: **R98786** TestNo: **LDNR 29-B** Analysis Date: **4/12/2021** SeqNo: **2407914**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Percent Moisture	18.4	1.00						18.40	0	20	

Sample ID **21040438-021Adup** SampType: **DUP** TestCode: **PMOIST_29B** Units: **wt%** Prep Date: RunNo: **98786**
Client ID: **H-23 32-34'** Batch ID: **R98786** TestNo: **LDNR 29-B** Analysis Date: **4/13/2021** SeqNo: **2407935**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Percent Moisture	19.8	1.00						20.90	5.41	20	

Sample ID **21040438-041Adup** SampType: **DUP** TestCode: **PMOIST_29B** Units: **wt%** Prep Date: RunNo: **98786**
Client ID: **H-26 30-32'** Batch ID: **R98786** TestNo: **LDNR 29-B** Analysis Date: **4/13/2021** SeqNo: **2407956**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Percent Moisture	17.2	1.00						17.60	2.30	20	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceede
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **21040438**

28-Apr-21

Client: Environmental Resources Management
Project: Henning/0526033 **BatchID:** **R98788**

Sample ID	**MB-R98788**	SampType:	**MBLK**	TestCode:	**EC_S**	Units:	**mmhos/cm**	Prep Date:		RunNo:	**98788**
Client ID:	**PBS**	Batch ID:	**R98788**	TestNo:	**LDNR 29-B**			Analysis Date:	**4/16/2021**	SeqNo:	**2408149**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Electrical Conductivity	< 0.10	0.10									

Sample ID	**LCS1-R98788**	SampType:	**LCS1**	TestCode:	**EC_S**	Units:	**mmhos/cm**	Prep Date:		RunNo:	**98788**
Client ID:	**ZZZZZZ**	Batch ID:	**R98788**	TestNo:	**LDNR 29-B**			Analysis Date:	**4/16/2021**	SeqNo:	**2408150**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Electrical Conductivity	0.45	0.10	0.46	0	98.5	90	110				

Sample ID	**LCS2-R98788**	SampType:	**LCS2**	TestCode:	**EC_S**	Units:	**mmhos/cm**	Prep Date:		RunNo:	**98788**
Client ID:	**ZZZZZZ**	Batch ID:	**R98788**	TestNo:	**LDNR 29-B**			Analysis Date:	**4/16/2021**	SeqNo:	**2408151**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Electrical Conductivity	51.4	0.10	53.00	0	97.0	90	110				

Sample ID	**21040438-001ADUP**	SampType:	**DUP**	TestCode:	**EC_S**	Units:	**mmhos/cm**	Prep Date:		RunNo:	**98788**
Client ID:	**H-20 4-6'**	Batch ID:	**R98788**	TestNo:	**LDNR 29-B**			Analysis Date:	**4/16/2021**	SeqNo:	**2408153**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Electrical Conductivity	1.67	0.10						1.66	0.48	20	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceede
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **21040438**

28-Apr-21

Client: Environmental Resources Management
Project: Henning/0526033 **BatchID:** **R98791**

Sample ID	**MB-R98791**	SampType:	**MBLK**	TestCode:	**EC_S**	Units:	**mmhos/cm**	Prep Date:		RunNo:	**98791**
Client ID:	**PBS**	Batch ID:	**R98791**	TestNo:	**LDNR 29-B**			Analysis Date:	**4/16/2021**	SeqNo:	**2408200**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Electrical Conductivity	< 0.10	0.10									

Sample ID	**LCS1-R98791**	SampType:	**LCS1**	TestCode:	**EC_S**	Units:	**mmhos/cm**	Prep Date:		RunNo:	**98791**
Client ID:	**ZZZZZZ**	Batch ID:	**R98791**	TestNo:	**LDNR 29-B**			Analysis Date:	**4/16/2021**	SeqNo:	**2408201**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Electrical Conductivity	0.44	0.10	0.46	0	96.9	90	110				

Sample ID	**LCS2-R98791**	SampType:	**LCS2**	TestCode:	**EC_S**	Units:	**mmhos/cm**	Prep Date:		RunNo:	**98791**
Client ID:	**ZZZZZZ**	Batch ID:	**R98791**	TestNo:	**LDNR 29-B**			Analysis Date:	**4/16/2021**	SeqNo:	**2408202**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Electrical Conductivity	50.9	0.10	53.00	0	96.0	90	110				

Sample ID	**21040438-041ADUP**	SampType:	**DUP**	TestCode:	**EC_S**	Units:	**mmhos/cm**	Prep Date:		RunNo:	**98791**
Client ID:	**H-26 30-32'**	Batch ID:	**R98791**	TestNo:	**LDNR 29-B**			Analysis Date:	**4/16/2021**	SeqNo:	**2408204**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Electrical Conductivity	0.75	0.10						0.75	0.13	20	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceede
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **21040438**

28-Apr-21

Client: Environmental Resources Management
Project: Henning/0526033 **BatchID:** **R98881**

Sample ID	**MB-R98881**	SampType:	**MBLK**	TestCode:	**EC_S**	Units:	**mmhos/cm**	Prep Date:		RunNo:	**98881**
Client ID:	**PBS**	Batch ID:	**R98881**	TestNo:	**LDNR 29-B**			Analysis Date:	**4/20/2021**	SeqNo:	**2410187**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Electrical Conductivity	< 0.10	0.10									

Sample ID	**LCS1-R98881**	SampType:	**LCS1**	TestCode:	**EC_S**	Units:	**mmhos/cm**	Prep Date:		RunNo:	**98881**
Client ID:	**ZZZZZZ**	Batch ID:	**R98881**	TestNo:	**LDNR 29-B**			Analysis Date:	**4/20/2021**	SeqNo:	**2410188**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Electrical Conductivity	0.49	0.10	0.46	0	108	90	110				

Sample ID	**LCS2-R98881**	SampType:	**LCS2**	TestCode:	**EC_S**	Units:	**mmhos/cm**	Prep Date:		RunNo:	**98881**
Client ID:	**ZZZZZZ**	Batch ID:	**R98881**	TestNo:	**LDNR 29-B**			Analysis Date:	**4/20/2021**	SeqNo:	**2410189**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Electrical Conductivity	57.3	0.10	53.00	0	108	90	110				

Sample ID	**21040438-021ADUP**	SampType:	**DUP**	TestCode:	**EC_S**	Units:	**mmhos/cm**	Prep Date:		RunNo:	**98881**
Client ID:	**H-23 32-34'**	Batch ID:	**R98881**	TestNo:	**LDNR 29-B**			Analysis Date:	**4/20/2021**	SeqNo:	**2410191**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Electrical Conductivity	1.25	0.10						1.25	0.08	20	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceede
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
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Sample Log-In Check List

Client Name: **ERM_HOUSTON** Work Order Number: **21040438** RcptNo: **1**

Logged by:	**Tammy Thibodeaux**	**4/12/2021 8:53:00 AM**	Tammy Thibodeaux
Completed By:	**Tammy Thibodeaux**	**4/12/2021 9:50:33 AM**	Tammy Thibodeaux
Reviewed By:	**Caitlin Duplantis**	**4/26/2021 10:31:22 AM**	Caitlin Duplantis

Chain of Custody

1.	Is Chain of Custody complete?	Yes ☑	No ☐	Not Present ☐
2.	How was the sample delivered?	Client		

Log In

3.	Coolers are present?	Yes ☐	No ☐	NA ☑
4.	Shipping container/cooler in good condition?	Yes ☑	No ☐	
	Custody seals intact on shipping container/cooler?	Yes ☐	No ☐	Not Present ☑
	No. Seal Date:	Signed By:		
5.	Was an attempt made to cool the samples?	Yes ☐	No ☐	NA ☑
6.	Were all samples received at a temperature of >0° C to 6.0°C	Yes ☐	No ☑	NA ☐
		Not required		
7.	Sample(s) in proper container(s)?	Yes ☑	No ☐	
8.	Sufficient sample volume for indicated test(s)?	Yes ☑	No ☐	
9.	Are samples (except VOA and ONG) properly preserved?	Yes ☑	No ☐	
10.	Was preservative added to bottles?	Yes ☐	No ☑	NA ☐
11.	Is the headspace in the VOA vials less than 1/4 inch or 6 mm?	Yes ☐	No ☐	No VOA Vials ☑
12.	Were any sample containers received broken?	Yes ☐	No ☑	
13.	Does paperwork match bottle labels? (Note discrepancies on chain of custody)	Yes ☑	No ☐	
14.	Are matrices correctly identified on Chain of Custody?	Yes ☑	No ☐	
15.	Is it clear what analyses were requested?	Yes ☑	No ☐	
16.	Were all holding times able to be met? (If no, notify customer for authorization.)	Yes ☑	No ☐	

Special Handling (if applicable)

17.	Was client notified of all discrepancies with this order?	Yes ☐	No ☐	NA ☑

Person Notified: Date

By Whom: Via: ☐ eMail ☐ Phone ☐ Fax ☐ In Person

Regarding:

Client Instructions:

18. Additional remarks:

Cooler Information

Cooler No	Temp ºC	Condition	Seal Intact	Seal No	Seal Date	Signed By

element™

Chain of Custody

Laboratory Number:	2104048 38

Client Information:		Billing Information:		
Company Name:	ERM	SAME	PO Number:	Project Name/Number: HENNING 0526033
Contact Name:	Dave Angle		Quote Number:	Sampler's Signature: [signature]
Address:	840 W. Sam Huston Pkwy N, Suite 600		Required QC Level	
City, State Zip:	Houston TX 77024			
Phone Number:	281.433.3836 Ext:	Ext:	Bill Monthly ☐Yes ☐No	Shipping Method: UPS / FedEx / NOW / DHL / Element / Hand (circled) / Mail
Fax Number:				
E-mail Address:	david.angle@erm.com			

Page 1 of 1

Matrix Code

DW = Drinking Water
WW = Waste Water
GW = Ground Water
AQ = Aqueous
OT = Other
SL = Sludge SOL = Solid
O = Oil SO = Soil
F = Food SW = Swab
NG = Natural Gas
NGL = Natural Gas Liquid
PW = Produced Water
CF = Completion Fluid

Which Regulations Apply:
☐RCRA ☐Drinking Water
☐POTW ☐Distribution
☐NPDES ☐Special
☐USDA/FDA ☐State
☐RECAP/RISC ☐Other

Turn Time
☐Standard
RUSH
☐1 Day
☐2 Day
☐Other

(Rush turn times will incur a surcharge and must be pre-approved by lab.)

Sample ID/Description	Date	Time	Grab / Composite	Matrix	Quantity	Type P=Plastic, G=Glass, V=Vial	Pres. HCl, HNO_3, H_2SO_4, NaOH, $Na_2S_2O_3$	EC	SAR/ESP	CEC	SPLP Cl/ANS	29B Metals	% Moisture					Comments
H-20 4-6'	3/29/21	1320	G	SO	1	P	None	X	X	X		X	X					29B Metals As, Ba, Tl, Pb, Cd, Cr, Sr, Zn, Pd, Hg
H-20 8-10'		1330						X	X	X		X	X					
H-20 18-20'		1355						X					X					
H-20 28-30'		1420						X					X					
H-20 38-40'		1445						X					X					
H-21 0-2'	3/30/21	1220						X	X	X		X	X					
H-21 8-10'		1235						X	X	X		X	X					
H-21 10-12'		1240						X			X	X	X					
H-21 14-16'		1250						X			X		X					

	Relinquished by	Date/Time	Received by	Date/Time
1	[signature]	4/12/21 0853	[signature]	4-12-21 0853
2				
3				

Field Notes:

Received at lab on ice? ☐Yes ☒No Temp:

All samples submitted to Element Materials Technology for analysis are accepted on a custodial basis only. Ownership of the material remains with the client submitting the samples. Element Materials Technology reserves the right to return unused sample portions.

8800 North US 31, Columbus, IN 47201 USA, P 812-375-0531, F 812-375-0731

328 Ley Road, Suite 100, Fort Wayne, IN 46825 USA, P 260-471-7000, F 260-471-7777

909 Executive Dr, Warsaw, IN 46580 USA, P 574-267-3305, F 574-269-6569

3371 Cleveland Road, Suite 100A, South Bend, IN 46628 USA, P 574-277-0707, F 574-273-5699

2417 W. Pinhook Rd, Lafayette, LA 70508 USA, P 337-235-0483, F 337-233-6540

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Chain of Custody

Laboratory Number: 21040438

Page 2 of

Client Information:	Billing Information:	PO Number:	Project Name/Number:
Company Name: ERM	SAME		Henning / 0526033
Contact Name: Dave Angle		Quote Number:	
Address: 842 W. Sam Houston Pkwy N. Suite 600		Required QC Level	Sampler's Signature
City, State Zip: Houston, TX 77024			
Phone Number: 281.433.3524 Ext:	Ext:	Bill Monthly ☐Yes ☐No	Shipping Method: UPS / FedEx / NOW DHL / Element / Hand / Mail
Fax Number:			
E-mail Address: david.angle@erm.com			

Matrix Code

DW = Drinking Water
WW = Waste Water
GW = Ground Water
AQ = Aqueous
OT = Other
SL = Sludge SOL = Solid
O = Oil SO = Soil
F = Food SW = Swab
NG = Natural Gas
NGL = Natural Gas Liquid
PW = Produced Water
CF = Completion Fluid

Which Regulations Apply:
☐RCRA ☐Drinking Water
☐POTW ☐Distribution
☐NPDES ☐Special
☐USDA/FDA ☐State
☐RECAP/RISC ☐Other

Turn Time
☐Standard
RUSH
☐1 Day
☐2 Day
☐Other
(Rush turn times will incur a surcharge and must be pre-approved by lab.)

Sample ID/Description	Collection Information: Date	Time	Grab / Composite	Matrix	Container: Quantity	Container: Type P=Plastic, G=Glass, V=Vial	Pres. HCl, HNO_3, H_2SO_4, NaOH, $Na_2S_2O_3$	Requested Tests: TIC	SAR/ESP	CEC	Soluble Salts	29B Metals	% Moisture	Comments
H-22 0-2'	4/1/21	1215	G	SO	1	P	None	X	X	X		X	X	29B Metals: As, Ba, TI, Be, Cd, Cr, Sr, Zn, Pb, Hg
H-22 4-6'		1220						X	X	X		X	X	
H-22 8-10'		1230						X	X	X		X	X	
H-22 14-16'		1245						X					X	
H-22 28-30'		1320						X					X	
H-22 40-42'		1350						X					X	
H-23 0-2'	4/5/21	1515						X	X	X		X	X	
H-23 4-6'		1520						X	X	X		X	X	
H-23 10-12'		1535						X	X	X		X	X	

	Relinquished by	Date/Time	Received by	Date/Time
1	Matt Chesterfield	4/2/21 0853		4-2-21- 0853
2				
3				

Field Notes:

Received at lab on ice?
☐Yes ☐No Temp:

All samples submitted to Element Materials Technology for analysis are accepted on a custodial basis only. Ownership of the material remains with the client submitting the samples. Element Materials Technology reserves the right to return unused sample portions.

8800 North US 31
Columbus, IN
47201 USA
P 812-375-0531
F 812-375-0731

328 Ley Road, Suite 100
Fort Wayne, IN
46825 USA
P 260-471-7000
F 260-471-7777

909 Executive Dr
Warsaw, IN
46580 USA
P 574-267-3305
F 574-269-6569

3371 Cleveland Road, Suite 100A
South Bend, IN
46628 USA
P 574-277-0707
F 574-273-5699

2417 W. Pinhook Rd
Lafayette, LA
70508 USA
P 337-235-0483
F 337-233-6540

element™

Chain of Custody

Laboratory Number: 21040438

Page 3 of

	Client Information:	Billing Information:	PO Number:	Project Name/Number:
Company Name:	ERM	SAME		
Contact Name:	Dave Angle		Quote Number:	Henning / 0552633
Address:	54 W. Sam Houston Pkwy N. Suite 600		Required QC Level	Sampler's Signature
City, State Zip:	Houston, TX 77024			
Phone Number:	281.433.3826 Ext:	Ext:	Bill Monthly ☐Yes ☐No	Shipping Method: UPS / FedEx / NOW DHL / Element / Hand / Mail
Fax Number:				
E-mail Address:	david.angle@erm.com			

Matrix Code

DW = Drinking Water
WW = Waste Water
GW = Ground Water
AQ = Aqueous
OT = Other
SL = Sludge SOL = Solid
O = Oil SO = Soil
F = Food SW = Swab
NG = Natural Gas
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PW = Produced Water
CF = Completion Fluid

Which Regulations Apply:
☐RCRA ☐Drinking Water
☐POTW ☐Distribution
☐NPDES ☐Special
☐USDA/FDA ☐State
☐RECAP/RISC ☐Other

Turn Time
☐Standard
RUSH
☐1 Day
☐2 Day
☐Other
(Rush turn times will incur a surcharge and must be pre-approved by lab.)

Sample ID/Description	Collection Information: Date	Time	Grab / Composite	Matrix	Container: Quantity	Container: Type P=Plastic, G=Glass, V=Vial	Pres.: HCl, HNO_3, H_2SO_4, NaOH, $Na_2S_2O_3$	Requested Tests: TIC	SAR/ESP	CEC	SPLP Cl/Alk	8260 Metals	% Moisture	Comments
H-23 14-16'	4/5/21	1345	G	SO	1	P	None	X					X	8260 Metals As, Ba, TlBa Cd, Cr, Sr, Zn Pd, Hg
H-23 28-30'		1620						X					X	
H-23 32-34'		1630						X					X	
H-24 0-2'	4/6/21	1215						X	X	X	X		X	
H-24 4-6'		1220						X	X	X	X		X	
H-24 8-10'		1230						X	X	X	X		X	
H-24 12-14'		1240						X					X	
H-24 28-30'		1320						X					X	
H-24 44-46'		1400						X					X	

	Relinquished by	Date/Time	Received by	Date/Time
1	Matt Chantry Park	4/12/21 0853		4-12-21 0853
2				
3				

Field Notes:

Received at lab on ice?
☐Yes ☐No Temp:

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3371 Cleveland Road, Suite 100A
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46628 USA
P 574-277-0707
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Lafayette, LA
70508 USA
P 337-235-0483
F 337-233-6540

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Chain of Custody

Laboratory Number: 21040438

Page 4 of

	Client Information:	Billing Information:
Company Name:	ERM	SAME
Contact Name:	Dave Angle	
Address:	840 W. Sam Houston Pkwy N., Suite 600	
City, State Zip:	Houston, TX 77024	
Phone Number:	281.433.3826 Ext:	Ext:
Fax Number:		
E-mail Address:	david.angle@erm.com	

PO Number:

Quote Number:

Required QC Level

Bill Monthly ☐Yes ☐No

Project Name/Number: Henning / 0504033

Sampler's Signature

Shipping Method: UPS / FedEx / NOW / DHL / Element / Hand / Mail

Matrix Code

DW = Drinking Water
WW = Waste Water
GW = Ground Water
AQ = Aqueous
OT = Other
SL = Sludge SOL = Solid
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F = Food SW = Swab
NG = Natural Gas
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Which Regulations Apply:
☐RCRA ☐Drinking Water
☐POTW ☐Distribution
☐NPDES ☐Special
☐USDA/FDA ☐State
☐RECAP/RISC ☐Other

Turn Time
☐Standard
RUSH
☐1 Day
☐2 Day
☐Other
(Rush turn times will incur a surcharge and must be pre-approved by lab.)

Sample ID/Description	Collection Information: Date	Time	Grab / Composite	Matrix	Container: Quantity	Container: Type P=Plastic, G=Glass, V=Vial	Pres. HCl, HNO_3, H_2SO_4, NaOH, $Na_2S_2O_3$	Requested Tests: IC	SAR/ESP	CEC	SPLP Cl/WA	8RB Metals	% Moisture	Comments
H-25 0-2'	4/7/21	1130	G	SO	1	P	None	X	X	X		X	X	8RB Metals
H-25 4-6'		1140						X	X	X		X	X	As, Ba, Tl, Be, Cd, Cr, Sr, Zn, Pd, Hg
H-25 6-8'		1145						X	X	X		X	X	
H-25 8-10'		1150						X	X	X		X	X	
H-25 10-12'		1155						X	X	X		X	X	
H-25 24-26'		1230						X					X	
H-25 40-42'		1310						X					X	
H-26 0-2'	4/8/21	1215						X	X	X		X	X	
H-26 4-6'		1225						X	X	X		X	X	

	Relinquished by	Date/Time	Received by	Date/Time
1		4/12/21 0853		4-12-21 0853
2				
3				

Field Notes:

Received at lab on ice? ☐Yes ☑No Temp:

All samples submitted to Element Materials Technology for analysis are accepted on a custodial basis only. Ownership of the material remains with the client submitting the samples. Element Materials Technology reserves the right to return unused sample portions.

8800 North US 31, Columbus, IN 47201 USA, P 812-375-0531, F 812-375-0731
328 Ley Road, Suite 100, Fort Wayne, IN 46825 USA, P 260-471-7000, F 260-471-7777
909 Executive Dr, Warsaw, IN 46580 USA, P 574-267-3305, F 574-269-6569
3371 Cleveland Road, Suite 100A, South Bend, IN 46628 USA, P 574-277-0707, F 574-273-5699
2417 W. Pinhook Rd, Lafayette, LA 70508 USA, P 337-235-0483, F 337-233-6540

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Chain of Custody

Laboratory Number: 2104038

Page 5 of

Client Information:	Billing Information:	PO Number:	Project Name/Number:
Company Name: ERM	SAME		Henning / 0526033
Contact Name: Dave Angle		Quote Number:	Sampler's Signature: [signature]
Address: 840 W. Sam Houston Pkwy N. Suite 600		Required QC Level	
City, State Zip: Houston, TX 77024			
Phone Number: 281.433.3826 Ext:	Ext:	Bill Monthly ☐Yes ☐No	Shipping Method: UPS / FedEx / NOW DHL / Element / Hand / Mail (Hand circled)
Fax Number:			
E-mail Address: david.angle@erm.com			

Matrix Code
DW = Drinking Water
WW = Waste Water
GW = Ground Water
AQ = Aqueous
OT = Other
SL = Sludge SOL = Solid
O = Oil SO = Soil
F = Food SW = Swab
NG = Natural Gas
NGL = Natural Gas Liquid
PW = Produced Water
CF = Completion Fluid

Which Regulations Apply: ☐RCRA ☐POTW ☐NPDES ☐USDA/FDA ☐RECAP/RISC ☐Drinking Water ☐Distribution ☐Special ☐State ☐Other

Turn Time ☐Standard RUSH ☐1 Day ☐2 Day ☐Other (Rush turn times will incur a surcharge and must be pre-approved by lab.)

Sample ID/Description	Date	Time	Grab / Composite	Matrix	Quantity	Type P=Plastic, G=Glass, V=Vial	Pres. HCl, HNO_3, H_2SO_4, NaOH, $Na_2S_2O_3$	EC	SAR/ESP	CEC	SPLP Cl/Na	29B Metals	% Moisture					Comments
H-26 6-8'	4/8/21	1230	G	SO	1	P	None	X	X	X		X	X					29B Metals: As, Ba, T Ba, Cd, Cr, Sr, Zn, Pb, Hg
H-26 8-10'	↓	1235	↓	↓	↓	↓	↓	X	X	X		X	X					
H-26 10-12'	↓	1240	↓	↓	↓	↓	↓	X	X	X		X	X					
H-26 22-24'	↓	1310	↓	↓	↓	↓	↓	X					X					
H-26 30-32'	↓	1330	↓	↓	↓	↓	↓	X					X					
H-26 48-49'	↓	1500	↓	↓	↓	↓	↓	X					X					
H-27 0-2'	4/9/21	1015	↓	↓	↓	↓	↓	X	X	X		X	X					
H-27 4-6'	↓	1025	↓	↓	↓	↓	↓	X	X	X		X	X					
H-27 6-8'	↓	1030	↓	↓	↓	↓	↓	X	X	X		X	X					

	Relinquished by	Date/Time	Received by	Date/Time
1	[signature]	4/12/21 0853	[signature]	4-12-21 0853
2				
3				

Field Notes:

Received at lab on ice? ☐Yes ☑No Temp:

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2417 W. Pinhook Rd Lafayette, LA 70508 USA P 337-235-0483 F 337-233-6540

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Chain of Custody

Laboratory Number: 210440438

Client Information:	Billing Information:	PO Number:	Project Name/Number:	Page 6 of
Company Name: ERM	SAME		HENNING / 0526033	**Matrix Code**
Contact Name: Dave Angle		Quote Number:	Sampler's Signature	DW = Drinking Water WW = Waste Water GW = Ground Water AQ = Aqueous OT = Other SL = Sludge SOL = Solid O = Oil SO = Soil F = Food SW = Swab NG = Natural Gas NGL = Natural Gas Liquid PW = Produced Water CF = Completion Fluid
Address: 840 W. Sam Houston Pkwy N. Suite 600		Required QC Level		
City, State Zip: Houston, TX 77024		Bill Monthly ☐Yes ☐No	Shipping Method: UPS / FedEx / NOW DHL / Element / Hand / Mail	
Phone Number: 281.433.3826 Ext:	Ext:			
Fax Number:				
E-mail Address: david.angle@erm.com				

Which Regulations Apply:
☐RCRA ☐Drinking Water
☐POTW ☐Distribution
☐NPDES ☐Special
☐USDA/FDA ☐State
☐RECAP/RISC ☐Other

Turn Time
☐Standard
RUSH
☐1 Day
☐2 Day
☐Other
(Rush turn times will incur a surcharge and must be pre-approved by lab.)

Sample ID/Description	Collection Information: Date	Time	Grab / Composite	Matrix	Container: Quantity	Container: Type P=Plastic, G=Glass, V=Vial	Pres. HCl, HNO_3, H_2SO_4, NaOH, $Na_2S_2O_3$	Requested Tests: EC	SAR/ESP	CEC	SPLP Cl/NO3	RCRA Metals	% Moisture	Comments
H-27 5-10'	4/9/21	1035	G	SO	1	P	None	X	X	X		X	X	8RB Metals: As, Ba, TCLP Cd, Cr, Se, Zn, Pb, Hg
H-27 16-18'		1055						X					X	
H-27 34-36'		1140						X					X	
H-27 50-51'		1220						X					X	

	Relinquished by	Date/Time	Received by	Date/Time
1		4/12/21 0853		4-12-21 0853
2				
3				

Field Notes:

Received at lab on ice? ☐Yes ☑No Temp:

All samples submitted to Element Materials Technology for analysis are accepted on a custodial basis only. Ownership of the material remains with the client submitting the samples. Element Materials Technology reserves the right to return unused sample portions.

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2417 W. Pinhook Rd, Lafayette, LA 70508 USA, P 337-235-0483, F 337-233-6540

Element Materials Technology Lafayette
2417 W. Pinhook Road
Lafayette, LA 70508-3344
TEL: (337) 235-0483 FAX: (337) 233-6540
Website: www.element.com

April 28, 2021

Dave Angle
Environmental Resources Management
CityCentre Four
840 W. Sam Houston Pkwy North, Suite 600
Houston, TX 77024
TEL:
FAX

RE: Henning/0526033

Order No.: 21040481

Dear Dave Angle:

Element Materials Technology Lafayette received 14 sample(s) on 4/13/2021 for the analyses presented in the following report.

In accordance with your instructions, Element Lafayette either conducted or subcontracted these analyses. Subcontracted analyses will be identified in the accompanying case narrative. All relevant sampling information can be found on the attached Chain-of-Custody form. Unless otherwise noted, all analyses were conducted using EPA approved methodologies and all test results meet the applicable requirements of TNI. Reported results relate only to the items tested.

Where applicable, all soil data, except for 29-B, are reported on a wet-weight basis unless otherwise indicated in the units field as –dry.

LELAP Certification No.: 01997. TCEQ Certification No.: T104704261. LDHH Certification No.: LA023. ISDH Certification No.: C-LA-01. NDELCP Certification No.: R-226. A scope of accredited parameters is available upon request. A "#" by the test method or analyte indicates this parameter is outside the scope of accreditation. PA registration No.: 68-05967.

Estimated uncertainty is available upon request. This report shall not be reproduced, except in full, without the written approval of the laboratory.

If you have any questions regarding these test results, please feel free to call.

Cristina Thibeaux
Customer Service Supervisor
2417 W. Pinhook Road
Lafayette, LA 70508-3344

Element Materials Technology Lafayette
2417 W. Pinhook Road
Lafayette, LA 70508-3344
TEL: (337) 235-0483 FAX: (337) 233-6540
Website: www.element.com

Case Narrative

WO#: **21040481**
Date: **4/28/2021**

CLIENT: Environmental Resources Management
Project: Henning/0526033

Unless specified by the client, a duplicate or MS/MSD, wherever applicable, is randomly selected and analyzed from each analytical batch provided sample volume is sufficient. The sample chosen for duplicate or MS/MSD may or may not be a sample submitted in this workorder. A method blank and/or a lab control sample (LCS)/lab control sample duplicate (LCSD), wherever applicable, are processed as a quality control check for each analytical batch. When the matrix QC data is not available due to insufficient sample volume or when the results indicate possible matrix effect, the validity of the batch is determined by the method blank and LCS/LCSD.

The results of the laboratory internal quality control data are provided in the QC Summary Report section of the report for your review. Laboratory-related QC exceptions that may impact the validity of data are discussed in the case narrative. Sample-related QC exceptions are flagged either in the results page(s) or in the QC report page(s). End users should consider QC exceptions when evaluating sample data against data quality objectives.

Any other exceptions associated with this report will be footnoted in the results page(s) or the QC summary page(s).

Element Materials Technology Lafayette
2417 W. Pinhook Road
Lafayette, LA 70508-3344
TEL: (337) 235-0483 FAX: (337) 233-6540
Website: www.element.com

Analytical Report

(consolidated)

WO#: **21040481**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 4/12/2021 12:00:00 PM

Project: Henning/0526033

Lab ID: 21040481-001 **Matrix:** SOIL

Client Sample ID H-28 0-2'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	35.0	0.100		meq/100g	1	4/27/2021
29B SALTS				**LDNR 29-B**		Analyst: **JMI**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	1.08	0.10		mmhos/cm	1	4/21/2021 11:45:00 AM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	8.95	0.10		%	1	4/27/2021
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	7.94	0.10			1	4/22/2021
Soluble Calcium	1.37	0.02		meq/L	1	4/22/2021
Soluble Magnesium	0.56	0.05		meq/L	1	4/22/2021
Soluble Sodium	7.81	0.25		meq/L	1	4/22/2021
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.0991	0.0991		mg/Kg	1	4/26/2021 3:13:45 PM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	2.48	0.983		mg/Kg	1	4/22/2021 4:25:01 PM
Barium	902	0.491		mg/Kg	1	4/22/2021 4:25:01 PM
Cadmium	< 0.246	0.246		mg/Kg	1	4/22/2021 4:25:01 PM
Chromium	5.94	0.491		mg/Kg	1	4/22/2021 4:25:01 PM
Lead	10.8	0.491		mg/Kg	1	4/22/2021 4:25:01 PM
Strontium	92.2	0.491		mg/Kg	1	4/22/2021 4:25:01 PM
Zinc	9.73	0.491		mg/Kg	1	4/22/2021 4:25:01 PM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	15,400	48.5		mg/Kg-dry	1	4/26/2021 6:52:15 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

Element Materials Technology Lafayette
2417 W. Pinhook Road
Lafayette, LA 70508-3344
TEL: (337) 235-0483 FAX: (337) 233-6540
Website: www.element.com

Analytical Report

(consolidated)

WO#: **21040481**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 4/12/2021 12:00:00 PM

Project: Henning/0526033

Lab ID: 21040481-001 **Matrix:** SOIL

Client Sample ID H-28 0-2'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXB**
Percent Moisture	25.3	1.00		wt%	1	4/13/2021 11:30:00 AM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

Element Materials Technology Lafayette
2417 W. Pinhook Road
Lafayette, LA 70508-3344
TEL: (337) 235-0483 FAX: (337) 233-6540
Website: www.element.com

Analytical Report

(consolidated)

WO#: **21040481**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 4/12/2021 12:05:00 PM

Project: Henning/0526033

Lab ID: 21040481-002 **Matrix:** SOIL

Client Sample ID H-28 4-6'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	39.6	0.100		meq/100g	1	4/27/2021
29B SALTS				**LDNR 29-B**		Analyst: **JMI**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	1.01	0.10		mmhos/cm	1	4/21/2021 11:45:00 AM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	13.9	0.10		%	1	4/27/2021
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	7.48	0.10			1	4/22/2021
Soluble Calcium	1.10	0.02		meq/L	1	4/22/2021
Soluble Magnesium	0.57	0.05		meq/L	1	4/22/2021
Soluble Sodium	6.83	0.25		meq/L	1	4/22/2021
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.0989	0.0989		mg/Kg	1	4/26/2021 3:16:01 PM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	2.70	1.01		mg/Kg	1	4/22/2021 4:27:09 PM
Barium	180	0.504		mg/Kg	1	4/22/2021 4:27:09 PM
Cadmium	< 0.252	0.252		mg/Kg	1	4/22/2021 4:27:09 PM
Chromium	5.11	0.504		mg/Kg	1	4/22/2021 4:27:09 PM
Lead	5.78	0.504		mg/Kg	1	4/22/2021 4:27:09 PM
Strontium	56.6	0.504		mg/Kg	1	4/22/2021 4:27:09 PM
Zinc	11.6	0.504		mg/Kg	1	4/22/2021 4:27:09 PM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	628	45.5		mg/Kg-dry	1	4/26/2021 6:58:37 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

Element Materials Technology Lafayette
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Analytical Report

(consolidated)

WO#: **21040481**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 4/12/2021 12:05:00 PM

Project: Henning/0526033

Lab ID: 21040481-002 **Matrix:** SOIL

Client Sample ID H-28 4-6'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXB**
Percent Moisture	17.6	1.00		wt%	1	4/13/2021 11:30:00 AM

Qualifiers:				
	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	H	Holding times for preparation or analysis exceeded	M	Matrix Interference
	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
	RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
	SDL	Sample detection limit	U	Analyte not detected
	W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

(consolidated)

WO#: **21040481**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 4/12/2021 12:10:00 PM

Project: Henning/0526033

Lab ID: 21040481-003 **Matrix:** SOIL

Client Sample ID H-28 6-8'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	39.4	0.100		meq/100g	1	4/27/2021
29B SALTS				**LDNR 29-B**		Analyst: **JMI**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	1.32	0.10		mmhos/cm	1	4/21/2021 11:45:00 AM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	11.1	0.10		%	1	4/27/2021
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	11.8	0.10			1	4/22/2021
Soluble Calcium	0.90	0.02		meq/L	1	4/22/2021
Soluble Magnesium	0.40	0.05		meq/L	1	4/22/2021
Soluble Sodium	9.48	0.25		meq/L	1	4/22/2021
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.0993	0.0993		mg/Kg	1	4/26/2021 3:18:17 PM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	1.75	0.983		mg/Kg	1	4/22/2021 4:29:18 PM
Barium	74.9	0.491		mg/Kg	1	4/22/2021 4:29:18 PM
Cadmium	< 0.246	0.246		mg/Kg	1	4/22/2021 4:29:18 PM
Chromium	8.00	0.491		mg/Kg	1	4/22/2021 4:29:18 PM
Lead	3.48	0.491		mg/Kg	1	4/22/2021 4:29:18 PM
Strontium	22.8	0.491		mg/Kg	1	4/22/2021 4:29:18 PM
Zinc	21.4	0.491		mg/Kg	1	4/22/2021 4:29:18 PM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	262	47.2		mg/Kg-dry	1	4/26/2021 7:00:46 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

(consolidated)

WO#: **21040481**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 4/12/2021 12:10:00 PM

Project: Henning/0526033

Lab ID: 21040481-003 **Matrix:** SOIL

Client Sample ID H-28 6-8'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXB**
Percent Moisture	17.1	1.00		wt%	1	4/13/2021 11:30:00 AM

Qualifiers:				
	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	H	Holding times for preparation or analysis exceeded	M	Matrix Interference
	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
	RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
	SDL	Sample detection limit	U	Analyte not detected
	W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

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WO#: **21040481**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 4/12/2021 12:30:00 PM

Project: Henning/0526033

Lab ID: 21040481-004 **Matrix:** SOIL

Client Sample ID H-28 14-15'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
ELECTRICAL CONDUCTIVITY @ SATURATION				**LDNR 29-B**		Analyst: **JMI**
Electrical Conductivity	3.05	0.10		mmhos/cm	1	4/21/2021 11:45:00 AM
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXB**
Percent Moisture	19.3	1.00		wt%	1	4/13/2021 11:30:00 AM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.
H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit
RL	Reporting Limit
SDL	Sample detection limit
W	Sample container temperature is out of limit as specified at testcode
B	Analyte detected in the associated Method Blank
M	Matrix Interference
R	RPD outside accepted recovery limits
S	Spike Recovery outside accepted recovery limits
U	Analyte not detected

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Analytical Report

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WO#: **21040481**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 4/12/2021 2:20:00 PM

Project: Henning/0526033

Lab ID: 21040481-005 **Matrix:** SOIL

Client Sample ID H-29 0-2'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	44.0	0.100		meq/100g	1	4/27/2021
29B SALTS				**LDNR 29-B**		Analyst: **JMI**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	0.78	0.10		mmhos/cm	1	4/21/2021 11:45:00 AM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	2.83	0.10		%	1	4/27/2021
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	3.05	0.10			1	4/22/2021
Soluble Calcium	2.38	0.02		meq/L	1	4/22/2021
Soluble Magnesium	0.90	0.05		meq/L	1	4/22/2021
Soluble Sodium	3.91	0.25		meq/L	1	4/22/2021
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.0929	0.0929		mg/Kg	1	4/26/2021 3:20:34 PM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	2.21	1.03		mg/Kg	1	4/22/2021 4:31:25 PM
Barium	105	0.515		mg/Kg	1	4/22/2021 4:31:25 PM
Cadmium	< 0.258	0.258		mg/Kg	1	4/22/2021 4:31:25 PM
Chromium	6.81	0.515		mg/Kg	1	4/22/2021 4:31:25 PM
Lead	6.87	0.515		mg/Kg	1	4/22/2021 4:31:25 PM
Strontium	15.7	0.515		mg/Kg	1	4/22/2021 4:31:25 PM
Zinc	8.78	0.515		mg/Kg	1	4/22/2021 4:31:25 PM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	408	49.3		mg/Kg-dry	1	4/26/2021 7:02:53 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

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WO#: **21040481**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 4/12/2021 2:20:00 PM

Project: Henning/0526033

Lab ID: 21040481-005 **Matrix:** SOIL

Client Sample ID H-29 0-2'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXB**
Percent Moisture	20.4	1.00		wt%	1	4/13/2021 11:30:00 AM

Qualifiers:				
	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	H	Holding times for preparation or analysis exceeded	M	Matrix Interference
	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
	RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
	SDL	Sample detection limit	U	Analyte not detected
	W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

(consolidated)

WO#: **21040481**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 4/12/2021 2:25:00 PM

Project: Henning/0526033

Lab ID: 21040481-006 **Matrix:** SOIL

Client Sample ID H-29 4-6'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	35.6	0.100		meq/100g	1	4/27/2021
29B SALTS				**LDNR 29-B**		Analyst: **JMI**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	3.15	0.10		mmhos/cm	1	4/21/2021 11:45:00 AM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	1.98	0.10		%	1	4/27/2021
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	2.32	0.10			1	4/22/2021
Soluble Calcium	24.9	0.02		meq/L	1	4/22/2021
Soluble Magnesium	5.26	0.05		meq/L	1	4/22/2021
Soluble Sodium	8.99	0.25		meq/L	1	4/22/2021
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.102	0.102		mg/Kg	1	4/26/2021 3:22:50 PM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	1.62	1.04		mg/Kg	1	4/22/2021 4:33:32 PM
Barium	35.5	0.518		mg/Kg	1	4/22/2021 4:33:32 PM
Cadmium	< 0.259	0.259		mg/Kg	1	4/22/2021 4:33:32 PM
Chromium	3.88	0.518		mg/Kg	1	4/22/2021 4:33:32 PM
Lead	5.51	0.518		mg/Kg	1	4/22/2021 4:33:32 PM
Strontium	20.6	0.518		mg/Kg	1	4/22/2021 4:33:32 PM
Zinc	6.47	0.518		mg/Kg	1	4/22/2021 4:33:32 PM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	363	48.4		mg/Kg-dry	1	4/26/2021 7:05:00 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

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WO#: **21040481**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 4/12/2021 2:25:00 PM

Project: Henning/0526033

Lab ID: 21040481-006 **Matrix:** SOIL

Client Sample ID H-29 4-6'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXB**
Percent Moisture	16.2	1.00		wt%	1	4/13/2021 11:30:00 AM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

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WO#: **21040481**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 4/12/2021 2:35:00 PM

Project: Henning/0526033

Lab ID: 21040481-007 **Matrix:** SOIL

Client Sample ID H-29 8-10'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	41.3	0.100		meq/100g	1	4/27/2021
29B SALTS				**LDNR 29-B**		Analyst: **JMI**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	1.07	0.10		mmhos/cm	1	4/21/2021 11:45:00 AM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	3.26	0.10		%	1	4/27/2021
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	2.92	0.10			1	4/22/2021
Soluble Calcium	3.76	0.02		meq/L	1	4/22/2021
Soluble Magnesium	1.47	0.05		meq/L	1	4/22/2021
Soluble Sodium	4.72	0.25		meq/L	1	4/22/2021
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.0972	0.0972		mg/Kg	1	4/26/2021 3:25:06 PM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	4.98	1.04		mg/Kg	1	4/22/2021 4:35:40 PM
Barium	36.2	0.521		mg/Kg	1	4/22/2021 4:35:40 PM
Cadmium	< 0.260	0.260		mg/Kg	1	4/22/2021 4:35:40 PM
Chromium	9.27	0.521		mg/Kg	1	4/22/2021 4:35:40 PM
Lead	9.95	0.521		mg/Kg	1	4/22/2021 4:35:40 PM
Strontium	15.2	0.521		mg/Kg	1	4/22/2021 4:35:40 PM
Zinc	29.4	0.521		mg/Kg	1	4/22/2021 4:35:40 PM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	219	47.5		mg/Kg-dry	1	4/26/2021 7:07:07 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

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WO#: **21040481**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 4/12/2021 2:35:00 PM

Project: Henning/0526033

Lab ID: 21040481-007 **Matrix:** SOIL

Client Sample ID H-29 8-10'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXB**
Percent Moisture	18.4	1.00		wt%	1	4/13/2021 11:30:00 AM

Qualifiers:				
	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	H	Holding times for preparation or analysis exceeded	M	Matrix Interference
	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
	RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
	SDL	Sample detection limit	U	Analyte not detected
	W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

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WO#: **21040481**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 4/12/2021 2:40:00 PM

Project: Henning/0526033

Lab ID: 21040481-008 **Matrix:** SOIL

Client Sample ID H-29 10-12'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	31.5	0.100		meq/100g	1	4/27/2021
29B SALTS				**LDNR 29-B**		Analyst: **JMI**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	1.09	0.10		mmhos/cm	1	4/21/2021 11:45:00 AM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	3.32	0.10		%	1	4/27/2021
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	2.39	0.10			1	4/22/2021
Soluble Calcium	4.29	0.02		meq/L	1	4/22/2021
Soluble Magnesium	1.58	0.05		meq/L	1	4/22/2021
Soluble Sodium	4.10	0.25		meq/L	1	4/22/2021
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.0975	0.0975		mg/Kg	1	4/26/2021 3:27:26 PM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	6.93	0.987		mg/Kg	1	4/22/2021 4:42:02 PM
Barium	140	0.494		mg/Kg	1	4/22/2021 4:42:02 PM
Cadmium	0.517	0.247		mg/Kg	1	4/22/2021 4:42:02 PM
Chromium	6.74	0.494		mg/Kg	1	4/22/2021 4:42:02 PM
Lead	6.45	0.494		mg/Kg	1	4/22/2021 4:42:02 PM
Strontium	239	0.494		mg/Kg	1	4/22/2021 4:42:02 PM
Zinc	32.2	0.494		mg/Kg	1	4/22/2021 4:42:02 PM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	128	46.9		mg/Kg-dry	1	4/26/2021 7:09:14 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

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WO#: **21040481**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 4/12/2021 2:40:00 PM

Project: Henning/0526033

Lab ID: 21040481-008 **Matrix:** SOIL

Client Sample ID H-29 10-12'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXB**
Percent Moisture	18.5	1.00		wt%	1	4/13/2021 11:30:00 AM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

Element Materials Technology Lafayette
2417 W. Pinhook Road
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TEL: (337) 235-0483 FAX: (337) 233-6540
Website: www.element.com

Analytical Report

(consolidated)

WO#: **21040481**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 4/12/2021 2:45:00 PM

Project: Henning/0526033

Lab ID: 21040481-009 **Matrix:** SOIL

Client Sample ID H-30 0-2'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	32.8	0.100		meq/100g	1	4/27/2021
29B SALTS				**LDNR 29-B**		Analyst: **JMI**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	2.96	0.10		mmhos/cm	1	4/21/2021 11:45:00 AM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	2.92	0.10		%	1	4/27/2021
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	1.87	0.10			1	4/22/2021
Soluble Calcium	24.1	0.02		meq/L	1	4/22/2021
Soluble Magnesium	5.52	0.05		meq/L	1	4/22/2021
Soluble Sodium	7.18	0.25		meq/L	1	4/22/2021
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.0996	0.0996		mg/Kg	1	4/26/2021 3:29:43 PM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	< 1.02	1.02		mg/Kg	1	4/22/2021 4:44:09 PM
Barium	76.9	0.509		mg/Kg	1	4/22/2021 4:44:09 PM
Cadmium	< 0.254	0.254		mg/Kg	1	4/22/2021 4:44:09 PM
Chromium	6.88	0.509		mg/Kg	1	4/22/2021 4:44:09 PM
Lead	6.05	0.509		mg/Kg	1	4/22/2021 4:44:09 PM
Strontium	11.5	0.509		mg/Kg	1	4/22/2021 4:44:09 PM
Zinc	6.64	0.509		mg/Kg	1	4/22/2021 4:44:09 PM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	464	48.1		mg/Kg-dry	1	4/26/2021 7:11:21 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

(consolidated)

WO#: **21040481**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 4/12/2021 2:45:00 PM

Project: Henning/0526033

Lab ID: 21040481-009 **Matrix:** SOIL

Client Sample ID H-30 0-2'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXB**
Percent Moisture	18.4	1.00		wt%	1	4/13/2021 11:30:00 AM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

(consolidated)

WO#: **21040481**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 4/12/2021 2:50:00 PM

Project: Henning/0526033

Lab ID: 21040481-010 **Matrix:** SOIL

Client Sample ID H-30 4-6'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	37.9	0.100		meq/100g	1	4/27/2021
29B SALTS				**LDNR 29-B**		Analyst: **JMI**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	3.09	0.10		mmhos/cm	1	4/21/2021 11:45:00 AM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	3.25	0.10		%	1	4/27/2021
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	2.23	0.10			1	4/22/2021
Soluble Calcium	24.2	0.02		meq/L	1	4/22/2021
Soluble Magnesium	6.12	0.05		meq/L	1	4/22/2021
Soluble Sodium	8.68	0.25		meq/L	1	4/22/2021
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.101	0.101		mg/Kg	1	4/26/2021 3:32:00 PM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	1.15	1.02		mg/Kg	1	4/22/2021 4:46:17 PM
Barium	81.3	0.511		mg/Kg	1	4/22/2021 4:46:17 PM
Cadmium	< 0.255	0.255		mg/Kg	1	4/22/2021 4:46:17 PM
Chromium	4.80	0.511		mg/Kg	1	4/22/2021 4:46:17 PM
Lead	4.67	0.511		mg/Kg	1	4/22/2021 4:46:17 PM
Strontium	15.2	0.511		mg/Kg	1	4/22/2021 4:46:17 PM
Zinc	8.62	0.511		mg/Kg	1	4/22/2021 4:46:17 PM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	304	48.1		mg/Kg-dry	1	4/26/2021 7:13:29 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

(consolidated)

WO#: **21040481**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 4/12/2021 2:50:00 PM

Project: Henning/0526033

Lab ID: 21040481-010 **Matrix:** SOIL

Client Sample ID H-30 4-6'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXB**
Percent Moisture	15.1	1.00		wt%	1	4/13/2021 11:30:00 AM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

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WO#: **21040481**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 4/12/2021 3:00:00 PM

Project: Henning/0526033

Lab ID: 21040481-011 **Matrix:** SOIL

Client Sample ID H-30 8-10'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	38.5	0.100		meq/100g	1	4/27/2021
29B SALTS				**LDNR 29-B**		Analyst: **JMI**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	1.20	0.10		mmhos/cm	1	4/21/2021 11:45:00 AM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	4.29	0.10		%	1	4/27/2021
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	3.52	0.10			1	4/22/2021
Soluble Calcium	4.05	0.02		meq/L	1	4/22/2021
Soluble Magnesium	1.53	0.05		meq/L	1	4/22/2021
Soluble Sodium	5.88	0.25		meq/L	1	4/22/2021
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.0995	0.0995		mg/Kg	1	4/26/2021 3:34:17 PM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	1.95	1.02		mg/Kg	1	4/22/2021 4:48:24 PM
Barium	38.3	0.508		mg/Kg	1	4/22/2021 4:48:24 PM
Cadmium	< 0.254	0.254		mg/Kg	1	4/22/2021 4:48:24 PM
Chromium	8.64	0.508		mg/Kg	1	4/22/2021 4:48:24 PM
Lead	4.60	0.508		mg/Kg	1	4/22/2021 4:48:24 PM
Strontium	14.9	0.508		mg/Kg	1	4/22/2021 4:48:24 PM
Zinc	23.7	0.508		mg/Kg	1	4/22/2021 4:48:24 PM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	382	48.7		mg/Kg-dry	1	4/26/2021 7:15:37 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

(consolidated)

WO#: **21040481**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 4/12/2021 3:00:00 PM

Project: Henning/0526033

Lab ID: 21040481-011 **Matrix:** SOIL

Client Sample ID H-30 8-10'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXB**
Percent Moisture	16.2	1.00		wt%	1	4/13/2021 12:15:00 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

(consolidated)

WO#: **21040481**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 4/12/2021 3:05:00 PM

Project: Henning/0526033

Lab ID: 21040481-012 **Matrix:** SOIL

Client Sample ID H-30 10-12'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	31.2	0.100		meq/100g	1	4/27/2021
29B SALTS				**LDNR 29-B**		Analyst: **JMI**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	1.18	0.10		mmhos/cm	1	4/21/2021 11:45:00 AM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	6.02	0.10		%	1	4/27/2021
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	3.22	0.10			1	4/22/2021
Soluble Calcium	3.93	0.02		meq/L	1	4/22/2021
Soluble Magnesium	1.53	0.05		meq/L	1	4/22/2021
Soluble Sodium	5.32	0.25		meq/L	1	4/22/2021
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.0951	0.0951		mg/Kg	1	4/26/2021 3:41:35 PM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	8.18	0.983		mg/Kg	1	4/22/2021 4:50:32 PM
Barium	46.9	0.491		mg/Kg	1	4/22/2021 4:50:32 PM
Cadmium	0.292	0.246		mg/Kg	1	4/22/2021 4:50:32 PM
Chromium	8.44	0.491		mg/Kg	1	4/22/2021 4:50:32 PM
Lead	7.96	0.491		mg/Kg	1	4/22/2021 4:50:32 PM
Strontium	92.6	0.491		mg/Kg	1	4/22/2021 4:50:32 PM
Zinc	59.6	0.491		mg/Kg	1	4/22/2021 4:50:32 PM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	136	48.5		mg/Kg-dry	1	4/26/2021 7:17:44 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

(consolidated)

WO#: **21040481**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 4/12/2021 3:05:00 PM

Project: Henning/0526033

Lab ID: 21040481-012 **Matrix:** SOIL

Client Sample ID H-30 10-12'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXB**
Percent Moisture	19.4	1.00		wt%	1	4/13/2021 12:15:00 PM

Qualifiers:				
	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	H	Holding times for preparation or analysis exceeded	M	Matrix Interference
	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
	RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
	SDL	Sample detection limit	U	Analyte not detected
	W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

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WO#: **21040481**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 4/12/2021 3:25:00 PM

Project: Henning/0526033

Lab ID: 21040481-013 **Matrix:** SOIL

Client Sample ID H-31 8-10'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	35.0	0.100		meq/100g	1	4/27/2021
29B SALTS				**LDNR 29-B**		Analyst: **JMI**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	1.27	0.10		mmhos/cm	1	4/21/2021 11:45:00 AM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	1.51	0.10		%	1	4/27/2021
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	2.38	0.10			1	4/22/2021
Soluble Calcium	5.01	0.02		meq/L	1	4/22/2021
Soluble Magnesium	1.46	0.05		meq/L	1	4/22/2021
Soluble Sodium	4.29	0.25		meq/L	1	4/22/2021
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.0967	0.0967		mg/Kg	1	4/26/2021 3:43:52 PM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	1.28	1.03		mg/Kg	1	4/22/2021 4:52:39 PM
Barium	33.8	0.514		mg/Kg	1	4/22/2021 4:52:39 PM
Cadmium	< 0.257	0.257		mg/Kg	1	4/22/2021 4:52:39 PM
Chromium	8.32	0.514		mg/Kg	1	4/22/2021 4:52:39 PM
Lead	3.46	0.514		mg/Kg	1	4/22/2021 4:52:39 PM
Strontium	16.9	0.514		mg/Kg	1	4/22/2021 4:52:39 PM
Zinc	22.6	0.514		mg/Kg	1	4/22/2021 4:52:39 PM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	313	49.4		mg/Kg-dry	1	4/26/2021 7:24:07 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

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WO#: **21040481**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 4/12/2021 3:25:00 PM

Project: Henning/0526033

Lab ID: 21040481-013 **Matrix:** SOIL

Client Sample ID H-31 8-10'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXB**
Percent Moisture	17.2	1.00		wt%	1	4/13/2021 12:15:00 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.
H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit
RL	Reporting Limit
SDL	Sample detection limit
W	Sample container temperature is out of limit as specified at testcode
B	Analyte detected in the associated Method Blank
M	Matrix Interference
R	RPD outside accepted recovery limits
S	Spike Recovery outside accepted recovery limits
U	Analyte not detected

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Analytical Report

(consolidated)

WO#: **21040481**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 4/12/2021 3:30:00 PM

Project: Henning/0526033

Lab ID: 21040481-014 **Matrix:** SOIL

Client Sample ID H-31 10-12'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	23.7	0.100		meq/100g	1	4/27/2021
29B SALTS				**LDNR 29-B**		Analyst: **JMI**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	1.43	0.10		mmhos/cm	1	4/21/2021 11:45:00 AM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	1.66	0.10		%	1	4/27/2021
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	1.94	0.10			1	4/22/2021
Soluble Calcium	6.60	0.02		meq/L	1	4/22/2021
Soluble Magnesium	1.95	0.05		meq/L	1	4/22/2021
Soluble Sodium	4.02	0.25		meq/L	1	4/22/2021
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.0987	0.0987		mg/Kg	1	4/26/2021 3:53:40 PM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	3.69	1.03		mg/Kg	1	4/22/2021 4:54:47 PM
Barium	13.7	0.517		mg/Kg	1	4/22/2021 4:54:47 PM
Cadmium	< 0.258	0.258		mg/Kg	1	4/22/2021 4:54:47 PM
Chromium	7.55	0.517		mg/Kg	1	4/22/2021 4:54:47 PM
Lead	3.87	0.517		mg/Kg	1	4/22/2021 4:54:47 PM
Strontium	53.2	0.517		mg/Kg	1	4/22/2021 4:54:47 PM
Zinc	24.3	0.517		mg/Kg	1	4/22/2021 4:54:47 PM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	129	48.8		mg/Kg-dry	1	4/26/2021 7:26:14 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report

(consolidated)

WO#: **21040481**

Date Reported: **4/28/2021**

CLIENT: Environmental Resources Management **Collection Date:** 4/12/2021 3:30:00 PM

Project: Henning/0526033

Lab ID: 21040481-014 **Matrix:** SOIL

Client Sample ID H-31 10-12'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXB**
Percent Moisture	17.4	1.00		wt%	1	4/13/2021 12:15:00 PM

Qualifiers:				
	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	H	Holding times for preparation or analysis exceeded	M	Matrix Interference
	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
	RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits
	SDL	Sample detection limit	U	Analyte not detected
	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **21040481**

28-Apr-21

Client: Environmental Resources Management
Project: Henning/0526033 **BatchID:** **39308**

Sample ID	**MB-39308**	SampType:	**MBLK**	TestCode:	**6010_S**	Units:	**mg/Kg**	Prep Date:	**4/14/2021**	RunNo:	**98967**
Client ID:	**PBS**	Batch ID:	**39308**	TestNo:	**SW6010B**	**SW3050B**		Analysis Date:	**4/22/2021**	SeqNo:	**2412691**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	< 1.00	1.00									
Barium	< 0.500	0.500									
Cadmium	< 0.250	0.250									
Chromium	< 0.500	0.500									
Lead	< 0.500	0.500									
Strontium	< 0.500	0.500									
Zinc	< 0.500	0.500									

Sample ID	**LCS-39308**	SampType:	**LCS**	TestCode:	**6010_S**	Units:	**mg/Kg**	Prep Date:	**4/14/2021**	RunNo:	**98967**
Client ID:	**LCSS**	Batch ID:	**39308**	TestNo:	**SW6010B**	**SW3050B**		Analysis Date:	**4/22/2021**	SeqNo:	**2412692**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	25.6	1.00	25.00	0	102	80	120				
Barium	26.7	0.500	25.00	0	107	80	120				
Cadmium	24.7	0.250	25.00	0	98.8	80	120				
Chromium	25.8	0.500	25.00	0	103	80	120				
Lead	25.3	0.500	25.00	0	101	80	120				
Strontium	25.7	0.500	25.00	0	103	80	120				
Zinc	24.4	0.500	25.00	0	97.7	80	120				

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceede
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **21040481**

28-Apr-21

Client: Environmental Resources Management
Project: Henning/0526033 **BatchID:** **39308**

Sample ID	**LCSD-39308**	SampType:	**LCSD**	TestCode:	**6010_S**	Units:	**mg/Kg**	Prep Date:	**4/14/2021**	RunNo:	**98967**
Client ID:	**LCSS02**	Batch ID:	**39308**	TestNo:	**SW6010B**	**SW3050B**		Analysis Date:	**4/22/2021**	SeqNo:	**2412693**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	25.3	1.00	25.00	0	101	80	120	25.56	1.06	20	
Barium	26.7	0.500	25.00	0	107	80	120	26.67	0.0768	20	
Cadmium	24.9	0.250	25.00	0	99.7	80	120	24.69	0.977	20	
Chromium	25.8	0.500	25.00	0	103	80	120	25.81	0.110	20	
Lead	25.2	0.500	25.00	0	101	80	120	25.32	0.386	20	
Strontium	25.6	0.500	25.00	0	102	80	120	25.67	0.170	20	
Zinc	24.5	0.500	25.00	0	97.8	80	120	24.43	0.0921	20	

Sample ID	**21040396-026AMS**	SampType:	**MS**	TestCode:	**6010_S**	Units:	**mg/Kg**	Prep Date:	**4/14/2021**	RunNo:	**98967**
Client ID:	**ZZZZZZ**	Batch ID:	**39308**	TestNo:	**SW6010B**	**SW3050B**		Analysis Date:	**4/22/2021**	SeqNo:	**2412695**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	26.7	0.991	24.79	2.840	96.2	75	125				
Barium	1,120	0.496	24.79	1,089	107	75	125				
Cadmium	24.5	0.248	24.79	0.09522	98.5	75	125				
Chromium	33.2	0.496	24.79	5.698	111	75	125				
Lead	35.1	0.496	24.79	11.83	93.9	75	125				
Strontium	55.7	0.496	24.79	34.06	87.3	75	125				
Zinc	35.0	0.496	24.79	9.203	104	75	125				

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceede
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **21040481**

28-Apr-21

Client: Environmental Resources Management

Project: Henning/0526033 **BatchID:** **39308**

Sample ID	**21040396-026AMSD**	SampType:	**MSD**	TestCode:	**6010_S**	Units:	**mg/Kg**	Prep Date:	**4/14/2021**	RunNo:	**98967**
Client ID:	**ZZZZZZ**	Batch ID:	**39308**	TestNo:	**SW6010B**	**SW3050B**		Analysis Date:	**4/22/2021**	SeqNo:	**2412698**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	27.1	1.02	25.52	2.840	95.1	75	125	26.70	1.56	20	
Barium	1,140	0.510	25.52	1,089	200	75	125	1,115	2.17	20	S
Cadmium	25.2	0.255	25.52	0.09522	98.4	75	125	24.52	2.78	20	
Chromium	34.1	0.510	25.52	5.698	111	75	125	33.22	2.57	20	
Lead	35.9	0.510	25.52	11.83	94.3	75	125	35.11	2.23	20	
Strontium	57.1	0.510	25.52	34.06	90.4	75	125	55.70	2.54	20	
Zinc	36.0	0.510	25.52	9.203	105	75	125	35.01	2.76	20	

NOTES:

S - Analyte concentration in native sample was too high for accurate spike recovery(ies). The method is in control as indicated by the laboratory control sample (LCS).

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceede
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
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QC SUMMARY REPORT

WO#: **21040481**

28-Apr-21

Client: Environmental Resources Management
Project: Henning/0526033 **BatchID:** **39317**

Sample ID	**MB-39317**	SampType:	**MBLK**	TestCode:	**TTBA**	Units:	**mg/Kg-dry**	Prep Date:	**4/14/2021**	RunNo:	**99038**
Client ID:	**PBS**	Batch ID:	**39317**	TestNo:	**LDNR 29-B**			Analysis Date:	**4/26/2021**	SeqNo:	**2415334**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
True Total Barium	< 50.0	50.0									

Sample ID	**LCS-39317**	SampType:	**LCS**	TestCode:	**TTBA**	Units:	**mg/Kg-dry**	Prep Date:	**4/14/2021**	RunNo:	**99038**
Client ID:	**LCSS**	Batch ID:	**39317**	TestNo:	**LDNR 29-B**			Analysis Date:	**4/26/2021**	SeqNo:	**2415335**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
True Total Barium	4,960	50.0	5,000	0	99.2	75	125				

Sample ID	**LCSD-39317**	SampType:	**LCSD**	TestCode:	**TTBA**	Units:	**mg/Kg-dry**	Prep Date:	**4/14/2021**	RunNo:	**99038**
Client ID:	**LCSS02**	Batch ID:	**39317**	TestNo:	**LDNR 29-B**			Analysis Date:	**4/26/2021**	SeqNo:	**2415338**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
True Total Barium	4,940	50.0	5,000	0	98.8	75	125	4,962	0.472	20	

Sample ID	**21040396-024AMS**	SampType:	**MS**	TestCode:	**TTBA**	Units:	**mg/Kg-dry**	Prep Date:	**4/14/2021**	RunNo:	**99038**
Client ID:	**ZZZZZZ**	Batch ID:	**39317**	TestNo:	**LDNR 29-B**			Analysis Date:	**4/26/2021**	SeqNo:	**2415340**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
True Total Barium	26,400	46.3	4,625	23,840	55.7	75	125				S

NOTES:
S - Analyte concentration in native sample was too high for accurate spike recovery(ies). The method is in control as indicated by the laboratory control sample (LCS).

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceede
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **21040481**

28-Apr-21

Client: Environmental Resources Management
Project: Henning/0526033 **BatchID:** **39317**

Sample ID	**21040396-024AMSD**	SampType:	**MSD**	TestCode:	**TTBA**	Units:	**mg/Kg-dry**	Prep Date:	**4/14/2021**	RunNo:	**99038**
Client ID:	**ZZZZZZ**	Batch ID:	**39317**	TestNo:	**LDNR 29-B**			Analysis Date:	**4/26/2021**	SeqNo:	**2415341**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
True Total Barium	28,500	46.2	4,617	23,840	102	75	125	26,420	7.69	20	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceede
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **21040481**

28-Apr-21

Client: Environmental Resources Management
Project: Henning/0526033 **BatchID:** **39393**

Sample ID	**MB-39393**	SampType:	**MBLK**	TestCode:	**HG_S_7471A**	Units:	**mg/Kg**	Prep Date:	**4/23/2021**	RunNo:	**99072**
Client ID:	**PBS**	Batch ID:	**39393**	TestNo:	**SW7471A**	**SW7471A**		Analysis Date:	**4/26/2021**	SeqNo:	**2416605**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	< 0.100	0.100									

Sample ID	**LCS-39393**	SampType:	**LCS**	TestCode:	**HG_S_7471A**	Units:	**mg/Kg**	Prep Date:	**4/23/2021**	RunNo:	**99072**
Client ID:	**LCSS**	Batch ID:	**39393**	TestNo:	**SW7471A**	**SW7471A**		Analysis Date:	**4/26/2021**	SeqNo:	**2416606**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.971	0.100	0.8330	0	117	80	120				

Sample ID	**21040438-036AMS**	SampType:	**MS**	TestCode:	**HG_S_7471A**	Units:	**mg/Kg**	Prep Date:	**4/23/2021**	RunNo:	**99072**
Client ID:	**ZZZZZZ**	Batch ID:	**39393**	TestNo:	**SW7471A**	**SW7471A**		Analysis Date:	**4/26/2021**	SeqNo:	**2416612**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	1.05	0.0991	0.8254	0	127	75	125				S

Sample ID	**21040438-036AMSD**	SampType:	**MSD**	TestCode:	**HG_S_7471A**	Units:	**mg/Kg**	Prep Date:	**4/23/2021**	RunNo:	**99072**
Client ID:	**ZZZZZZ**	Batch ID:	**39393**	TestNo:	**SW7471A**	**SW7471A**		Analysis Date:	**4/26/2021**	SeqNo:	**2416613**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	1.07	0.0993	0.8269	0	129	75	125	1.047	1.72	20	S

NOTES:
S - Spike recoveries were outside of QC limits in MS/MSD and PDS/PDSD, suggesting matrix effect. The method is in control as indicated by the Lab Control Sample(s).

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceede
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **21040481**

28-Apr-21

Client: Environmental Resources Management
Project: Henning/0526033 **BatchID:** **39393**

Sample ID	**LCSD-39393**	SampType:	**LCSD**	TestCode:	**HG_S_7471A**	Units:	**mg/Kg**	Prep Date:	**4/23/2021**	RunNo:	**99072**
Client ID:	**LCSS02**	Batch ID:	**39393**	TestNo:	**SW7471A**	**SW7471A**		Analysis Date:	**4/28/2021**	SeqNo:	**2416682**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.920	0.100	0.8330	0	110	80	120	0.9713	5.40	20	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceede
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **21040481**

28-Apr-21

Client: Environmental Resources Management
Project: Henning/0526033 **BatchID:** **39394**

Sample ID	**MB-39394**	SampType:	**MBLK**	TestCode:	**HG_S_7471A**	Units:	**mg/Kg**	Prep Date:	**4/23/2021**	RunNo:	**99072**
Client ID:	**PBS**	Batch ID:	**39394**	TestNo:	**SW7471A**	**SW7471A**		Analysis Date:	**4/26/2021**	SeqNo:	**2416637**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	< 0.100	0.100									

Sample ID	**21040481-014AMS**	SampType:	**MS**	TestCode:	**HG_S_7471A**	Units:	**mg/Kg**	Prep Date:	**4/23/2021**	RunNo:	**99072**
Client ID:	**H-31 10-12'**	Batch ID:	**39394**	TestNo:	**SW7471A**	**SW7471A**		Analysis Date:	**4/26/2021**	SeqNo:	**2416642**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	1.08	0.101	0.8428	0.03663	124	75	125				

Sample ID	**21040481-014AMSD**	SampType:	**MSD**	TestCode:	**HG_S_7471A**	Units:	**mg/Kg**	Prep Date:	**4/23/2021**	RunNo:	**99072**
Client ID:	**H-31 10-12'**	Batch ID:	**39394**	TestNo:	**SW7471A**	**SW7471A**		Analysis Date:	**4/26/2021**	SeqNo:	**2416643**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	1.07	0.0986	0.8214	0.03663	126	75	125	1.085	0.953	20	S

NOTES:
S - Spike recoveries were outside of QC limits in MS/MSD and PDS/PDSD, suggesting matrix effect. The method is in control as indicated by the Lab Control Sample(s).

Sample ID	**LCS-39394**	SampType:	**LCS**	TestCode:	**HG_S_7471A**	Units:	**mg/Kg**	Prep Date:	**4/23/2021**	RunNo:	**99072**
Client ID:	**LCSS**	Batch ID:	**39394**	TestNo:	**SW7471A**	**SW7471A**		Analysis Date:	**4/27/2021**	SeqNo:	**2416668**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.977	0.100	0.8330	0	117	80	120				

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceede
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **21040481**

28-Apr-21

Client: Environmental Resources Management
Project: Henning/0526033 **BatchID:** **39394**

Sample ID	**LCSD-39394**	SampType:	**LCSD**	TestCode:	**HG_S_7471A**	Units:	**mg/Kg**	Prep Date:	**4/23/2021**	RunNo:	**99072**
Client ID:	**LCSS02**	Batch ID:	**39394**	TestNo:	**SW7471A**	**SW7471A**		Analysis Date:	**4/27/2021**	SeqNo:	**2416669**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.998	0.100	0.8330	0	120	80	120	0.9772	2.06	20	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceede
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
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QC SUMMARY REPORT

WO#: **21040481**

28-Apr-21

Client: Environmental Resources Management
Project: Henning/0526033 **BatchID:** **39420**

Sample ID **21040481-011ADUP** SampType: **DUP** TestCode: **SAR_S** Units: Prep Date: **4/22/2021** RunNo: **98998**
Client ID: **H-30 8-10'** Batch ID: **39420** TestNo: **LDNR 29-B** **LDNR 29-B** Analysis Date: **4/22/2021** SeqNo: **2413703**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sodium Adsorption Ratio	3.50	0.10						3.52	0.69	20	
Soluble Calcium	3.99	0.02						4.05	1.39	20	
Soluble Magnesium	1.52	0.05						1.53	1.08	20	
Soluble Sodium	5.80	0.25						5.88	1.34	20	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceede
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

Element Materials Technology Lafayette
2417 W. Pinhook Road
Lafayette, LA 70508-3344
TEL: (337) 235-0483 FAX: (337) 233-6540
Website: www.element.com

QC SUMMARY REPORT

WO#: **21040481**

28-Apr-21

Client: Environmental Resources Management
Project: Henning/0526033 **BatchID:** **39449**

Sample ID	**lcs-39449**	SampType:	**LCS**	TestCode:	**CEC**	Units:	**meq/100g**	Prep Date:	**4/26/2021**	RunNo:	**99056**
Client ID:	**LCSS**	Batch ID:	**39449**	TestNo:	**LDNR 29-B**	**LDNR 29-B**		Analysis Date:	**4/27/2021**	SeqNo:	**2416009**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Cation Exchange Capacity	20.4	0.100	25.00	0	81.4	76	124				

Sample ID	**lcsd-39449**	SampType:	**LCSD**	TestCode:	**CEC**	Units:	**meq/100g**	Prep Date:	**4/26/2021**	RunNo:	**99056**
Client ID:	**LCSS02**	Batch ID:	**39449**	TestNo:	**LDNR 29-B**	**LDNR 29-B**		Analysis Date:	**4/27/2021**	SeqNo:	**2416010**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Cation Exchange Capacity	20.9	0.100	25.00	0	83.5	76	124	20.36	2.52	20	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceede
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **21040481**

28-Apr-21

Client: Environmental Resources Management
Project: Henning/0526033 **BatchID:** **R98787**

Sample ID **21040441-001Adup** SampType: **DUP** TestCode: **PMOIST_29B** Units: **wt%** Prep Date: RunNo: **98787**
Client ID: **ZZZZZZ** Batch ID: **R98787** TestNo: **LDNR 29-B** Analysis Date: **4/13/2021** SeqNo: **2407983**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Percent Moisture	19.3	1.00						17.50	9.78	20	

Sample ID **21040441-021Adup** SampType: **DUP** TestCode: **PMOIST_29B** Units: **wt%** Prep Date: RunNo: **98787**
Client ID: **ZZZZZZ** Batch ID: **R98787** TestNo: **LDNR 29-B** Analysis Date: **4/13/2021** SeqNo: **2408004**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Percent Moisture	19.9	1.00						22.50	12.3	20	

Sample ID **21040441-041Adup** SampType: **DUP** TestCode: **PMOIST_29B** Units: **wt%** Prep Date: RunNo: **98787**
Client ID: **ZZZZZZ** Batch ID: **R98787** TestNo: **LDNR 29-B** Analysis Date: **4/13/2021** SeqNo: **2408028**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Percent Moisture	17.1	1.00						17.00	0.59	20	

Sample ID **21040481-0011ADU** SampType: **DUP** TestCode: **PMOIST_29B** Units: **wt%** Prep Date: RunNo: **98787**
Client ID: **ZZZZZZ** Batch ID: **R98787** TestNo: **LDNR 29-B** Analysis Date: **4/13/2021** SeqNo: **2408072**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Percent Moisture	17.1	1.00						16.20	5.41	20	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceede
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **21040481**

28-Apr-21

Client: Environmental Resources Management
Project: Henning/0526033 **BatchID:** **R98787**

Sample ID	**21040518-001ADUP**	SampType:	**DUP**	TestCode:	**PMOIST_29B**	Units:	**wt%**	Prep Date:		RunNo:	**98787**
Client ID:	**ZZZZZZ**	Batch ID:	**R98787**	TestNo:	**LDNR 29-B**			Analysis Date:	**4/14/2021**	SeqNo:	**2408105**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Percent Moisture	23.4	1.00						22.90	2.16	20	

Sample ID	**21040509-001ADUP**	SampType:	**DUP**	TestCode:	**PMOIST_29B**	Units:	**wt%**	Prep Date:		RunNo:	**98787**
Client ID:	**ZZZZZZ**	Batch ID:	**R98787**	TestNo:	**LDNR 29-B**			Analysis Date:	**4/14/2021**	SeqNo:	**2408129**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Percent Moisture	59.9	1.00						55.00	8.53	20	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceede
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **21040481**

28-Apr-21

Client: Environmental Resources Management
Project: Henning/0526033 **BatchID:** **R98838**

Sample ID **21040568-001ADUP** SampType: **DUP** TestCode: **PMOIST_29B** Units: **wt%** Prep Date: RunNo: **98838**
Client ID: **ZZZZZZ** Batch ID: **R98838** TestNo: **LDNR 29-B** Analysis Date: **4/15/2021** SeqNo: **2409187**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Percent Moisture	19.1	1.00						19.30	1.04	20	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceede
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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QC SUMMARY REPORT

WO#: **21040481**

28-Apr-21

Client: Environmental Resources Management
Project: Henning/0526033 **BatchID:** **R98913**

Sample ID	**MB-R98913**	SampType:	**MBLK**	TestCode:	**EC_S**	Units:	**mmhos/cm**	Prep Date:		RunNo:	**98913**
Client ID:	**PBS**	Batch ID:	**R98913**	TestNo:	**LDNR 29-B**			Analysis Date:	**4/21/2021**	SeqNo:	**2411017**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Electrical Conductivity	< 0.10	0.10									

Sample ID	**LCS1-R98913**	SampType:	**LCS1**	TestCode:	**EC_S**	Units:	**mmhos/cm**	Prep Date:		RunNo:	**98913**
Client ID:	**ZZZZZZ**	Batch ID:	**R98913**	TestNo:	**LDNR 29-B**			Analysis Date:	**4/21/2021**	SeqNo:	**2411018**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Electrical Conductivity	0.48	0.10	0.46	0	104	90	110				

Sample ID	**LCS2-R98913**	SampType:	**LCS2**	TestCode:	**EC_S**	Units:	**mmhos/cm**	Prep Date:		RunNo:	**98913**
Client ID:	**ZZZZZZ**	Batch ID:	**R98913**	TestNo:	**LDNR 29-B**			Analysis Date:	**4/21/2021**	SeqNo:	**2411019**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Electrical Conductivity	54.3	0.10	53.00	0	102	90	110				

Sample ID	**21040481-011ADUP**	SampType:	**DUP**	TestCode:	**EC_S**	Units:	**mmhos/cm**	Prep Date:		RunNo:	**98913**
Client ID:	**H-30 8-10'**	Batch ID:	**R98913**	TestNo:	**LDNR 29-B**			Analysis Date:	**4/21/2021**	SeqNo:	**2411031**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Electrical Conductivity	1.21	0.10						1.20	1.08	20	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	H	Holding times for preparation or analysis exceede
M	Matrix Interference	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
RL	Reporting Limit	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode		

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Website: www.element.com

Sample Log-In Check List

Client Name: **ERM_HOUSTON** Work Order Number: **21040481** RcptNo: **1**

Logged by:	**Tammy Thibodeaux**	**4/13/2021 10:40:00 AM**	Tammy Thibodeaux
Completed By:	**Tammy Thibodeaux**	**4/13/2021 11:24:22 AM**	Tammy Thibodeaux
Reviewed By:	**Caitlin Duplantis**	**4/26/2021 2:42:42 PM**	Caitlin Duplantis

Chain of Custody

1.	Is Chain of Custody complete?	Yes ☑	No ☐	Not Present ☐
2.	How was the sample delivered?	Client		

Log In

3.	Coolers are present?	Yes ☐	No ☐	NA ☑
4.	Shipping container/cooler in good condition?	Yes ☑	No ☐	
	Custody seals intact on shipping container/cooler?	Yes ☐	No ☐	Not Present ☑
	No. Seal Date:	Signed By:		
5.	Was an attempt made to cool the samples?	Yes ☐	No ☐	NA ☑
6.	Were all samples received at a temperature of >0° C to 6.0°C	Yes ☐	No ☑	NA ☐
		Not required		
7.	Sample(s) in proper container(s)?	Yes ☑	No ☐	
8.	Sufficient sample volume for indicated test(s)?	Yes ☑	No ☐	
9.	Are samples (except VOA and ONG) properly preserved?	Yes ☑	No ☐	
10.	Was preservative added to bottles?	Yes ☐	No ☑	NA ☐
11.	Is the headspace in the VOA vials less than 1/4 inch or 6 mm?	Yes ☐	No ☐	No VOA Vials ☑
12.	Were any sample containers received broken?	Yes ☐	No ☑	
13.	Does paperwork match bottle labels? (Note discrepancies on chain of custody)	Yes ☑	No ☐	
14.	Are matrices correctly identified on Chain of Custody?	Yes ☑	No ☐	
15.	Is it clear what analyses were requested?	Yes ☑	No ☐	
16.	Were all holding times able to be met? (If no, notify customer for authorization.)	Yes ☑	No ☐	

Special Handling (if applicable)

17. Was client notified of all discrepancies with this order? Yes ☐ No ☐ NA ☑

Person Notified: Date

By Whom: Via: ☐ eMail ☐ Phone ☐ Fax ☐ In Person

Regarding:

Client Instructions:

18. Additional remarks:

Cooler Information

Cooler No	Temp ºC	Condition	Seal Intact	Seal No	Seal Date	Signed By

element™

Chain of Custody

Laboratory Number: 2104048 481 485 4/13/21

Client Information:		Billing Information:	PO Number:	Project Name/Number:	Page 2 of 2
Company Name:	ERM	SAME		Henning / 0552603	
Contact Name:	Dave Angle		Quote Number:	Sampler's Signature	
Address:	840 W. Sam Houston Pkwy N Suite 600		Required QC Level		
City, State Zip:	Houston, TX 77024				
Phone Number:	281.433.3826 Ext:	Ext:	Bill Monthly ☐Yes ☐No	Shipping Method: UPS / FedEx / NOW DHL / Element / Hand (circled) / Mail	
Fax Number:					
E-mail Address:	david.angle@erm.com				

Matrix Code
DW = Drinking Water
WW = Waste Water
GW = Ground Water
AQ = Aqueous
OT = Other
SL = Sludge SOL = Solid
O = Oil SO = Soil
F = Food SW = Swab
NG = Natural Gas
NGL = Natural Gas Liquid
PW = Produced Water
CF = Completion Fluid

Which Regulations Apply:
☐RCRA ☐Drinking Water
☐POTW ☐Distribution
☐NPDES ☐Special
☐USDA/FDA ☐State
☐RECAP/RISC ☐Other

Turn Time
☐Standard
RUSH
☐1 Day
☐2 Day
☐Other
(Rush turn times will incur a surcharge and must be pre-approved by lab.)

Sample ID/Description	Date	Time	Grab / Composite	Matrix	Quantity	Type P=Plastic, G=Glass, V=Vial	Pres. HCl, HNO_3, H_2SO_4, NaOH, $Na_2S_2O_3$	EC	SAR/ESP	CEC	SPLP on No	29B Metals	% Moisture				Comments
H-28 0-2'	4/12/21	1200	G	SO	1	P	None	X	X	X		X	X				29B Metals As, Ba, TTBa Cd, Cr, Sr, Zn Pb, Hg
H-28 4-6'	↓	1205	↓	↓	↓	↓	↓	X	X	X		X	X				
H-28 6-8'	↓	1210	↓	↓	↓	↓	↓	X	X	X		X	X				
H-28 14-15'	↓	1230	↓	↓	↓	↓	↓	X				X	X				
H-29 0-2'	↓	1420	↓	↓	↓	↓	↓	X	X	X		X	X				
H-29 4-6'	↓	1425	↓	↓	↓	↓	↓	X	X	X		X	X				
H-29 8-10'	↓	1435	↓	↓	↓	↓	↓	X	X	X		X	X				
H-29 10-12'	↓	1440	↓	↓	↓	↓	↓	X	X	X		X	X				
H-30 0-2'	↓	1445	↓	↓	↓	↓	↓	X	X	X		X	X				

	Relinquished by	Date/Time	Received by	Date/Time	Field Notes:
1	[signature]	4/13/21 1040	[signature]	4-13-21 1040	
2					Received at lab on ice?
3					☐Yes ☒No Temp:

8800 North US 31, Columbus, IN 47201 USA, P 812-375-0531, F 812-375-0731
328 Ley Road, Suite 100, Fort Wayne, IN 46825 USA, P 260-471-7000, F 260-471-7777
909 Executive Dr, Warsaw, IN 46580 USA, P 574-267-3305, F 574-269-6569
3371 Cleveland Road, Suite 100A, South Bend, IN 46628 USA, P 574-277-0707, F 574-273-5699
2417 W. Pinhook Rd, Lafayette, LA 70508 USA, P 337-235-0483, F 337-233-6540

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Chain of Custody

Laboratory Number: 21045481

Page 2 of 2

Client Information:	Billing Information:	PO Number:	Project Name/Number:
Company Name: ERM	SAME		Heading/0526033
Contact Name: Dave Angle		Quote Number:	
Address: 840 W. Sam Houston Pkwy N. Suite 600		Required QC Level	Sampler's Signature
City, State Zip: Houston, TX 77024			
Phone Number: 281, 433, 3826 Ext:	Ext:	Bill Monthly ☐Yes ☐No	Shipping Method: UPS / FedEx / NOW DHL / Element / Hand / Mail
Fax Number:			
E-mail Address: david.angle@erm.com			

Matrix Code

DW = Drinking Water
WW = Waste Water
GW = Ground Water
AQ = Aqueous
OT = Other
SL = Sludge SOL = Solid
O = Oil SO = Soil
F = Food SW = Swab
NG = Natural Gas
NGL = Natural Gas Liquid
PW = Produced Water
CF = Completion Fluid

Which Regulations Apply:
☐RCRA ☐Drinking Water
☐POTW ☐Distribution
☐NPDES ☐Special
☐USDA/FDA ☐State
☐RECAP/RISC ☐Other

Turn Time
☐Standard
RUSH
☐1 Day
☐2 Day
☐Other
(Rush turn times will incur a surcharge and must be pre-approved by lab.)

Sample ID/Description	Collection Information: Date	Time	Grab / Composite	Matrix	Container: Quantity	Container: Type P=Plastic, G=Glass, V=Vial	Pres.: HCl, HNO_3, H_2SO_4, NaOH, $Na_2S_2O_3$	Requested Tests: EC	SAR / ESP	CEC	SPLP Cl/NO3	29B Metals	% Moisture	Comments
H-30 4-6'	4/12/21	1450	G	So	1	P	None	X	X	X		X	X	29B Metals As, Ba, TTBa Cd, Cr, Sr, Zn Pb, Hg
H-30 8-10'		1500						X	X	X		X	X	
H-30 10-12'		1505						X	X	X		X	X	
H-31 8-10'		1525						X	X	X		X	X	
H-31 10-12'		1530						X	X	X		X	X	

	Relinquished by	Date/Time	Received by	Date/Time
1	Matt Church via	4/13/21 1040		4-13-21 1040
2				
3				

Field Notes:

Received at lab on ice?
☐Yes ☑No Temp:

All samples submitted to Element Materials Technology for analysis are accepted on a custodial basis only. Ownership of the material remains with the client submitting the samples. Element Materials Technology reserves the right to return unused sample portions.

8800 North US 31
Columbus, IN
47201 USA
P 812-375-0531
F 812-375-0731

328 Ley Road, Suite 100
Fort Wayne, IN
46825 USA
P 260-471-7000
F 260-471-7777

909 Executive Dr
Warsaw, IN
46580 USA
P 574-267-3305
F 574-269-6569

3371 Edgelandi Road, Suite 100A
South Bend, IN
46628 USA
P 574-277-0707
F 574-273-5699

2417 W. Pinhook Rd
Lafayette, LA
70508 USA
P 337-235-0483
F 337-233-6540

Element Materials Technology Lafayette
2417 W. Pinhook Road
Lafayette, LA 70508-3344
TEL: (337) 235-0483 FAX: (337) 233-6540
Website: www.element.com

August 30, 2021

Shawn Wiggins
Environmental Resources Management
CityCentre Four
840 W. Sam Houston Pkwy North, Suite 600
Houston, TX 77024
TEL:
FAX

RE: Henning-0526033

Order No.: 21080908

Dear Shawn Wiggins:

Element Materials Technology Lafayette received 16 sample(s) on 8/20/2021 for the analyses presented in the following report.

In accordance with your instructions, Element Lafayette either conducted or subcontracted these analyses. Subcontracted analyses will be identified in the accompanying case narrative. All relevant sampling information can be found on the attached Chain-of-Custody form. Unless otherwise noted, all analyses were conducted using EPA approved methodologies and all test results meet the applicable requirements of TNI. Reported results relate only to the items tested.

Where applicable, all soil data, except for 29-B, are reported on a wet-weight basis unless otherwise indicated in the units field as –dry.

LELAP Certification No.: 01997. TCEQ Certification No.: T104704261. LDHH Certification No.: LA023. ISDH Certification No.: C-LA-01. NDELCP Certification No.: R-226. A scope of accredited parameters is available upon request. A "#" by the test method or analyte indicates this parameter is outside the scope of accreditation. PA registration No.: 68-05967.

Estimated uncertainty is available upon request. This report shall not be reproduced, except in full, without the written approval of the laboratory.

If you have any questions regarding these test results, please feel free to call.

Cristina Thibeaux
Customer Service Supervisor
2417 W. Pinhook Road
Lafayette, LA 70508-3344

Element Materials Technology Lafayette
2417 W. Pinhook Road
Lafayette, LA 70508-3344
TEL: (337) 235-0483 FAX: (337) 233-6540
Website: www.element.com

Case Narrative

WO#: **21080908**
Date: **8/30/2021**

CLIENT: Environmental Resources Management
Project: Henning-0526033

Unless specified by the client, a duplicate or MS/MSD, wherever applicable, is randomly selected and analyzed from each analytical batch provided sample volume is sufficient. The sample chosen for duplicate or MS/MSD may or may not be a sample submitted in this workorder. A method blank and/or a lab control sample (LCS)/lab control sample duplicate (LCSD), wherever applicable, are processed as a quality control check for each analytical batch. When the matrix QC data is not available due to insufficient sample volume or when the results indicate possible matrix effect, the validity of the batch is determined by the method blank and LCS/LCSD.

The results of the laboratory internal quality control data are provided in the QC Summary Report section of the report for your review. Laboratory-related QC exceptions that may impact the validity of data are discussed in the case narrative. Sample-related QC exceptions are flagged either in the results page(s) or in the QC report page(s). End users should consider QC exceptions when evaluating sample data against data quality objectives.

Any other exceptions associated with this report will be footnoted in the results page(s) or the QC summary page(s).

Element Materials Technology Lafayette
2417 W. Pinhook Road
Lafayette, LA 70508-3344
TEL: (337) 235-0483 FAX: (337) 233-6540
Website: www.element.com

Analytical Report

(consolidated)

WO#: **21080908**

Date Reported: **8/30/2021**

CLIENT: Environmental Resources Management **Collection Date:** 8/17/2021 1:55:00 PM

Project: Henning-0526033

Lab ID: 21080908-001 **Matrix:** SOIL

Client Sample ID H-32 (2-4')

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	25.8	0.100		meq/100g	1	8/27/2021
29B SALTS				**LDNR 29-B**		Analyst: **JMI**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	0.54	0.10		mmhos/cm	1	8/26/2021 2:00:00 PM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	2.17	0.10		%	1	8/27/2021
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	3.76	0.10			1	8/26/2021
Soluble Calcium	0.75	0.02		meq/L	1	8/26/2021
Soluble Magnesium	0.47	0.05		meq/L	1	8/26/2021
Soluble Sodium	2.94	0.25		meq/L	1	8/26/2021
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.101	0.101		mg/Kg	1	8/27/2021 12:14:14 PM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	3.48	0.999		mg/Kg	1	8/25/2021 4:50:48 PM
Barium	46.9	0.500		mg/Kg	1	8/25/2021 4:50:48 PM
Cadmium	< 0.250	0.250		mg/Kg	1	8/25/2021 4:50:48 PM
Chromium	8.85	0.500		mg/Kg	1	8/25/2021 4:50:48 PM
Lead	9.57	0.500		mg/Kg	1	8/25/2021 4:50:48 PM
Selenium	< 2.00	2.00		mg/Kg	1	8/25/2021 4:50:48 PM
Silver	< 0.250	0.250		mg/Kg	1	8/25/2021 4:50:48 PM
Zinc	10.8	0.500		mg/Kg	1	8/25/2021 4:50:48 PM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	H	Holding times for preparation or analysis exceeded
M	Matrix Interference	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	RL	Reporting Limit
S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode

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Analytical Report

(consolidated)

WO#: **21080908**

Date Reported: **8/30/2021**

CLIENT: Environmental Resources Management **Collection Date:** 8/17/2021 1:55:00 PM

Project: Henning-0526033

Lab ID: 21080908-001 **Matrix:** SOIL

Client Sample ID H-32 (2-4')

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	144	46.9		mg/Kg-dry	1	8/26/2021 11:11:11 PM
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXB**
Percent Moisture	15.4	1.00		wt%	1	8/23/2021 11:00:00 AM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	H	Holding times for preparation or analysis exceeded
M	Matrix Interference	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	RL	Reporting Limit
S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode

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Analytical Report

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WO#: **21080908**

Date Reported: **8/30/2021**

CLIENT: Environmental Resources Management **Collection Date:** 8/17/2021 2:00:00 PM

Project: Henning-0526033

Lab ID: 21080908-002 **Matrix:** SOIL

Client Sample ID H-32 (4-6')

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	39.6	0.100		meq/100g	1	8/27/2021
29B SALTS				**LDNR 29-B**		Analyst: **JMI**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	0.49	0.10		mmhos/cm	1	8/26/2021 2:00:00 PM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	4.35	0.10		%	1	8/27/2021
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	5.38	0.10			1	8/26/2021
Soluble Calcium	0.41	0.02		meq/L	1	8/26/2021
Soluble Magnesium	0.26	0.05		meq/L	1	8/26/2021
Soluble Sodium	3.11	0.25		meq/L	1	8/26/2021
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.0992	0.0992		mg/Kg	1	8/27/2021 12:29:00 PM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	2.44	1.02		mg/Kg	1	8/25/2021 4:53:07 PM
Barium	30.1	0.511		mg/Kg	1	8/25/2021 4:53:07 PM
Cadmium	< 0.255	0.255		mg/Kg	1	8/25/2021 4:53:07 PM
Chromium	8.64	0.511		mg/Kg	1	8/25/2021 4:53:07 PM
Lead	8.31	0.511		mg/Kg	1	8/25/2021 4:53:07 PM
Selenium	< 2.04	2.04		mg/Kg	1	8/25/2021 4:53:07 PM
Silver	< 0.255	0.255		mg/Kg	1	8/25/2021 4:53:07 PM
Zinc	8.60	0.511		mg/Kg	1	8/25/2021 4:53:07 PM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	H	Holding times for preparation or analysis exceeded
M	Matrix Interference	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	RL	Reporting Limit
S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode

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Analytical Report

(consolidated)

WO#: **21080908**

Date Reported: **8/30/2021**

CLIENT: Environmental Resources Management **Collection Date:** 8/17/2021 2:00:00 PM

Project: Henning-0526033

Lab ID: 21080908-002 **Matrix:** SOIL

Client Sample ID H-32 (4-6')

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	168	48.0		mg/Kg-dry	1	8/26/2021 11:13:31 PM
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXB**
Percent Moisture	16.8	1.00		wt%	1	8/23/2021 11:00:00 AM

Qualifiers:				
	*	Value exceeds Maximum Contaminant Level.	H	Holding times for preparation or analysis exceeded
	M	Matrix Interference	ND	Not Detected at the Reporting Limit
	R	RPD outside accepted recovery limits	RL	Reporting Limit
	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
	U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode

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Analytical Report

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WO#: **21080908**

Date Reported: **8/30/2021**

CLIENT: Environmental Resources Management **Collection Date:** 8/17/2021 2:10:00 PM

Project: Henning-0526033

Lab ID: 21080908-003 **Matrix:** SOIL

Client Sample ID H-32 (8-10')

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	36.2	0.100		meq/100g	1	8/27/2021
29B SALTS				**LDNR 29-B**		Analyst: **JMI**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	0.98	0.10		mmhos/cm	1	8/26/2021 2:00:00 PM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	4.20	0.10		%	1	8/27/2021
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	5.89	0.10			1	8/26/2021
Soluble Calcium	1.35	0.02		meq/L	1	8/26/2021
Soluble Magnesium	0.79	0.05		meq/L	1	8/26/2021
Soluble Sodium	6.10	0.25		meq/L	1	8/26/2021
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.103	0.103		mg/Kg	1	8/27/2021 12:31:17 PM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	2.99	1.05		mg/Kg	1	8/25/2021 4:55:26 PM
Barium	81.9	0.524		mg/Kg	1	8/25/2021 4:55:26 PM
Cadmium	< 0.262	0.262		mg/Kg	1	8/25/2021 4:55:26 PM
Chromium	6.79	0.524		mg/Kg	1	8/25/2021 4:55:26 PM
Lead	7.48	0.524		mg/Kg	1	8/25/2021 4:55:26 PM
Selenium	< 2.09	2.09		mg/Kg	1	8/25/2021 4:55:26 PM
Silver	< 0.262	0.262		mg/Kg	1	8/25/2021 4:55:26 PM
Zinc	16.1	0.524		mg/Kg	1	8/25/2021 4:55:26 PM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	H	Holding times for preparation or analysis exceeded
M	Matrix Interference	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	RL	Reporting Limit
S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode

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Analytical Report

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WO#: **21080908**

Date Reported: **8/30/2021**

CLIENT: Environmental Resources Management **Collection Date:** 8/17/2021 2:10:00 PM

Project: Henning-0526033

Lab ID: 21080908-003 **Matrix:** SOIL

Client Sample ID H-32 (8-10')

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	330	46.8		mg/Kg-dry	1	8/26/2021 11:15:51 PM
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXB**
Percent Moisture	14.4	1.00		wt%	1	8/23/2021 11:00:00 AM

Qualifiers:				
	*	Value exceeds Maximum Contaminant Level.	H	Holding times for preparation or analysis exceeded
	M	Matrix Interference	ND	Not Detected at the Reporting Limit
	R	RPD outside accepted recovery limits	RL	Reporting Limit
	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
	U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode

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WO#: **21080908**

Date Reported: **8/30/2021**

CLIENT: Environmental Resources Management **Collection Date:** 8/17/2021 2:15:00 PM

Project: Henning-0526033

Lab ID: 21080908-004 **Matrix:** SOIL

Client Sample ID H-32 (10-12')

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	53.9	0.100		meq/100g	1	8/27/2021
29B SALTS				**LDNR 29-B**		Analyst: **JMI**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	0.78	0.10		mmhos/cm	1	8/26/2021 2:00:00 PM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	3.68	0.10		%	1	8/27/2021
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	5.25	0.10			1	8/26/2021
Soluble Calcium	0.99	0.02		meq/L	1	8/26/2021
Soluble Magnesium	0.62	0.05		meq/L	1	8/26/2021
Soluble Sodium	4.71	0.25		meq/L	1	8/26/2021
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.0975	0.0975		mg/Kg	1	8/27/2021 12:33:33 PM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	5.86	0.961		mg/Kg	1	8/25/2021 4:57:45 PM
Barium	210	0.480		mg/Kg	1	8/25/2021 4:57:45 PM
Cadmium	< 0.240	0.240		mg/Kg	1	8/25/2021 4:57:45 PM
Chromium	8.84	0.480		mg/Kg	1	8/25/2021 4:57:45 PM
Lead	9.06	0.480		mg/Kg	1	8/25/2021 4:57:45 PM
Selenium	< 1.92	1.92		mg/Kg	1	8/25/2021 4:57:45 PM
Silver	< 0.240	0.240		mg/Kg	1	8/25/2021 4:57:45 PM
Zinc	41.2	0.480		mg/Kg	1	8/25/2021 4:57:45 PM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	H	Holding times for preparation or analysis exceeded
M	Matrix Interference	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	RL	Reporting Limit
S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode

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Analytical Report

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WO#: **21080908**

Date Reported: **8/30/2021**

CLIENT: Environmental Resources Management **Collection Date:** 8/17/2021 2:15:00 PM

Project: Henning-0526033

Lab ID: 21080908-004 **Matrix:** SOIL

Client Sample ID H-32 (10-12')

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	215	46.9		mg/Kg-dry	1	8/26/2021 11:18:10 PM
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXB**
Percent Moisture	18.1	1.00		wt%	1	8/23/2021 11:00:00 AM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	H	Holding times for preparation or analysis exceeded
M	Matrix Interference	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	RL	Reporting Limit
S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode

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Analytical Report

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WO#: **21080908**

Date Reported: **8/30/2021**

CLIENT: Environmental Resources Management **Collection Date:** 8/17/2021 2:35:00 PM

Project: Henning-0526033

Lab ID: 21080908-005 **Matrix:** SOIL

Client Sample ID H-32 (18-20')

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
ELECTRICAL CONDUCTIVITY @ SATURATION				**LDNR 29-B**		Analyst: **JMI**
Electrical Conductivity	0.62	0.10		mmhos/cm	1	8/26/2021 2:00:00 PM
INORGANIC ANIONS, SPLP LEACHED BY SW1312/9056A				**SW9056A**		Analyst: **SGP**
Chloride	2.20	1.25		mg/L	5	8/25/2021 12:30:10 PM
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXB**
Percent Moisture	17.9	1.00		wt%	1	8/23/2021 11:00:00 AM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	H	Holding times for preparation or analysis exceeded
M	Matrix Interference	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	RL	Reporting Limit
S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode

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Analytical Report

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WO#: **21080908**

Date Reported: **8/30/2021**

CLIENT: Environmental Resources Management **Collection Date:** 8/17/2021 3:50:00 PM

Project: Henning-0526033

Lab ID: 21080908-006 **Matrix:** SOIL

Client Sample ID H-32 (48-50')

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
ELECTRICAL CONDUCTIVITY @ SATURATION				**LDNR 29-B**		Analyst: **JMI**
Electrical Conductivity	1.29	0.10		mmhos/cm	1	8/26/2021 2:00:00 PM
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXB**
Percent Moisture	25.0	1.00		wt%	1	8/23/2021 11:00:00 AM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	H	Holding times for preparation or analysis exceeded
M	Matrix Interference	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	RL	Reporting Limit
S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode

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Analytical Report

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WO#: **21080908**

Date Reported: **8/30/2021**

CLIENT: Environmental Resources Management **Collection Date:** 8/18/2021 3:35:00 PM

Project: Henning-0526033

Lab ID: 21080908-007 **Matrix:** SOIL

Client Sample ID H-33 (2-4')

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	21.1	0.100		meq/100g	1	8/27/2021
29B SALTS				**LDNR 29-B**		Analyst: **JMI**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	0.58	0.10		mmhos/cm	1	8/26/2021 2:00:00 PM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	1.25	0.10		%	1	8/27/2021
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	3.65	0.10			1	8/26/2021
Soluble Calcium	0.84	0.02		meq/L	1	8/26/2021
Soluble Magnesium	0.53	0.05		meq/L	1	8/26/2021
Soluble Sodium	3.02	0.25		meq/L	1	8/26/2021
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.105	0.105		mg/Kg	1	8/27/2021 12:35:51 PM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	2.30	1.03		mg/Kg	1	8/25/2021 5:00:03 PM
Barium	27.0	0.517		mg/Kg	1	8/25/2021 5:00:03 PM
Cadmium	< 0.259	0.259		mg/Kg	1	8/25/2021 5:00:03 PM
Chromium	6.42	0.517		mg/Kg	1	8/25/2021 5:00:03 PM
Lead	8.00	0.517		mg/Kg	1	8/25/2021 5:00:03 PM
Selenium	< 2.07	2.07		mg/Kg	1	8/25/2021 5:00:03 PM
Silver	< 0.259	0.259		mg/Kg	1	8/25/2021 5:00:03 PM
Zinc	5.57	0.517		mg/Kg	1	8/25/2021 5:00:03 PM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	H	Holding times for preparation or analysis exceeded
M	Matrix Interference	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	RL	Reporting Limit
S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode

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Analytical Report

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WO#: **21080908**

Date Reported: **8/30/2021**

CLIENT: Environmental Resources Management **Collection Date:** 8/18/2021 3:35:00 PM

Project: Henning-0526033

Lab ID: 21080908-007 **Matrix:** SOIL

Client Sample ID H-33 (2-4')

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	102	47.9		mg/Kg-dry	1	8/26/2021 11:20:31 PM
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXB**
Percent Moisture	16.1	1.00		wt%	1	8/23/2021 11:00:00 AM

Qualifiers:				
	*	Value exceeds Maximum Contaminant Level.	H	Holding times for preparation or analysis exceeded
	M	Matrix Interference	ND	Not Detected at the Reporting Limit
	R	RPD outside accepted recovery limits	RL	Reporting Limit
	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
	U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode

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Analytical Report

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WO#: **21080908**

Date Reported: **8/30/2021**

CLIENT: Environmental Resources Management **Collection Date:** 8/18/2021 3:45:00 PM

Project: Henning-0526033

Lab ID: 21080908-008 **Matrix:** SOIL

Client Sample ID H-33 (6-8')

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	49.2	0.100		meq/100g	1	8/27/2021
29B SALTS				**LDNR 29-B**		Analyst: **JMI**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	1.05	0.10		mmhos/cm	1	8/26/2021 2:00:00 PM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	3.57	0.10		%	1	8/27/2021
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	6.91	0.10			1	8/26/2021
Soluble Calcium	1.06	0.02		meq/L	1	8/26/2021
Soluble Magnesium	0.68	0.05		meq/L	1	8/26/2021
Soluble Sodium	6.45	0.25		meq/L	1	8/26/2021
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.0991	0.0991		mg/Kg	1	8/27/2021 12:38:07 PM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	2.96	1.02		mg/Kg	1	8/25/2021 5:02:22 PM
Barium	35.9	0.510		mg/Kg	1	8/25/2021 5:02:22 PM
Cadmium	< 0.255	0.255		mg/Kg	1	8/25/2021 5:02:22 PM
Chromium	6.88	0.510		mg/Kg	1	8/25/2021 5:02:22 PM
Lead	7.92	0.510		mg/Kg	1	8/25/2021 5:02:22 PM
Selenium	< 2.04	2.04		mg/Kg	1	8/25/2021 5:02:22 PM
Silver	< 0.255	0.255		mg/Kg	1	8/25/2021 5:02:22 PM
Zinc	16.4	0.510		mg/Kg	1	8/25/2021 5:02:22 PM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	H	Holding times for preparation or analysis exceeded
M	Matrix Interference	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	RL	Reporting Limit
S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode

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Analytical Report

(consolidated)

WO#: **21080908**

Date Reported: **8/30/2021**

CLIENT: Environmental Resources Management **Collection Date:** 8/18/2021 3:45:00 PM

Project: Henning-0526033

Lab ID: 21080908-008 **Matrix:** SOIL

Client Sample ID H-33 (6-8')

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	270	48.6		mg/Kg-dry	1	8/26/2021 11:22:50 PM
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXB**
Percent Moisture	16.7	1.00		wt%	1	8/23/2021 11:00:00 AM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	H	Holding times for preparation or analysis exceeded
M	Matrix Interference	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	RL	Reporting Limit
S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode

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Analytical Report

(consolidated)

WO#: **21080908**

Date Reported: **8/30/2021**

CLIENT: Environmental Resources Management **Collection Date:** 8/18/2021 3:50:00 PM

Project: Henning-0526033

Lab ID: 21080908-009 **Matrix:** SOIL

Client Sample ID H-33 (8-10')

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	27.4	0.100		meq/100g	1	8/27/2021
29B SALTS				**LDNR 29-B**		Analyst: **JMI**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	0.96	0.10		mmhos/cm	1	8/26/2021 2:00:00 PM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	6.89	0.10		%	1	8/27/2021
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	6.03	0.10			1	8/26/2021
Soluble Calcium	1.24	0.02		meq/L	1	8/26/2021
Soluble Magnesium	0.80	0.05		meq/L	1	8/26/2021
Soluble Sodium	6.09	0.25		meq/L	1	8/26/2021
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.0990	0.0990		mg/Kg	1	8/27/2021 12:40:24 PM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	3.08	0.979		mg/Kg	1	8/25/2021 5:04:40 PM
Barium	158	0.490		mg/Kg	1	8/25/2021 5:04:40 PM
Cadmium	< 0.245	0.245		mg/Kg	1	8/25/2021 5:04:40 PM
Chromium	7.07	0.490		mg/Kg	1	8/25/2021 5:04:40 PM
Lead	7.31	0.490		mg/Kg	1	8/25/2021 5:04:40 PM
Selenium	< 1.96	1.96		mg/Kg	1	8/25/2021 5:04:40 PM
Silver	< 0.245	0.245		mg/Kg	1	8/25/2021 5:04:40 PM
Zinc	17.1	0.490		mg/Kg	1	8/25/2021 5:04:40 PM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	H	Holding times for preparation or analysis exceeded
M	Matrix Interference	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	RL	Reporting Limit
S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode

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Analytical Report

(consolidated)

WO#: **21080908**

Date Reported: **8/30/2021**

CLIENT: Environmental Resources Management **Collection Date:** 8/18/2021 3:50:00 PM

Project: Henning-0526033

Lab ID: 21080908-009 **Matrix:** SOIL

Client Sample ID H-33 (8-10')

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	141	46.0		mg/Kg-dry	1	8/26/2021 11:25:10 PM
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXB**
Percent Moisture	14.0	1.00		wt%	1	8/23/2021 11:00:00 AM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	H	Holding times for preparation or analysis exceeded
M	Matrix Interference	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	RL	Reporting Limit
S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode

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Analytical Report

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WO#: **21080908**

Date Reported: **8/30/2021**

CLIENT: Environmental Resources Management **Collection Date:** 8/18/2021 3:55:00 PM

Project: Henning-0526033

Lab ID: 21080908-010 **Matrix:** SOIL

Client Sample ID H-33 (10-12')

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	50.9	0.100		meq/100g	1	8/27/2021
29B SALTS				**LDNR 29-B**		Analyst: **JMI**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	0.86	0.10		mmhos/cm	1	8/26/2021 2:00:00 PM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	4.45	0.10		%	1	8/27/2021
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	5.00	0.10			1	8/26/2021
Soluble Calcium	1.35	0.02		meq/L	1	8/26/2021
Soluble Magnesium	0.85	0.05		meq/L	1	8/26/2021
Soluble Sodium	5.25	0.25		meq/L	1	8/26/2021
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.0980	0.0980		mg/Kg	1	8/27/2021 12:42:40 PM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	4.15	0.961		mg/Kg	1	8/25/2021 5:06:59 PM
Barium	98.9	0.481		mg/Kg	1	8/25/2021 5:06:59 PM
Cadmium	< 0.240	0.240		mg/Kg	1	8/25/2021 5:06:59 PM
Chromium	13.4	0.481		mg/Kg	1	8/25/2021 5:06:59 PM
Lead	9.45	0.481		mg/Kg	1	8/25/2021 5:06:59 PM
Selenium	< 1.92	1.92		mg/Kg	1	8/25/2021 5:06:59 PM
Silver	< 0.240	0.240		mg/Kg	1	8/25/2021 5:06:59 PM
Zinc	41.2	0.481		mg/Kg	1	8/25/2021 5:06:59 PM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	H	Holding times for preparation or analysis exceeded
M	Matrix Interference	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	RL	Reporting Limit
S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode

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Analytical Report

(consolidated)

WO#: **21080908**

Date Reported: **8/30/2021**

CLIENT: Environmental Resources Management **Collection Date:** 8/18/2021 3:55:00 PM

Project: Henning-0526033

Lab ID: 21080908-010 **Matrix:** SOIL

Client Sample ID H-33 (10-12')

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	367	46.9		mg/Kg-dry	1	8/26/2021 11:32:07 PM
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXB**
Percent Moisture	18.2	1.00		wt%	1	8/23/2021 11:00:00 AM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	H	Holding times for preparation or analysis exceeded
M	Matrix Interference	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	RL	Reporting Limit
S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode

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WO#: **21080908**

Date Reported: **8/30/2021**

CLIENT: Environmental Resources Management **Collection Date:** 8/18/2021 4:10:00 PM

Project: Henning-0526033

Lab ID: 21080908-011 **Matrix:** SOIL

Client Sample ID H-33 (16-18')

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
ELECTRICAL CONDUCTIVITY @ SATURATION				**LDNR 29-B**		Analyst: **JMI**
Electrical Conductivity	0.78	0.10		mmhos/cm	1	8/26/2021 2:00:00 PM
INORGANIC ANIONS, SPLP LEACHED BY SW1312/9056A				**SW9056A**		Analyst: **SGP**
Chloride	2.54	1.25		mg/L	5	8/25/2021 12:43:58 PM
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXB**
Percent Moisture	21.8	1.00		wt%	1	8/23/2021 11:00:00 AM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	H	Holding times for preparation or analysis exceeded
M	Matrix Interference	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	RL	Reporting Limit
S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode

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Analytical Report

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WO#: **21080908**

Date Reported: **8/30/2021**

CLIENT: Environmental Resources Management **Collection Date:** 8/19/2021 2:50:00 PM

Project: Henning-0526033

Lab ID: 21080908-012 **Matrix:** SOIL

Client Sample ID H-34 (4-6')

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	60.2	0.100		meq/100g	1	8/27/2021
29B SALTS				**LDNR 29-B**		Analyst: **JMI**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	0.64	0.10		mmhos/cm	1	8/26/2021 2:00:00 PM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	2.34	0.10		%	1	8/27/2021
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	5.07	0.10			1	8/26/2021
Soluble Calcium	0.69	0.02		meq/L	1	8/26/2021
Soluble Magnesium	0.43	0.05		meq/L	1	8/26/2021
Soluble Sodium	3.80	0.25		meq/L	1	8/26/2021
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.106	0.106		mg/Kg	1	8/27/2021 12:44:56 PM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	1.95	1.03		mg/Kg	1	8/25/2021 5:09:17 PM
Barium	123	0.515		mg/Kg	1	8/25/2021 5:09:17 PM
Cadmium	< 0.258	0.258		mg/Kg	1	8/25/2021 5:09:17 PM
Chromium	7.45	0.515		mg/Kg	1	8/25/2021 5:09:17 PM
Lead	8.94	0.515		mg/Kg	1	8/25/2021 5:09:17 PM
Selenium	< 2.06	2.06		mg/Kg	1	8/25/2021 5:09:17 PM
Silver	< 0.258	0.258		mg/Kg	1	8/25/2021 5:09:17 PM
Zinc	10.4	0.515		mg/Kg	1	8/25/2021 5:09:17 PM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	H	Holding times for preparation or analysis exceeded
M	Matrix Interference	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	RL	Reporting Limit
S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode

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Analytical Report

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WO#: **21080908**

Date Reported: **8/30/2021**

CLIENT: Environmental Resources Management **Collection Date:** 8/19/2021 2:50:00 PM

Project: Henning-0526033

Lab ID: 21080908-012 **Matrix:** SOIL

Client Sample ID H-34 (4-6')

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	179	49.0		mg/Kg-dry	1	8/26/2021 11:34:28 PM
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXB**
Percent Moisture	21.0	1.00		wt%	1	8/23/2021 11:00:00 AM

Qualifiers:				
	*	Value exceeds Maximum Contaminant Level.	H	Holding times for preparation or analysis exceeded
	M	Matrix Interference	ND	Not Detected at the Reporting Limit
	R	RPD outside accepted recovery limits	RL	Reporting Limit
	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
	U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode

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Analytical Report

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WO#: **21080908**

Date Reported: **8/30/2021**

CLIENT: Environmental Resources Management **Collection Date:** 8/19/2021 2:55:00 PM

Project: Henning-0526033

Lab ID: 21080908-013 **Matrix:** SOIL

Client Sample ID H-34 (6-8')

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	35.1	0.100		meq/100g	1	8/27/2021
29B SALTS				**LDNR 29-B**		Analyst: **JMI**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	0.88	0.10		mmhos/cm	1	8/26/2021 2:00:00 PM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	2.94	0.10		%	1	8/27/2021
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	5.45	0.10			1	8/26/2021
Soluble Calcium	1.09	0.02		meq/L	1	8/26/2021
Soluble Magnesium	0.65	0.05		meq/L	1	8/26/2021
Soluble Sodium	5.09	0.25		meq/L	1	8/26/2021
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.102	0.102		mg/Kg	1	8/27/2021 12:52:14 PM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	4.09	0.985		mg/Kg	1	8/25/2021 5:16:12 PM
Barium	42.7	0.493		mg/Kg	1	8/25/2021 5:16:12 PM
Cadmium	< 0.246	0.246		mg/Kg	1	8/25/2021 5:16:12 PM
Chromium	3.66	0.493		mg/Kg	1	8/25/2021 5:16:12 PM
Lead	5.06	0.493		mg/Kg	1	8/25/2021 5:16:12 PM
Selenium	< 1.97	1.97		mg/Kg	1	8/25/2021 5:16:12 PM
Silver	< 0.246	0.246		mg/Kg	1	8/25/2021 5:16:12 PM
Zinc	9.26	0.493		mg/Kg	1	8/25/2021 5:16:12 PM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	H	Holding times for preparation or analysis exceeded
M	Matrix Interference	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	RL	Reporting Limit
S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode

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Analytical Report

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WO#: **21080908**

Date Reported: **8/30/2021**

CLIENT: Environmental Resources Management **Collection Date:** 8/19/2021 2:55:00 PM

Project: Henning-0526033

Lab ID: 21080908-013 **Matrix:** SOIL

Client Sample ID H-34 (6-8')

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	191	49.7		mg/Kg-dry	1	8/26/2021 11:36:48 PM
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXB**
Percent Moisture	16.9	1.00		wt%	1	8/23/2021 11:00:00 AM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	H	Holding times for preparation or analysis exceeded
M	Matrix Interference	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	RL	Reporting Limit
S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode

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Analytical Report

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WO#: **21080908**

Date Reported: **8/30/2021**

CLIENT: Environmental Resources Management **Collection Date:** 8/19/2021 3:05:00 PM

Project: Henning-0526033

Lab ID: 21080908-014 **Matrix:** SOIL

Client Sample ID H-34 (10-12')

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
CATION EXCHANGE CAPACITY						
Cation Exchange Capacity	38.6	0.100		meq/100g	1	8/27/2021
29B SALTS				**LDNR 29-B**		Analyst: **JMI**
ELECTRICAL CONDUCTIVITY @ SATURATION						
Electrical Conductivity	1.25	0.10		mmhos/cm	1	8/26/2021 2:00:00 PM
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **BXB**
EXCHANGEABLE SODIUM PERCENTAGE						
Exchangeable Sodium %	5.23	0.10		%	1	8/27/2021
29B SALTS				**LDNR 29-B**	**LDNR 29-B**	Analyst: **STS**
SODIUM ADSORPTION RATIO						
Sodium Adsorption Ratio	5.70	0.10			1	8/26/2021
Soluble Calcium	2.06	0.02		meq/L	1	8/26/2021
Soluble Magnesium	1.05	0.05		meq/L	1	8/26/2021
Soluble Sodium	7.11	0.25		meq/L	1	8/26/2021
29B METALS				**SW7471A**	**SW7471A**	Analyst: **BXB**
MERCURY IN SOIL OR SLUDGE						
Mercury	< 0.109	0.109		mg/Kg	1	8/27/2021 12:54:31 PM
29B METALS				**SW6010B**	**SW3050B**	Analyst: **STS**
METALS IN SOIL OR SLUDGE BY ICP						
Arsenic	3.57	0.955		mg/Kg	1	8/25/2021 5:18:31 PM
Barium	197	0.477		mg/Kg	1	8/25/2021 5:18:31 PM
Cadmium	2.39	0.239		mg/Kg	1	8/25/2021 5:18:31 PM
Chromium	4.26	0.477		mg/Kg	1	8/25/2021 5:18:31 PM
Lead	8.04	0.477		mg/Kg	1	8/25/2021 5:18:31 PM
Selenium	< 1.91	1.91		mg/Kg	1	8/25/2021 5:18:31 PM
Silver	< 0.239	0.239		mg/Kg	1	8/25/2021 5:18:31 PM
Zinc	19.0	0.477		mg/Kg	1	8/25/2021 5:18:31 PM
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	H	Holding times for preparation or analysis exceeded
M	Matrix Interference	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	RL	Reporting Limit
S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode

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Analytical Report

(consolidated)

WO#: **21080908**

Date Reported: **8/30/2021**

CLIENT: Environmental Resources Management **Collection Date:** 8/19/2021 3:05:00 PM

Project: Henning-0526033

Lab ID: 21080908-014 **Matrix:** SOIL

Client Sample ID H-34 (10-12')

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
29B METALS				**LDNR 29-B**		Analyst: **STS**
TRUE TOTAL BARIUM						
True Total Barium	2,540	49.1		mg/Kg-dry	1	8/26/2021 11:39:08 PM
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXB**
Percent Moisture	19.4	1.00		wt%	1	8/23/2021 11:00:00 AM

Qualifiers:				
	*	Value exceeds Maximum Contaminant Level.	H	Holding times for preparation or analysis exceeded
	M	Matrix Interference	ND	Not Detected at the Reporting Limit
	R	RPD outside accepted recovery limits	RL	Reporting Limit
	S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
	U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode

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Analytical Report

(consolidated)

WO#: **21080908**

Date Reported: **8/30/2021**

CLIENT: Environmental Resources Management **Collection Date:** 8/19/2021 3:20:00 PM

Project: Henning-0526033

Lab ID: 21080908-015 **Matrix:** SOIL

Client Sample ID H-34 (16-18')

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
ELECTRICAL CONDUCTIVITY @ SATURATION				**LDNR 29-B**		Analyst: **JMI**
Electrical Conductivity	0.66	0.10		mmhos/cm	1	8/26/2021 2:00:00 PM
INORGANIC ANIONS, SPLP LEACHED BY SW1312/9056A				**SW9056A**		Analyst: **SGP**
Chloride	1.95	1.25		mg/L	5	8/25/2021 12:57:46 PM
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXB**
Percent Moisture	22.1	1.00		wt%	1	8/23/2021 11:00:00 AM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	H	Holding times for preparation or analysis exceeded
M	Matrix Interference	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	RL	Reporting Limit
S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode

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Analytical Report

(consolidated)

WO#: **21080908**

Date Reported: **8/30/2021**

CLIENT: Environmental Resources Management **Collection Date:** 8/19/2021 3:50:00 PM

Project: Henning-0526033

Lab ID: 21080908-016 **Matrix:** SOIL

Client Sample ID H-34 (28-30')

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
ELECTRICAL CONDUCTIVITY @ SATURATION				**LDNR 29-B**		Analyst: **JMI**
Electrical Conductivity	0.71	0.10		mmhos/cm	1	8/26/2021 2:00:00 PM
PERCENT MOISTURE				**LDNR 29-B**		Analyst: **BXB**
Percent Moisture	21.4	1.00		wt%	1	8/23/2021 11:00:00 AM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	H	Holding times for preparation or analysis exceeded
M	Matrix Interference	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	RL	Reporting Limit
S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit
U	Analyte not detected	W	Sample container temperature is out of limit as specified at testcode

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QC SUMMARY REPORT

WO#: **21080908**

30-Aug-21

Client: Environmental Resources Management
Project: Henning-0526033 **BatchID:** **40751**

Sample ID	**MB-40751**	SampType:	**MBLK**	TestCode:	**6010_S**	Units:	**mg/Kg**	Prep Date:	**8/24/2021**	RunNo:	**102157**
Client ID:	**PBS**	Batch ID:	**40751**	TestNo:	**SW6010B**	**SW3050B**		Analysis Date:	**8/25/2021**	SeqNo:	**2493777**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	< 1.00	1.00									
Barium	< 0.500	0.500									
Cadmium	< 0.250	0.250									
Chromium	< 0.500	0.500									
Lead	< 0.500	0.500									
Selenium	< 2.00	2.00									
Silver	< 0.250	0.250									
Zinc	< 0.500	0.500									

Sample ID	**LCS-40751**	SampType:	**LCS**	TestCode:	**6010_S**	Units:	**mg/Kg**	Prep Date:	**8/24/2021**	RunNo:	**102157**
Client ID:	**LCSS**	Batch ID:	**40751**	TestNo:	**SW6010B**	**SW3050B**		Analysis Date:	**8/25/2021**	SeqNo:	**2493778**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	25.6	1.00	25.00	0	102	80	120				
Barium	25.9	0.500	25.00	0	103	80	120				
Cadmium	24.9	0.250	25.00	0	99.8	80	120				
Chromium	25.9	0.500	25.00	0	103	80	120				
Lead	25.2	0.500	25.00	0	101	80	120				
Selenium	24.9	2.00	25.00	0	99.5	80	120				
Silver	4.94	0.250	5.000	0	98.9	80	120				
Zinc	24.7	0.500	25.00	0	98.7	80	120				

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	RL	Reporting Limit
S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode				

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QC SUMMARY REPORT

WO#: **21080908**
30-Aug-21

Client: Environmental Resources Management
Project: Henning-0526033 **BatchID:** **40751**

Sample ID	**LCSD-40751**	SampType:	**LCSD**	TestCode:	**6010_S**	Units:	**mg/Kg**	Prep Date:	**8/24/2021**	RunNo:	**102157**
Client ID:	**LCSS02**	Batch ID:	**40751**	TestNo:	**SW6010B**	**SW3050B**		Analysis Date:	**8/25/2021**	SeqNo:	**2493779**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	25.5	1.00	25.00	0	102	80	120	25.62	0.609	20	
Barium	25.7	0.500	25.00	0	103	80	120	25.86	0.521	20	
Cadmium	24.9	0.250	25.00	0	99.5	80	120	24.94	0.317	20	
Chromium	25.7	0.500	25.00	0	103	80	120	25.86	0.650	20	
Lead	25.1	0.500	25.00	0	100	80	120	25.22	0.553	20	
Selenium	24.6	2.00	25.00	0	98.6	80	120	24.87	0.921	20	
Silver	4.95	0.250	5.000	0	99.0	80	120	4.945	0.101	20	
Zinc	24.7	0.500	25.00	0	98.7	80	120	24.67	0.00811	20	

Sample ID	**21080866-018AMS**	SampType:	**MS**	TestCode:	**6010_S**	Units:	**mg/Kg**	Prep Date:	**8/24/2021**	RunNo:	**102157**
Client ID:	**ZZZZZZ**	Batch ID:	**40751**	TestNo:	**SW6010B**	**SW3050B**		Analysis Date:	**8/25/2021**	SeqNo:	**2493782**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	25.6	0.995	24.88	2.320	93.5	75	125				
Barium	84.5	0.498	24.88	52.10	130	75	125				S
Cadmium	23.8	0.249	24.88	0.09149	95.3	75	125				
Chromium	32.1	0.498	24.88	7.234	100	75	125				
Lead	28.1	0.498	24.88	5.336	91.4	75	125				
Selenium	47.0	1.99	24.88	0.1197	188	75	125				S
Silver	4.76	0.249	4.976	0.02769	95.1	75	125				
Zinc	53.1	0.498	24.88	28.84	97.4	75	125				

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	RL	Reporting Limit
S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode				

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QC SUMMARY REPORT

WO#: **21080908**

30-Aug-21

Client: Environmental Resources Management
Project: Henning-0526033 **BatchID:** **40751**

Sample ID	**21080866-018AMSD**	SampType:	**MSD**	TestCode:	**6010_S**	Units:	**mg/Kg**	Prep Date:	**8/24/2021**	RunNo:	**102157**
Client ID:	**ZZZZZZ**	Batch ID:	**40751**	TestNo:	**SW6010B**	**SW3050B**		Analysis Date:	**8/25/2021**	SeqNo:	**2493783**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	26.3	1.01	25.18	2.320	95.3	75	125	25.59	2.79	20	
Barium	85.6	0.504	25.18	52.10	133	75	125	84.49	1.27	20	S
Cadmium	24.1	0.252	25.18	0.09149	95.2	75	125	23.79	1.17	20	
Chromium	32.4	0.504	25.18	7.234	100	75	125	32.11	0.993	20	
Lead	28.8	0.504	25.18	5.336	93.0	75	125	28.09	2.35	20	
Selenium	47.5	2.01	25.18	0.1197	188	75	125	47.00	1.13	20	S
Silver	4.80	0.252	5.036	0.02769	94.7	75	125	4.757	0.824	20	
Zinc	53.9	0.504	25.18	28.84	99.4	75	125	53.07	1.47	20	

Note: S - Spike recovery indicates matrix interference. The method is in control as indicated by the Lab Control Sample.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	RL	Reporting Limit
S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit	U	Analyte not detected
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QC SUMMARY REPORT

WO#: **21080908**
30-Aug-21

Client: Environmental Resources Management
Project: Henning-0526033 **BatchID:** **40761**

Sample ID	**MB-40761**	SampType:	**MBLK**	TestCode:	**HG_S_7471A**	Units:	**mg/Kg**	Prep Date:	**8/25/2021**	RunNo:	**102216**
Client ID:	**PBS**	Batch ID:	**40761**	TestNo:	**SW7471A**	**SW7471A**		Analysis Date:	**8/27/2021**	SeqNo:	**2495659**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	< 0.100	0.100									

Sample ID	**LCS-40761**	SampType:	**LCS**	TestCode:	**HG_S_7471A**	Units:	**mg/Kg**	Prep Date:	**8/25/2021**	RunNo:	**102216**
Client ID:	**LCSS**	Batch ID:	**40761**	TestNo:	**SW7471A**	**SW7471A**		Analysis Date:	**8/27/2021**	SeqNo:	**2495660**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.897	0.100	0.8330	0	108	80	120				

Sample ID	**LCSD-40761**	SampType:	**LCSD**	TestCode:	**HG_S_7471A**	Units:	**mg/Kg**	Prep Date:	**8/25/2021**	RunNo:	**102216**
Client ID:	**LCSS02**	Batch ID:	**40761**	TestNo:	**SW7471A**	**SW7471A**		Analysis Date:	**8/27/2021**	SeqNo:	**2495661**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.903	0.100	0.8330	0	108	80	120	0.8973	0.641	20	

Sample ID	**21080908-001AMS**	SampType:	**MS**	TestCode:	**HG_S_7471A**	Units:	**mg/Kg**	Prep Date:	**8/25/2021**	RunNo:	**102216**
Client ID:	**H-32 (2-4')**	Batch ID:	**40761**	TestNo:	**SW7471A**	**SW7471A**		Analysis Date:	**8/27/2021**	SeqNo:	**2495666**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.871	0.0999	0.8320	0	105	75	125				

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	RL	Reporting Limit
S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode				

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QC SUMMARY REPORT

WO#: **21080908**

30-Aug-21

Client: Environmental Resources Management
Project: Henning-0526033 **BatchID:** **40761**

Sample ID	**21080908-001AMSD**	SampType:	**MSD**	TestCode:	**HG_S_7471A**	Units:	**mg/Kg**	Prep Date:	**8/25/2021**	RunNo:	**102216**
Client ID:	**H-32 (2-4')**	Batch ID:	**40761**	TestNo:	**SW7471A**	**SW7471A**		Analysis Date:	**8/27/2021**	SeqNo:	**2495667**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.897	0.103	0.8583	0	104	75	125	0.8715	2.85	20	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	RL	Reporting Limit
S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode				

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QC SUMMARY REPORT

WO#: **21080908**
30-Aug-21

Client: Environmental Resources Management
Project: Henning-0526033 **BatchID:** **40782**

Sample ID	**MB-40782**	SampType:	**MBLK**	TestCode:	**TTBA**	Units:	**mg/Kg-dry**	Prep Date:	**8/26/2021**	RunNo:	**102190**
Client ID:	**PBS**	Batch ID:	**40782**	TestNo:	**LDNR 29-B**			Analysis Date:	**8/26/2021**	SeqNo:	**2494722**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
True Total Barium	< 50.0	50.0									

Sample ID	**LCS-40782**	SampType:	**LCS**	TestCode:	**TTBA**	Units:	**mg/Kg-dry**	Prep Date:	**8/26/2021**	RunNo:	**102190**
Client ID:	**LCSS**	Batch ID:	**40782**	TestNo:	**LDNR 29-B**			Analysis Date:	**8/26/2021**	SeqNo:	**2494723**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
True Total Barium	4,570	50.0	5,000	0	91.3	75	125				

Sample ID	**LCSD-40782**	SampType:	**LCSD**	TestCode:	**TTBA**	Units:	**mg/Kg-dry**	Prep Date:	**8/26/2021**	RunNo:	**102190**
Client ID:	**LCSS02**	Batch ID:	**40782**	TestNo:	**LDNR 29-B**			Analysis Date:	**8/26/2021**	SeqNo:	**2494724**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
True Total Barium	4,560	50.0	5,000	0	91.1	75	125	4,565	0.205	20	

Sample ID	**21080780-001AMS**	SampType:	**MS**	TestCode:	**TTBA**	Units:	**mg/Kg-dry**	Prep Date:	**8/26/2021**	RunNo:	**102190**
Client ID:	**ZZZZZZ**	Batch ID:	**40782**	TestNo:	**LDNR 29-B**			Analysis Date:	**8/26/2021**	SeqNo:	**2494726**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
True Total Barium	6,040	47.1	4,713	2,006	85.6	75	125				

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	RL	Reporting Limit
S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode				

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QC SUMMARY REPORT

WO#: **21080908**

30-Aug-21

Client: Environmental Resources Management
Project: Henning-0526033 **BatchID:** **40782**

Sample ID	**21080780-001AMSD**	SampType:	**MSD**	TestCode:	**TTBA**	Units:	**mg/Kg-dry**	Prep Date:	**8/26/2021**	RunNo:	**102190**
Client ID:	**ZZZZZZ**	Batch ID:	**40782**	TestNo:	**LDNR 29-B**			Analysis Date:	**8/26/2021**	SeqNo:	**2494727**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
True Total Barium	6,190	47.6	4,757	2,006	87.9	75	125	6,038	2.45	20	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	RL	Reporting Limit
S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode				

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QC SUMMARY REPORT

WO#: **21080908**

30-Aug-21

Client: Environmental Resources Management
Project: Henning-0526033 **BatchID:** **40787**

Sample ID	**21080844-001ADUP**	SampType:	**DUP**	TestCode:	**ESP_S**	Units:	**%**	Prep Date:	**8/26/2021**	RunNo:	**102224**
Client ID:	**ZZZZZZ**	Batch ID:	**40787**	TestNo:	**LDNR 29-B**	**LDNR 29-B**		Analysis Date:	**8/27/2021**	SeqNo:	**2495871**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Exchangeable Sodium %	2.32	0.10						2.27	2.18	20	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	RL	Reporting Limit
S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode				

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QC SUMMARY REPORT

WO#: **21080908**
30-Aug-21

Client: Environmental Resources Management
Project: Henning-0526033 **BatchID:** **40788**

Sample ID	**21080844-001ADUP**	SampType:	**DUP**	TestCode:	**CEC**	Units:	**meq/100g**	Prep Date:	**8/26/2021**	RunNo:	**102224**
Client ID:	**ZZZZZZ**	Batch ID:	**40788**	TestNo:	**LDNR 29-B**	**LDNR 29-B**		Analysis Date:	**8/27/2021**	SeqNo:	**2495793**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Cation Exchange Capacity	16.4	0.100						16.90	3.00	20	

Sample ID	**lcs-40788**	SampType:	**LCS**	TestCode:	**CEC**	Units:	**meq/100g**	Prep Date:	**8/26/2021**	RunNo:	**102224**
Client ID:	**LCSS**	Batch ID:	**40788**	TestNo:	**LDNR 29-B**	**LDNR 29-B**		Analysis Date:	**8/27/2021**	SeqNo:	**2495797**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Cation Exchange Capacity	20.9	0.100	25.00	0	83.8	76	124				

Sample ID	**lcsd-40788**	SampType:	**LCSD**	TestCode:	**CEC**	Units:	**meq/100g**	Prep Date:	**8/26/2021**	RunNo:	**102224**
Client ID:	**LCSS02**	Batch ID:	**40788**	TestNo:	**LDNR 29-B**	**LDNR 29-B**		Analysis Date:	**8/27/2021**	SeqNo:	**2495798**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Cation Exchange Capacity	21.4	0.100	25.00	0	85.8	76	124	20.94	2.41	20	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	RL	Reporting Limit
S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode				

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Lafayette, LA 70508-3344
TEL: (337) 235-0483 FAX: (337) 233-6540
Website: www.element.com

QC SUMMARY REPORT

WO#: **21080908**

30-Aug-21

Client: Environmental Resources Management
Project: Henning-0526033 **BatchID:** **40802**

Sample ID	**21080866-006ADUP**	SampType:	**DUP**	TestCode:	**SAR_S**	Units:		Prep Date:	**8/26/2021**	RunNo:	**102228**
Client ID:	**ZZZZZZ**	Batch ID:	**40802**	TestNo:	**LDNR 29-B**	**LDNR 29-B**		Analysis Date:	**8/26/2021**	SeqNo:	**2496056**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sodium Adsorption Ratio	34.6	0.10						34.02	1.59	20	*
Soluble Calcium	5.24	0.02						5.26	0.36	20	
Soluble Magnesium	2.87	0.05						2.90	1.01	20	
Soluble Sodium	69.6	0.25						68.71	1.30	20	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	RL	Reporting Limit
S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode				

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QC SUMMARY REPORT

WO#: **21080908**
30-Aug-21

Client: Environmental Resources Management
Project: Henning-0526033 **BatchID:** **R102138**

Sample ID **21080695-011ADUP** SampType: **DUP** TestCode: **PMOIST_29B** Units: **wt%** Prep Date: RunNo: **102138**
Client ID: **ZZZZZZ** Batch ID: **R102138** TestNo: **LDNR 29-B** Analysis Date: **8/17/2021** SeqNo: **2493465**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Percent Moisture	6.90	1.00						7.40	6.99	20	

Sample ID **21080866-006ADUP** SampType: **DUP** TestCode: **PMOIST_29B** Units: **wt%** Prep Date: RunNo: **102138**
Client ID: **ZZZZZZ** Batch ID: **R102138** TestNo: **LDNR 29-B** Analysis Date: **8/23/2021** SeqNo: **2493486**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Percent Moisture	22.7	1.00						22.10	2.68	20	

Sample ID **21080909-001ADUP** SampType: **DUP** TestCode: **PMOIST_29B** Units: **wt%** Prep Date: RunNo: **102138**
Client ID: **ZZZZZZ** Batch ID: **R102138** TestNo: **LDNR 29-B** Analysis Date: **8/23/2021** SeqNo: **2493506**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Percent Moisture	17.0	1.00						13.00	26.7	20	R

Sample ID **21080924-001ADUP** SampType: **DUP** TestCode: **PMOIST_29B** Units: **wt%** Prep Date: RunNo: **102138**
Client ID: **ZZZZZZ** Batch ID: **R102138** TestNo: **LDNR 29-B** Analysis Date: **8/23/2021** SeqNo: **2493526**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Percent Moisture	19.0	1.00						19.00	0	20	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	RL	Reporting Limit
S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode				

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QC SUMMARY REPORT

WO#: **21080908**
30-Aug-21

Client: Environmental Resources Management
Project: Henning-0526033 **BatchID:** **R102165**

Sample ID **MBLK**	SampType: **MBLK**	TestCode: **9056_SPLP**	Units: **mg/L**	Prep Date:	RunNo: **102165**
Client ID: **PBS**	Batch ID: **R102165**	TestNo: **SW9056A**		Analysis Date: **8/25/2021**	SeqNo: **2494099**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	< 0.250	0.250									

Sample ID **LCS**	SampType: **LCS**	TestCode: **9056_SPLP**	Units: **mg/L**	Prep Date:	RunNo: **102165**
Client ID: **LCSS**	Batch ID: **R102165**	TestNo: **SW9056A**		Analysis Date: **8/25/2021**	SeqNo: **2494100**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	10.1	0.250	10.00	0	101	80	120				

Sample ID **LCSD**	SampType: **LCSD**	TestCode: **9056_SPLP**	Units: **mg/L**	Prep Date:	RunNo: **102165**
Client ID: **LCSS02**	Batch ID: **R102165**	TestNo: **SW9056A**		Analysis Date: **8/25/2021**	SeqNo: **2494101**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	10.1	0.250	10.00	0	101	80	120	10.07	0.184	15	

Sample ID **32080992-004BMS**	SampType: **MS**	TestCode: **9056_SPLP**	Units: **mg/L**	Prep Date:	RunNo: **102165**
Client ID: **ZZZZZZ**	Batch ID: **R102165**	TestNo: **SW9056A**		Analysis Date: **8/25/2021**	SeqNo: **2494114**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	782	12.5	250.0	496.2	114	80	120				

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	RL	Reporting Limit
S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode				

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QC SUMMARY REPORT

WO#: **21080908**

30-Aug-21

Client: Environmental Resources Management
Project: Henning-0526033 **BatchID:** **R102165**

Sample ID	**32080992-004BMSD**	SampType:	**MSD**	TestCode:	**9056_SPLP**	Units:	**mg/L**	Prep Date:		RunNo:	**102165**
Client ID:	**ZZZZZZ**	Batch ID:	**R102165**	TestNo:	**SW9056A**			Analysis Date:	**8/25/2021**	SeqNo:	**2494115**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	791	12.5	250.0	496.2	118	80	120	782.2	1.11	15	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	RL	Reporting Limit
S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode				

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QC SUMMARY REPORT

WO#: **21080908**
30-Aug-21

Client: Environmental Resources Management
Project: Henning-0526033 **BatchID:** **R102179**

Sample ID	**MB-R102179**	SampType:	**MBLK**	TestCode:	**EC_S**	Units:	**mmhos/cm**	Prep Date:		RunNo:	**102179**
Client ID:	**PBS**	Batch ID:	**R102179**	TestNo:	**LDNR 29-B**			Analysis Date:	**8/26/2021**	SeqNo:	**2494572**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Electrical Conductivity	< 0.10	0.10									

Sample ID	**LCS1-R102179**	SampType:	**LCS1**	TestCode:	**EC_S**	Units:	**mmhos/cm**	Prep Date:		RunNo:	**102179**
Client ID:	**ZZZZZZ**	Batch ID:	**R102179**	TestNo:	**LDNR 29-B**			Analysis Date:	**8/26/2021**	SeqNo:	**2494573**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Electrical Conductivity	0.43	0.10	0.46	0	93.9	90	110				

Sample ID	**LCS2-R102179**	SampType:	**LCS2**	TestCode:	**EC_S**	Units:	**mmhos/cm**	Prep Date:		RunNo:	**102179**
Client ID:	**ZZZZZZ**	Batch ID:	**R102179**	TestNo:	**LDNR 29-B**			Analysis Date:	**8/26/2021**	SeqNo:	**2494574**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Electrical Conductivity	52.8	0.10	53.00	0	99.6	90	110				

Sample ID	**21080866-006ADUP**	SampType:	**DUP**	TestCode:	**EC_S**	Units:	**mmhos/cm**	Prep Date:		RunNo:	**102179**
Client ID:	**ZZZZZZ**	Batch ID:	**R102179**	TestNo:	**LDNR 29-B**			Analysis Date:	**8/26/2021**	SeqNo:	**2494576**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Electrical Conductivity	9.56	0.10						9.58	0.21	20	*

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	H	Holding times for preparation or analysis exceeded	M	Matrix Interference
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	RL	Reporting Limit
S	Spike Recovery outside accepted recovery limits	SDL	Sample detection limit	U	Analyte not detected
W	Sample container temperature is out of limit as specified at testcode				

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Sample Log-In Check List

Client Name: **ERM_HOUSTON** Work Order Number: **21080908** RcptNo: **1**

Logged by:	**Danielle Hollier**	**8/20/2021 11:25:00 AM**	Danielle Hollier
Completed By:	**Danielle Hollier**	**8/20/2021 11:46:28 AM**	Danielle Hollier
Reviewed By:	**Caitlin Duplantis**	**8/23/2021 2:30:40 PM**	Caitlin Duplantis

Chain of Custody

1.	Is Chain of Custody complete?	Yes ☑	No ☐	Not Present ☐
2.	How was the sample delivered?	Client		

Log In

3.	Coolers are present?	Yes ☑	No ☐	NA ☐
4.	Shipping container/cooler in good condition?	Yes ☑	No ☐	
	Custody seals intact on shipping container/cooler?	Yes ☐	No ☐	Not Present ☑
	No. Seal Date:	Signed By:		
5.	Was an attempt made to cool the samples?	Yes ☐	No ☐	NA ☑
6.	Were all samples received at a temperature of >0° C to 6.0°C	Yes ☐	No ☑	NA ☐
		Not required		
7.	Sample(s) in proper container(s)?	Yes ☑	No ☐	
8.	Sufficient sample volume for indicated test(s)?	Yes ☑	No ☐	
9.	Are samples (except VOA and ONG) properly preserved?	Yes ☑	No ☐	
10.	Was preservative added to bottles?	Yes ☐	No ☑	NA ☐
11.	Is the headspace in the VOA vials less than 1/4 inch or 6 mm?	Yes ☐	No ☐	No VOA Vials ☑
12.	Were any sample containers received broken?	Yes ☐	No ☑	
13.	Does paperwork match bottle labels? (Note discrepancies on chain of custody)	Yes ☑	No ☐	
14.	Are matrices correctly identified on Chain of Custody?	Yes ☑	No ☐	
15.	Is it clear what analyses were requested?	Yes ☑	No ☐	
16.	Were all holding times able to be met? (If no, notify customer for authorization.)	Yes ☑	No ☐	

Special Handling (if applicable)

17.	Was client notified of all discrepancies with this order?	Yes ☐	No ☐	NA ☑

Person Notified: Date

By Whom: Via: ☐ eMail ☐ Phone ☐ Fax ☐ In Person

Regarding:

Client Instructions:

18. Additional remarks:

Cooler Information

Cooler No	Temp ºC	Condition	Seal Intact	Seal No	Seal Date	Signed By

element

Chain of Custody

Laboratory Number: 21080904

	Client Information:	Billing Information:	PO Number:	Project Name/Number:	Page of
Company Name:	ERM	SAME		HENNING - 0526033	**Matrix Code**
Contact Name:	SHAWN WIGGINS		Quote Number:		DW = Drinking Water WW = Waste Water GW = Ground Water AQ = Aqueous OT = Other SL = Sludge SOL = Solid O = Oil SO = Soil F = Food SW = Swab NG = Natural Gas NGL = Natural Gas Liquid PW = Produced Water CF = Completion Fluid
Address:	840 W. SAM HOUSTON PKWY NORTH			Sampler's Signature:	
	SUITE 600		Required QC Level		
City, State Zip:	HOUSTON, TX 77024				
Phone Number:	971-303-2385 Ext:	Ext:	Bill Monthly ☐Yes ☐No	Shipping Method: UPS / FedEx / NOW DHL / Element / Hand / Mail	
Fax Number:					
E-mail Address:	SHAWN.WIGGINS@ERM.COM				

Which Regulations Apply: ☐RCRA ☐Drinking Water ☐POTW ☐Distribution ☐NPDES ☐Special ☐USDA/FDA ☐State ☐RECAP/RISC ☐Other

Turn Time ☐Standard RUSH ☐1 Day ☐2 Day ☐Other (Rush turn times will incur a surcharge and must be pre-approved by lab.)

Sample ID/Description	Collection Information: Date	Time	Grab / Composite	Matrix	Container: Quantity	Type P=Plastic, G=Glass, V=Vial	Pres. HCl, HNO_3, H_2SO_4, NaOH, $Na_2S_2O_3$	Requested Tests: EC	% MOISTURE	29B METALS	CEC/ESP/SAR	SPLP GK.						Comments
H-32 (2-4')	8/17/2021	1355	GRAB	SO	1	G	NONE	X	X	X	X							
H-32 (4-6')		1400			1			X	X	X	X							
H-32 (8-10')		1410			1			X	X	X	X							
H-32 (10-12')		1415			1			X	X	X	X							
H-32 (18-20')		1435			1			X	X			X						
H-32 (48-50')	8/17/2021	1550			1			X	X									
H-33 (2-4')	8/18/2021	1535			1			X	X	X	X							
H-33 (6-8')	8/18/2021	1545			1			X	X	X	X							
H-33 (8-10')	8/18/2021	1550	GRAB	SO	1	G	NONE	X	X	X	X							

	Relinquished by	Date/Time	Received by	Date/Time	Field Notes:
1		8/19/21 1200		8/19/21 1200	
2		8/20/21 1125		8-19-21 1125	Received at lab on ice? ☐Yes ☑No Temp:
3					

All samples submitted to Element Materials Technology for analysis are accepted on a custodial basis only. Ownership of the material remains with the client submitting the samples. Element Materials Technology reserves the right to return unused sample portions.

8800 North US 31, Columbus, IN 47201 USA, P 812-375-0531, F 812-375-0731
328 Ley Road, Suite 100, Fort Wayne, IN 46825 USA, P 260-471-7000, F 260-471-7777
909 Executive Dr, Warsaw, IN 46580 USA, P 574-267-3305, F 574-269-6569
3371 Cleveland Road, Suite 100A, South Bend, IN 46628 USA, P 574-277-0707, F 574-273-5699
2417 W. Pinhook Rd, Lafayette, LA 70508 USA, P 337-235-0483, F 337-233-6540

element

Chain of Custody

Laboratory Number: 21080908

Client Information:		Billing Information:		PO Number:	Project Name/Number:	Page of
Company Name:	ERM	SAME			HENNING-0526033	**Matrix Code**
Contact Name:	SHAWN WIGGINS			Quote Number:		DW = Drinking Water
Address:	840 W. SAM HOUSTON PKWY NORTH				Sampler's Signature	WW = Waste Water
	SUITE 600			Required QC Level		GW = Ground Water
City, State Zip:	HOUSTON, TX 77024					AQ = Aqueous
Phone Number:	971-303-2395 Ext:	Ext:		Bill Monthly	Shipping Method:	OT = Other
Fax Number:				☐ Yes	UPS / FedEx / NOW	SL = Sludge SOL = Solid
E-mail Address:	SHAWN.WIGGINS@ERM.COM			☐ No	DHL / Element / Hand / Mail	O = Oil SO = Soil
						F = Food SW = Swab
						NG = Natural Gas
						NGL = Natural Gas Liquid
						PW = Produced Water
						CF = Completion Fluid

Which Regulations Apply: ☐ RCRA ☐ POTW ☐ NPDES ☐ USDA/FDA ☒ RECAP/RISC ☐ Drinking Water ☐ Distribution ☐ Special ☐ State ☐ Other

Turn Time: ☐ Standard RUSH ☐ 1 Day ☐ 2 Day ☐ Other (Rush turn times will incur a surcharge and must be pre-approved by lab.)

Sample ID/Description	Collection Information: Date	Time	Grab / Composite	Matrix	Container: Quantity	Container: Type P=Plastic, G=Glass, V=Vial	Pres.: HCl, HNO_3, H_2SO_4, NaOH, $Na_2S_2O_3$	Requested Tests: EC	% MOISTURE	7 RB METALS	CEC/ESP/SAR	SPLP CL.	Comments
H-33 (10-12')	8/19/2021	1555	GRAB	SO	1	G	NONE	X	X	X	X		
H-33 (16-18')	8/19/2021	1610	GRAB	SO	1	G	NONE	X	X			X	
H-34 (4-6')	8/19/21	1450			1	G	NONE	X	X	X	X		
H-34 (6-8')		1455			1	G	NONE	X	X	X	X		
H-34 (10-12')		1505			1	G	NONE	X	X	X	X		
H-34 (16-18)		1520			1	G	NONE	X	X			X	
H-34 (28-30')	↓	1550	↓	↓	1	G	NONE	X	X				

	Relinquished by	Date/Time	Received by	Date/Time
1		8/19/21 1200		8/19/21 1200
2		8/20/21 1125		8-19-21 1125
3				

Field Notes:

Received at lab on ice? ☐ Yes ☒ No Temp:

All samples submitted to Element Materials Technology for analysis are accepted on a custodial basis only. Ownership of the material remains with the client submitting the samples. Element Materials Technology reserves the right to return unused sample portions.

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3371 Cleveland Road, Suite 100A, South Bend, IN 46628 USA, P 574-277-0707, F 574-273-5699
2417 W. Pinhook Rd, Lafayette, LA 70508 USA, P 337-235-0483, F 337-233-6540

LELAP CERTIFICATE NUMBER: 01955
DOD-ELAP ACCREDITATION NUMBER: 74960

ANALYTICAL RESULTS

PERFORMED BY

Pace Analytical Gulf Coast
7979 Innovation Park Dr.
Baton Rouge, LA 70820
(225) 769-4900

Report Date 11/20/2019

Report # 219111258

Project 0526033/Henning Management

Deliver To	***Additional Recipients***
Dave Angle ERM 13313 Southwest Freeway Suite 221 Sugar Land, TX 77478 281-242-5700	NONE

Laboratory Endorsement

Sample analysis was performed in accordance with approved methodologies provided by the Environmental Protection Agency or other recognized agencies. The samples and their corresponding extracts will be maintained for a period of 30 days unless otherwise arranged. Following this retention period the samples will be disposed in accordance with Pace Gulf Coast's Standard Operating Procedures.

Common Abbreviations that may be Utilized in this Report

ND	Indicates the result was Not Detected at the specified reporting limit
NO	Indicates the sample did not ignite when preliminary test performed for EPA Method 1030
DO	Indicates the result was Diluted Out
MI	Indicates the result was subject to Matrix Interference
TNTC	Indicates the result was Too Numerous To Count
SUBC	Indicates the analysis was Sub-Contracted
FLD	Indicates the analysis was performed in the Field
DL	Detection Limit
LOD	Limit of Detection
LOQ	Limit of Quantitation
RE	Re-analysis
CF	HPLC or GC Confirmation
00:01	Reported as a time equivalent to 12:00 AM

Reporting Flags that may be Utilized in this Report

J or I	Indicates the result is between the MDL and LOQ
J	DOD flag on analyte in the parent sample for MS/MSD outside acceptance criteria
U	Indicates the compound was analyzed for but not detected
B or V	Indicates the analyte was detected in the associated Method Blank
Q	Indicates a non-compliant QC Result (See Q Flag Application Report)
*****	Indicates a non-compliant or not applicable QC recovery or RPD – see narrative
E	Organics - The result is estimated because it exceeded the instrument calibration range
E	Metals - % diference for the serial dilution is > 10%
L	Reporting Limits adjusted to meet risk-based limit.
P	RPD between primary and confirmation result is greater than 40
DL	Diluted analysis – when appended to Client Sample ID

Sample receipt at Pace Gulf Coast is documented through the attached chain of custody. In accordance with NELAC, this report shall be reproduced only in full and with the written permission of Pace Gulf Coast. The results contained within this report relate only to the samples reported. The documented results are presented within this report.

This report pertains only to the samples listed in the Report Sample Summary and should be retained as a permanent record thereof. The results contained within this report are intended for the use of the client. Any unauthorized use of the information contained in this report is prohibited.

I certify that this data package is in compliance with The NELAC Institute (TNI) Standard 2009 and terms and conditions of the contract and Statement of Work both technically and for completeness, for other than the conditions in the case narrative. Release of the data contained in this hardcopy data package and in the computer readable data submitted has been authorized by the Quality Assurance Manager or his/her designee, as verified by the following signature.

Estimated uncertainty of measurement is available upon request. This report is in compliance with the DOD QSM as specified in the contract if applicable.

_____

Authorized Signature
Pace Gulf Coast Report 219111258

Certifications

Certification	Certification Number
DOD ELAP	74960
Alabama	01955
Arkansas	88-0655
Colorado	01955
Delaware	01955
Florida	E87854
Georgia	01955
Hawaii	01955
Idaho	01955
Illinois	200048
Indiana	01955
Kansas	E-10354
Kentucky	95
Louisiana	01955
Maryland	01955
Massachusetts	01955
Michigan	01955
Mississippi	01955
Missouri	01955
Montana	N/A
Nebraska	01955
New Mexico	01955
North Carolina	618
North Dakota	R-195
Oklahoma	9403
South Carolina	73006001
South Dakota	01955
Tennessee	01955
Texas	T104704178
Vermont	01955
Virginia	460215
Washington	C929
USDA Soil Permit	P330-16-00234

Case Narrative

Client: ERM **Report:** 219111258

Gulf Coast Analytical Laboratories received and analyzed the sample(s) listed on the Report Sample Summary page of this report. Receipt of the sample(s) is documented by the attached chain of custody. This applies only to the sample(s) listed in this report. No sample integrity or quality control exceptions were identified unless noted below.

SEMI--VOLATILES GAS CHROMATOGRAPHY

In the MADEP EPH Revision 1.1 analysis, the LCS/LCSd RPD is above the control limit for one Aromatic range. All recoveries are acceptable.

Sample Summary

LAB ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21911125801	H-8 4-6'	Solid	11/05/2019 12:55	11/12/2019 12:55
21911125802	H-8 6-8'	Solid	11/05/2019 13:00	11/12/2019 12:55

Sample Results

H-8 4-6'				
	Collect Date	11/05/2019 12:55	LAB ID	21911125801
	Receive Date	11/12/2019 12:55	Matrix	Solid

MADEP VPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1000	11/13/2019 19:29	JAR	671299

CAS#	Parameter	Result	LOQ	Units
GCSV-02-10	Aliphatic >C8-C10	ND	26.3	mg/kg
GCSV-02-30	Aliphatic C6-C8	ND	26.3	mg/kg

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
615-59-8	2,5-Dibromotoluene	43.80	37.3	mg/kg	85	60 - 140

MADEP VPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	11/13/2019 19:29	JAR	671298

CAS#	Parameter	Result	LOQ	Units
GCSV-02-14	Aromatic >C8-C10	ND	0.026	mg/kg

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
615-59-8	2,5-Dibromotoluene	0.0438	.0365	mg/kg	83	60 - 140

MADEP EPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
11/13/2019 08:15	671252	MADEP EPH Revision 1.1 (LA)	1	11/18/2019 13:21	MFS	671606

CAS#	Parameter	Result	LOQ	Units
GCSV-02-11	Aliphatic >C10-C12	ND	5.88	mg/kg

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
3386-33-2	1-Chlorooctadecane	3.92	3.01	mg/kg	77	40 - 140

MADEP EPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
11/13/2019 08:15	671252	MADEP EPH Revision 1.1 (LA)	1	11/18/2019 13:21	MFS	671605

CAS#	Parameter	Result	LOQ	Units
GCSV-05-18	Aromatic >C21-C35	7.37	5.88	mg/kg

Sample Results

H-8 4-6'

Collect Date	11/05/2019 12:55	**LAB ID**	21911125801
Receive Date	11/12/2019 12:55	**Matrix**	Solid

MADEP EPH Revision 1.1 (LA) (Continued)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
11/13/2019 08:15	671252	MADEP EPH Revision 1.1 (LA) (Continued)	1	11/18/2019 13:21	MFS	671605

CAS#	Parameter	Result	LOQ	Units
GCSV-02-15	Unadjusted >C10-C12 Aromatics	ND	5.88	mg/kg
GCSV-02-16	Unadjusted >C12-C16 Aromatics	7.48	5.88	mg/kg
GCSV-02-17	Unadjusted >C16-C21 Aromatics	ND	5.88	mg/kg

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
84-15-1	o-Terphenyl	3.92	3.59	mg/kg	92	40 - 140
580-13-2	2-Bromonaphthalene	3.92	4.85	mg/kg	124	40 - 140
321-60-8	2-Fluorobiphenyl	3.92	4.68	mg/kg	119	40 - 140

MADEP EPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
11/13/2019 08:15	671252	MADEP EPH Revision 1.1 (LA)	2	11/19/2019 18:35	MFS	671699

CAS#	Parameter	Result	LOQ	Units
GCSV-02-12	Aliphatic >C12-C16	35.7	11.8	mg/kg
GCSV-02-31	Aliphatic >C16-C35	35.4	11.8	mg/kg

H-8 6-8'

Collect Date	11/05/2019 13:00	**LAB ID**	21911125802
Receive Date	11/12/2019 12:55	**Matrix**	Solid

MADEP VPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1000	11/13/2019 19:59	JAR	671299

CAS#	Parameter	Result	LOQ	Units
GCSV-02-10	Aliphatic >C8-C10	ND	26.5	mg/kg
GCSV-02-30	Aliphatic C6-C8	ND	26.5	mg/kg

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
615-59-8	2,5-Dibromotoluene	44.10	37	mg/kg	84	60 - 140

Sample Results

H-8 6-8'	**Collect Date**	11/05/2019 13:00	**LAB ID**	21911125802
	Receive Date	11/12/2019 12:55	**Matrix**	Solid

MADEP VPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1000	11/13/2019 19:59	JAR	671298

CAS#	Parameter	Result	LOQ	Units
GCSV-02-14	Aromatic >C8-C10	ND	26.5	mg/kg

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
615-59-8	2,5-Dibromotoluene	44.10	36.7	mg/kg	83	60 - 140

MADEP EPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
11/13/2019 08:15	671252	MADEP EPH Revision 1.1 (LA)	1	11/18/2019 13:41	MFS	671606

CAS#	Parameter	Result	LOQ	Units
GCSV-02-11	Aliphatic >C10-C12	8.61	5.88	mg/kg
GCSV-02-31	Aliphatic >C16-C35	32.0	5.88	mg/kg

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
3386-33-2	1-Chlorooctadecane	3.92	1.78	mg/kg	45	40 - 140

MADEP EPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
11/13/2019 08:15	671252	MADEP EPH Revision 1.1 (LA)	1	11/18/2019 13:41	MFS	671605

CAS#	Parameter	Result	LOQ	Units
GCSV-05-18	Aromatic >C21-C35	6.55	5.88	mg/kg
GCSV-02-15	Unadjusted >C10-C12 Aromatics	ND	5.88	mg/kg
GCSV-02-16	Unadjusted >C12-C16 Aromatics	10.2	5.88	mg/kg
GCSV-02-17	Unadjusted >C16-C21 Aromatics	ND	5.88	mg/kg

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
84-15-1	o-Terphenyl	3.92	2.87	mg/kg	73	40 - 140
580-13-2	2-Bromonaphthalene	3.92	4.13	mg/kg	105	40 - 140
321-60-8	2-Fluorobiphenyl	3.92	3.72	mg/kg	95	40 - 140

Sample Results

H-8 6-8'				
	Collect Date	11/05/2019 13:00	**LAB ID**	21911125802
	Receive Date	11/12/2019 12:55	**Matrix**	Solid

MADEP EPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
11/13/2019 08:15	671252	MADEP EPH Revision 1.1 (LA)	2	11/19/2019 18:54	MFS	671699

CAS#	Parameter	Result	LOQ	Units
GCSV-02-12	Aliphatic >C12-C16	29.6	11.8	mg/kg

GC Volatiles QC Summary

Analytical Batch 671298	Client ID	MB671298		LCS671298				LCSD671298				
	LAB ID	1981739		1981740				1981741				
	Sample Type	MB		LCS				LCSD				
	Prep Date	NA		NA				NA				
	Analysis Date	11/12/2019 17:25		11/12/2019 13:48				11/12/2019 15:58				
	Matrix	Solid		Solid				Solid				
MADEP VPH Revision 1.1 (LA)		Units Result	mg/kg LOQ	Spike Added	Result	%R	Control Limits%R	Spike Added	Result	%R	RPD	RPD Limit
Aromatic >C8-C10	GCSV-02-14	ND	1.50	7.50	6.87	92	60 - 140	7.50	6.26	83	9	30
Surrogate												
2,5-Dibromotoluene	615-59-8	1.79	72	2.5	1.96	78	60 - 140	2.5	2.59	104	NA	NA

Analytical Batch 671299	Client ID	MB671299		LCS671299				LCSD671299				
	LAB ID	1981743		1981744				1981745				
	Sample Type	MB		LCS				LCSD				
	Prep Date	NA		NA				NA				
	Analysis Date	11/12/2019 17:25		11/12/2019 13:48				11/12/2019 15:58				
	Matrix	Solid		Solid				Solid				
MADEP VPH Revision 1.1 (LA)		Units Result	mg/kg LOQ	Spike Added	Result	%R	Control Limits%R	Spike Added	Result	%R	RPD	RPD Limit
Aliphatic >C8-C10	GCSV-02-10	ND	1.50	5.00	5.75	115	60 - 140	5.00	5.10	102	12	30
Aliphatic C6-C8	GCSV-02-30	ND	1.50	7.50	8.59	115	60 - 140	7.50	7.12	95	19	30
Surrogate												
2,5-Dibromotoluene	615-59-8	1.8	72	2.5	1.97	79	60 - 140	2.5	2.56	102	NA	NA

GC Semi-Volatiles QC Summary

Analytical Batch	Client ID	MB671252		LCS671252				LCSD671252				
671606	LAB ID	1981614		1981615				1981616				
Prep Batch	Sample Type	MB		LCS				LCSD				
671252	Prep Date	11/13/2019 08:15		11/13/2019 08:15				11/13/2019 08:15				
Prep Method	Analysis Date	11/18/2019 12:22		11/18/2019 12:42				11/18/2019 13:01				
MADEP EPH Revision 1.1 (LA)	Matrix	Solid		Solid				Solid				
MADEP EPH Revision 1.1 (LA)		Units Result	mg/kg LOQ	Spike Added	Result	%R	Control Limits%R	Spike Added	Result	%R	RPD	RPD Limit
Aliphatic >C10-C12	GCSV-02-11	ND	6.00	10.0	6.42	64	30 - 140	10.0	6.83	68	6	25
Aliphatic >C12-C16	GCSV-02-12	ND	6.00	10.0	7.34	73	40 - 140	10.0	7.81	78	6	25
Aliphatic >C16-C35	GCSV-02-31	ND	6.00	45.0	39.0	87	40 - 140	45.0	41.7	93	7	25
Surrogate												
1-Chlorooctadecane	3386-33-2	2.2	55	4	2.92	73	40 - 140	4	2.23	56	NA	NA

Analytical Batch	Client ID	MB671252		LCS671252				LCSD671252				
671605	LAB ID	1981614		1981615				1981616				
Prep Batch	Sample Type	MB		LCS				LCSD				
671252	Prep Date	11/13/2019 08:15		11/13/2019 08:15				11/13/2019 08:15				
Prep Method	Analysis Date	11/18/2019 12:22		11/18/2019 12:42				11/18/2019 13:01				
MADEP EPH Revision 1.1 (LA)	Matrix	Solid		Solid				Solid				
MADEP EPH Revision 1.1 (LA)		Units Result	mg/kg LOQ	Spike Added	Result	%R	Control Limits%R	Spike Added	Result	%R	RPD	RPD Limit
Aromatic >C21-C35	GCSV-05-18	ND	6.00	50.0	37.8	76	40 - 140	50.0	40.4	81	7	25
Unadjusted >C10-C12 Aromatics	GCSV-02-15	ND	6.00	5.00	3.95	79	30 - 140	5.00	5.37	107	30*	25
Unadjusted >C12-C16 Aromatics	GCSV-02-16	ND	6.00	20.0	16.0	80	40 - 140	20.0	20.1	101	23	25
Unadjusted >C16-C21 Aromatics	GCSV-02-17	ND	6.00	10.0	8.18	82	40 - 140	10.0	9.76	98	18	25
Surrogate												
2-Bromonaphthalene	580-13-2	5.16	129	4	4.31	108	40 - 140	4	4.79	120	NA	NA
2-Fluorobiphenyl	321-60-8	4.94	124	4	4.23	106	40 - 140	4	4.67	117	NA	NA
o-Terphenyl	84-15-1	3.45	86	4	3.08	77	40 - 140	4	3.51	88	NA	NA

CHAIN OF CUSTODY RECORD

GCAL ANALYTICAL LABORATORIES, LLC
7979 Innovation Park Dr., Baton Rouge, LA 70820-7402
Phone: 225.769.4900 • Fax: 225.767.5717 • www.gcal.com

Client ID: 4271 - ERM
SDG: 219111258
PM: AMK

Report to:
Client: ERM
Address: 945 W. Sam Houston Pkwy N, Suite 600 Houston, TX 77024
Contact: Dave Angle
Phone: 832.786.4781
E-mail: david.angle@erm.com

Bill to:
Client: SAME
Address:
Contact:
Phone:
E-mail:

P.O. Number
Project Name/Number: Henning Management / 0526033
Sampled By: R. Charles Trahan

Analytical Requests & Method

GCAL use only:
Custody Seal used ☐ yes ☐ no intact ☐ yes ☐ no
Temperature °C 0.2
E34 73CFM

☐ Dissolved Analysis Requested
☐ Field filtered
☐ Lab filtered

Matrix[1]	Date	Time (2400)	Comp	Grab	Sample Description	No Containers	VPH March 37	EPH May 2	Preservative
S	11/5/19	1255		G	H-8 4-6'	5	X	X	-1
↓	↓	1300		↓	H-8 6-8'	5	X	X	-2

Air Bill No:

Turn Around Time (Business Days): ☐ 24h* ☐ 48h* ☐ 3 days* ☐ 1 week* ☑ Standard (Per Contract/Quote)

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
R. Charles Trahan	11/8/19	1925	GCAL	11/8/19	1925
PACE	11/12/19	0930		11/12/19	0930
	11/12/19	1255		11/12/19	1255

Note:

By submitting these samples, you agree to GCAL's terms and conditions contained in our most recent schedule of services.

Matrix[1]: W = water, S = solid, L = liquid, T = tissue

*Requires prior approval, rush charges may apply.

We cannot accept verbal changes. Please email written changes to your PM.

WHITE: CLIENT FINAL REPORT - CANARY: CLIENT

SAMPLE RECEIVING CHECKLIST

SAMPLE DELIVERY GROUP 219111258	
Client **PM** AMK 4271 - ERM	**Transport Method** COURIER
Profile Number 282045	**Received By** Savage, Tiffany R
Line Item(s) 1 - Solid	**Receive Date(s)** 11/12/19

CHECKLIST	YES	NO
Samples received with proper thermal preservation?	☑	☐
Radioactivity is <1600 cpm? If no, record cpm value in notes section.	☑	☐
COC relinquished and complete (including sampleIDs, collect times, and sampler)?	☑	☐
All containers received in good condition and within hold time?	☑	☐
All sample labels and containers received match the chain of custody?	☑	☐
Preservative added to any containers?	☐	☑
If received, was headspace for VOC water containers < 6mm?	☑	☐
Samples collected in containers provided by Pace Gulf Coast?	☑	☐

COOLERS

Airbill	Thermometer ID: E34	Temp °C
		0.2

DISCREPANCIES

None

LAB PRESERVATIONS

None

NOTES

Revision 1.6

LELAP CERTIFICATE NUMBER: 01955
DOD-ELAP ACCREDITATION NUMBER: 74960

ANALYTICAL RESULTS

PERFORMED BY

Pace Analytical Gulf Coast
7979 Innovation Park Dr.
Baton Rouge, LA 70820
(225) 769-4900

Report Date 12/10/2019

Report # 219112313

Project 0526033/Henning Management

Deliver To	***Additional Recipients***
Dave Angle ERM 13313 Southwest Freeway Suite 221 Sugar Land, TX 77478 281-242-5700	NONE

Laboratory Endorsement

Sample analysis was performed in accordance with approved methodologies provided by the Environmental Protection Agency or other recognized agencies. The samples and their corresponding extracts will be maintained for a period of 30 days unless otherwise arranged. Following this retention period the samples will be disposed in accordance with Pace Gulf Coast's Standard Operating Procedures.

Common Abbreviations that may be Utilized in this Report

ND	Indicates the result was Not Detected at the specified reporting limit
NO	Indicates the sample did not ignite when preliminary test performed for EPA Method 1030
DO	Indicates the result was Diluted Out
MI	Indicates the result was subject to Matrix Interference
TNTC	Indicates the result was Too Numerous To Count
SUBC	Indicates the analysis was Sub-Contracted
FLD	Indicates the analysis was performed in the Field
DL	Detection Limit
LOD	Limit of Detection
LOQ	Limit of Quantitation
RE	Re-analysis
CF	HPLC or GC Confirmation
00:01	Reported as a time equivalent to 12:00 AM

Reporting Flags that may be Utilized in this Report

J or I	Indicates the result is between the MDL and LOQ
J	DOD flag on analyte in the parent sample for MS/MSD outside acceptance criteria
U	Indicates the compound was analyzed for but not detected
B or V	Indicates the analyte was detected in the associated Method Blank
Q	Indicates a non-compliant QC Result (See Q Flag Application Report)
*****	Indicates a non-compliant or not applicable QC recovery or RPD – see narrative
E	Organics - The result is estimated because it exceeded the instrument calibration range
E	Metals - % diference for the serial dilution is > 10%
L	Reporting Limits adjusted to meet risk-based limit.
P	RPD between primary and confirmation result is greater than 40
DL	Diluted analysis – when appended to Client Sample ID

Sample receipt at Pace Gulf Coast is documented through the attached chain of custody. In accordance with NELAC, this report shall be reproduced only in full and with the written permission of Pace Gulf Coast. The results contained within this report relate only to the samples reported. The documented results are presented within this report.

This report pertains only to the samples listed in the Report Sample Summary and should be retained as a permanent record thereof. The results contained within this report are intended for the use of the client. Any unauthorized use of the information contained in this report is prohibited.

I certify that this data package is in compliance with The NELAC Institute (TNI) Standard 2009 and terms and conditions of the contract and Statement of Work both technically and for completeness, for other than the conditions in the case narrative. Release of the data contained in this hardcopy data package and in the computer readable data submitted has been authorized by the Quality Assurance Manager or his/her designee, as verified by the following signature.

Estimated uncertainty of measurement is available upon request. This report is in compliance with the DOD QSM as specified in the contract if applicable.

_____

Authorized Signature
Pace Gulf Coast Report 219112313

Certifications

Certification	Certification Number
DOD ELAP	74960
Alabama	01955
Arkansas	88-0655
Colorado	01955
Delaware	01955
Florida	E87854
Georgia	01955
Hawaii	01955
Idaho	01955
Illinois	200048
Indiana	01955
Kansas	E-10354
Kentucky	95
Louisiana	01955
Maryland	01955
Massachusetts	01955
Michigan	01955
Mississippi	01955
Missouri	01955
Montana	N/A
Nebraska	01955
New Mexico	01955
North Carolina	618
North Dakota	R-195
Oklahoma	9403
South Carolina	73006001
South Dakota	01955
Tennessee	01955
Texas	T104704178
Vermont	01955
Virginia	460215
Washington	C929
USDA Soil Permit	P330-16-00234

Case Narrative

Client: ERM **Report:** 219112313

Gulf Coast Analytical Laboratories received and analyzed the sample(s) listed on the Report Sample Summary page of this report. Receipt of the sample(s) is documented by the attached chain of custody. This applies only to the sample(s) listed in this report. No sample integrity or quality control exceptions were identified unless noted below.

SEMI-VOLATILES GAS CHROMATOGRAPHY

In the MADEP EPH Revision 1.1 (LA) analysis, the recoveries for the surrogates, 2-Bromonaphthalene and 2-Fluorobiphenyl are above the upper control limits for samples 21911231301 (H-15 4-6'), 21911231306 (H-16 10-12'). and 21911231307 (H-16 14-16'). The recovery for the surrogate, 1-Chlorooctadecane is outside control limits for sample 21911231301 (H-15 4-6'). No target ranges were detected in these samples.

In the MADEP EPH Revision 1.1 (LA) analysis, the recovery for the surrogate(s) is reported as diluted out for those analyses performed at a 10 or higher dilution.

In the MADEP EPH Revision 1.1 (LA) analysis for prep batch 672062, the LCS/LCSD RPD is above the control limit for all aliphatic ranges. All recoveries are acceptable.

In the MADEP EPH Revision 1.1 (LA) analysis for prep batch 672621, the LCS/LCSD RPD is above the control limit for two ranges. All recoveries are acceptable.

Sample Summary

LAB ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21911231301	H-15 4-6'	Solid	11/19/2019 11:15	11/22/2019 16:30
21911231302	H-15 6-8'	Solid	11/19/2019 11:20	11/22/2019 16:30
21911231303	H-15 8-10'	Solid	11/19/2019 11:25	11/22/2019 16:30
21911231304	H-15 10-12'	Solid	11/19/2019 11:30	11/22/2019 16:30
21911231305	H-15 12-14'	Solid	11/19/2019 11:35	11/22/2019 16:30
21911231306	H-16 10-12'	Solid	11/20/2019 08:50	11/22/2019 16:30
21911231307	H-16 14-16'	Solid	11/20/2019 09:00	11/22/2019 16:30
21911231308	H-17 4-6'	Solid	11/20/2019 14:20	11/22/2019 16:30
21911231309	H-17 6-8'	Solid	11/20/2019 14:25	11/22/2019 16:30
21911231310	H-17 8-10'	Solid	11/20/2019 14:30	11/22/2019 16:30
21911231311	H-17 10-12'	Solid	11/20/2019 14:35	11/22/2019 16:30
21911231312	H-17 12-14'	Solid	11/20/2019 14:40	11/22/2019 16:30
21911231313	H-17 14-16'	Solid	11/20/2019 14:45	11/22/2019 16:30

Sample Results

H-15 4-6'				
	Collect Date	11/19/2019 11:15	LAB ID	21911231301
	Receive Date	11/22/2019 16:30	Matrix	Solid

MADEP VPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1000	11/25/2019 16:27	JAR	672144

CAS#	Parameter	Result	LOQ	Units
GCSV-02-10	Aliphatic >C8-C10	46.4	26.9	mg/kg
GCSV-02-30	Aliphatic C6-C8	ND	26.9	mg/kg

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
615-59-8	2,5-Dibromotoluene	44.80	39.6	mg/kg	88	60 - 140

MADEP VPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1000	11/25/2019 16:27	JAR	672143

CAS#	Parameter	Result	LOQ	Units
GCSV-02-14	Aromatic >C8-C10	ND	26.9	mg/kg

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
615-59-8	2,5-Dibromotoluene	44.80	45.7	mg/kg	102	60 - 140

MADEP EPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
11/25/2019 10:45	672062	MADEP EPH Revision 1.1 (LA)	1	12/02/2019 16:09	MFS	672488

CAS#	Parameter	Result	LOQ	Units
GCSV-02-11	Aliphatic >C10-C12	ND	5.88	mg/kg
GCSV-02-12	Aliphatic >C12-C16	28.8	5.88	mg/kg

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
3386-33-2	1-Chlorooctadecane	3.92	1.34	mg/kg	34*	40 - 140

Sample Results

H-15 4-6'

Collect Date	11/19/2019 11:15	**LAB ID**	21911231301
Receive Date	11/22/2019 16:30	**Matrix**	Solid

MADEP EPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
11/25/2019 10:45	672062	MADEP EPH Revision 1.1 (LA)	1	12/03/2019 11:30	MFS	672571

CAS#	Parameter	Result	LOQ	Units
GCSV-05-18	Aromatic >C21-C35	ND	5.88	mg/kg
GCSV-02-15	Unadjusted >C10-C12 Aromatics	ND	5.88	mg/kg
GCSV-02-16	Unadjusted >C12-C16 Aromatics	ND	5.88	mg/kg
GCSV-02-17	Unadjusted >C16-C21 Aromatics	ND	5.88	mg/kg

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
84-15-1	o-Terphenyl	3.92	1.71	mg/kg	44	40 - 140
580-13-2	2-Bromonaphthalene	3.92	6.28	mg/kg	160*	40 - 140
321-60-8	2-Fluorobiphenyl	3.92	5.86	mg/kg	149*	40 - 140

MADEP EPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
11/25/2019 10:45	672062	MADEP EPH Revision 1.1 (LA)	2	12/03/2019 15:11	MFS	672572

CAS#	Parameter	Result	LOQ	Units
GCSV-02-31	Aliphatic >C16-C35	58.3	11.8	mg/kg

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
3386-33-2	1-Chlorooctadecane	3.92	1.64	mg/kg	42	40 - 140

H-15 6-8'

Collect Date	11/19/2019 11:20	**LAB ID**	21911231302
Receive Date	11/22/2019 16:30	**Matrix**	Solid

MADEP VPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1000	11/25/2019 16:56	JAR	672144

CAS#	Parameter	Result	LOQ	Units
GCSV-02-10	Aliphatic >C8-C10	129	22.5	mg/kg

Sample Results

H-15 6-8'	**Collect Date**	11/19/2019 11:20	**LAB ID**	21911231302
	Receive Date	11/22/2019 16:30	**Matrix**	Solid

MADEP VPH Revision 1.1 (LA) (Continued)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1000	11/25/2019 16:56	JAR	672144

CAS#	Parameter	Result	LOQ	Units
GCSV-02-30	Aliphatic C6-C8	42.2	22.5	mg/kg

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
615-59-8	2,5-Dibromotoluene	37.50	34.1	mg/kg	91	60 - 140

MADEP VPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1000	11/25/2019 16:56	JAR	672143

CAS#	Parameter	Result	LOQ	Units
GCSV-02-14	Aromatic >C8-C10	34.0	22.5	mg/kg

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
615-59-8	2,5-Dibromotoluene	37.50	38.8	mg/kg	104	60 - 140

MADEP EPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
11/25/2019 10:45	672062	MADEP EPH Revision 1.1 (LA)	1	12/02/2019 16:28	MFS	672488

CAS#	Parameter	Result	LOQ	Units
GCSV-02-11	Aliphatic >C10-C12	19.2	6.00	mg/kg

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
3386-33-2	1-Chlorooctadecane	4	2.61	mg/kg	65	40 - 140

MADEP EPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
11/25/2019 10:45	672062	MADEP EPH Revision 1.1 (LA)	1	12/02/2019 16:28	MFS	672478

CAS#	Parameter	Result	LOQ	Units
GCSV-05-18	Aromatic >C21-C35	9.71	6.00	mg/kg
GCSV-02-15	Unadjusted >C10-C12 Aromatics	ND	6.00	mg/kg

Sample Results

H-15 6-8'

Collect Date	11/19/2019 11:20	**LAB ID**	21911231302
Receive Date	11/22/2019 16:30	**Matrix**	Solid

MADEP EPH Revision 1.1 (LA) (Continued)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
11/25/2019 10:45	672062	MADEP EPH Revision 1.1 (LA) (Continued)	1	12/02/2019 16:28	MFS	672478

CAS#	Parameter	Result	LOQ	Units
GCSV-02-16	Unadjusted >C12-C16 Aromatics	7.27	6.00	mg/kg
GCSV-02-17	Unadjusted >C16-C21 Aromatics	ND	6.00	mg/kg

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
84-15-1	o-Terphenyl	4	2.47	mg/kg	62	40 - 140
580-13-2	2-Bromonaphthalene	4	1.76	mg/kg	44	40 - 140
321-60-8	2-Fluorobiphenyl	4	4.87	mg/kg	122	40 - 140

MADEP EPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
11/25/2019 10:45	672062	MADEP EPH Revision 1.1 (LA)	5	12/03/2019 15:30	MFS	672572

CAS#	Parameter	Result	LOQ	Units
GCSV-02-12	Aliphatic >C12-C16	87.3	30.0	mg/kg
GCSV-02-31	Aliphatic >C16-C35	142	30.0	mg/kg

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
3386-33-2	1-Chlorooctadecane	4	3.02	mg/kg	76	40 - 140

H-15 8-10'

Collect Date	11/19/2019 11:25	**LAB ID**	21911231303
Receive Date	11/22/2019 16:30	**Matrix**	Solid

MADEP VPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1000	11/25/2019 17:25	JAR	672144

CAS#	Parameter	Result	LOQ	Units
GCSV-02-10	Aliphatic >C8-C10	74.1	30.1	mg/kg
GCSV-02-30	Aliphatic C6-C8	ND	30.1	mg/kg

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
615-59-8	2,5-Dibromotoluene	50.10	41	mg/kg	82	60 - 140

Sample Results

H-15 8-10'	**Collect Date**	11/19/2019 11:25	**LAB ID**	21911231303
	Receive Date	11/22/2019 16:30	**Matrix**	Solid

MADEP VPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1000	11/25/2019 17:25	JAR	672143

CAS#	Parameter	Result	LOQ	Units
GCSV-02-14	Aromatic >C8-C10	ND	30.1	mg/kg

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
615-59-8	2,5-Dibromotoluene	50.10	46.9	mg/kg	94	60 - 140

MADEP EPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
11/25/2019 10:45	672062	MADEP EPH Revision 1.1 (LA)	1	11/27/2019 20:29	MFS	672456

CAS#	Parameter	Result	LOQ	Units
GCSV-02-11	Aliphatic >C10-C12	35.4	5.88	mg/kg

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
3386-33-2	1-Chlorooctadecane	3.92	3.28	mg/kg	84	40 - 140

MADEP EPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
11/25/2019 10:45	672062	MADEP EPH Revision 1.1 (LA)	1	11/27/2019 20:29	MFS	672449

CAS#	Parameter	Result	LOQ	Units
GCSV-05-18	Aromatic >C21-C35	25.8	5.88	mg/kg
GCSV-02-15	Unadjusted >C10-C12 Aromatics	ND	5.88	mg/kg
GCSV-02-16	Unadjusted >C12-C16 Aromatics	19.6	5.88	mg/kg
GCSV-02-17	Unadjusted >C16-C21 Aromatics	9.95	5.88	mg/kg

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
84-15-1	o-Terphenyl	3.92	4.71	mg/kg	120	40 - 140
580-13-2	2-Bromonaphthalene	3.92	2.84	mg/kg	72	40 - 140
321-60-8	2-Fluorobiphenyl	3.92	5.38	mg/kg	137	40 - 140

Sample Results

H-15 8-10'

Collect Date	11/19/2019 11:25	LAB ID	21911231303
Receive Date	11/22/2019 16:30	Matrix	Solid

MADEP EPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
11/25/2019 10:45	672062	MADEP EPH Revision 1.1 (LA)	10	12/02/2019 15:23	MFS	672488

CAS#	Parameter	Result	LOQ	Units
GCSV-02-12	Aliphatic >C12-C16	173	58.8	mg/kg
GCSV-02-31	Aliphatic >C16-C35	187	58.8	mg/kg

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
3386-33-2	1-Chlorooctadecane	3.92	Diluted Out	mg/kg	0*	40 - 140

H-15 10-12'

Collect Date	11/19/2019 11:30	LAB ID	21911231304
Receive Date	11/22/2019 16:30	Matrix	Solid

MADEP VPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1000	11/25/2019 17:54	JAR	672144

CAS#	Parameter	Result	LOQ	Units
GCSV-02-10	Aliphatic >C8-C10	ND	25.8	mg/kg
GCSV-02-30	Aliphatic C6-C8	ND	25.8	mg/kg

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
615-59-8	2,5-Dibromotoluene	43	33	mg/kg	77	60 - 140

MADEP VPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1000	11/25/2019 17:54	JAR	672143

CAS#	Parameter	Result	LOQ	Units
GCSV-02-14	Aromatic >C8-C10	ND	25.8	mg/kg

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
615-59-8	2,5-Dibromotoluene	43	38.2	mg/kg	89	60 - 140

Sample Results

H-15 10-12'				
	Collect Date	11/19/2019 11:30	**LAB ID**	21911231304
	Receive Date	11/22/2019 16:30	**Matrix**	Solid

MADEP EPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
11/25/2019 10:45	672062	MADEP EPH Revision 1.1 (LA)	1	12/02/2019 16:48	MFS	672488

CAS#	Parameter	Result	LOQ	Units
GCSV-02-11	Aliphatic >C10-C12	12.8	5.88	mg/kg
GCSV-02-31	Aliphatic >C16-C35	30.2	5.88	mg/kg

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
3386-33-2	1-Chlorooctadecane	3.92	2.17	mg/kg	55	40 - 140

MADEP EPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
11/25/2019 10:45	672062	MADEP EPH Revision 1.1 (LA)	1	12/02/2019 16:48	MFS	672478

CAS#	Parameter	Result	LOQ	Units
GCSV-05-18	Aromatic >C21-C35	10.3	5.88	mg/kg
GCSV-02-15	Unadjusted >C10-C12 Aromatics	ND	5.88	mg/kg
GCSV-02-16	Unadjusted >C12-C16 Aromatics	ND	5.88	mg/kg
GCSV-02-17	Unadjusted >C16-C21 Aromatics	ND	5.88	mg/kg

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
84-15-1	o-Terphenyl	3.92	1.85	mg/kg	47	40 - 140
580-13-2	2-Bromonaphthalene	3.92	2.16	mg/kg	55	40 - 140
321-60-8	2-Fluorobiphenyl	3.92	3.76	mg/kg	96	40 - 140

MADEP EPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
11/25/2019 10:45	672062	MADEP EPH Revision 1.1 (LA)	2	12/03/2019 15:50	MFS	672572

CAS#	Parameter	Result	LOQ	Units
GCSV-02-12	Aliphatic >C12-C16	45.7	11.8	mg/kg

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
3386-33-2	1-Chlorooctadecane	3.92	2.35	mg/kg	60	40 - 140

Sample Results

H-15 12-14'				
	Collect Date	11/19/2019 11:35	LAB ID	21911231305
	Receive Date	11/22/2019 16:30	Matrix	Solid

MADEP VPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1000	11/25/2019 18:24	JAR	672144

CAS#	Parameter	Result	LOQ	Units
GCSV-02-10	Aliphatic >C8-C10	ND	25.1	mg/kg
GCSV-02-30	Aliphatic C6-C8	ND	25.1	mg/kg

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
615-59-8	2,5-Dibromotoluene	41.80	32.9	mg/kg	79	60 - 140

MADEP VPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1000	11/25/2019 18:24	JAR	672143

CAS#	Parameter	Result	LOQ	Units
GCSV-02-14	Aromatic >C8-C10	ND	25.1	mg/kg

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
615-59-8	2,5-Dibromotoluene	41.80	37.2	mg/kg	89	60 - 140

MADEP EPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
11/25/2019 10:45	672062	MADEP EPH Revision 1.1 (LA)	1	12/02/2019 17:07	MFS	672488

CAS#	Parameter	Result	LOQ	Units
GCSV-02-11	Aliphatic >C10-C12	ND	5.83	mg/kg
GCSV-02-12	Aliphatic >C12-C16	ND	5.83	mg/kg
GCSV-02-31	Aliphatic >C16-C35	ND	5.83	mg/kg

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
3386-33-2	1-Chlorooctadecane	3.88	1.94	mg/kg	50	40 - 140

Sample Results

H-15 12-14'

Collect Date	11/19/2019 11:35	**LAB ID**	21911231305
Receive Date	11/22/2019 16:30	**Matrix**	Solid

MADEP EPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
11/25/2019 10:45	672062	MADEP EPH Revision 1.1 (LA)	1	12/02/2019 17:07	MFS	672478

CAS#	Parameter	Result	LOQ	Units
GCSV-05-18	Aromatic >C21-C35	7.35	5.83	mg/kg
GCSV-02-15	Unadjusted >C10-C12 Aromatics	ND	5.83	mg/kg
GCSV-02-16	Unadjusted >C12-C16 Aromatics	6.87	5.83	mg/kg
GCSV-02-17	Unadjusted >C16-C21 Aromatics	ND	5.83	mg/kg

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
84-15-1	o-Terphenyl	3.88	1.96	mg/kg	50	40 - 140
580-13-2	2-Bromonaphthalene	3.88	2.13	mg/kg	55	40 - 140
321-60-8	2-Fluorobiphenyl	3.88	4.89	mg/kg	126	40 - 140

H-16 10-12'

Collect Date	11/20/2019 08:50	**LAB ID**	21911231306
Receive Date	11/22/2019 16:30	**Matrix**	Solid

MADEP VPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1000	11/25/2019 18:53	JAR	672144

CAS#	Parameter	Result	LOQ	Units
GCSV-02-10	Aliphatic >C8-C10	ND	23.6	mg/kg
GCSV-02-30	Aliphatic C6-C8	ND	23.6	mg/kg

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
615-59-8	2,5-Dibromotoluene	39.40	24.1	mg/kg	61	60 - 140

MADEP VPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1000	11/25/2019 18:53	JAR	672143

CAS#	Parameter	Result	LOQ	Units
GCSV-02-14	Aromatic >C8-C10	ND	23.6	mg/kg

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
615-59-8	2,5-Dibromotoluene	39.40	25	mg/kg	64	60 - 140

Sample Results

H-16 10-12'

Collect Date	11/20/2019 08:50	LAB ID	21911231306
Receive Date	11/22/2019 16:30	Matrix	Solid

MADEP EPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
11/25/2019 10:45	672062	MADEP EPH Revision 1.1 (LA)	1	12/03/2019 12:28	MFS	672571

CAS#	Parameter	Result	LOQ	Units
GCSV-05-18	Aromatic >C21-C35	ND	5.88	mg/kg
GCSV-02-15	Unadjusted >C10-C12 Aromatics	ND	5.88	mg/kg
GCSV-02-16	Unadjusted >C12-C16 Aromatics	ND	5.88	mg/kg
GCSV-02-17	Unadjusted >C16-C21 Aromatics	ND	5.88	mg/kg

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
84-15-1	o-Terphenyl	3.92	1.75	mg/kg	45	40 - 140
580-13-2	2-Bromonaphthalene	3.92	6.48	mg/kg	165*	40 - 140
321-60-8	2-Fluorobiphenyl	3.92	6.71	mg/kg	171*	40 - 140

MADEP EPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
11/25/2019 10:45	672062	MADEP EPH Revision 1.1 (LA)	1	12/03/2019 12:28	MFS	672572

CAS#	Parameter	Result	LOQ	Units
GCSV-02-11	Aliphatic >C10-C12	ND	5.88	mg/kg
GCSV-02-12	Aliphatic >C12-C16	ND	5.88	mg/kg
GCSV-02-31	Aliphatic >C16-C35	ND	5.88	mg/kg

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
3386-33-2	1-Chlorooctadecane	3.92	1.59	mg/kg	41	40 - 140

H-16 14-16'

Collect Date	11/20/2019 09:00	LAB ID	21911231307
Receive Date	11/22/2019 16:30	Matrix	Solid

MADEP VPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1000	11/26/2019 10:56	JAR	672144

CAS#	Parameter	Result	LOQ	Units
GCSV-02-10	Aliphatic >C8-C10	ND	26.5	mg/kg

Sample Results

H-16 14-16'	Collect Date	11/20/2019 09:00	LAB ID	21911231307
	Receive Date	11/22/2019 16:30	Matrix	Solid

MADEP VPH Revision 1.1 (LA) (Continued)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1000	11/26/2019 10:56	JAR	672144

CAS#	Parameter	Result	LOQ	Units
GCSV-02-30	Aliphatic C6-C8	26.8	26.5	mg/kg

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
615-59-8	2,5-Dibromotoluene	44.20	44	mg/kg	99	60 - 140

MADEP VPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1000	11/26/2019 10:56	JAR	672143

CAS#	Parameter	Result	LOQ	Units
GCSV-02-14	Aromatic >C8-C10	ND	26.5	mg/kg

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
615-59-8	2,5-Dibromotoluene	44.20	50.7	mg/kg	115	60 - 140

MADEP EPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
11/25/2019 10:45	672062	MADEP EPH Revision 1.1 (LA)	1	12/02/2019 17:46	MFS	672488

CAS#	Parameter	Result	LOQ	Units
GCSV-02-11	Aliphatic >C10-C12	ND	5.88	mg/kg
GCSV-02-12	Aliphatic >C12-C16	ND	5.88	mg/kg
GCSV-02-31	Aliphatic >C16-C35	ND	5.88	mg/kg

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
3386-33-2	1-Chlorooctadecane	3.92	2.25	mg/kg	57	40 - 140

Sample Results

H-16 14-16'

Collect Date	11/20/2019 09:00	LAB ID	21911231307
Receive Date	11/22/2019 16:30	Matrix	Solid

MADEP EPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
11/25/2019 10:45	672062	MADEP EPH Revision 1.1 (LA)	1	12/02/2019 17:46	MFS	672478

CAS#	Parameter	Result	LOQ	Units
GCSV-05-18	Aromatic >C21-C35	ND	5.88	mg/kg
GCSV-02-15	Unadjusted >C10-C12 Aromatics	ND	5.88	mg/kg
GCSV-02-16	Unadjusted >C12-C16 Aromatics	ND	5.88	mg/kg
GCSV-02-17	Unadjusted >C16-C21 Aromatics	ND	5.88	mg/kg

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
84-15-1	o-Terphenyl	3.92	2.24	mg/kg	57	40 - 140
580-13-2	2-Bromonaphthalene	3.92	5.82	mg/kg	148*	40 - 140
321-60-8	2-Fluorobiphenyl	3.92	6.9	mg/kg	176*	40 - 140

H-17 4-6'

Collect Date	11/20/2019 14:20	LAB ID	21911231308
Receive Date	11/22/2019 16:30	Matrix	Solid

MADEP VPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1000	11/25/2019 19:51	JAR	672144

CAS#	Parameter	Result	LOQ	Units
GCSV-02-10	Aliphatic >C8-C10	28.7	22.5	mg/kg
GCSV-02-30	Aliphatic C6-C8	ND	22.5	mg/kg

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
615-59-8	2,5-Dibromotoluene	37.50	29.1	mg/kg	78	60 - 140

MADEP VPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1000	11/25/2019 19:51	JAR	672143

CAS#	Parameter	Result	LOQ	Units
GCSV-02-14	Aromatic >C8-C10	ND	22.5	mg/kg

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
615-59-8	2,5-Dibromotoluene	37.50	30.9	mg/kg	82	60 - 140

Sample Results

H-17 4-6'	**Collect Date**	11/20/2019 14:20	**LAB ID**	21911231308
	Receive Date	11/22/2019 16:30	**Matrix**	Solid

MADEP EPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
12/04/2019 11:15	672621	MADEP EPH Revision 1.1 (LA)	1	12/06/2019 16:44	MFS	672849

CAS#	Parameter	Result	LOQ	Units
GCSV-05-18	Aromatic >C21-C35	ND	5.88	mg/kg
GCSV-02-15	Unadjusted >C10-C12 Aromatics	ND	5.88	mg/kg
GCSV-02-16	Unadjusted >C12-C16 Aromatics	7.51	5.88	mg/kg
GCSV-02-17	Unadjusted >C16-C21 Aromatics	ND	5.88	mg/kg

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
84-15-1	o-Terphenyl	3.92	1.98	mg/kg	50	40 - 140
580-13-2	2-Bromonaphthalene	3.92	3.94	mg/kg	100	40 - 140
321-60-8	2-Fluorobiphenyl	3.92	3.2	mg/kg	82	40 - 140

MADEP EPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
12/04/2019 11:15	672621	MADEP EPH Revision 1.1 (LA)	1	12/06/2019 16:44	MFS	672850

CAS#	Parameter	Result	LOQ	Units
GCSV-02-11	Aliphatic >C10-C12	11.0	5.88	mg/kg

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
3386-33-2	1-Chlorooctadecane	3.92	1.55	mg/kg	40	40 - 140

MADEP EPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
12/04/2019 11:15	672621	MADEP EPH Revision 1.1 (LA)	2	12/07/2019 11:48	MFS	672924

CAS#	Parameter	Result	LOQ	Units
GCSV-02-12	Aliphatic >C12-C16	59.2	11.8	mg/kg
GCSV-02-31	Aliphatic >C16-C35	44.7	11.8	mg/kg

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
3386-33-2	1-Chlorooctadecane	3.92	1.69	mg/kg	43	40 - 140

Sample Results

H-17 6-8'	**Collect Date**	11/20/2019 14:25	**LAB ID**	21911231309
	Receive Date	11/22/2019 16:30	**Matrix**	Solid

MADEP VPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1000	11/25/2019 20:21	JAR	672144

CAS#	Parameter	Result	LOQ	Units
GCSV-02-10	Aliphatic >C8-C10	79.3	22.7	mg/kg
GCSV-02-30	Aliphatic C6-C8	ND	22.7	mg/kg

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
615-59-8	2,5-Dibromotoluene	37.80	28.2	mg/kg	75	60 - 140

MADEP VPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1000	11/25/2019 20:21	JAR	672143

CAS#	Parameter	Result	LOQ	Units
GCSV-02-14	Aromatic >C8-C10	ND	22.7	mg/kg

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
615-59-8	2,5-Dibromotoluene	37.80	32.6	mg/kg	86	60 - 140

MADEP EPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
12/04/2019 11:15	672621	MADEP EPH Revision 1.1 (LA)	1	12/05/2019 16:44	MFS	672839

CAS#	Parameter	Result	LOQ	Units
GCSV-05-18	Aromatic >C21-C35	ND	6.00	mg/kg
GCSV-02-15	Unadjusted >C10-C12 Aromatics	ND	6.00	mg/kg
GCSV-02-16	Unadjusted >C12-C16 Aromatics	10.3	6.00	mg/kg
GCSV-02-17	Unadjusted >C16-C21 Aromatics	ND	6.00	mg/kg

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
84-15-1	o-Terphenyl	4	2.62	mg/kg	66	40 - 140
580-13-2	2-Bromonaphthalene	4	5.41	mg/kg	135	40 - 140
321-60-8	2-Fluorobiphenyl	4	4.39	mg/kg	110	40 - 140

Sample Results

H-17 6-8'

Collect Date	11/20/2019 14:25	**LAB ID**	21911231309
Receive Date	11/22/2019 16:30	**Matrix**	Solid

MADEP EPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
12/04/2019 11:15	672621	MADEP EPH Revision 1.1 (LA)	1	12/05/2019 16:44	MFS	672840

CAS#	Parameter	Result	LOQ	Units
GCSV-02-11	Aliphatic >C10-C12	8.00	6.00	mg/kg
GCSV-02-12	Aliphatic >C12-C16	29.9	6.00	mg/kg
GCSV-02-31	Aliphatic >C16-C35	27.5	6.00	mg/kg

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
3386-33-2	1-Chlorooctadecane	4	2.39	mg/kg	60	40 - 140

H-17 8-10'

Collect Date	11/20/2019 14:30	**LAB ID**	21911231310
Receive Date	11/22/2019 16:30	**Matrix**	Solid

MADEP VPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1000	11/25/2019 20:50	JAR	672144

CAS#	Parameter	Result	LOQ	Units
GCSV-02-10	Aliphatic >C8-C10	44.4	23.3	mg/kg
GCSV-02-30	Aliphatic C6-C8	38.8	23.3	mg/kg

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
615-59-8	2,5-Dibromotoluene	38.80	33.5	mg/kg	86	60 - 140

MADEP VPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1000	11/25/2019 20:50	JAR	672143

CAS#	Parameter	Result	LOQ	Units
GCSV-02-14	Aromatic >C8-C10	ND	23.3	mg/kg

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
615-59-8	2,5-Dibromotoluene	38.80	38.4	mg/kg	99	60 - 140

Sample Results

H-17 8-10'

Collect Date	11/20/2019 14:30	LAB ID	21911231310
Receive Date	11/22/2019 16:30	Matrix	Solid

MADEP EPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
11/25/2019 10:45	672062	MADEP EPH Revision 1.1 (LA)	1	11/27/2019 23:07	MFS	672456

CAS#	Parameter	Result	LOQ	Units
GCSV-02-11	Aliphatic >C10-C12	ND	5.83	mg/kg
GCSV-02-12	Aliphatic >C12-C16	20.0	5.83	mg/kg
GCSV-02-31	Aliphatic >C16-C35	14.0	5.83	mg/kg

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
3386-33-2	1-Chlorooctadecane	3.88	3.23	mg/kg	83	40 - 140

MADEP EPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
11/25/2019 10:45	672062	MADEP EPH Revision 1.1 (LA)	1	11/27/2019 23:07	MFS	672449

CAS#	Parameter	Result	LOQ	Units
GCSV-05-18	Aromatic >C21-C35	ND	5.83	mg/kg
GCSV-02-15	Unadjusted >C10-C12 Aromatics	ND	5.83	mg/kg
GCSV-02-16	Unadjusted >C12-C16 Aromatics	ND	5.83	mg/kg
GCSV-02-17	Unadjusted >C16-C21 Aromatics	ND	5.83	mg/kg

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
84-15-1	o-Terphenyl	3.88	2.29	mg/kg	59	40 - 140
580-13-2	2-Bromonaphthalene	3.88	4.03	mg/kg	104	40 - 140
321-60-8	2-Fluorobiphenyl	3.88	3.72	mg/kg	96	40 - 140

H-17 10-12'

Collect Date	11/20/2019 14:35	LAB ID	21911231311
Receive Date	11/22/2019 16:30	Matrix	Solid

MADEP VPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1000	11/25/2019 21:19	JAR	672144

CAS#	Parameter	Result	LOQ	Units
GCSV-02-10	Aliphatic >C8-C10	ND	26.2	mg/kg

Sample Results

H-17 10-12'	Collect Date	11/20/2019 14:35	LAB ID	21911231311
	Receive Date	11/22/2019 16:30	Matrix	Solid

MADEP VPH Revision 1.1 (LA) (Continued)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1000	11/25/2019 21:19	JAR	672144

CAS#	Parameter	Result	LOQ	Units
GCSV-02-30	Aliphatic C6-C8	ND	26.2	mg/kg

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
615-59-8	2,5-Dibromotoluene	43.60	34.2	mg/kg	78	60 - 140

MADEP VPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1000	11/25/2019 21:19	JAR	672143

CAS#	Parameter	Result	LOQ	Units
GCSV-02-14	Aromatic >C8-C10	ND	26.2	mg/kg

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
615-59-8	2,5-Dibromotoluene	43.60	38.8	mg/kg	89	60 - 140

MADEP EPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
11/25/2019 10:45	672062	MADEP EPH Revision 1.1 (LA)	1	11/27/2019 23:27	MFS	672456

CAS#	Parameter	Result	LOQ	Units
GCSV-02-11	Aliphatic >C10-C12	ND	5.71	mg/kg
GCSV-02-12	Aliphatic >C12-C16	10.9	5.71	mg/kg
GCSV-02-31	Aliphatic >C16-C35	ND	5.71	mg/kg

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
3386-33-2	1-Chlorooctadecane	3.81	1.78	mg/kg	47	40 - 140

Sample Results

H-17 10-12'

Collect Date	11/20/2019 14:35	**LAB ID**	21911231311
Receive Date	11/22/2019 16:30	**Matrix**	Solid

MADEP EPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
11/25/2019 10:45	672062	MADEP EPH Revision 1.1 (LA)	1	11/27/2019 23:27	MFS	672449

CAS#	Parameter	Result	LOQ	Units
GCSV-05-18	Aromatic >C21-C35	ND	5.71	mg/kg
GCSV-02-15	Unadjusted >C10-C12 Aromatics	ND	5.71	mg/kg
GCSV-02-16	Unadjusted >C12-C16 Aromatics	ND	5.71	mg/kg
GCSV-02-17	Unadjusted >C16-C21 Aromatics	ND	5.71	mg/kg

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
84-15-1	o-Terphenyl	3.81	3.04	mg/kg	80	40 - 140
580-13-2	2-Bromonaphthalene	3.81	4.55	mg/kg	119	40 - 140
321-60-8	2-Fluorobiphenyl	3.81	4.3	mg/kg	113	40 - 140

H-17 12-14'

Collect Date	11/20/2019 14:40	**LAB ID**	21911231312
Receive Date	11/22/2019 16:30	**Matrix**	Solid

MADEP VPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1000	11/26/2019 11:25	JAR	672144

CAS#	Parameter	Result	LOQ	Units
GCSV-02-10	Aliphatic >C8-C10	ND	28.9	mg/kg
GCSV-02-30	Aliphatic C6-C8	ND	28.9	mg/kg

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
615-59-8	2,5-Dibromotoluene	48.20	42.5	mg/kg	88	60 - 140

MADEP VPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1000	11/26/2019 11:25	JAR	672143

CAS#	Parameter	Result	LOQ	Units
GCSV-02-14	Aromatic >C8-C10	ND	28.9	mg/kg

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
615-59-8	2,5-Dibromotoluene	48.20	48.5	mg/kg	101	60 - 140

Sample Results

H-17 12-14'

Collect Date	11/20/2019 14:40	**LAB ID**	21911231312
Receive Date	11/22/2019 16:30	**Matrix**	Solid

MADEP EPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
11/25/2019 10:45	672062	MADEP EPH Revision 1.1 (LA)	1	11/27/2019 23:46	MFS	672456

CAS#	Parameter	Result	LOQ	Units
GCSV-02-11	Aliphatic >C10-C12	ND	6.00	mg/kg
GCSV-02-12	Aliphatic >C12-C16	ND	6.00	mg/kg
GCSV-02-31	Aliphatic >C16-C35	ND	6.00	mg/kg

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
3386-33-2	1-Chlorooctadecane	4	2.2	mg/kg	55	40 - 140

MADEP EPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
11/25/2019 10:45	672062	MADEP EPH Revision 1.1 (LA)	1	11/27/2019 23:46	MFS	672449

CAS#	Parameter	Result	LOQ	Units
GCSV-05-18	Aromatic >C21-C35	ND	6.00	mg/kg
GCSV-02-15	Unadjusted >C10-C12 Aromatics	ND	6.00	mg/kg
GCSV-02-16	Unadjusted >C12-C16 Aromatics	ND	6.00	mg/kg
GCSV-02-17	Unadjusted >C16-C21 Aromatics	ND	6.00	mg/kg

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
84-15-1	o-Terphenyl	4	2.03	mg/kg	51	40 - 140
580-13-2	2-Bromonaphthalene	4	3.83	mg/kg	96	40 - 140
321-60-8	2-Fluorobiphenyl	4	3.59	mg/kg	90	40 - 140

H-17 14-16'

Collect Date	11/20/2019 14:45	**LAB ID**	21911231313
Receive Date	11/22/2019 16:30	**Matrix**	Solid

MADEP VPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1000	11/25/2019 22:17	JAR	672144

CAS#	Parameter	Result	LOQ	Units
GCSV-02-10	Aliphatic >C8-C10	ND	25.3	mg/kg

Sample Results

H-17 14-16'	Collect Date	11/20/2019 14:45	LAB ID	21911231313
	Receive Date	11/22/2019 16:30	Matrix	Solid

MADEP VPH Revision 1.1 (LA) (Continued)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1000	11/25/2019 22:17	JAR	672144

CAS#	Parameter	Result	LOQ	Units
GCSV-02-30	Aliphatic C6-C8	ND	25.3	mg/kg

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
615-59-8	2,5-Dibromotoluene	42.20	26.5	mg/kg	63	60 - 140

MADEP VPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1000	11/25/2019 22:17	JAR	672143

CAS#	Parameter	Result	LOQ	Units
GCSV-02-14	Aromatic >C8-C10	ND	25.3	mg/kg

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
615-59-8	2,5-Dibromotoluene	42.20	30.4	mg/kg	72	60 - 140

MADEP EPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
11/25/2019 10:45	672062	MADEP EPH Revision 1.1 (LA)	1	11/28/2019 00:06	MFS	672456

CAS#	Parameter	Result	LOQ	Units
GCSV-02-11	Aliphatic >C10-C12	ND	6.00	mg/kg
GCSV-02-12	Aliphatic >C12-C16	ND	6.00	mg/kg
GCSV-02-31	Aliphatic >C16-C35	ND	6.00	mg/kg

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
3386-33-2	1-Chlorooctadecane	4	2.02	mg/kg	51	40 - 140

Sample Results

H-17 14-16'	**Collect Date**	11/20/2019 14:45	**LAB ID**	21911231313
	Receive Date	11/22/2019 16:30	**Matrix**	Solid

MADEP EPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
11/25/2019 10:45	672062	MADEP EPH Revision 1.1 (LA)	1	11/28/2019 00:06	MFS	672449

CAS#	Parameter	Result	LOQ	Units
GCSV-05-18	Aromatic >C21-C35	ND	6.00	mg/kg
GCSV-02-15	Unadjusted >C10-C12 Aromatics	ND	6.00	mg/kg
GCSV-02-16	Unadjusted >C12-C16 Aromatics	ND	6.00	mg/kg
GCSV-02-17	Unadjusted >C16-C21 Aromatics	ND	6.00	mg/kg

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
84-15-1	o-Terphenyl	4	3.22	mg/kg	81	40 - 140
580-13-2	2-Bromonaphthalene	4	4.84	mg/kg	121	40 - 140
321-60-8	2-Fluorobiphenyl	4	4.66	mg/kg	117	40 - 140

GC Volatiles QC Summary

Analytical Batch 672143	Client ID	MB672143		LCS672143				LCSD672143				
	LAB ID	1986128		1986129				1986130				
	Sample Type	MB		LCS				LCSD				
	Prep Date	NA		NA				NA				
	Analysis Date	11/25/2019 15:07		11/25/2019 13:10				11/25/2019 13:39				
	Matrix	Solid		Solid				Solid				
MADEP VPH Revision 1.1 (LA)		Units Result	mg/kg LOQ	Spike Added	Result	%R	Control Limits%R	Spike Added	Result	%R	RPD	RPD Limit
Aromatic >C8-C10	GCSV-02-14	ND	1.50	7.50	8.58	114	60 - 140	7.50	8.21	109	4	30
Surrogate												
2,5-Dibromotoluene	615-59-8	2.36	94	2.5	2.57	103	60 - 140	2.5	2.74	110	NA	NA

Analytical Batch 672144	Client ID	MB672144		LCS672144				LCSD672144				
	LAB ID	1986131		1986132				1986133				
	Sample Type	MB		LCS				LCSD				
	Prep Date	NA		NA				NA				
	Analysis Date	11/25/2019 15:07		11/25/2019 13:10				11/25/2019 13:39				
	Matrix	Solid		Solid				Solid				
MADEP VPH Revision 1.1 (LA)		Units Result	mg/kg LOQ	Spike Added	Result	%R	Control Limits%R	Spike Added	Result	%R	RPD	RPD Limit
Aliphatic >C8-C10	GCSV-02-10	ND	1.50	5.00	5.23	105	60 - 140	5.00	4.80	96	9	30
Aliphatic C6-C8	GCSV-02-30	ND	1.50	7.50	8.30	111	60 - 140	7.50	6.51	87	24	30
Surrogate												
2,5-Dibromotoluene	615-59-8	2.08	83	2.5	2.75	110	60 - 140	2.5	2.37	95	NA	NA

GC Semi-Volatiles QC Summary

Analytical Batch	Client ID	MB672062		LCS672062				LCSD672062				
672456	LAB ID	1985872		1985873				1985874				
Prep Batch	Sample Type	MB		LCS				LCSD				
672062	Prep Date	11/25/2019 10:45		11/25/2019 10:45				11/25/2019 10:45				
Prep Method	Analysis Date	11/27/2019 18:12		11/27/2019 18:31				11/27/2019 18:51				
MADEP EPH Revision 1.1 (LA)	Matrix	Solid		Solid				Solid				
MADEP EPH Revision 1.1 (LA)		Units Result	mg/kg LOQ	Spike Added	Result	%R	Control Limits%R	Spike Added	Result	%R	RPD	RPD Limit
Aliphatic >C10-C12	GCSV-02-11	ND	6.00	10.0	8.88	89	30 - 140	10.0	12.5	125	34*	25
Aliphatic >C12-C16	GCSV-02-12	ND	6.00	10.0	7.91	79	40 - 140	10.0	10.7	107	30*	25
Aliphatic >C16-C35	GCSV-02-31	ND	6.00	45.0	35.6	79	40 - 140	45.0	46.9	104	27*	25
Surrogate												
1-Chlorooctadecane	3386-33-2	2.73	68	4	2.83	71	40 - 140	4	3.75	94	NA	NA

Analytical Batch	Client ID	MB672621		LCS672621				LCSD672621				
672840	LAB ID	1988362		1988363				1988364				
Prep Batch	Sample Type	MB		LCS				LCSD				
672621	Prep Date	12/04/2019 11:15		12/04/2019 11:15				12/04/2019 11:15				
Prep Method	Analysis Date	12/05/2019 14:47		12/05/2019 15:06				12/05/2019 15:26				
MADEP EPH Revision 1.1 (LA)	Matrix	Solid		Solid				Solid				
MADEP EPH Revision 1.1 (LA)		Units Result	mg/kg LOQ	Spike Added	Result	%R	Control Limits%R	Spike Added	Result	%R	RPD	RPD Limit
Aliphatic >C10-C12	GCSV-02-11	ND	6.00	10.0	6.90	69	30 - 140	10.0	8.83	88	25	25
Aliphatic >C12-C16	GCSV-02-12	ND	6.00	10.0	6.72	67	40 - 140	10.0	8.83	88	27*	25
Aliphatic >C16-C35	GCSV-02-31	ND	6.00	45.0	29.0	64	40 - 140	45.0	37.3	83	25	25
Surrogate												
1-Chlorooctadecane	3386-33-2	1.95	49	4	2.43	61	40 - 140	4	2.42	61	NA	NA

Analytical Batch	Client ID	MB672062		LCS672062				LCSD672062				
672449	LAB ID	1985872		1985873				1985874				
Prep Batch	Sample Type	MB		LCS				LCSD				
672062	Prep Date	11/25/2019 10:45		11/25/2019 10:45				11/25/2019 10:45				
Prep Method	Analysis Date	11/27/2019 18:12		12/02/2019 12:45				12/02/2019 15:23				
MADEP EPH Revision 1.1 (LA)	Matrix	Solid		Solid				Solid				
MADEP EPH Revision 1.1 (LA)		Units Result	mg/kg LOQ	Spike Added	Result	%R	Control Limits%R	Spike Added	Result	%R	RPD	RPD Limit
Aromatic >C21-C35	GCSV-05-18	ND	6.00	50.0	24.1	48	40 - 140	50.0	24.4	49	1	25
Unadjusted >C10-C12 Aromatics	GCSV-02-15	ND	6.00	5.00	2.49	50	30 - 140	5.00	2.45	49	2	25
Unadjusted >C12-C16 Aromatics	GCSV-02-16	ND	6.00	20.0	9.94	50	40 - 140	20.0	9.65	48	3	25
Unadjusted >C16-C21 Aromatics	GCSV-02-17	ND	6.00	10.0	5.23	52	40 - 140	10.0	5.16	52	1	25
Surrogate												
2-Bromonaphthalene	580-13-2	2.5	63	4	3.79	95	40 - 140	4	3.63	91	NA	NA
2-Fluorobiphenyl	321-60-8	3.9	98	4	3.37	84	40 - 140	4	3.26	82	NA	NA
o-Terphenyl	84-15-1	2.37	59	4	1.68	42	40 - 140	4	1.66	42	NA	NA

Analytical Batch	Client ID	MB672621		LCS672621				LCSD672621				
672839	LAB ID	1988362		1988363				1988364				
Prep Batch	Sample Type	MB		LCS				LCSD				
672621	Prep Date	12/04/2019 11:15		12/04/2019 11:15				12/04/2019 11:15				
Prep Method	Analysis Date	12/05/2019 14:47		12/05/2019 15:06				12/05/2019 15:26				
MADEP EPH Revision 1.1 (LA)	Matrix	Solid		Solid				Solid				
MADEP EPH Revision 1.1 (LA)		Units Result	mg/kg LOQ	Spike Added	Result	%R	Control Limits%R	Spike Added	Result	%R	RPD	RPD Limit
Aromatic >C21-C35	GCSV-05-18	ND	6.00	50.0	33.8	68	40 - 140	50.0	33.2	66	2	25
Unadjusted >C10-C12 Aromatics	GCSV-02-15	ND	6.00	5.00	4.72	94	30 - 140	5.00	2.91	58	47*	25
Unadjusted >C12-C16 Aromatics	GCSV-02-16	ND	6.00	20.0	15.8	79	40 - 140	20.0	12.7	64	22	25
Unadjusted >C16-C21 Aromatics	GCSV-02-17	ND	6.00	10.0	7.76	78	40 - 140	10.0	6.79	68	13	25
Surrogate												
2-Bromonaphthalene	580-13-2	3.97	99	4	4.85	121	40 - 140	4	3.5	88	NA	NA
2-Fluorobiphenyl	321-60-8	3.47	87	4	4.33	108	40 - 140	4	3	75	NA	NA
o-Terphenyl	84-15-1	2.11	53	4	2.44	61	40 - 140	4	1.98	50	NA	NA

GCAL ANALYTICAL LABORATORIES, LLC

7979 Innovation Park Dr., Baton Rouge, LA 70820-7402
Phone: 225.769.4900 • Fax: 225.767.5717 • www.gcal.com

CHAIN OF CUSTODY RECORD

Client ID: 4271 - ERM
SDG: 219112313
PM: AMK

Report to:	**Bill to:**
Client: ERM	Client: SAME
Address: 840 W. Sam Houston Pkwy N. #600 Houston, TX 77024	Address:
Contact: DAVE ANGLE	Contact:
Phone: 832-786-4781	Phone:
E-mail: DAVID.ANGLE@ERM.COM	E-mail:

P.O. Number

Project Name/Number: HENNING MANAGEMENT / 0526033

Sampled By: SHANON WIGGINS

Analytical Requests & Method: VPH, EPH

GCAL use only:
Custody Seal used ☐ yes ☑ no
intact ☐ yes ☐ no EBJ
Temperature °C 2.6, 1.5
41, 28 CRM

☐ Dissolved Analysis Requested
☐ Field filtered
☐ Lab filtered

Matrix[1]	Date	Time (2400)	Comp	Grab	Sample Description	No Containers	VPH	EPH	Preservative
S	11/19/19	1115		X	H-15 4-6'	S	X	X	1
		1120			H-15 6-8'		X	X	2
		1125			H-15 8-10'		X	X	3
		1130			H-15 10-12'		X	X	4
		1135			H-15 12-14'		X	X	5
	11/20/19	0850			H-16 10-12'		X	X	6
		0900			H-16 14-16'		X	X	7
		1420			H-17 4-6'		X	X	8
		1425			H-17 6-8'		X	X	9
		1430			H-17 8-10'		X	X	10
		1435			H-17 10-12'		X	X	11
		1440			H-17 12-14'		X	X	12
		1445			H-17 14-16'		X	X	13

Air Bill No:

Turn Around Time (Business Days): ☐ 24h* ☐ 48h* ☐ 3 days* ☐ 1 week* ☑ Standard (Per Contract/Quote)

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
	11/22/19	1155	PACE GC	11/22	1115
	11/22/19	1630		11/22/19	1630

Note:

By submitting these samples, you agree to GCAL's terms and conditions contained in our most recent schedule of services.

Matrix[1]: W = water, S = solid, L = liquid, T = tissue

*Requires prior approval, rush charges may apply.

We cannot accept verbal changes. Please email written changes to your PM.

WHITE: CLIENT FINAL REPORT - CANARY: CLIENT

Pace Analytical®

SAMPLE RECEIVING CHECKLIST

219112313

SAMPLE DELIVERY GROUP 219112313	
Client **PM** AMK 4271 - ERM	**Transport Method** CUST
Profile Number 282045	**Received By** Savage, Tiffany R
Line Item(s) 1 - Solid	**Receive Date(s)** 11/22/19

CHECKLIST	YES	NO
Samples received with proper thermal preservation?	☑	☐
Radioactivity is <1600 cpm? If no, record cpm value in notes section.	☑	☐
COC relinquished and complete (including sampleIDs, collect times, and sampler)?	☑	☐
All containers received in good condition and within hold time?	☑	☐
All sample labels and containers received match the chain of custody?	☑	☐
Preservative added to any containers?	☐	☑
If received, was headspace for VOC water containers < 6mm?	☑	☐
Samples collected in containers provided by Pace Gulf Coast?	☑	☐

COOLERS

Airbill	Thermometer ID: E34	Temp °C
		2.6
		1.5

DISCREPANCIES

None

LAB PRESERVATIONS

None

NOTES

Revision 1.6

LELAP CERTIFICATE NUMBER: 01955
DOD-ELAP ACCREDITATION NUMBER: 74960

ANALYTICAL RESULTS

PERFORMED BY

Pace Analytical Gulf Coast
7979 Innovation Park Dr.
Baton Rouge, LA 70820
(225) 769-4900

Report Date 03/25/2020

Report # 220030912

Project 0526033/Henning Management

Deliver To	***Additional Recipients***
Dave Angle ERM 13313 Southwest Freeway Suite 221 Sugar Land, TX 77478 281-242-5700	Shawn Wiggins, ERM

Laboratory Endorsement

Sample analysis was performed in accordance with approved methodologies provided by the Environmental Protection Agency or other recognized agencies. The samples and their corresponding extracts will be maintained for a period of 30 days unless otherwise arranged. Following this retention period the samples will be disposed in accordance with Pace Gulf Coast's Standard Operating Procedures.

Common Abbreviations that may be Utilized in this Report

ND	Indicates the result was Not Detected at the specified reporting limit
NO	Indicates the sample did not ignite when preliminary test performed for EPA Method 1030
DO	Indicates the result was Diluted Out
MI	Indicates the result was subject to Matrix Interference
TNTC	Indicates the result was Too Numerous To Count
SUBC	Indicates the analysis was Sub-Contracted
FLD	Indicates the analysis was performed in the Field
DL	Detection Limit
LOD	Limit of Detection
LOQ	Limit of Quantitation
RE	Re-analysis
CF	HPLC or GC Confirmation
00:01	Reported as a time equivalent to 12:00 AM

Reporting Flags that may be Utilized in this Report

J or I	Indicates the result is between the MDL and LOQ
J	DOD flag on analyte in the parent sample for MS/MSD outside acceptance criteria
U	Indicates the compound was analyzed for but not detected
B or V	Indicates the analyte was detected in the associated Method Blank
Q	Indicates a non-compliant QC Result (See Q Flag Application Report)
*****	Indicates a non-compliant or not applicable QC recovery or RPD – see narrative
E	Organics - The result is estimated because it exceeded the instrument calibration range
E	Metals - % diference for the serial dilution is > 10%
L	Reporting Limits adjusted to meet risk-based limit.
P	RPD between primary and confirmation result is greater than 40
DL	Diluted analysis – when appended to Client Sample ID

Sample receipt at Pace Gulf Coast is documented through the attached chain of custody. In accordance with NELAC, this report shall be reproduced only in full and with the written permission of Pace Gulf Coast. The results contained within this report relate only to the samples reported. The documented results are presented within this report.

This report pertains only to the samples listed in the Report Sample Summary and should be retained as a permanent record thereof. The results contained within this report are intended for the use of the client. Any unauthorized use of the information contained in this report is prohibited.

I certify that this data package is in compliance with The NELAC Institute (TNI) Standard 2009 and terms and conditions of the contract and Statement of Work both technically and for completeness, for other than the conditions in the case narrative. Release of the data contained in this hardcopy data package and in the computer readable data submitted has been authorized by the Quality Assurance Manager or his/her designee, as verified by the following signature.

Estimated uncertainty of measurement is available upon request. This report is in compliance with the DOD QSM as specified in the contract if applicable.

_____

Authorized Signature
Pace Gulf Coast Report 220030912

Certifications

Certification	Certification Number
DOD ELAP	74960
Alabama	01955
Arkansas	88-0655
Colorado	01955
Delaware	01955
Florida	E87854
Georgia	01955
Hawaii	01955
Idaho	01955
Illinois	200048
Indiana	01955
Kansas	E-10354
Kentucky	95
Louisiana	01955
Maryland	01955
Massachusetts	01955
Michigan	01955
Mississippi	01955
Missouri	01955
Montana	N/A
Nebraska	01955
New Mexico	01955
North Carolina	618
North Dakota	R-195
Oklahoma	9403
South Carolina	73006001
South Dakota	01955
Tennessee	01955
Texas	T104704178
Vermont	01955
Virginia	460215
Washington	C929
USDA Soil Permit	P330-16-00234

Case Narrative

Client: ERM **Report:** 220030912

Pace Analytical Gulf Coast received and analyzed the sample(s) listed
on the Report Sample Summary page of this report. Receipt of the sample(s) is documented
by the attached chain of custody. This applies only to the sample(s) listed in this report.
No sample integrity or quality control exceptions were identified unless noted below.

COC ANOMALIES

Per David Sanguinetti's e-mail dated 03/09/20 - sample H-18 (35-40) 220030912-06 on the COC should be H-1 (35-40). Sample H-18 (45-50) 220030912-08 was left off of the COC. Client would like us to login and run; the sample was collected 03/06/20 @ 09:50. (Anna Kinchen 03/10/2020 09:22)

SEMI-VOLATILES GAS CHROMATOGRAPHY

In the MADEP EPH Revision 1.1 (LA) analysis, the recovery for the surrogate, 2-Bromonaphthalene is above the upper control limit for the LCSD (2021654). All surrogate recoveries are acceptable for the associated samples.

In the MADEP EPH Revision 1.1 (LA) analysis for prep batch 679685, the LCS/LCSD exhibited RPD failures. All recoveries are acceptable.

MISCELLANEOUS

Sample 22003091208 (H-18 (45-50)) was received but was not listed on the chain of custody. The client was contacted and authorized proceeding with analysis.

Sample Summary

LAB ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
22003091201	H-12 (50-60)	Water	03/05/2020 11:05	03/07/2020 12:52
22003091202	H-9 (50-55)	Water	03/05/2020 13:35	03/07/2020 12:52
22003091203	H-10 (35-40)	Water	03/05/2020 15:30	03/07/2020 12:52
22003091204	H-2 (30-35)	Water	03/05/2020 16:55	03/07/2020 12:52
22003091205	H-16 (35-40)	Water	03/06/2020 08:15	03/07/2020 12:52
22003091206	H-1 (35-40)	Water	03/06/2020 11:10	03/07/2020 12:52
22003091207	H-3 (22-27)	Water	03/06/2020 13:15	03/07/2020 12:52
22003091208	H-18 (45-50)	Water	03/06/2020 09:50	03/07/2020 12:52

Sample Results

H-12 (50-60)	**Collect Date**	03/05/2020 11:05	**LAB ID**	22003091201
	Receive Date	03/07/2020 12:52	**Matrix**	Water

EPA 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	03/12/2020 14:48	SMS	679546

CAS#	Parameter	Result	LOQ	Units
71-43-2	Benzene	0.089	0.00500	mg/L
100-41-4	Ethylbenzene	ND	0.00500	mg/L
108-88-3	Toluene	ND	0.00500	mg/L
1330-20-7	Xylene (total)	ND	0.015	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	0.05	.051	mg/L	103	78 - 130
1868-53-7	Dibromofluoromethane	0.05	.052	mg/L	104	77 - 127
2037-26-5	Toluene d8	0.05	.053	mg/L	105	76 - 134
17060-07-0	1,2-Dichloroethane-d4	0.05	.049	mg/L	98	71 - 127

MADEP VPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	03/10/2020 17:17	JAR	679391

CAS#	Parameter	Result	LOQ	Units
GCSV-02-10	Aliphatic >C8-C10	ND	0.020	mg/L
GCSV-02-30	Aliphatic C6-C8	0.122	0.030	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
615-59-8	2,5-Dibromotoluene	0.05	.055	mg/L	110	70 - 130

MADEP VPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	03/11/2020 12:48	JAR	679390

CAS#	Parameter	Result	LOQ	Units
GCSV-02-14	Aromatic >C8-C10	ND	0.030	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
615-59-8	2,5-Dibromotoluene	0.05	.061	mg/L	122	70 - 130

Sample Results

H-12 (50-60)

Collect Date	03/05/2020 11:05	**LAB ID**	22003091201
Receive Date	03/07/2020 12:52	**Matrix**	Water

MADEP EPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
03/14/2020 08:30	679685	MADEP EPH Revision 1.1 (LA)	1	03/16/2020 09:46	MFS	679775

CAS#	Parameter	Result	LOQ	Units
GCSV-02-11	Aliphatic >C10-C12	ND	0.100	mg/L
GCSV-02-12	Aliphatic >C12-C16	ND	0.100	mg/L
GCSV-02-31	Aliphatic >C16-C35	ND	0.150	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
3386-33-2	1-Chlorooctadecane	0.16	.115	mg/L	72	40 - 140

MADEP EPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
03/14/2020 08:30	679685	MADEP EPH Revision 1.1 (LA)	1	03/16/2020 09:46	MFS	679774

CAS#	Parameter	Result	LOQ	Units
GCSV-05-18	Aromatic >C21-C35	ND	0.100	mg/L
GCSV-02-15	Unadjusted >C10-C12 Aromatics	ND	0.100	mg/L
GCSV-02-16	Unadjusted >C12-C16 Aromatics	ND	0.100	mg/L
GCSV-02-17	Unadjusted >C16-C21 Aromatics	ND	0.100	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
84-15-1	o-Terphenyl	0.16	.11	mg/L	69	40 - 140
580-13-2	2-Bromonaphthalene	0.16	.208	mg/L	130	40 - 140
321-60-8	2-Fluorobiphenyl	0.16	.175	mg/L	109	40 - 140

EPA 6020B

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
03/23/2020 07:00	680126	EPA 3010A	100	03/23/2020 16:11	LWZ	680255

CAS#	Parameter	Result	LOQ		Units
7440-38-2	Arsenic	ND	0.025	L	mg/L
7440-39-3	Barium	2.27	0.10		mg/L
7440-43-9	Cadmium	ND	0.025	L	mg/L
7440-70-2	Calcium	2310	50.0		mg/L
7440-47-3	Chromium	ND	0.10		mg/L
7439-89-6	Iron	ND	10.0		mg/L
7439-92-1	Lead	ND	0.025	L	mg/L
7439-95-4	Magnesium	616	10.0		mg/L
7439-96-5	Manganese	16.8	0.50		mg/L
7440-09-7	Potassium	47.2	10.0		mg/L

Sample Results

H-12 (50-60)

Collect Date	03/05/2020 11:05	**LAB ID**	22003091201
Receive Date	03/07/2020 12:52	**Matrix**	Water

EPA 6020B (Continued)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
03/23/2020 07:00	680126	EPA 3010A	100	03/23/2020 16:11	LWZ	680255

CAS#	Parameter	Result	LOQ		Units
7440-24-6	Strontium	49.2	0.10		mg/L
7440-66-6	Zinc	ND	1.10	L	mg/L

EPA 6020B

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
03/23/2020 07:00	680126	EPA 3010A	500	03/24/2020 15:31	BDP	680339

CAS#	Parameter	Result	LOQ	Units
7440-23-5	Sodium	38300	50.0	mg/L

EPA 6020B Dissolved

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
03/09/2020 14:45	679251	EPA 3005A Dissolved	100	03/13/2020 12:02	LWZ	679655

CAS#	Parameter	Result	LOQ		Units
7440-38-2	Arsenic	ND	0.025	L	mg/L
7440-39-3	Barium	2.13	0.10		mg/L
7440-43-9	Cadmium	ND	0.025	L	mg/L
7440-47-3	Chromium	ND	0.10		mg/L
7439-89-6	Iron	ND	10.0		mg/L
7439-92-1	Lead	ND	0.025	L	mg/L
7439-96-5	Manganese	16.2	0.50		mg/L
7440-24-6	Strontium	44.1	0.10		mg/L
7440-66-6	Zinc	ND	1.10	L	mg/L

EPA 7470A

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
03/10/2020 08:50	679250	EPA 7470A	1	03/10/2020 15:28	TJR	679266

CAS#	Parameter	Result	LOQ	Units
7439-97-6	Mercury	ND	0.00020	mg/L

Sample Results

H-12 (50-60)

Collect Date	03/05/2020 11:05	**LAB ID**	22003091201
Receive Date	03/07/2020 12:52	**Matrix**	Water

EPA 7470A Dissolved

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
03/10/2020 08:50	679250	EPA 7470A Dissolved	1	03/10/2020 15:30	TJR	679266

CAS#	Parameter	Result	LOQ	Units
7439-97-6	Mercury	ND	0.00020	mg/L

EPA 9056A

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	500	03/11/2020 05:43	DAM	679297

CAS#	Parameter	Result	LOQ	Units
14808-79-8	Sulfate	148	100	mg/L

EPA 9056A

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	5000	03/11/2020 05:24	DAM	679297

CAS#	Parameter	Result	LOQ	Units
16887-00-6	Chloride	45800	1000	mg/L

SM 2320 B-2011

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	03/10/2020 08:50	RYC	679329

CAS#	Parameter	Result	LOQ	Units
T-005-C	Carbonate Alkalinity	ND	1.0	mg/L CaCO3

SM 2320 B-2011

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	03/10/2020 08:50	RYC	679329

CAS#	Parameter	Result	LOQ	Units
T-005-B	Bicarbonate Alkalinity	348	1.0	mg/L CaCO3

Sample Results

H-12 (50-60)

Collect Date	03/05/2020 11:05	**LAB ID**	22003091201
Receive Date	03/07/2020 12:52	**Matrix**	Water

SM 2540 C-2011

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	03/12/2020 16:00	CJS	679526

CAS#	Parameter	Result	LOQ	Units
WET-035	Total Dissolved Solids(TDS)	71900	10.0	mg/L

H-9 (50-55)

Collect Date	03/05/2020 13:35	**LAB ID**	22003091202
Receive Date	03/07/2020 12:52	**Matrix**	Water

EPA 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	03/12/2020 15:10	SMS	679546

CAS#	Parameter	Result	LOQ	Units
71-43-2	Benzene	0.014	0.00500	mg/L
100-41-4	Ethylbenzene	ND	0.00500	mg/L
108-88-3	Toluene	0.012	0.00500	mg/L
1330-20-7	Xylene (total)	ND	0.015	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	0.05	.049	mg/L	98	78 - 130
1868-53-7	Dibromofluoromethane	0.05	.049	mg/L	98	77 - 127
2037-26-5	Toluene d8	0.05	.052	mg/L	104	76 - 134
17060-07-0	1,2-Dichloroethane-d4	0.05	.048	mg/L	95	71 - 127

MADEP VPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	03/10/2020 17:32	JAR	679391

CAS#	Parameter	Result	LOQ	Units
GCSV-02-10	Aliphatic >C8-C10	ND	0.020	mg/L
GCSV-02-30	Aliphatic C6-C8	0.040	0.030	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
615-59-8	2,5-Dibromotoluene	0.05	.059	mg/L	119	70 - 130

Sample Results

H-9 (50-55)

Collect Date	03/05/2020 13:35	**LAB ID**	22003091202
Receive Date	03/07/2020 12:52	**Matrix**	Water

MADEP VPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	03/11/2020 15:55	JAR	679390

CAS#	Parameter	Result	LOQ	Units
GCSV-02-14	Aromatic >C8-C10	ND	0.030	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
615-59-8	2,5-Dibromotoluene	0.05	.062	mg/L	124	70 - 130

MADEP EPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
03/14/2020 08:30	679685	MADEP EPH Revision 1.1 (LA)	1	03/16/2020 10:31	MFS	679775

CAS#	Parameter	Result	LOQ	Units
GCSV-02-11	Aliphatic >C10-C12	ND	0.100	mg/L
GCSV-02-12	Aliphatic >C12-C16	ND	0.100	mg/L
GCSV-02-31	Aliphatic >C16-C35	ND	0.150	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
3386-33-2	1-Chlorooctadecane	0.16	.092	mg/L	57	40 - 140

MADEP EPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
03/14/2020 08:30	679685	MADEP EPH Revision 1.1 (LA)	1	03/16/2020 10:31	MFS	679774

CAS#	Parameter	Result	LOQ	Units
GCSV-05-18	Aromatic >C21-C35	ND	0.100	mg/L
GCSV-02-15	Unadjusted >C10-C12 Aromatics	ND	0.100	mg/L
GCSV-02-16	Unadjusted >C12-C16 Aromatics	ND	0.100	mg/L
GCSV-02-17	Unadjusted >C16-C21 Aromatics	ND	0.100	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
84-15-1	o-Terphenyl	0.16	.115	mg/L	72	40 - 140
580-13-2	2-Bromonaphthalene	0.16	.198	mg/L	124	40 - 140
321-60-8	2-Fluorobiphenyl	0.16	.165	mg/L	103	40 - 140

Sample Results

H-9 (50-55)

Collect Date	03/05/2020 13:35	**LAB ID**	22003091202
Receive Date	03/07/2020 12:52	**Matrix**	Water

EPA 6020B

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
03/10/2020 08:50	679249	EPA 3010A	50	03/13/2020 19:05	LWZ	679655

CAS#	Parameter	Result	LOQ		Units
7440-38-2	Arsenic	ND	0.013	L	mg/L
7440-39-3	Barium	0.29	0.050		mg/L
7440-43-9	Cadmium	ND	0.013	L	mg/L
7440-70-2	Calcium	3060	25.0		mg/L
7440-47-3	Chromium	ND	0.050		mg/L
7439-89-6	Iron	6.54	5.00		mg/L
7439-92-1	Lead	ND	0.015	L	mg/L
7439-95-4	Magnesium	1150	5.00		mg/L
7439-96-5	Manganese	17.4	0.25		mg/L
7440-09-7	Potassium	26.9	5.00		mg/L
7440-24-6	Strontium	22.3	0.050		mg/L
7440-66-6	Zinc	ND	1.00		mg/L

EPA 6020B

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
03/10/2020 08:50	679249	EPA 3010A	500	03/14/2020 16:57	LWZ	679693

CAS#	Parameter	Result	LOQ	Units
7440-23-5	Sodium	7840	50.0	mg/L

EPA 6020B Dissolved

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
03/09/2020 14:45	679251	EPA 3005A Dissolved	50	03/13/2020 18:24	LWZ	679655

CAS#	Parameter	Result	LOQ		Units
7440-38-2	Arsenic	ND	0.013	L	mg/L
7440-39-3	Barium	0.27	0.050		mg/L
7440-43-9	Cadmium	ND	0.013	L	mg/L
7440-47-3	Chromium	ND	0.050		mg/L
7439-89-6	Iron	6.07	5.00		mg/L
7439-92-1	Lead	ND	0.015	L	mg/L
7439-96-5	Manganese	15.1	0.25		mg/L
7440-24-6	Strontium	20.9	0.050		mg/L
7440-66-6	Zinc	ND	1.00		mg/L

Sample Results

H-9 (50-55)				
	Collect Date	03/05/2020 13:35	LAB ID	22003091202
	Receive Date	03/07/2020 12:52	Matrix	Water

EPA 7470A

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
03/10/2020 08:50	679250	EPA 7470A	1	03/10/2020 15:32	TJR	679266

CAS#	Parameter	Result	LOQ	Units
7439-97-6	Mercury	ND	0.00020	mg/L

EPA 7470A Dissolved

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
03/10/2020 08:50	679250	EPA 7470A Dissolved	1	03/10/2020 15:34	TJR	679266

CAS#	Parameter	Result	LOQ	Units
7439-97-6	Mercury	ND	0.00020	mg/L

EPA 9056A

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	500	03/11/2020 06:22	DAM	679297

CAS#	Parameter	Result	LOQ	Units
14808-79-8	Sulfate	360	100	mg/L

EPA 9056A

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	5000	03/11/2020 06:02	DAM	679297

CAS#	Parameter	Result	LOQ	Units
16887-00-6	Chloride	23900	1000	mg/L

SM 2320 B-2011

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	03/10/2020 08:50	RYC	679329

CAS#	Parameter	Result	LOQ	Units
T-005-C	Carbonate Alkalinity	ND	1.0	mg/L CaCO3

Sample Results

H-9 (50-55)

Collect Date	03/05/2020 13:35	**LAB ID**	22003091202
Receive Date	03/07/2020 12:52	**Matrix**	Water

SM 2320 B-2011

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	03/10/2020 08:50	RYC	679329

CAS#	Parameter	Result	LOQ	Units
T-005-B	Bicarbonate Alkalinity	300	1.0	mg/L CaCO3

SM 2540 C-2011

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	03/12/2020 16:00	CJS	679526

CAS#	Parameter	Result	LOQ	Units
WET-035	Total Dissolved Solids(TDS)	45800	10.0	mg/L

H-10 (35-40)

Collect Date	03/05/2020 15:30	**LAB ID**	22003091203
Receive Date	03/07/2020 12:52	**Matrix**	Water

EPA 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	03/12/2020 15:32	SMS	679546

CAS#	Parameter	Result	LOQ	Units
71-43-2	Benzene	ND	0.00500	mg/L
100-41-4	Ethylbenzene	ND	0.00500	mg/L
108-88-3	Toluene	ND	0.00500	mg/L
1330-20-7	Xylene (total)	ND	0.015	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	0.05	.049	mg/L	98	78 - 130
1868-53-7	Dibromofluoromethane	0.05	.05	mg/L	101	77 - 127
2037-26-5	Toluene d8	0.05	.053	mg/L	107	76 - 134
17060-07-0	1,2-Dichloroethane-d4	0.05	.047	mg/L	95	71 - 127

Sample Results

H-10 (35-40)

Collect Date	03/05/2020 15:30	**LAB ID**	22003091203
Receive Date	03/07/2020 12:52	**Matrix**	Water

MADEP VPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	03/10/2020 17:47	JAR	679391

CAS#	Parameter	Result	LOQ	Units
GCSV-02-10	Aliphatic >C8-C10	ND	0.020	mg/L
GCSV-02-30	Aliphatic C6-C8	ND	0.030	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
615-59-8	2,5-Dibromotoluene	0.05	.054	mg/L	108	70 - 130

MADEP VPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	03/10/2020 17:32	JAR	679390

CAS#	Parameter	Result	LOQ	Units
GCSV-02-14	Aromatic >C8-C10	ND	0.030	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
615-59-8	2,5-Dibromotoluene	0.05	.062	mg/L	125	70 - 130

MADEP EPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
03/14/2020 08:30	679685	MADEP EPH Revision 1.1 (LA)	1	03/16/2020 10:50	MFS	679775

CAS#	Parameter	Result	LOQ	Units
GCSV-02-11	Aliphatic >C10-C12	ND	0.100	mg/L
GCSV-02-12	Aliphatic >C12-C16	ND	0.100	mg/L
GCSV-02-31	Aliphatic >C16-C35	ND	0.150	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
3386-33-2	1-Chlorooctadecane	0.16	.099	mg/L	62	40 - 140

Sample Results

H-10 (35-40)

Collect Date	03/05/2020 15:30	**LAB ID**	22003091203
Receive Date	03/07/2020 12:52	**Matrix**	Water

MADEP EPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
03/14/2020 08:30	679685	MADEP EPH Revision 1.1 (LA)	1	03/16/2020 10:50	MFS	679774

CAS#	Parameter	Result	LOQ	Units
GCSV-05-18	Aromatic >C21-C35	ND	0.100	mg/L
GCSV-02-15	Unadjusted >C10-C12 Aromatics	ND	0.100	mg/L
GCSV-02-16	Unadjusted >C12-C16 Aromatics	ND	0.100	mg/L
GCSV-02-17	Unadjusted >C16-C21 Aromatics	ND	0.100	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
84-15-1	o-Terphenyl	0.16	.124	mg/L	78	40 - 140
580-13-2	2-Bromonaphthalene	0.16	.181	mg/L	113	40 - 140
321-60-8	2-Fluorobiphenyl	0.16	.167	mg/L	104	40 - 140

EPA 6020B

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
03/10/2020 08:50	679249	EPA 3010A	5	03/13/2020 19:09	LWZ	679655

CAS#	Parameter	Result	LOQ	Units
7440-38-2	Arsenic	ND	0.0050	mg/L
7440-39-3	Barium	0.027	0.0050	mg/L
7440-43-9	Cadmium	ND	0.0050	mg/L
7440-70-2	Calcium	439	2.50	mg/L
7440-47-3	Chromium	ND	0.0050	mg/L
7439-89-6	Iron	0.82	0.50	mg/L
7439-92-1	Lead	ND	0.0050	mg/L
7439-95-4	Magnesium	180	0.50	mg/L
7439-96-5	Manganese	1.35	0.025	mg/L
7440-09-7	Potassium	5.25	0.50	mg/L
7440-23-5	Sodium	348	0.50	mg/L
7440-24-6	Strontium	2.35	0.0050	mg/L
7440-66-6	Zinc	ND	0.10	mg/L

EPA 6020B Dissolved

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
03/09/2020 14:45	679251	EPA 3005A Dissolved	5	03/13/2020 18:29	LWZ	679655

CAS#	Parameter	Result	LOQ	Units
7440-38-2	Arsenic	ND	0.0050	mg/L
7440-39-3	Barium	0.020	0.0050	mg/L
7440-43-9	Cadmium	ND	0.0050	mg/L
7440-47-3	Chromium	ND	0.0050	mg/L

Sample Results

H-10 (35-40)

Collect Date	03/05/2020 15:30	**LAB ID**	22003091203
Receive Date	03/07/2020 12:52	**Matrix**	Water

EPA 6020B Dissolved (Continued)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
03/09/2020 14:45	679251	EPA 3005A Dissolved	5	03/13/2020 18:29	LWZ	679655

CAS#	Parameter	Result	LOQ	Units
7439-89-6	Iron	ND	0.50	mg/L
7439-92-1	Lead	ND	0.0050	mg/L
7439-96-5	Manganese	1.28	0.025	mg/L
7440-24-6	Strontium	2.12	0.0050	mg/L
7440-66-6	Zinc	ND	0.10	mg/L

EPA 7470A

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
03/10/2020 08:50	679250	EPA 7470A	1	03/10/2020 15:36	TJR	679266

CAS#	Parameter	Result	LOQ	Units
7439-97-6	Mercury	ND	0.00020	mg/L

EPA 7470A Dissolved

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
03/10/2020 08:50	679250	EPA 7470A Dissolved	1	03/10/2020 15:38	TJR	679266

CAS#	Parameter	Result	LOQ	Units
7439-97-6	Mercury	ND	0.00020	mg/L

EPA 9056A

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	200	03/11/2020 06:41	DAM	679297

CAS#	Parameter	Result	LOQ	Units
16887-00-6	Chloride	1290	40.0	mg/L
14808-79-8	Sulfate	824	40.0	mg/L

Sample Results

H-10 (35-40)

Collect Date	03/05/2020 15:30	**LAB ID**	22003091203
Receive Date	03/07/2020 12:52	**Matrix**	Water

SM 2320 B-2011

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	03/10/2020 08:50	RYC	679329

CAS#	Parameter	Result	LOQ	Units
T-005-C	Carbonate Alkalinity	ND	1.0	mg/L CaCO3

SM 2320 B-2011

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	03/10/2020 08:50	RYC	679329

CAS#	Parameter	Result	LOQ	Units
T-005-B	Bicarbonate Alkalinity	293	1.0	mg/L CaCO3

SM 2540 C-2011

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	03/12/2020 16:00	CJS	679526

CAS#	Parameter	Result	LOQ	Units
WET-035	Total Dissolved Solids(TDS)	3650	10.0	mg/L

H-2 (30-35)

Collect Date	03/05/2020 16:55	**LAB ID**	22003091204
Receive Date	03/07/2020 12:52	**Matrix**	Water

EPA 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	03/12/2020 15:54	SMS	679546

CAS#	Parameter	Result	LOQ	Units
71-43-2	Benzene	ND	0.00500	mg/L
100-41-4	Ethylbenzene	ND	0.00500	mg/L
108-88-3	Toluene	ND	0.00500	mg/L

Sample Results

H-2 (30-35)	**Collect Date**	03/05/2020 16:55	**LAB ID**	22003091204
	Receive Date	03/07/2020 12:52	**Matrix**	Water

EPA 8260B (Continued)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	03/12/2020 15:54	SMS	679546

CAS#	Parameter	Result	LOQ	Units
1330-20-7	Xylene (total)	ND	0.015	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	0.05	.049	mg/L	98	78 - 130
1868-53-7	Dibromofluoromethane	0.05	.05	mg/L	100	77 - 127
2037-26-5	Toluene d8	0.05	.052	mg/L	104	76 - 134
17060-07-0	1,2-Dichloroethane-d4	0.05	.047	mg/L	94	71 - 127

MADEP VPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	03/10/2020 18:03	JAR	679391

CAS#	Parameter	Result	LOQ	Units
GCSV-02-10	Aliphatic >C8-C10	ND	0.020	mg/L
GCSV-02-30	Aliphatic C6-C8	ND	0.030	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
615-59-8	2,5-Dibromotoluene	0.05	.058	mg/L	115	70 - 130

MADEP VPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	03/11/2020 16:11	JAR	679390

CAS#	Parameter	Result	LOQ	Units
GCSV-02-14	Aromatic >C8-C10	ND	0.030	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
615-59-8	2,5-Dibromotoluene	0.05	.061	mg/L	123	70 - 130

Sample Results

H-2 (30-35)	**Collect Date**	03/05/2020 16:55	**LAB ID**	22003091204
	Receive Date	03/07/2020 12:52	**Matrix**	Water

MADEP EPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
03/14/2020 08:30	679685	MADEP EPH Revision 1.1 (LA)	1	03/16/2020 11:09	MFS	679775

CAS#	Parameter	Result	LOQ	Units
GCSV-02-11	Aliphatic >C10-C12	ND	0.100	mg/L
GCSV-02-12	Aliphatic >C12-C16	ND	0.100	mg/L
GCSV-02-31	Aliphatic >C16-C35	ND	0.150	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
3386-33-2	1-Chlorooctadecane	0.16	.098	mg/L	61	40 - 140

MADEP EPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
03/14/2020 08:30	679685	MADEP EPH Revision 1.1 (LA)	1	03/16/2020 11:09	MFS	679774

CAS#	Parameter	Result	LOQ	Units
GCSV-05-18	Aromatic >C21-C35	ND	0.100	mg/L
GCSV-02-15	Unadjusted >C10-C12 Aromatics	ND	0.100	mg/L
GCSV-02-16	Unadjusted >C12-C16 Aromatics	ND	0.100	mg/L
GCSV-02-17	Unadjusted >C16-C21 Aromatics	ND	0.100	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
84-15-1	o-Terphenyl	0.16	.098	mg/L	62	40 - 140
580-13-2	2-Bromonaphthalene	0.16	.186	mg/L	116	40 - 140
321-60-8	2-Fluorobiphenyl	0.16	.156	mg/L	98	40 - 140

EPA 6020B

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
03/10/2020 08:50	679249	EPA 3010A	5	03/13/2020 19:14	LWZ	679655

CAS#	Parameter	Result	LOQ	Units
7440-38-2	Arsenic	ND	0.0050	mg/L
7440-39-3	Barium	0.026	0.0050	mg/L
7440-43-9	Cadmium	ND	0.0050	mg/L
7440-70-2	Calcium	364	2.50	mg/L
7440-47-3	Chromium	ND	0.0050	mg/L
7439-89-6	Iron	ND	0.50	mg/L
7439-92-1	Lead	ND	0.0050	mg/L
7439-95-4	Magnesium	140	0.50	mg/L
7439-96-5	Manganese	1.23	0.025	mg/L
7440-09-7	Potassium	5.77	0.50	mg/L

Sample Results

H-2 (30-35)

Collect Date	03/05/2020 16:55	**LAB ID**	22003091204
Receive Date	03/07/2020 12:52	**Matrix**	Water

EPA 6020B (Continued)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
03/10/2020 08:50	679249	EPA 3010A	5	03/13/2020 19:14	LWZ	679655

CAS#	Parameter	Result	LOQ	Units
7440-24-6	Strontium	1.81	0.0050	mg/L
7440-66-6	Zinc	ND	0.10	mg/L

EPA 6020B

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
03/10/2020 08:50	679249	EPA 3010A	100	03/13/2020 17:43	LWZ	679655

CAS#	Parameter	Result	LOQ	Units
7440-23-5	Sodium	406	10.0	mg/L

EPA 6020B Dissolved

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
03/09/2020 14:45	679251	EPA 3005A Dissolved	5	03/13/2020 18:33	LWZ	679655

CAS#	Parameter	Result	LOQ	Units
7440-38-2	Arsenic	ND	0.0050	mg/L
7440-39-3	Barium	0.022	0.0050	mg/L
7440-43-9	Cadmium	ND	0.0050	mg/L
7440-47-3	Chromium	ND	0.0050	mg/L
7439-89-6	Iron	ND	0.50	mg/L
7439-92-1	Lead	ND	0.0050	mg/L
7439-96-5	Manganese	1.14	0.025	mg/L
7440-24-6	Strontium	1.66	0.0050	mg/L
7440-66-6	Zinc	ND	0.10	mg/L

EPA 7470A

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
03/10/2020 08:50	679250	EPA 7470A	1	03/10/2020 15:40	TJR	679266

CAS#	Parameter	Result	LOQ	Units
7439-97-6	Mercury	ND	0.00020	mg/L

Sample Results

H-2 (30-35)

Collect Date	03/05/2020 16:55	**LAB ID**	22003091204
Receive Date	03/07/2020 12:52	**Matrix**	Water

EPA 7470A Dissolved

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
03/10/2020 08:50	679250	EPA 7470A Dissolved	1	03/10/2020 15:46	TJR	679266

CAS#	Parameter	Result	LOQ	Units
7439-97-6	Mercury	ND	0.00020	mg/L

EPA 9056A

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	200	03/11/2020 07:00	DAM	679297

CAS#	Parameter	Result	LOQ	Units
16887-00-6	Chloride	1340	40.0	mg/L
14808-79-8	Sulfate	599	40.0	mg/L

SM 2320 B-2011

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	03/10/2020 08:50	RYC	679329

CAS#	Parameter	Result	LOQ	Units
T-005-C	Carbonate Alkalinity	ND	1.0	mg/L CaCO3

SM 2320 B-2011

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	03/10/2020 08:50	RYC	679329

CAS#	Parameter	Result	LOQ	Units
T-005-B	Bicarbonate Alkalinity	322	1.0	mg/L CaCO3

Sample Results

H-2 (30-35)

Collect Date	03/05/2020 16:55	**LAB ID**	22003091204
Receive Date	03/07/2020 12:52	**Matrix**	Water

SM 2540 C-2011

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	03/12/2020 16:00	CJS	679526

CAS#	Parameter	Result	LOQ	Units
WET-035	Total Dissolved Solids(TDS)	2930	10.0	mg/L

H-16 (35-40)

Collect Date	03/06/2020 08:15	**LAB ID**	22003091205
Receive Date	03/07/2020 12:52	**Matrix**	Water

EPA 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	03/12/2020 16:15	SMS	679546

CAS#	Parameter	Result	LOQ	Units
71-43-2	Benzene	ND	0.00500	mg/L
100-41-4	Ethylbenzene	ND	0.00500	mg/L
108-88-3	Toluene	ND	0.00500	mg/L
1330-20-7	Xylene (total)	ND	0.015	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	0.05	.051	mg/L	101	78 - 130
1868-53-7	Dibromofluoromethane	0.05	.049	mg/L	98	77 - 127
2037-26-5	Toluene d8	0.05	.053	mg/L	106	76 - 134
17060-07-0	1,2-Dichloroethane-d4	0.05	.046	mg/L	93	71 - 127

MADEP VPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	03/10/2020 18:19	JAR	679391

CAS#	Parameter	Result	LOQ	Units
GCSV-02-10	Aliphatic >C8-C10	ND	0.020	mg/L
GCSV-02-30	Aliphatic C6-C8	ND	0.030	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
615-59-8	2,5-Dibromotoluene	0.05	.052	mg/L	103	70 - 130

Sample Results

H-16 (35-40)

Collect Date	03/06/2020 08:15	**LAB ID**	22003091205
Receive Date	03/07/2020 12:52	**Matrix**	Water

MADEP VPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	03/10/2020 18:19	JAR	679390

CAS#	Parameter	Result	LOQ	Units
GCSV-02-14	Aromatic >C8-C10	ND	0.030	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
615-59-8	2,5-Dibromotoluene	0.05	.063	mg/L	125	70 - 130

MADEP EPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
03/14/2020 08:30	679685	MADEP EPH Revision 1.1 (LA)	1	03/16/2020 11:49	MFS	679775

CAS#	Parameter	Result	LOQ	Units
GCSV-02-11	Aliphatic >C10-C12	ND	0.100	mg/L
GCSV-02-12	Aliphatic >C12-C16	ND	0.100	mg/L
GCSV-02-31	Aliphatic >C16-C35	ND	0.150	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
3386-33-2	1-Chlorooctadecane	0.16	.07	mg/L	44	40 - 140

MADEP EPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
03/14/2020 08:30	679685	MADEP EPH Revision 1.1 (LA)	1	03/16/2020 11:49	MFS	679774

CAS#	Parameter	Result	LOQ	Units
GCSV-05-18	Aromatic >C21-C35	ND	0.100	mg/L
GCSV-02-15	Unadjusted >C10-C12 Aromatics	ND	0.100	mg/L
GCSV-02-16	Unadjusted >C12-C16 Aromatics	ND	0.100	mg/L
GCSV-02-17	Unadjusted >C16-C21 Aromatics	ND	0.100	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
84-15-1	o-Terphenyl	0.16	.112	mg/L	70	40 - 140
580-13-2	2-Bromonaphthalene	0.16	.209	mg/L	131	40 - 140
321-60-8	2-Fluorobiphenyl	0.16	.178	mg/L	111	40 - 140

Sample Results

H-16 (35-40)

Collect Date	03/06/2020 08:15	**LAB ID**	22003091205
Receive Date	03/07/2020 12:52	**Matrix**	Water

EPA 6020B

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
03/23/2020 07:00	680126	EPA 3010A	100	03/23/2020 16:20	LWZ	680255

CAS#	Parameter	Result	LOQ		Units
7440-23-5	Sodium	3850	10.0		mg/L
7440-24-6	Strontium	27.2	0.10		mg/L

EPA 6020B

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
03/23/2020 07:00	680126	EPA 3010A	20	03/24/2020 15:35	BDP	680339

CAS#	Parameter	Result	LOQ		Units
7440-38-2	Arsenic	ND	0.010	L	mg/L
7440-39-3	Barium	0.14	0.020		mg/L
7440-43-9	Cadmium	0.0064	0.0050	L	mg/L
7440-70-2	Calcium	3120	10.0		mg/L
7440-47-3	Chromium	ND	0.020		mg/L
7439-89-6	Iron	ND	2.00		mg/L
7439-92-1	Lead	ND	0.015	L	mg/L
7439-95-4	Magnesium	1030	2.00		mg/L
7439-96-5	Manganese	12.6	0.10		mg/L
7440-09-7	Potassium	21.2	2.00		mg/L
7440-66-6	Zinc	ND	0.40		mg/L

EPA 6020B Dissolved

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
03/09/2020 14:45	679251	EPA 3005A Dissolved	20	03/13/2020 18:38	LWZ	679655

CAS#	Parameter	Result	LOQ		Units
7440-38-2	Arsenic	ND	0.010	L	mg/L
7440-39-3	Barium	0.10	0.020		mg/L
7440-43-9	Cadmium	ND	0.0050	L	mg/L
7440-47-3	Chromium	ND	0.020		mg/L
7439-89-6	Iron	ND	2.00		mg/L
7439-92-1	Lead	ND	0.015	L	mg/L
7439-96-5	Manganese	9.30	0.10		mg/L
7440-66-6	Zinc	ND	0.40		mg/L

Sample Results

H-16 (35-40)

Collect Date	03/06/2020 08:15	**LAB ID**	22003091205
Receive Date	03/07/2020 12:52	**Matrix**	Water

EPA 6020B Dissolved

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
03/09/2020 14:45	679251	EPA 3005A Dissolved	100	03/13/2020 12:34	LWZ	679655

CAS#	Parameter	Result	LOQ	Units
7440-24-6	Strontium	25.6	0.10	mg/L

EPA 7470A

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
03/10/2020 08:50	679250	EPA 7470A	1	03/10/2020 15:48	TJR	679266

CAS#	Parameter	Result	LOQ	Units
7439-97-6	Mercury	ND	0.00020	mg/L

EPA 7470A Dissolved

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
03/10/2020 08:50	679250	EPA 7470A Dissolved	1	03/10/2020 15:50	TJR	679266

CAS#	Parameter	Result	LOQ	Units
7439-97-6	Mercury	ND	0.00020	mg/L

EPA 9056A

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	500	03/11/2020 07:39	DAM	679297

CAS#	Parameter	Result	LOQ	Units
14808-79-8	Sulfate	598	100	mg/L

EPA 9056A

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	2000	03/11/2020 07:20	DAM	679297

CAS#	Parameter	Result	LOQ	Units
16887-00-6	Chloride	13000	400	mg/L

Sample Results

H-16 (35-40)

Collect Date	03/06/2020 08:15	**LAB ID**	22003091205
Receive Date	03/07/2020 12:52	**Matrix**	Water

SM 2320 B-2011

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	03/10/2020 08:50	RYC	679329

CAS#	Parameter	Result	LOQ	Units
T-005-C	Carbonate Alkalinity	ND	1.0	mg/L CaCO3

SM 2320 B-2011

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	03/10/2020 08:50	RYC	679329

CAS#	Parameter	Result	LOQ	Units
T-005-B	Bicarbonate Alkalinity	273	1.0	mg/L CaCO3

SM 2540 C-2011

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	03/12/2020 16:00	CJS	679526

CAS#	Parameter	Result	LOQ	Units
WET-035	Total Dissolved Solids(TDS)	19900	10.0	mg/L

H-1 (35-40)

Collect Date	03/06/2020 11:10	**LAB ID**	22003091206
Receive Date	03/07/2020 12:52	**Matrix**	Water

EPA 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	03/12/2020 16:37	SMS	679546

CAS#	Parameter	Result	LOQ	Units
71-43-2	Benzene	ND	0.00500	mg/L
100-41-4	Ethylbenzene	ND	0.00500	mg/L
108-88-3	Toluene	ND	0.00500	mg/L

Sample Results

H-1 (35-40)				
	Collect Date	03/06/2020 11:10	LAB ID	22003091206
	Receive Date	03/07/2020 12:52	Matrix	Water

EPA 8260B (Continued)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	03/12/2020 16:37	SMS	679546

CAS#	Parameter	Result	LOQ	Units
1330-20-7	Xylene (total)	ND	0.015	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	0.05	.05	mg/L	101	78 - 130
1868-53-7	Dibromofluoromethane	0.05	.051	mg/L	101	77 - 127
2037-26-5	Toluene d8	0.05	.051	mg/L	103	76 - 134
17060-07-0	1,2-Dichloroethane-d4	0.05	.047	mg/L	95	71 - 127

MADEP VPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	03/10/2020 18:34	JAR	679391

CAS#	Parameter	Result	LOQ	Units
GCSV-02-10	Aliphatic >C8-C10	ND	0.020	mg/L
GCSV-02-30	Aliphatic C6-C8	ND	0.030	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
615-59-8	2,5-Dibromotoluene	0.05	.059	mg/L	119	70 - 130

MADEP VPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	03/11/2020 16:28	JAR	679390

CAS#	Parameter	Result	LOQ	Units
GCSV-02-14	Aromatic >C8-C10	ND	0.030	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
615-59-8	2,5-Dibromotoluene	0.05	.06	mg/L	119	70 - 130

Sample Results

H-1 (35-40)

Collect Date	03/06/2020 11:10	**LAB ID**	22003091206
Receive Date	03/07/2020 12:52	**Matrix**	Water

MADEP EPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
03/14/2020 08:30	679685	MADEP EPH Revision 1.1 (LA)	1	03/16/2020 12:08	MFS	679775

CAS#	Parameter	Result	LOQ	Units
GCSV-02-11	Aliphatic >C10-C12	ND	0.100	mg/L
GCSV-02-12	Aliphatic >C12-C16	ND	0.100	mg/L
GCSV-02-31	Aliphatic >C16-C35	ND	0.150	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
3386-33-2	1-Chlorooctadecane	0.16	.101	mg/L	63	40 - 140

MADEP EPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
03/14/2020 08:30	679685	MADEP EPH Revision 1.1 (LA)	1	03/16/2020 12:08	MFS	679774

CAS#	Parameter	Result	LOQ	Units
GCSV-05-18	Aromatic >C21-C35	ND	0.100	mg/L
GCSV-02-15	Unadjusted >C10-C12 Aromatics	ND	0.100	mg/L
GCSV-02-16	Unadjusted >C12-C16 Aromatics	ND	0.100	mg/L
GCSV-02-17	Unadjusted >C16-C21 Aromatics	ND	0.100	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
84-15-1	o-Terphenyl	0.16	.143	mg/L	89	40 - 140
580-13-2	2-Bromonaphthalene	0.16	.211	mg/L	132	40 - 140
321-60-8	2-Fluorobiphenyl	0.16	.19	mg/L	119	40 - 140

EPA 6020B

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
03/10/2020 08:50	679249	EPA 3010A	5	03/13/2020 19:23	LWZ	679655

CAS#	Parameter	Result	LOQ	Units
7440-38-2	Arsenic	ND	0.0050	mg/L
7440-39-3	Barium	0.15	0.0050	mg/L
7440-43-9	Cadmium	ND	0.0050	mg/L
7440-70-2	Calcium	443	2.50	mg/L
7440-47-3	Chromium	ND	0.0050	mg/L
7439-89-6	Iron	ND	0.50	mg/L
7439-92-1	Lead	ND	0.0050	mg/L
7439-95-4	Magnesium	174	0.50	mg/L
7439-96-5	Manganese	2.38	0.025	mg/L
7440-09-7	Potassium	6.38	0.50	mg/L

Sample Results

H-1 (35-40)

Collect Date	03/06/2020 11:10	**LAB ID**	22003091206
Receive Date	03/07/2020 12:52	**Matrix**	Water

EPA 6020B (Continued)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
03/10/2020 08:50	679249	EPA 3010A	5	03/13/2020 19:23	LWZ	679655

CAS#	Parameter	Result	LOQ	Units
7440-23-5	Sodium	369	0.50	mg/L
7440-24-6	Strontium	2.19	0.0050	mg/L
7440-66-6	Zinc	ND	0.10	mg/L

EPA 6020B Dissolved

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
03/09/2020 14:45	679251	EPA 3005A Dissolved	5	03/13/2020 18:42	LWZ	679655

CAS#	Parameter	Result	LOQ	Units
7440-38-2	Arsenic	ND	0.0050	mg/L
7440-39-3	Barium	0.14	0.0050	mg/L
7440-43-9	Cadmium	ND	0.0050	mg/L
7440-47-3	Chromium	ND	0.0050	mg/L
7439-89-6	Iron	ND	0.50	mg/L
7439-92-1	Lead	ND	0.0050	mg/L
7439-96-5	Manganese	2.16	0.025	mg/L
7440-24-6	Strontium	2.08	0.0050	mg/L
7440-66-6	Zinc	ND	0.10	mg/L

EPA 7470A

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
03/10/2020 08:50	679250	EPA 7470A	1	03/10/2020 15:52	TJR	679266

CAS#	Parameter	Result	LOQ	Units
7439-97-6	Mercury	ND	0.00020	mg/L

EPA 7470A Dissolved

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
03/10/2020 08:50	679250	EPA 7470A Dissolved	1	03/10/2020 15:54	TJR	679266

CAS#	Parameter	Result	LOQ	Units
7439-97-6	Mercury	ND	0.00020	mg/L

Sample Results

H-1 (35-40)

Collect Date	03/06/2020 11:10	**LAB ID**	22003091206
Receive Date	03/07/2020 12:52	**Matrix**	Water

EPA 9056A

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	100	03/11/2020 08:18	DAM	679297

CAS#	Parameter	Result	LOQ	Units
14808-79-8	Sulfate	139	20.0	mg/L

EPA 9056A

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	200	03/11/2020 07:58	DAM	679297

CAS#	Parameter	Result	LOQ	Units
16887-00-6	Chloride	1830	40.0	mg/L

SM 2320 B-2011

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	03/10/2020 08:50	RYC	679329

CAS#	Parameter	Result	LOQ	Units
T-005-C	Carbonate Alkalinity	ND	1.0	mg/L CaCO3

SM 2320 B-2011

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	03/10/2020 08:50	RYC	679329

CAS#	Parameter	Result	LOQ	Units
T-005-B	Bicarbonate Alkalinity	307	1.0	mg/L CaCO3

SM 2540 C-2011

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	03/12/2020 16:00	CJS	679526

CAS#	Parameter	Result	LOQ	Units
WET-035	Total Dissolved Solids(TDS)	3310	10.0	mg/L

Sample Results

H-3 (22-27)	**Collect Date**	03/06/2020 13:15	**LAB ID**	22003091207
	Receive Date	03/07/2020 12:52	**Matrix**	Water

EPA 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	03/12/2020 16:59	SMS	679546

CAS#	Parameter	Result	LOQ	Units
71-43-2	Benzene	ND	0.00500	mg/L
100-41-4	Ethylbenzene	ND	0.00500	mg/L
108-88-3	Toluene	ND	0.00500	mg/L
1330-20-7	Xylene (total)	ND	0.015	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	0.05	.051	mg/L	101	78 - 130
1868-53-7	Dibromofluoromethane	0.05	.05	mg/L	99	77 - 127
2037-26-5	Toluene d8	0.05	.052	mg/L	103	76 - 134
17060-07-0	1,2-Dichloroethane-d4	0.05	.046	mg/L	92	71 - 127

MADEP VPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	03/10/2020 18:49	JAR	679391

CAS#	Parameter	Result	LOQ	Units
GCSV-02-10	Aliphatic >C8-C10	ND	0.020	mg/L
GCSV-02-30	Aliphatic C6-C8	ND	0.030	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
615-59-8	2,5-Dibromotoluene	0.05	.058	mg/L	116	70 - 130

MADEP VPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	03/11/2020 16:44	JAR	679390

CAS#	Parameter	Result	LOQ	Units
GCSV-02-14	Aromatic >C8-C10	ND	0.030	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
615-59-8	2,5-Dibromotoluene	0.05	.054	mg/L	109	70 - 130

Sample Results

H-3 (22-27)

Collect Date	03/06/2020 13:15	**LAB ID**	22003091207
Receive Date	03/07/2020 12:52	**Matrix**	Water

MADEP EPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
03/14/2020 08:30	679685	MADEP EPH Revision 1.1 (LA)	1	03/16/2020 12:28	MFS	679775

CAS#	Parameter	Result	LOQ	Units
GCSV-02-11	Aliphatic >C10-C12	ND	0.100	mg/L
GCSV-02-12	Aliphatic >C12-C16	ND	0.100	mg/L
GCSV-02-31	Aliphatic >C16-C35	ND	0.150	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
3386-33-2	1-Chlorooctadecane	0.16	.095	mg/L	59	40 - 140

MADEP EPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
03/14/2020 08:30	679685	MADEP EPH Revision 1.1 (LA)	1	03/16/2020 12:28	MFS	679774

CAS#	Parameter	Result	LOQ	Units
GCSV-05-18	Aromatic >C21-C35	ND	0.100	mg/L
GCSV-02-15	Unadjusted >C10-C12 Aromatics	ND	0.100	mg/L
GCSV-02-16	Unadjusted >C12-C16 Aromatics	ND	0.100	mg/L
GCSV-02-17	Unadjusted >C16-C21 Aromatics	ND	0.100	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
84-15-1	o-Terphenyl	0.16	.112	mg/L	70	40 - 140
580-13-2	2-Bromonaphthalene	0.16	.196	mg/L	123	40 - 140
321-60-8	2-Fluorobiphenyl	0.16	.166	mg/L	104	40 - 140

EPA 6020B

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
03/10/2020 08:50	679249	EPA 3010A	5	03/13/2020 19:27	LWZ	679655

CAS#	Parameter	Result	LOQ	Units
7440-38-2	Arsenic	ND	0.0050	mg/L
7440-39-3	Barium	0.24	0.0050	mg/L
7440-43-9	Cadmium	ND	0.0050	mg/L
7440-70-2	Calcium	102	2.50	mg/L
7440-47-3	Chromium	ND	0.0050	mg/L
7439-89-6	Iron	ND	0.50	mg/L
7439-92-1	Lead	ND	0.0050	mg/L
7439-95-4	Magnesium	27.0	0.50	mg/L
7439-96-5	Manganese	0.34	0.025	mg/L
7440-09-7	Potassium	2.42	0.50	mg/L

Sample Results

H-3 (22-27)	**Collect Date**	03/06/2020 13:15	**LAB ID**	22003091207
	Receive Date	03/07/2020 12:52	**Matrix**	Water

EPA 6020B (Continued)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
03/10/2020 08:50	679249	EPA 3010A	5	03/13/2020 19:27	LWZ	679655

CAS#	Parameter	Result	LOQ	Units
7440-66-6	Zinc	ND	0.10	mg/L

EPA 6020B

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
03/10/2020 08:50	679249	EPA 3010A	100	03/13/2020 17:57	LWZ	679655

CAS#	Parameter	Result	LOQ	Units
7440-23-5	Sodium	397	10.0	mg/L
7440-24-6	Strontium	2.21	0.10	mg/L

EPA 6020B Dissolved

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
03/09/2020 14:45	679251	EPA 3005A Dissolved	5	03/13/2020 18:47	LWZ	679655

CAS#	Parameter	Result	LOQ	Units
7440-38-2	Arsenic	ND	0.0050	mg/L
7440-39-3	Barium	0.18	0.0050	mg/L
7440-43-9	Cadmium	ND	0.0050	mg/L
7440-47-3	Chromium	ND	0.0050	mg/L
7439-89-6	Iron	ND	0.50	mg/L
7439-92-1	Lead	ND	0.0050	mg/L
7439-96-5	Manganese	0.29	0.025	mg/L
7440-24-6	Strontium	0.40	0.0050	mg/L
7440-66-6	Zinc	ND	0.10	mg/L

EPA 7470A

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
03/10/2020 08:50	679250	EPA 7470A	1	03/10/2020 15:56	TJR	679266

CAS#	Parameter	Result	LOQ	Units
7439-97-6	Mercury	ND	0.00020	mg/L

Sample Results

H-3 (22-27)	**Collect Date**	03/06/2020 13:15	**LAB ID**	22003091207
	Receive Date	03/07/2020 12:52	**Matrix**	Water

EPA 7470A Dissolved

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
03/10/2020 08:50	679250	EPA 7470A Dissolved	1	03/10/2020 15:58	TJR	679266

CAS#	Parameter	Result	LOQ	Units
7439-97-6	Mercury	ND	0.00020	mg/L

EPA 9056A

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	50	03/11/2020 09:16	DAM	679297

CAS#	Parameter	Result	LOQ	Units
16887-00-6	Chloride	84.4	10.0	mg/L
14808-79-8	Sulfate	63.6	10.0	mg/L

SM 2320 B-2011

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	03/10/2020 08:50	RYC	679329

CAS#	Parameter	Result	LOQ	Units
T-005-C	Carbonate Alkalinity	ND	1.0	mg/L CaCO3

SM 2320 B-2011

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	03/10/2020 08:50	RYC	679329

CAS#	Parameter	Result	LOQ	Units
T-005-B	Bicarbonate Alkalinity	363	1.0	mg/L CaCO3

Sample Results

H-3 (22-27)

Collect Date	03/06/2020 13:15	**LAB ID**	22003091207
Receive Date	03/07/2020 12:52	**Matrix**	Water

SM 2540 C-2011

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	03/12/2020 16:00	CJS	679526

CAS#	Parameter	Result	LOQ	Units
WET-035	Total Dissolved Solids(TDS)	572	10.0	mg/L

H-18 (45-50)

Collect Date	03/06/2020 09:50	**LAB ID**	22003091208
Receive Date	03/07/2020 12:52	**Matrix**	Water

EPA 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	03/12/2020 17:21	SMS	679546

CAS#	Parameter	Result	LOQ	Units
71-43-2	Benzene	ND	0.00500	mg/L
100-41-4	Ethylbenzene	ND	0.00500	mg/L
108-88-3	Toluene	ND	0.00500	mg/L
1330-20-7	Xylene (total)	ND	0.015	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	0.05	.051	mg/L	102	78 - 130
1868-53-7	Dibromofluoromethane	0.05	.051	mg/L	101	77 - 127
2037-26-5	Toluene d8	0.05	.053	mg/L	106	76 - 134
17060-07-0	1,2-Dichloroethane-d4	0.05	.048	mg/L	95	71 - 127

MADEP VPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	03/10/2020 19:05	JAR	679391

CAS#	Parameter	Result	LOQ	Units
GCSV-02-10	Aliphatic >C8-C10	ND	0.020	mg/L
GCSV-02-30	Aliphatic C6-C8	ND	0.030	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
615-59-8	2,5-Dibromotoluene	0.05	.053	mg/L	107	70 - 130

Sample Results

H-18 (45-50)

Collect Date	03/06/2020 09:50	**LAB ID**	22003091208
Receive Date	03/07/2020 12:52	**Matrix**	Water

MADEP VPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	03/11/2020 17:00	JAR	679390

CAS#	Parameter	Result	LOQ	Units
GCSV-02-14	Aromatic >C8-C10	ND	0.030	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
615-59-8	2,5-Dibromotoluene	0.05	.061	mg/L	121	70 - 130

MADEP EPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
03/14/2020 08:30	679685	MADEP EPH Revision 1.1 (LA)	1	03/16/2020 12:48	MFS	679775

CAS#	Parameter	Result	LOQ	Units
GCSV-02-11	Aliphatic >C10-C12	ND	0.100	mg/L
GCSV-02-12	Aliphatic >C12-C16	ND	0.100	mg/L
GCSV-02-31	Aliphatic >C16-C35	ND	0.150	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
3386-33-2	1-Chlorooctadecane	0.16	.067	mg/L	42	40 - 140

MADEP EPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
03/14/2020 08:30	679685	MADEP EPH Revision 1.1 (LA)	1	03/16/2020 12:48	MFS	679774

CAS#	Parameter	Result	LOQ	Units
GCSV-05-18	Aromatic >C21-C35	ND	0.100	mg/L
GCSV-02-15	Unadjusted >C10-C12 Aromatics	ND	0.100	mg/L
GCSV-02-16	Unadjusted >C12-C16 Aromatics	ND	0.100	mg/L
GCSV-02-17	Unadjusted >C16-C21 Aromatics	ND	0.100	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
84-15-1	o-Terphenyl	0.16	.146	mg/L	91	40 - 140
580-13-2	2-Bromonaphthalene	0.16	.229	mg/L	143*	40 - 140
321-60-8	2-Fluorobiphenyl	0.16	.2	mg/L	125	40 - 140

Sample Results

H-18 (45-50)

Collect Date	03/06/2020 09:50	**LAB ID**	22003091208
Receive Date	03/07/2020 12:52	**Matrix**	Water

EPA 6020B

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
03/23/2020 07:00	680126	EPA 3010A	100	03/23/2020 16:29	LWZ	680255

CAS#	Parameter	Result	LOQ	Units
7440-23-5	Sodium	688	10.0	mg/L

EPA 6020B

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
03/23/2020 07:00	680126	EPA 3010A	5	03/24/2020 15:38	BDP	680339

CAS#	Parameter	Result	LOQ	Units
7440-38-2	Arsenic	ND	0.0050	mg/L
7440-39-3	Barium	0.081	0.0050	mg/L
7440-43-9	Cadmium	0.0059	0.0050	mg/L
7440-70-2	Calcium	857	2.50	mg/L
7440-47-3	Chromium	ND	0.0050	mg/L
7439-89-6	Iron	ND	0.50	mg/L
7439-92-1	Lead	ND	0.0050	mg/L
7439-95-4	Magnesium	415	0.50	mg/L
7439-96-5	Manganese	5.66	0.025	mg/L
7440-09-7	Potassium	10.5	0.50	mg/L
7440-24-6	Strontium	4.48	0.0050	mg/L
7440-66-6	Zinc	ND	0.10	mg/L

EPA 6020B Dissolved

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
03/09/2020 14:45	679251	EPA 3005A Dissolved	5	03/13/2020 18:51	LWZ	679655

CAS#	Parameter	Result	LOQ	Units
7440-38-2	Arsenic	ND	0.0050	mg/L
7440-39-3	Barium	0.067	0.0050	mg/L
7440-43-9	Cadmium	ND	0.0050	mg/L
7440-47-3	Chromium	ND	0.0050	mg/L
7439-89-6	Iron	ND	0.50	mg/L
7439-92-1	Lead	ND	0.0050	mg/L
7439-96-5	Manganese	5.04	0.025	mg/L
7440-24-6	Strontium	4.30	0.0050	mg/L
7440-66-6	Zinc	ND	0.10	mg/L

Sample Results

H-18 (45-50)

Collect Date	03/06/2020 09:50	**LAB ID**	22003091208
Receive Date	03/07/2020 12:52	**Matrix**	Water

EPA 7470A

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
03/10/2020 08:50	679250	EPA 7470A	1	03/10/2020 16:00	TJR	679266

CAS#	Parameter	Result	LOQ	Units
7439-97-6	Mercury	ND	0.00020	mg/L

EPA 7470A Dissolved

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
03/10/2020 08:50	679250	EPA 7470A Dissolved	1	03/10/2020 16:02	TJR	679266

CAS#	Parameter	Result	LOQ	Units
7439-97-6	Mercury	ND	0.00020	mg/L

EPA 9056A

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	100	03/11/2020 09:55	DAM	679297

CAS#	Parameter	Result	LOQ	Units
14808-79-8	Sulfate	348	20.0	mg/L

EPA 9056A

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	500	03/11/2020 09:35	DAM	679297

CAS#	Parameter	Result	LOQ	Units
16887-00-6	Chloride	3960	100	mg/L

SM 2320 B-2011

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	03/10/2020 08:50	RYC	679329

CAS#	Parameter	Result	LOQ	Units
T-005-C	Carbonate Alkalinity	ND	1.0	mg/L CaCO3

Sample Results

H-18 (45-50)

Collect Date	03/06/2020 09:50	**LAB ID**	22003091208
Receive Date	03/07/2020 12:52	**Matrix**	Water

SM 2320 B-2011

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	03/10/2020 08:50	RYC	679329

CAS#	Parameter	Result	LOQ	Units
T-005-B	Bicarbonate Alkalinity	274	1.0	mg/L CaCO3

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Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	03/12/2020 16:00	CJS	679526

CAS#	Parameter	Result	LOQ	Units
WET-035	Total Dissolved Solids(TDS)	6450	10.0	mg/L

GC/MS Volatiles QC Summary

Analytical Batch 679546	Client ID	MB679546		LCS679546				LCSD679546				
	LAB ID	2020827		2020828				2020829				
	Sample Type	MB		LCS				LCSD				
	Prep Date	NA		NA				NA				
	Analysis Date	03/12/2020 11:55		03/12/2020 10:07				03/12/2020 10:49				
	Matrix	Water		Water				Water				
EPA 8260B		Units Result	mg/L LOQ	Spike Added	Result	%R	Control Limits%R	Spike Added	Result	%R	RPD	RPD Limit
Benzene	71-43-2	ND	0.00500	0.050	0.048	97	70 - 129	0.050	0.050	100	4	20
Ethylbenzene	100-41-4	ND	0.00500	0.050	0.047	93	74 - 126	0.050	0.048	96	2	30
Toluene	108-88-3	ND	0.00500	0.050	0.052	104	72 - 120	0.050	0.054	108	4	20
Xylene (total)	1330-20-7	ND	0.015	0.150	0.149	99	74 - 127	0.150	0.152	101	2	30
Surrogate												
1,2-Dichloroethane-d4	17060-07-0	.0462	92	.05	.0477	95	71 - 127	.05	.0473	95	NA	NA
4-Bromofluorobenzene	460-00-4	.0499	100	.05	.05	100	78 - 130	.05	.0509	102	NA	NA
Dibromofluoromethane	1868-53-7	.0502	100	.05	.0502	100	77 - 127	.05	.0497	99	NA	NA
Toluene d8	2037-26-5	.0515	103	.05	.0505	101	76 - 134	.05	.051	102	NA	NA

GC Volatiles QC Summary

Analytical Batch 679390	Client ID	MB679390		LCS679390				LCSD679390				
	LAB ID	2020143		2020144				2020145				
	Sample Type	MB		LCS				LCSD				
	Prep Date	NA		NA				NA				
	Analysis Date	03/11/2020 15:40		03/10/2020 14:45				03/11/2020 13:10				
	Matrix	Water		Water				Water				
MADEP VPH Revision 1.1 (LA)		Units Result	mg/L LOQ	Spike Added	Result	%R	Control Limits%R	Spike Added	Result	%R	RPD	RPD Limit
Aromatic >C8-C10	GCSV-02-14	ND	0.030	0.150	0.157	105	60 - 140	0.150	0.154	103	2	30
Surrogate												
2,5-Dibromotoluene	615-59-8	.0537	107	.05	.0561	112	70 - 130	.05	.0546	109	NA	NA

Analytical Batch 679391	Client ID	MB679391		LCS679391				LCSD679391				
	LAB ID	2020147		2020148				2020149				
	Sample Type	MB		LCS				LCSD				
	Prep Date	NA		NA				NA				
	Analysis Date	03/10/2020 16:39		03/10/2020 14:24				03/10/2020 15:53				
	Matrix	Water		Water				Water				
MADEP VPH Revision 1.1 (LA)		Units Result	mg/L LOQ	Spike Added	Result	%R	Control Limits%R	Spike Added	Result	%R	RPD	RPD Limit
Aliphatic >C8-C10	GCSV-02-10	ND	0.020	0.100	0.079	79	60 - 140	0.100	0.090	90	13	30
Aliphatic C6-C8	GCSV-02-30	ND	0.030	0.150	0.151	101	60 - 140	0.150	0.153	102	1	30
Surrogate												
2,5-Dibromotoluene	615-59-8	.0583	117	.05	.0546	109	70 - 130	.05	.0604	121	NA	NA

GC Semi-Volatiles QC Summary

Analytical Batch	Client ID	MB679685		LCS679685				LCSD679685				
679775	LAB ID	2021653		2021654				2021655				
Prep Batch	Sample Type	MB		LCS				LCSD				
679685	Prep Date	03/14/2020 08:30		03/14/2020 08:30				03/14/2020 08:30				
Prep Method	Analysis Date	03/16/2020 08:48		03/16/2020 09:08				03/16/2020 09:27				
MADEP EPH Revision 1.1 (LA)	Matrix	Water		Water				Water				
MADEP EPH Revision 1.1 (LA)		Units Result	mg/L LOQ	Spike Added	Result	%R	Control Limits%R	Spike Added	Result	%R	RPD	RPD Limit
Aliphatic >C10-C12	GCSV-02-11	ND	0.100	0.400	0.259	65	30 - 140	0.400	0.173	43	40	40
Aliphatic >C12-C16	GCSV-02-12	ND	0.100	0.400	0.307	77	40 - 140	0.400	0.229	57	29	40
Aliphatic >C16-C35	GCSV-02-31	ND	0.150	1.80	1.77	98	40 - 140	1.80	1.57	87	12	40
Surrogate												
1-Chlorooctadecane	3386-33-2	.089	56	.16	.0975	61	40 - 140	.16	.0841	53	NA	NA

Analytical Batch	Client ID	MB679685		LCS679685				LCSD679685				
679774	LAB ID	2021653		2021654				2021655				
Prep Batch	Sample Type	MB		LCS				LCSD				
679685	Prep Date	03/14/2020 08:30		03/14/2020 08:30				03/14/2020 08:30				
Prep Method	Analysis Date	03/16/2020 08:48		03/16/2020 09:08				03/16/2020 09:27				
MADEP EPH Revision 1.1 (LA)	Matrix	Water		Water				Water				
MADEP EPH Revision 1.1 (LA)		Units Result	mg/L LOQ	Spike Added	Result	%R	Control Limits%R	Spike Added	Result	%R	RPD	RPD Limit
Aromatic >C21-C35	GCSV-05-18	ND	0.100	2.00	2.06	103	40 - 140	2.00	1.52	76	30	40
Unadjusted >C10-C12 Aromatics	GCSV-02-15	ND	0.100	0.200	0.255	128	30 - 140	0.200	0.153	77	50*	40
Unadjusted >C12-C16 Aromatics	GCSV-02-16	ND	0.100	0.800	0.948	119	40 - 140	0.800	0.621	78	42*	40
Unadjusted >C16-C21 Aromatics	GCSV-02-17	ND	0.100	0.400	0.404	101	40 - 140	0.400	0.281	70	36	40
Surrogate												
2-Bromonaphthalene	580-13-2	.209	131	.16	.253	158*	40 - 140	.16	.171	107	NA	NA
2-Fluorobiphenyl	321-60-8	.185	116	.16	.224	140	40 - 140	.16	.155	97	NA	NA
o-Terphenyl	84-15-1	.127	79	.16	.165	103	40 - 140	.16	.116	73	NA	NA

Inorganics QC Summary

Analytical Batch	Client ID	MB679250		LCS679250				LCSD679250				
679266	LAB ID	2019506		2019508				2019507				
Prep Batch	Sample Type	MB		LCS				LCSD				
679250	Prep Date	03/10/2020 08:50		03/10/2020 08:50				03/10/2020 08:50				
Prep Method	Analysis Date	03/10/2020 15:22		03/10/2020 15:26				03/10/2020 15:24				
EPA 7470A	Matrix	Water		Water				Water				
EPA 7470A		Units Result	mg/L LOQ	Spike Added	Result	%R	Control Limits%R	Spike Added	Result	%R	RPD	RPD Limit
Mercury	7439-97-6	ND	0.00020	0.0050	0.0055	110	80 - 120	0.0050	0.0057	115	4	20

Analytical Batch	Client ID	MB679250		LCS679250				LCSD679250				
679266	LAB ID	2019506		2019508				2019507				
Prep Batch	Sample Type	MB		LCS				LCSD				
679250	Prep Date	03/10/2020 08:50		03/10/2020 08:50				03/10/2020 08:50				
Prep Method	Analysis Date	03/10/2020 15:22		03/10/2020 15:26				03/10/2020 15:24				
EPA 7470A	Matrix	Water		Water				Water				
EPA 7470A Dissolved		Units Result	mg/L LOQ	Spike Added	Result	%R	Control Limits%R	Spike Added	Result	%R	RPD	RPD Limit
Mercury	7439-97-6	ND	0.00020	0.0050	0.0055	110	80 - 120	0.0050	0.0057	115	4	20

Analytical Batch	Client ID	MB679249		LCS679249			
679539	LAB ID	2019504		2019505			
Prep Batch	Sample Type	MB		LCS			
679249	Prep Date	03/10/2020 08:50		03/10/2020 08:50			
Prep Method	Analysis Date	03/12/2020 20:52		03/12/2020 20:57			
EPA 3010A	Matrix	Water		Water			
EPA 6020B		Units Result	mg/L LOQ	Spike Added	Result	%R	Control Limits%R
Arsenic	7440-38-2	ND	0.00025	0.050	0.052	103	80 - 120
Barium	7440-39-3	ND	0.0010	0.050	0.049	97	80 - 120
Cadmium	7440-43-9	ND	0.00025	0.050	0.048	97	80 - 120
Calcium	7440-70-2	ND	0.50	25.0	25.7	103	80 - 120
Chromium	7440-47-3	ND	0.0010	0.050	0.050	101	80 - 120
Iron	7439-89-6	ND	0.10	5.00	5.01	100	80 - 120
Magnesium	7439-95-4	ND	0.10	5.00	4.85	97	80 - 120
Manganese	7439-96-5	ND	0.0050	0.050	0.054	108	80 - 120
Potassium	7440-09-7	ND	0.10	5.00	5.19	104	80 - 120
Sodium	7440-23-5	ND	0.10	5.00	5.25	105	80 - 120
Strontium	7440-24-6	ND	0.0010	0.050	0.052	104	80 - 120
Zinc	7440-66-6	ND	0.020	1.00	0.98	98	80 - 120

Analytical Batch	Client ID	MB680126		LCS680126			
680255	LAB ID	2023409		2023410			
Prep Batch	Sample Type	MB		LCS			
680126	Prep Date	03/23/2020 07:00		03/23/2020 07:00			
Prep Method	Analysis Date	03/23/2020 16:02		03/23/2020 16:06			
EPA 3010A	Matrix	Water		Water			
EPA 6020B		Units Result	mg/L LOQ	Spike Added	Result	%R	Control Limits%R
Arsenic	7440-38-2	ND	0.00050	0.050	0.049	98	80 - 120
Barium	7440-39-3	ND	0.0010	0.050	0.047	94	80 - 120
Cadmium	7440-43-9	ND	0.00025	0.050	0.047	94	80 - 120
Calcium	7440-70-2	ND	0.50	25.0	25.0	100	80 - 120
Chromium	7440-47-3	ND	0.0010	0.050	0.050	100	80 - 120
Iron	7439-89-6	ND	0.10	5.00	5.06	101	80 - 120
Lead	7439-92-1	ND	0.00075	0.050	0.049	97	80 - 120
Magnesium	7439-95-4	ND	0.10	5.00	4.96	99	80 - 120
Manganese	7439-96-5	ND	0.0050	0.050	0.052	104	80 - 120
Potassium	7440-09-7	ND	0.10	5.00	5.02	100	80 - 120
Strontium	7440-24-6	ND	0.0010	0.050	0.049	97	80 - 120
Zinc	7440-66-6	ND	0.020	1.00	1.00	100	80 - 120

Inorganics QC Summary

Analytical Batch	Client ID	MB680126		LCS680126			
680339	LAB ID	2023409		2023410			
Prep Batch	Sample Type	MB		LCS			
680126	Prep Date	03/23/2020 07:00		03/23/2020 07:00			
Prep Method	Analysis Date	03/24/2020 15:24		03/24/2020 15:28			
EPA 3010A	Matrix	Water		Water			
EPA 6020B		Units Result	mg/L LOQ	Spike Added	Result	%R	Control Limits%R
Sodium	7440-23-5	ND	0.10	5.00	5.13	103	80 - 120

Analytical Batch	Client ID	MB679251		LCS679251				LCSD679251				
679570	LAB ID	2019509		2019511				2019510				
Prep Batch	Sample Type	MB		LCS				LCSD				
679251	Prep Date	03/09/2020 14:45		03/09/2020 14:45				03/09/2020 14:45				
Prep Method	Analysis Date	03/12/2020 19:04		03/12/2020 19:12				03/12/2020 19:08				
EPA 3005A Dissolved	Matrix	Water		Water				Water				
EPA 6020B Dissolved		Units Result	mg/L LOQ	Spike Added	Result	%R	Control Limits%R	Spike Added	Result	%R	RPD	RPD Limit
Arsenic	7440-38-2	ND	0.00025	0.050	0.053	106	80 - 120	0.050	0.049	99	8	20
Barium	7440-39-3	ND	0.0010	0.050	0.050	99	80 - 120	0.050	0.047	95	6	20
Cadmium	7440-43-9	ND	0.00025	0.050	0.052	103	80 - 120	0.050	0.049	97	6	20
Chromium	7440-47-3	ND	0.0010	0.050	0.053	106	80 - 120	0.050	0.049	98	8	20
Iron	7439-89-6	ND	0.10	5.00	5.39	108	80 - 120	5.00	5.00	100	8	20
Lead	7439-92-1	ND	0.00025	0.050	0.051	102	80 - 120	0.050	0.048	97	6	20
Manganese	7439-96-5	ND	0.0050	0.050	0.058	116	80 - 120	0.050	0.054	107	7	20
Strontium	7440-24-6	ND	0.0010	0.050	0.051	103	80 - 120	0.050	0.049	99	4	20
Zinc	7440-66-6	ND	0.011	1.00	1.07	107	80 - 120	1.00	1.00	100	7	20

General Chemistry QC Summary

Analytical Batch		Client ID	MB679297		LCS679297			
679297		LAB ID	2019653		2019654			
		Sample Type	MB		LCS			
		Prep Date	NA		NA			
		Analysis Date	03/11/2020 05:04		03/11/2020 04:45			
		Matrix	Water		Water			
EPA 9056A		Units	mg/L		Spike			
		Result	LOQ		Added	Result	%R	Control Limits%R
Chloride	16887-00-6	ND	0.200		2.50	2.47	99	80 - 120
Sulfate	14808-79-8	ND	0.200		2.50	2.45	98	80 - 120

Analytical Batch		Client ID	MB679526	
679526		LAB ID	2020728	
		Sample Type	MB	
		Prep Date	NA	
		Analysis Date	03/12/2020 16:00	
		Matrix	Water	
SM 2540 C-2011		Units	mg/L	
		Result	LOQ	
Total Dissolved Solids(TDS)	WET-035	ND	10.0	

CHAIN-OF-CUSTODY Analytical Request Document

Pace Analytical

Chain-of-Custody is a LEGAL DOCUMENT - Complete all relevent fields

LAB USE ONLY- Affix Wor

Client ID: 4271 - ERM
SDG: 220030912
PM: AMK

ALL SHAD

Container Preservative Ty

** Preservative Types: (1) nitric acid, (2) sulfuric acid, (3) hydrochloric acid, (4) sodium hydroxide, (5) zinc acetate, (6) methanol, (7) sodium bisulfate, (8) sodium thiosulfate, (9) hexane, (A) ascorbic acid, (B) ammonium sulfate, (C) ammonium hydroxide, (D) TSP, (U) Unpreserved, (O) Other _____

Company: ERM	Billing Information: SAME
Address: 840 W Sam Houston Pkwy	
Report To: David Angle	Email To: /
Copy To: Shawn.Wiggins@ERM.com	Site Collection Info/Address: Henning
Customer Project Name/Number: Henning Management 0526033	State: LA / County/City: HAYES Time Zone Collected: [ ] PT [ ] MT [✓] CT [ ] ET
Phone: 832-750-4781 Email: DAVID.ANGLE@ERM.com	Site/Facility ID #: Compliance Monitoring? [ ] Yes [✓] No
Collected By (print): David Sanguinetti	Purchase Order #: Quote #: DW PWS ID #: DW Location Code:
Collected By (signature): DS	Turnaround Date Required: Immediately Packed on Ice: [✓] Yes [ ] No
Sample Disposal: [ ] Dispose as appropriate [ ] Return [ ] Archive: _____ [ ] Hold: _____	Rush: [ ] Same Day [ ] Next Day [ ] 2 Day [ ] 3 Day [ ] 4 Day [ ] 5 Day (Expedite Charges Apply) Field Filtered (if applicable): [✓] Yes [ ] No Analysis: Diss Metals

* Matrix Codes (Insert in Matrix box below): Drinking Water (DW), Ground Water (GW), Wastewater (WW), Product (P), Soil/Solid (SL), Oil (OL), Wipe (WP), Air (AR), Tissue (TS), Bioassay (B), Vapor (V), Other (OT)

Analyses: BTEX, EPH, VPH, ANIONS, CATIONS, TAS, TOTAL METALS, DISSOLVED METALS

Customer Sample ID	Matrix *	Comp / Grab	Collected (or Composite Start) Date	Time	Composite End Date	Time	Res Cl	# of Ctns	BTEX	EPH	VPH	ANIONS	CATIONS	TAS	TOTAL METALS	DISSOLVED METALS			Lab Profile/Line:
H-12 (50-60)	GW	G	3/5/20	1105				10	X	X	X	X	X	X	X	X			1
H-9 (50-55)			3/5/20	1335															2
H-10 (35-40)			3/5/20	1530															3
H-2 (30-35)			3/5/20	1655															4
H-16 (35-40)			3/6/20	0815															5
H-18 (35-40)			3/6/20	1110															6
H-3 (22-27)			3/6/20	1315															7-8

Lab Profile/Line:

Lab Sample Receipt Checklist:

Custody Seals Present/Intact	Y N NA
Custody Signatures Present	Y N NA
Collector Signature Present	Y N NA
Bottles Intact	Y N NA
Correct Bottles	Y N NA
Sufficient Volume	Y N NA
Samples Received on Ice	Y N NA
VOA - Headspace Acceptable	Y N NA
USDA Regulated Soils	Y N NA
Samples in Holding Time	Y N NA
Residual Chlorine Present	Y N NA
Cl Strips: _____	
Sample pH Acceptable	Y N NA
pH Strips: _____	
Sulfide Present	Y N NA
Lead Acetate Strips: _____	

LAB USE ONLY:
Lab Sample # / Comments:

Customer Remarks / Special Conditions / Possible Hazards:

Type of Ice Used: Wet Blue Dry None

Packing Material Used:

Radchem sample(s) screened (<500 cpm): Y N NA

SHORT HOLDS PRESENT (<72 hours): Y N N/A

Lab Tracking #: 2512863

Samples received via: FEDEX UPS Client Courier Pace Courier

Lab Sample Temperature Info:
Temp Blank Received: Y N NA
Therm ID#: E34
Cooler 1 Temp Upon Receipt: ____oC
Cooler 1 Therm Corr. Factor: ____oC
Cooler 1 Corrected Temp: ____oC
Comments: 0.1°C 42CPM

Trip Blank Received: Y N NA
HCL MeOH TSP Other

Non Conformance(s): YES / NO
Page: ____ of: ____

Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:
DS / ERM	3/6/20 1500	PACE	3/6/20 1500
PACE	3/7/20 1115		3-7-20 1115
	3-7-20 1252		3-7-20 1252

MTJL LAB USE ONLY
Table #:
Acctnum:
Template:
Prelogin:
PM:
PB:

SAMPLE RECEIVING CHECKLIST

SAMPLE DELIVERY GROUP 220030912	
Client **PM** AMK 4271 - ERM	**Transport Method** COURIER
Profile Number 282045	**Received By** McCune, Dodie N.
Line Item(s) 2 - Waters - BTEX	**Receive Date(s)** 03/07/20

CHECKLIST	YES	NO
Samples received with proper thermal preservation?	☑	☐
Radioactivity is <1600 cpm? If no, record cpm value in notes section.	☑	☐
COC relinquished and complete (including sampleIDs, collect times, and sampler)?	☑	☐
All containers received in good condition and within hold time?	☑	☐
All sample labels and containers received match the chain of custody?	☐	☑
Preservative added to any containers?	☐	☑
If received, was headspace for VOC water containers < 6mm?	☑	☐
Samples collected in containers provided by Pace Gulf Coast?	☑	☐

COOLERS

Airbill	Thermometer ID: E34	Temp °C
		0.1

DISCREPANCIES

22003091208 - H-18 (45-50):
Extra Sample - Not Listed on COC

LAB PRESERVATIONS

None

NOTES

Revision 1.6

LELAP CERTIFICATE NUMBER: 01955
DOD-ELAP ACCREDITATION NUMBER: 74960

ANALYTICAL RESULTS

PERFORMED BY

Pace Analytical Gulf Coast
7979 Innovation Park Dr.
Baton Rouge, LA 70820
(225) 769-4900

Report Date 05/10/2021

Report # 221042166

Project 0526033/Henning Management

Deliver To	***Additional Recipients***
Lance Cooper ERM 3838 N. Causeway Blvd Suite 3000 Metairie, LA 70002 (504) 846-9282	Kurt Boehringer, ERM

Laboratory Endorsement

Sample analysis was performed in accordance with approved methodologies provided by the Environmental Protection Agency or other recognized agencies. The samples and their corresponding extracts will be maintained for a period of 30 days unless otherwise arranged. Following this retention period the samples will be disposed in accordance with Pace Gulf Coast's Standard Operating Procedures.

Common Abbreviations that may be Utilized in this Report

ND	Indicates the result was Not Detected at the specified reporting limit
NO	Indicates the sample did not ignite when preliminary test performed for EPA Method 1030
DO	Indicates the result was Diluted Out
MI	Indicates the result was subject to Matrix Interference
TNTC	Indicates the result was Too Numerous To Count
SUBC	Indicates the analysis was Sub-Contracted
FLD	Indicates the analysis was performed in the Field
DL	Detection Limit
LOD	Limit of Detection
LOQ	Limit of Quantitation
RE	Re-analysis
CF	HPLC or GC Confirmation
00:01	Reported as a time equivalent to 12:00 AM

Reporting Flags that may be Utilized in this Report

J or I	Indicates the result is between the MDL and LOQ
J	DOD flag on analyte in the parent sample for MS/MSD outside acceptance criteria
U	Indicates the compound was analyzed for but not detected
B or V	Indicates the analyte was detected in the associated Method Blank
Q	Indicates a non-compliant QC Result (See Q Flag Application Report)
*****	Indicates a non-compliant or not applicable QC recovery or RPD – see narrative
E	Organics - The result is estimated because it exceeded the instrument calibration range
E	Metals - % diference for the serial dilution is > 10%
L	Reporting Limits adjusted to meet risk-based limit.
P	RPD between primary and confirmation result is greater than 40
DL	Diluted analysis – when appended to Client Sample ID

Sample receipt at Pace Gulf Coast is documented through the attached chain of custody. In accordance with NELAC, this report shall be reproduced only in full and with the written permission of Pace Gulf Coast. The results contained within this report relate only to the samples reported. The documented results are presented within this report.

This report pertains only to the samples listed in the Report Sample Summary and should be retained as a permanent record thereof. The results contained within this report are intended for the use of the client. Any unauthorized use of the information contained in this report is prohibited.

I certify that this data package is in compliance with The NELAC Institute (TNI) Standard 2009 and terms and conditions of the contract and Statement of Work both technically and for completeness, for other than the conditions in the case narrative. Release of the data contained in this hardcopy data package and in the computer readable data submitted has been authorized by the Quality Assurance Manager or his/her designee, as verified by the following signature.

Estimated uncertainty of measurement is available upon request. This report is in compliance with the DOD QSM as specified in the contract if applicable.

Authorized Signature
Pace Gulf Coast Report 221042166

Certifications

Certification	Certification Number
DOD ELAP	74960
Alabama	01955
Arkansas	88-0655
Colorado	01955
Delaware	01955
Florida	E87854
Georgia	01955
Hawaii	01955
Idaho	01955
Illinois	200048
Indiana	01955
Kansas	E-10354
Kentucky	95
Louisiana	01955
Maryland	01955
Massachusetts	01955
Michigan	01955
Mississippi	01955
Missouri	01955
Montana	N/A
Nebraska	01955
New Mexico	01955
North Carolina	618
North Dakota	R-195
Oklahoma	9403
South Carolina	73006001
South Dakota	01955
Tennessee	01955
Texas	T104704178
Vermont	01955
Virginia	460215
Washington	C929
USDA Soil Permit	P330-16-00234

Case Narrative

Client: ERM-Baton Rouge **Report:** 221042166

Pace Analytical Gulf Coast received and analyzed the sample(s) listed
on the Report Sample Summary page of this report. Receipt of the sample(s) is documented
by the attached chain of custody. This applies only to the sample(s) listed in this report.
No sample integrity or quality control exceptions were identified unless noted below.

SEMI-VOLATILES GAS CHROMATOGRAPHY

In the MADEP EPH Revision 1.1 (LA) analysis, the recoveries for the surrogates, 2-Bromonaphthalene and 2-Fluorobiphenyl are above the upper control limit for sample 22104216602,(H-22). No target analytes were detected in the sample..

In the MADEP EPH Revision 1.1 (LA) analysis for prep batch 709760, the LCS/LCSD RPD is a above the control limit for Aliphatic >C12-C16. All recoveries are acceptable.

Sample Summary

LAB ID	Client ID	Matrix	Collect Date	Receive Date
22104216601	H-20	Water	04/19/2021 10:00	04/21/2021 13:17
22104216602	H-22	Water	04/19/2021 11:10	04/21/2021 13:17
22104216603	H-23	Water	04/19/2021 13:35	04/21/2021 13:17
22104216604	H-24	Water	04/19/2021 15:00	04/21/2021 13:17
22104216605	H-25	Water	04/20/2021 14:40	04/21/2021 13:17
22104216606	H-27	Water	04/20/2021 14:00	04/21/2021 13:17

Sample Results

H-20

Collect Date	04/19/2021 10:00	**LAB ID**	22104216601
Receive Date	04/21/2021 13:17	**Matrix**	Water

EPA 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	04/25/2021 02:26	SMS	709355

CAS#	Parameter	Result	LOQ	Units
71-43-2	Benzene	ND	0.00500	mg/L
100-41-4	Ethylbenzene	ND	0.00500	mg/L
108-88-3	Toluene	ND	0.00500	mg/L
1330-20-7	Xylene (total)	ND	0.015	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	0.05	.051	mg/L	102	78 - 130
1868-53-7	Dibromofluoromethane	0.05	.053	mg/L	105	77 - 127
2037-26-5	Toluene d8	0.05	.049	mg/L	98	76 - 134
17060-07-0	1,2-Dichloroethane-d4	0.05	.053	mg/L	106	71 - 127

MADEP VPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	04/27/2021 18:05	JAR	709542

CAS#	Parameter	Result	LOQ	Units
GCSV-02-10	Aliphatic >C8-C10	ND	0.020	mg/L
GCSV-02-30	Aliphatic C6-C8	ND	0.030	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
615-59-8	2,5-Dibromotoluene	0.05	.048	mg/L	96	70 - 130

MADEP VPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	04/27/2021 18:05	JAR	709543

CAS#	Parameter	Result	LOQ	Units
GCSV-02-14	Aromatic >C8-C10	ND	0.030	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
615-59-8	2,5-Dibromotoluene	0.05	.043	mg/L	85	70 - 130

MADEP EPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
04/29/2021 11:15	709760	MADEP EPH Revision 1.1 (LA)	1	04/30/2021 21:01	MFS	709947

CAS#	Parameter	Result	LOQ	Units
GCSV-02-11	Aliphatic >C10-C12	ND	0.100	mg/L
GCSV-02-12	Aliphatic >C12-C16	ND	0.100	mg/L
GCSV-02-31	Aliphatic >C16-C35	ND	0.150	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
3386-33-2	1-Chlorooctadecane	0.16	.106	mg/L	66	40 - 140

Sample Results

H-20

Collect Date	04/19/2021 10:00	**LAB ID**	22104216601
Receive Date	04/21/2021 13:17	**Matrix**	Water

MADEP EPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
04/29/2021 11:15	709760	MADEP EPH Revision 1.1 (LA)	1	04/30/2021 20:42	MFS	709946

CAS#	Parameter	Result	LOQ	Units
GCSV-05-18	Aromatic >C21-C35	ND	0.100	mg/L
GCSV-02-15	Unadjusted >C10-C12 Aromatics	ND	0.100	mg/L
GCSV-02-16	Unadjusted >C12-C16 Aromatics	ND	0.100	mg/L
GCSV-02-17	Unadjusted >C16-C21 Aromatics	ND	0.100	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
84-15-1	o-Terphenyl	0.16	.131	mg/L	82	40 - 140
580-13-2	2-Bromonaphthalene	0.16	.186	mg/L	116	40 - 140
321-60-8	2-Fluorobiphenyl	0.16	.188	mg/L	118	40 - 140

EPA 6020B

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
04/22/2021 08:15	709135	EPA 3010A	1	04/22/2021 22:35	LWZ	709206

CAS#	Parameter	Result	LOQ	Units
7440-38-2	Arsenic	0.0016	0.0010	mg/L
7440-39-3	Barium	0.016	0.0010	mg/L
7440-43-9	Cadmium	ND	0.0010	mg/L
7440-70-2	Calcium	211	0.50	mg/L
7440-47-3	Chromium	ND	0.0010	mg/L
7439-89-6	Iron	0.18	0.10	mg/L
7439-92-1	Lead	ND	0.0010	mg/L
7439-96-5	Manganese	1.73	0.0050	mg/L
7440-09-7	Potassium	4.80	0.10	mg/L
7440-66-6	Zinc	ND	0.020	mg/L

EPA 6020B

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
04/22/2021 08:15	709135	EPA 3010A	10	04/23/2021 15:02	LWZ	709297

CAS#	Parameter	Result	LOQ	Units
7439-95-4	Magnesium	121	1.00	mg/L
7440-23-5	Sodium	341	1.00	mg/L
7440-24-6	Strontium	1.33	0.010	mg/L

EPA 6020B Dissolved

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
04/23/2021 09:30	709133	EPA 3005A Dissolved	1	04/23/2021 16:37	LWZ	709297

CAS#	Parameter	Result	LOQ	Units
7440-38-2	Arsenic	0.0016	0.0010	mg/L
7440-39-3	Barium	0.014	0.0010	mg/L
7440-43-9	Cadmium	ND	0.0010	mg/L
7440-47-3	Chromium	ND	0.0010	mg/L
7439-89-6	Iron	ND	0.10	mg/L
7439-92-1	Lead	ND	0.0010	mg/L
7439-96-5	Manganese	1.62	0.0050	mg/L

Sample Results

H-20

Collect Date	04/19/2021 10:00	**LAB ID**	22104216601
Receive Date	04/21/2021 13:17	**Matrix**	Water

EPA 6020B Dissolved (Continued)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
04/23/2021 09:30	709133	EPA 3005A Dissolved	1	04/23/2021 16:37	LWZ	709297

CAS#	Parameter	Result	LOQ	Units
7440-66-6	Zinc	ND	0.020	mg/L

EPA 6020B Dissolved

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
04/23/2021 09:30	709133	EPA 3005A Dissolved	5	04/26/2021 19:04	LWZ	709461

CAS#	Parameter	Result	LOQ	Units
7440-24-6	Strontium	1.30	0.0050	mg/L

EPA 7470A

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
04/22/2021 11:00	709138	EPA 7470A	1	04/27/2021 13:37	LWZ	709420

CAS#	Parameter	Result	LOQ	Units
7439-97-6	Mercury	ND	0.00020	mg/L

EPA 7470A Dissolved

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
04/22/2021 14:30	709139	EPA 7470A Dissolved	1	04/23/2021 14:21	LWZ	709301

CAS#	Parameter	Result	LOQ	Units
7439-97-6	Mercury	ND	0.00020	mg/L

EPA 9056A

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	200	05/08/2021 17:54	AJE	710668

CAS#	Parameter	Result	LOQ	Units
16887-00-6	Chloride	316	40.0	mg/L
14808-79-8	Sulfate	834	40.0	mg/L

SM 2320 B-2011

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	04/26/2021 11:30	SLL2	709482

CAS#	Parameter	Result	LOQ	Units
T-005-C	Carbonate Alkalinity	ND	1.0	mg/L CaCO3

Sample Results

H-20

Collect Date	04/19/2021 10:00	**LAB ID**	22104216601
Receive Date	04/21/2021 13:17	**Matrix**	Water

SM 2320 B-2011

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	04/26/2021 11:30	SLL2	709482

CAS#	Parameter	Result	LOQ	Units
T-005-B	Bicarbonate Alkalinity	363	1.0	mg/L CaCO3

SM 2540 C-2011

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	04/24/2021 12:31	AJE	709345

CAS#	Parameter	Result	LOQ	Units
WET-035	Total Dissolved Solids(TDS)	1910	10.0	mg/L

H-22

Collect Date	04/19/2021 11:10	**LAB ID**	22104216602
Receive Date	04/21/2021 13:17	**Matrix**	Water

EPA 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	04/25/2021 02:47	SMS	709355

CAS#	Parameter	Result	LOQ	Units
71-43-2	Benzene	ND	0.00500	mg/L
100-41-4	Ethylbenzene	ND	0.00500	mg/L
108-88-3	Toluene	ND	0.00500	mg/L
1330-20-7	Xylene (total)	ND	0.015	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	0.05	.051	mg/L	102	78 - 130
1868-53-7	Dibromofluoromethane	0.05	.053	mg/L	106	77 - 127
2037-26-5	Toluene d8	0.05	.05	mg/L	100	76 - 134
17060-07-0	1,2-Dichloroethane-d4	0.05	.052	mg/L	104	71 - 127

MADEP VPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	04/27/2021 18:38	JAR	709542

CAS#	Parameter	Result	LOQ	Units
GCSV-02-10	Aliphatic >C8-C10	ND	0.020	mg/L
GCSV-02-30	Aliphatic C6-C8	ND	0.030	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
615-59-8	2,5-Dibromotoluene	0.05	.049	mg/L	98	70 - 130

Sample Results

H-22

Collect Date	04/19/2021 11:10	**LAB ID**	22104216602
Receive Date	04/21/2021 13:17	**Matrix**	Water

MADEP VPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	04/27/2021 18:38	JAR	709543

CAS#	Parameter	Result	LOQ	Units
GCSV-02-14	Aromatic >C8-C10	ND	0.030	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
615-59-8	2,5-Dibromotoluene	0.05	.044	mg/L	89	70 - 130

MADEP EPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
04/29/2021 11:15	709760	MADEP EPH Revision 1.1 (LA)	1	04/30/2021 21:21	MFS	709947

CAS#	Parameter	Result	LOQ	Units
GCSV-02-11	Aliphatic >C10-C12	ND	0.100	mg/L
GCSV-02-12	Aliphatic >C12-C16	ND	0.100	mg/L
GCSV-02-31	Aliphatic >C16-C35	ND	0.150	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
3386-33-2	1-Chlorooctadecane	0.16	.089	mg/L	56	40 - 140

MADEP EPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
04/29/2021 11:15	709760	MADEP EPH Revision 1.1 (LA)	1	04/30/2021 21:01	MFS	709946

CAS#	Parameter	Result	LOQ	Units
GCSV-05-18	Aromatic >C21-C35	ND	0.100	mg/L
GCSV-02-15	Unadjusted >C10-C12 Aromatics	ND	0.100	mg/L
GCSV-02-16	Unadjusted >C12-C16 Aromatics	ND	0.100	mg/L
GCSV-02-17	Unadjusted >C16-C21 Aromatics	ND	0.100	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
84-15-1	o-Terphenyl	0.16	.166	mg/L	104	40 - 140
580-13-2	2-Bromonaphthalene	0.16	.229	mg/L	143*	40 - 140
321-60-8	2-Fluorobiphenyl	0.16	.251	mg/L	157*	40 - 140

EPA 6020B

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
04/22/2021 08:15	709135	EPA 3010A	1	04/22/2021 22:39	LWZ	709206

CAS#	Parameter	Result	LOQ	Units
7440-38-2	Arsenic	0.0013	0.0010	mg/L
7440-39-3	Barium	0.032	0.0010	mg/L
7440-43-9	Cadmium	ND	0.0010	mg/L
7440-70-2	Calcium	188	0.50	mg/L
7440-47-3	Chromium	0.0011	0.0010	mg/L
7439-89-6	Iron	0.69	0.10	mg/L
7439-92-1	Lead	ND	0.0010	mg/L
7439-95-4	Magnesium	81.0	0.10	mg/L
7439-96-5	Manganese	1.24	0.0050	mg/L
7440-09-7	Potassium	4.38	0.10	mg/L

Sample Results

H-22

Collect Date	04/19/2021 11:10	**LAB ID**	22104216602
Receive Date	04/21/2021 13:17	**Matrix**	Water

EPA 6020B (Continued)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
04/22/2021 08:15	709135	EPA 3010A	1	04/22/2021 22:39	LWZ	709206

CAS#	Parameter	Result	LOQ	Units
7440-24-6	Strontium	0.98	0.0010	mg/L
7440-66-6	Zinc	ND	0.020	mg/L

EPA 6020B

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
04/22/2021 08:15	709135	EPA 3010A	10	04/23/2021 15:05	LWZ	709297

CAS#	Parameter	Result	LOQ	Units
7440-23-5	Sodium	359	1.00	mg/L

EPA 6020B Dissolved

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
04/23/2021 09:30	709133	EPA 3005A Dissolved	1	04/23/2021 16:41	LWZ	709297

CAS#	Parameter	Result	LOQ	Units
7440-38-2	Arsenic	ND	0.0010	mg/L
7440-39-3	Barium	0.024	0.0010	mg/L
7440-43-9	Cadmium	ND	0.0010	mg/L
7440-47-3	Chromium	ND	0.0010	mg/L
7439-89-6	Iron	ND	0.10	mg/L
7439-92-1	Lead	ND	0.0010	mg/L
7439-96-5	Manganese	1.12	0.0050	mg/L
7440-24-6	Strontium	0.85	0.0010	mg/L
7440-66-6	Zinc	ND	0.020	mg/L

EPA 7470A

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
04/22/2021 11:00	709138	EPA 7470A	1	04/28/2021 10:26	LWZ	709709

CAS#	Parameter	Result	LOQ	Units
7439-97-6	Mercury	ND	0.00020	mg/L

EPA 7470A Dissolved

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
04/22/2021 14:30	709139	EPA 7470A Dissolved	1	04/23/2021 14:23	LWZ	709301

CAS#	Parameter	Result	LOQ	Units
7439-97-6	Mercury	ND	0.00020	mg/L

Sample Results

H-22

Collect Date 04/19/2021 11:10 **LAB ID** 22104216602
Receive Date 04/21/2021 13:17 **Matrix** Water

EPA 9056A

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	200	05/08/2021 18:35	AJE	710668

CAS#	Parameter	Result	LOQ	Units
16887-00-6	Chloride	315	40.0	mg/L
14808-79-8	Sulfate	670	40.0	mg/L

SM 2320 B-2011

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	04/26/2021 11:30	SLL2	709482

CAS#	Parameter	Result	LOQ	Units
T-005-C	Carbonate Alkalinity	ND	1.0	mg/L CaCO3

SM 2320 B-2011

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	04/26/2021 11:30	SLL2	709482

CAS#	Parameter	Result	LOQ	Units
T-005-B	Bicarbonate Alkalinity	356	1.0	mg/L CaCO3

SM 2540 C-2011

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	04/24/2021 12:31	AJE	709345

CAS#	Parameter	Result	LOQ	Units
WET-035	Total Dissolved Solids(TDS)	1720	10.0	mg/L

H-23

Collect Date 04/19/2021 13:35 **LAB ID** 22104216603
Receive Date 04/21/2021 13:17 **Matrix** Water

EPA 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	04/25/2021 03:08	SMS	709355

CAS#	Parameter	Result	LOQ	Units
71-43-2	Benzene	ND	0.00500	mg/L
100-41-4	Ethylbenzene	ND	0.00500	mg/L
108-88-3	Toluene	ND	0.00500	mg/L
1330-20-7	Xylene (total)	ND	0.015	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	0.05	.05	mg/L	100	78 - 130
1868-53-7	Dibromofluoromethane	0.05	.054	mg/L	109	77 - 127
2037-26-5	Toluene d8	0.05	.049	mg/L	98	76 - 134
17060-07-0	1,2-Dichloroethane-d4	0.05	.053	mg/L	107	71 - 127

Sample Results

H-23

Collect Date 04/19/2021 13:35 **LAB ID** 22104216603
Receive Date 04/21/2021 13:17 **Matrix** Water

MADEP VPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	04/27/2021 19:05	JAR	709542

CAS#	Parameter	Result	LOQ	Units
GCSV-02-10	Aliphatic >C8-C10	ND	0.020	mg/L
GCSV-02-30	Aliphatic C6-C8	ND	0.030	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
615-59-8	2,5-Dibromotoluene	0.05	.049	mg/L	98	70 - 130

MADEP VPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	04/27/2021 19:05	JAR	709543

CAS#	Parameter	Result	LOQ	Units
GCSV-02-14	Aromatic >C8-C10	ND	0.030	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
615-59-8	2,5-Dibromotoluene	0.05	.044	mg/L	87	70 - 130

MADEP EPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
04/29/2021 11:15	709760	MADEP EPH Revision 1.1 (LA)	1	04/30/2021 21:39	MFS	709947

CAS#	Parameter	Result	LOQ	Units
GCSV-02-11	Aliphatic >C10-C12	ND	0.100	mg/L
GCSV-02-12	Aliphatic >C12-C16	ND	0.100	mg/L
GCSV-02-31	Aliphatic >C16-C35	ND	0.150	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
3386-33-2	1-Chlorooctadecane	0.16	.071	mg/L	44	40 - 140

MADEP EPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
04/29/2021 11:15	709760	MADEP EPH Revision 1.1 (LA)	1	04/30/2021 21:21	MFS	709946

CAS#	Parameter	Result	LOQ	Units
GCSV-05-18	Aromatic >C21-C35	ND	0.100	mg/L
GCSV-02-15	Unadjusted >C10-C12 Aromatics	ND	0.100	mg/L
GCSV-02-16	Unadjusted >C12-C16 Aromatics	ND	0.100	mg/L
GCSV-02-17	Unadjusted >C16-C21 Aromatics	ND	0.100	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
84-15-1	o-Terphenyl	0.16	.091	mg/L	57	40 - 140
580-13-2	2-Bromonaphthalene	0.16	.19	mg/L	119	40 - 140
321-60-8	2-Fluorobiphenyl	0.16	.183	mg/L	114	40 - 140

Sample Results

H-23

Collect Date	04/19/2021 13:35	**LAB ID**	22104216603
Receive Date	04/21/2021 13:17	**Matrix**	Water

EPA 6020B

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
04/22/2021 08:15	709135	EPA 3010A	1	04/22/2021 22:44	LWZ	709206

CAS#	Parameter	Result	LOQ	Units
7440-38-2	Arsenic	ND	0.0010	mg/L
7440-39-3	Barium	0.023	0.0010	mg/L
7440-43-9	Cadmium	ND	0.0010	mg/L
7440-70-2	Calcium	179	0.50	mg/L
7440-47-3	Chromium	ND	0.0010	mg/L
7439-89-6	Iron	0.18	0.10	mg/L
7439-92-1	Lead	ND	0.0010	mg/L
7439-95-4	Magnesium	81.0	0.10	mg/L
7439-96-5	Manganese	0.95	0.0050	mg/L
7440-09-7	Potassium	4.09	0.10	mg/L
7440-24-6	Strontium	0.93	0.0010	mg/L
7440-66-6	Zinc	ND	0.020	mg/L

EPA 6020B

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
04/22/2021 08:15	709135	EPA 3010A	10	04/23/2021 15:09	LWZ	709297

CAS#	Parameter	Result	LOQ	Units
7440-23-5	Sodium	406	1.00	mg/L

EPA 6020B Dissolved

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
04/23/2021 09:30	709133	EPA 3005A Dissolved	1	04/23/2021 16:44	LWZ	709297

CAS#	Parameter	Result	LOQ	Units
7440-38-2	Arsenic	ND	0.0010	mg/L
7440-39-3	Barium	0.020	0.0010	mg/L
7440-43-9	Cadmium	ND	0.0010	mg/L
7440-47-3	Chromium	ND	0.0010	mg/L
7439-89-6	Iron	ND	0.10	mg/L
7439-92-1	Lead	ND	0.0010	mg/L
7439-96-5	Manganese	0.89	0.0050	mg/L
7440-24-6	Strontium	0.81	0.0010	mg/L
7440-66-6	Zinc	ND	0.020	mg/L

EPA 7470A

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
04/22/2021 11:00	709138	EPA 7470A	1	04/28/2021 10:28	LWZ	709709

CAS#	Parameter	Result	LOQ	Units
7439-97-6	Mercury	ND	0.00020	mg/L

Sample Results

H-23

Collect Date 04/19/2021 13:35 **LAB ID** 22104216603
Receive Date 04/21/2021 13:17 **Matrix** Water

EPA 7470A Dissolved

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
04/22/2021 14:30	709139	EPA 7470A Dissolved	1	04/23/2021 14:25	LWZ	709301

CAS#	Parameter	Result	LOQ	Units
7439-97-6	Mercury	ND	0.00020	mg/L

EPA 9056A

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	200	05/08/2021 19:16	AJE	710668

CAS#	Parameter	Result	LOQ	Units
16887-00-6	Chloride	363	40.0	mg/L
14808-79-8	Sulfate	695	40.0	mg/L

SM 2320 B-2011

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	04/26/2021 11:30	SLL2	709482

CAS#	Parameter	Result	LOQ	Units
T-005-C	Carbonate Alkalinity	ND	1.0	mg/L CaCO3

SM 2320 B-2011

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	04/26/2021 11:30	SLL2	709482

CAS#	Parameter	Result	LOQ	Units
T-005-B	Bicarbonate Alkalinity	368	1.0	mg/L CaCO3

SM 2540 C-2011

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	04/24/2021 12:31	AJE	709345

CAS#	Parameter	Result	LOQ	Units
WET-035	Total Dissolved Solids(TDS)	1790	10.0	mg/L

H-24

Collect Date 04/19/2021 15:00 **LAB ID** 22104216604
Receive Date 04/21/2021 13:17 **Matrix** Water

EPA 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	04/25/2021 03:29	SMS	709355

CAS#	Parameter	Result	LOQ	Units
71-43-2	Benzene	ND	0.00500	mg/L
100-41-4	Ethylbenzene	ND	0.00500	mg/L
108-88-3	Toluene	ND	0.00500	mg/L

Sample Results

H-24

Collect Date	04/19/2021 15:00	**LAB ID**	22104216604
Receive Date	04/21/2021 13:17	**Matrix**	Water

EPA 8260B (Continued)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	04/25/2021 03:29	SMS	709355

CAS#	Parameter	Result	LOQ	Units
1330-20-7	Xylene (total)	ND	0.015	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	0.05	.051	mg/L	102	78 - 130
1868-53-7	Dibromofluoromethane	0.05	.052	mg/L	103	77 - 127
2037-26-5	Toluene d8	0.05	.049	mg/L	99	76 - 134
17060-07-0	1,2-Dichloroethane-d4	0.05	.053	mg/L	107	71 - 127

MADEP VPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	04/27/2021 19:38	JAR	709542

CAS#	Parameter	Result	LOQ	Units
GCSV-02-10	Aliphatic >C8-C10	ND	0.020	mg/L
GCSV-02-30	Aliphatic C6-C8	ND	0.030	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
615-59-8	2,5-Dibromotoluene	0.05	.049	mg/L	98	70 - 130

MADEP VPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	04/27/2021 19:38	JAR	709543

CAS#	Parameter	Result	LOQ	Units
GCSV-02-14	Aromatic >C8-C10	ND	0.030	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
615-59-8	2,5-Dibromotoluene	0.05	.043	mg/L	87	70 - 130

MADEP EPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
04/29/2021 11:15	709760	MADEP EPH Revision 1.1 (LA)	1	04/30/2021 21:57	MFS	709947

CAS#	Parameter	Result	LOQ	Units
GCSV-02-11	Aliphatic >C10-C12	ND	0.100	mg/L
GCSV-02-12	Aliphatic >C12-C16	ND	0.100	mg/L
GCSV-02-31	Aliphatic >C16-C35	ND	0.150	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
3386-33-2	1-Chlorooctadecane	0.16	.092	mg/L	57	40 - 140

Sample Results

H-24

Collect Date	04/19/2021 15:00	**LAB ID**	22104216604
Receive Date	04/21/2021 13:17	**Matrix**	Water

MADEP EPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
04/29/2021 11:15	709760	MADEP EPH Revision 1.1 (LA)	1	04/30/2021 21:39	MFS	709946

CAS#	Parameter	Result	LOQ	Units
GCSV-05-18	Aromatic >C21-C35	ND	0.100	mg/L
GCSV-02-15	Unadjusted >C10-C12 Aromatics	ND	0.100	mg/L
GCSV-02-16	Unadjusted >C12-C16 Aromatics	ND	0.100	mg/L
GCSV-02-17	Unadjusted >C16-C21 Aromatics	ND	0.100	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
84-15-1	o-Terphenyl	0.16	.122	mg/L	76	40 - 140
580-13-2	2-Bromonaphthalene	0.16	.101	mg/L	63	40 - 140
321-60-8	2-Fluorobiphenyl	0.16	.181	mg/L	113	40 - 140

EPA 6020B

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
04/22/2021 08:15	709135	EPA 3010A	1	04/22/2021 22:48	LWZ	709206

CAS#	Parameter	Result	LOQ	Units
7440-38-2	Arsenic	0.0011	0.0010	mg/L
7440-39-3	Barium	0.048	0.0010	mg/L
7440-43-9	Cadmium	ND	0.0010	mg/L
7440-70-2	Calcium	191	0.50	mg/L
7440-47-3	Chromium	ND	0.0010	mg/L
7439-89-6	Iron	0.28	0.10	mg/L
7439-92-1	Lead	ND	0.0010	mg/L
7439-95-4	Magnesium	86.9	0.10	mg/L
7439-96-5	Manganese	1.32	0.0050	mg/L
7440-09-7	Potassium	4.54	0.10	mg/L
7440-66-6	Zinc	ND	0.020	mg/L

EPA 6020B

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
04/22/2021 08:15	709135	EPA 3010A	10	04/23/2021 15:12	LWZ	709297

CAS#	Parameter	Result	LOQ	Units
7440-23-5	Sodium	262	1.00	mg/L
7440-24-6	Strontium	1.10	0.010	mg/L

EPA 6020B Dissolved

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
04/23/2021 09:30	709133	EPA 3005A Dissolved	1	04/23/2021 16:48	LWZ	709297

CAS#	Parameter	Result	LOQ	Units
7440-38-2	Arsenic	ND	0.0010	mg/L
7440-39-3	Barium	0.042	0.0010	mg/L
7440-43-9	Cadmium	ND	0.0010	mg/L
7440-47-3	Chromium	ND	0.0010	mg/L
7439-89-6	Iron	ND	0.10	mg/L
7439-92-1	Lead	ND	0.0010	mg/L
7439-96-5	Manganese	1.28	0.0050	mg/L

Sample Results

H-24

Collect Date 04/19/2021 15:00 **LAB ID** 22104216604
Receive Date 04/21/2021 13:17 **Matrix** Water

EPA 6020B Dissolved (Continued)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
04/23/2021 09:30	709133	EPA 3005A Dissolved	1	04/23/2021 16:48	LWZ	709297

CAS#	Parameter	Result	LOQ	Units
7440-24-6	Strontium	0.95	0.0010	mg/L
7440-66-6	Zinc	ND	0.020	mg/L

EPA 7470A

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
04/22/2021 11:00	709138	EPA 7470A	1	04/28/2021 10:30	LWZ	709709

CAS#	Parameter	Result	LOQ	Units
7439-97-6	Mercury	ND	0.00020	mg/L

EPA 7470A Dissolved

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
04/22/2021 14:30	709139	EPA 7470A Dissolved	1	04/23/2021 14:27	LWZ	709301

CAS#	Parameter	Result	LOQ	Units
7439-97-6	Mercury	ND	0.00020	mg/L

EPA 9056A

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	200	05/08/2021 19:56	AJE	710668

CAS#	Parameter	Result	LOQ	Units
16887-00-6	Chloride	583	40.0	mg/L
14808-79-8	Sulfate	250	40.0	mg/L

SM 2320 B-2011

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	04/26/2021 11:30	SLL2	709482

CAS#	Parameter	Result	LOQ	Units
T-005-C	Carbonate Alkalinity	ND	1.0	mg/L CaCO3

SM 2320 B-2011

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	04/26/2021 11:30	SLL2	709482

CAS#	Parameter	Result	LOQ	Units
T-005-B	Bicarbonate Alkalinity	347	1.0	mg/L CaCO3

Sample Results

H-24

Collect Date 04/19/2021 15:00 **LAB ID** 22104216604
Receive Date 04/21/2021 13:17 **Matrix** Water

SM 2540 C-2011

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	04/24/2021 12:31	AJE	709345

CAS#	Parameter	Result	LOQ	Units
WET-035	Total Dissolved Solids(TDS)	1490	10.0	mg/L

H-25

Collect Date 04/20/2021 14:40 **LAB ID** 22104216605
Receive Date 04/21/2021 13:17 **Matrix** Water

EPA 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	04/25/2021 03:51	SMS	709355

CAS#	Parameter	Result	LOQ	Units
71-43-2	Benzene	ND	0.00500	mg/L
100-41-4	Ethylbenzene	ND	0.00500	mg/L
108-88-3	Toluene	ND	0.00500	mg/L
1330-20-7	Xylene (total)	ND	0.015	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	0.05	.05	mg/L	100	78 - 130
1868-53-7	Dibromofluoromethane	0.05	.05	mg/L	100	77 - 127
2037-26-5	Toluene d8	0.05	.05	mg/L	100	76 - 134
17060-07-0	1,2-Dichloroethane-d4	0.05	.052	mg/L	103	71 - 127

MADEP VPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	04/27/2021 20:06	JAR	709542

CAS#	Parameter	Result	LOQ	Units
GCSV-02-10	Aliphatic >C8-C10	ND	0.020	mg/L
GCSV-02-30	Aliphatic C6-C8	ND	0.030	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
615-59-8	2,5-Dibromotoluene	0.05	.049	mg/L	98	70 - 130

MADEP VPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	04/27/2021 20:06	JAR	709543

CAS#	Parameter	Result	LOQ	Units
GCSV-02-14	Aromatic >C8-C10	ND	0.030	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
615-59-8	2,5-Dibromotoluene	0.05	.045	mg/L	90	70 - 130

Sample Results

H-25

Collect Date	04/20/2021 14:40	**LAB ID**	22104216605
Receive Date	04/21/2021 13:17	**Matrix**	Water

MADEP EPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
04/29/2021 11:15	709760	MADEP EPH Revision 1.1 (LA)	1	04/30/2021 22:15	MFS	709947

CAS#	Parameter	Result	LOQ	Units
GCSV-02-11	Aliphatic >C10-C12	ND	0.100	mg/L
GCSV-02-12	Aliphatic >C12-C16	ND	0.100	mg/L
GCSV-02-31	Aliphatic >C16-C35	ND	0.150	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
3386-33-2	1-Chlorooctadecane	0.16	.081	mg/L	50	40 - 140

MADEP EPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
04/29/2021 11:15	709760	MADEP EPH Revision 1.1 (LA)	1	04/30/2021 21:57	MFS	709946

CAS#	Parameter	Result	LOQ	Units
GCSV-05-18	Aromatic >C21-C35	ND	0.100	mg/L
GCSV-02-15	Unadjusted >C10-C12 Aromatics	ND	0.100	mg/L
GCSV-02-16	Unadjusted >C12-C16 Aromatics	ND	0.100	mg/L
GCSV-02-17	Unadjusted >C16-C21 Aromatics	ND	0.100	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
84-15-1	o-Terphenyl	0.16	.095	mg/L	59	40 - 140
580-13-2	2-Bromonaphthalene	0.16	.167	mg/L	104	40 - 140
321-60-8	2-Fluorobiphenyl	0.16	.18	mg/L	113	40 - 140

EPA 6020B Dissolved

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
04/23/2021 09:30	709133	EPA 3005A Dissolved	1	04/23/2021 16:51	TJR	709297

CAS#	Parameter	Result	LOQ	Units
7440-38-2	Arsenic	0.0016	0.0010	mg/L
7440-39-3	Barium	0.087	0.0010	mg/L
7440-43-9	Cadmium	ND	0.0010	mg/L
7440-47-3	Chromium	0.0030	0.0010	mg/L
7439-89-6	Iron	1.23	0.10	mg/L
7439-92-1	Lead	0.0014	0.0010	mg/L
7439-96-5	Manganese	1.58	0.0050	mg/L
7440-24-6	Strontium	0.70	0.0010	mg/L
7440-66-6	Zinc	ND	0.020	mg/L

EPA 7470A Dissolved

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
04/22/2021 14:30	709139	EPA 7470A Dissolved	1	04/23/2021 14:29	LWZ	709301

CAS#	Parameter	Result	LOQ	Units
7439-97-6	Mercury	ND	0.00020	mg/L

Sample Results

H-25

Collect Date 04/20/2021 14:40 **LAB ID** 22104216605
Receive Date 04/21/2021 13:17 **Matrix** Water

EPA 9056A

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	100	05/08/2021 20:37	AJE	710668

CAS#	Parameter	Result	LOQ	Units
16887-00-6	Chloride	372	20.0	mg/L
14808-79-8	Sulfate	237	20.0	mg/L

SM 2320 B-2011

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	04/26/2021 11:30	SLL2	709482

CAS#	Parameter	Result	LOQ	Units
T-005-C	Carbonate Alkalinity	ND	1.0	mg/L CaCO3

SM 2320 B-2011

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	04/26/2021 11:30	SLL2	709482

CAS#	Parameter	Result	LOQ	Units
T-005-B	Bicarbonate Alkalinity	362	1.0	mg/L CaCO3

SM 2540 C-2011

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	04/27/2021 13:44	DJJ	709552

CAS#	Parameter	Result	LOQ	Units
WET-035	Total Dissolved Solids(TDS)	2250	10.0	mg/L

H-27

Collect Date 04/20/2021 14:00 **LAB ID** 22104216606
Receive Date 04/21/2021 13:17 **Matrix** Water

EPA 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	04/25/2021 04:12	SMS	709355

CAS#	Parameter	Result	LOQ	Units
71-43-2	Benzene	ND	0.00500	mg/L
100-41-4	Ethylbenzene	ND	0.00500	mg/L
108-88-3	Toluene	ND	0.00500	mg/L
1330-20-7	Xylene (total)	ND	0.015	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	0.05	.051	mg/L	101	78 - 130
1868-53-7	Dibromofluoromethane	0.05	.051	mg/L	102	77 - 127
2037-26-5	Toluene d8	0.05	.048	mg/L	95	76 - 134
17060-07-0	1,2-Dichloroethane-d4	0.05	.053	mg/L	105	71 - 127

Sample Results

H-27

Collect Date	04/20/2021 14:00	**LAB ID**	22104216606
Receive Date	04/21/2021 13:17	**Matrix**	Water

MADEP VPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	04/27/2021 20:38	JAR	709542

CAS#	Parameter	Result	LOQ	Units
GCSV-02-10	Aliphatic >C8-C10	ND	0.020	mg/L
GCSV-02-30	Aliphatic C6-C8	ND	0.030	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
615-59-8	2,5-Dibromotoluene	0.05	.049	mg/L	98	70 - 130

MADEP VPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	04/27/2021 20:38	JAR	709543

CAS#	Parameter	Result	LOQ	Units
GCSV-02-14	Aromatic >C8-C10	ND	0.030	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
615-59-8	2,5-Dibromotoluene	0.05	.043	mg/L	86	70 - 130

MADEP EPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
04/29/2021 11:15	709760	MADEP EPH Revision 1.1 (LA)	1	04/30/2021 22:34	MFS	709947

CAS#	Parameter	Result	LOQ	Units
GCSV-02-11	Aliphatic >C10-C12	ND	0.100	mg/L
GCSV-02-12	Aliphatic >C12-C16	ND	0.100	mg/L
GCSV-02-31	Aliphatic >C16-C35	ND	0.150	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
3386-33-2	1-Chlorooctadecane	0.16	.09	mg/L	57	40 - 140

MADEP EPH Revision 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
04/29/2021 11:15	709760	MADEP EPH Revision 1.1 (LA)	1	04/30/2021 22:15	MFS	709946

CAS#	Parameter	Result	LOQ	Units
GCSV-05-18	Aromatic >C21-C35	ND	0.100	mg/L
GCSV-02-15	Unadjusted >C10-C12 Aromatics	ND	0.100	mg/L
GCSV-02-16	Unadjusted >C12-C16 Aromatics	ND	0.100	mg/L
GCSV-02-17	Unadjusted >C16-C21 Aromatics	ND	0.100	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
84-15-1	o-Terphenyl	0.16	.101	mg/L	63	40 - 140
580-13-2	2-Bromonaphthalene	0.16	.127	mg/L	79	40 - 140
321-60-8	2-Fluorobiphenyl	0.16	.165	mg/L	103	40 - 140

Sample Results

H-27

Collect Date	04/20/2021 14:00	**LAB ID**	22104216606
Receive Date	04/21/2021 13:17	**Matrix**	Water

EPA 6020B Dissolved

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
04/23/2021 09:30	709133	EPA 3005A Dissolved	1	04/23/2021 16:55	TJR	709297

CAS#	Parameter	Result	LOQ	Units
7440-38-2	Arsenic	0.0041	0.0010	mg/L
7440-39-3	Barium	0.048	0.0010	mg/L
7440-43-9	Cadmium	ND	0.0010	mg/L
7440-47-3	Chromium	ND	0.0010	mg/L
7439-89-6	Iron	1.32	0.10	mg/L
7439-92-1	Lead	ND	0.0010	mg/L
7439-96-5	Manganese	0.78	0.0050	mg/L
7440-66-6	Zinc	ND	0.020	mg/L

EPA 6020B Dissolved

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
04/23/2021 09:30	709133	EPA 3005A Dissolved	5	04/26/2021 19:09	LWZ	709461

CAS#	Parameter	Result	LOQ	Units
7440-24-6	Strontium	1.23	0.0050	mg/L

EPA 7470A Dissolved

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
04/22/2021 14:30	709139	EPA 7470A Dissolved	1	04/23/2021 14:31	LWZ	709301

CAS#	Parameter	Result	LOQ	Units
7439-97-6	Mercury	ND	0.00020	mg/L

EPA 9056A

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	200	05/08/2021 22:19	AJE	710668

CAS#	Parameter	Result	LOQ	Units
16887-00-6	Chloride	496	40.0	mg/L
14808-79-8	Sulfate	445	40.0	mg/L

SM 2320 B-2011

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	04/26/2021 11:30	SLL2	709482

CAS#	Parameter	Result	LOQ	Units
T-005-C	Carbonate Alkalinity	ND	1.0	mg/L CaCO3

Sample Results

H-27

Collect Date	04/20/2021 14:00	**LAB ID**	22104216606
Receive Date	04/21/2021 13:17	**Matrix**	Water

SM 2320 B-2011

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	04/26/2021 11:30	SLL2	709482

CAS#	Parameter	Result	LOQ	Units
T-005-B	Bicarbonate Alkalinity	311	1.0	mg/L CaCO3

SM 2540 C-2011

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	04/27/2021 13:44	DJJ	709552

CAS#	Parameter	Result	LOQ	Units
WET-035	Total Dissolved Solids(TDS)	1690	10.0	mg/L

GC/MS Volatiles QC Summary

Analytical Batch	Client ID	MB709355		LCS709355				LCSD709355				
709355	LAB ID	2176320		2176321				2176322				
	Sample Type	MB		LCS				LCSD				
	Prep Date											
	Analysis Date	04/25/21 02:04		04/24/21 23:57				04/25/21 00:18				
	Matrix	Water		Water				Water				
EPA 8260B		Units Result	mg/L LOQ	Spike Added	Result	%R	Control Limits%R	Spike Added	Result	%R	RPD	RPD Limit
Benzene	71-43-2	ND	0.00500	0.050	0.054	109	70 - 129	0.050	0.053	107	2	20
Ethylbenzene	100-41-4	ND	0.00500	0.050	0.051	102	74 - 126	0.050	0.050	99	2	30
Toluene	108-88-3	ND	0.00500	0.050	0.049	97	72 - 120	0.050	0.049	97	0	20
Xylene (total)	1330-20-7	ND	0.015	0.150	0.155	103	74 - 127	0.150	0.155	103	0	30
Surrogate												
1,2-Dichloroethane-d4	17060-07-0	.0522	104	.05	.0525	105	71 - 127	.05	.0514	103	NA	NA
4-Bromofluorobenzene	460-00-4	.05	100	.05	.0524	105	78 - 130	.05	.0522	104	NA	NA
Dibromofluoromethane	1868-53-7	.0503	101	.05	.053	106	77 - 127	.05	.0519	104	NA	NA
Toluene d8	2037-26-5	.0476	95	.05	.0487	97	76 - 134	.05	.0485	97	NA	NA

GC Volatiles QC Summary

Analytical Batch	Client ID	MB709542		LCS709542				LCSD709542				
709542	LAB ID	2177110		2177111				2177112				
	Sample Type	MB		LCS				LCSD				
	Prep Date											
	Analysis Date	04/27/21 17:37		04/27/21 13:09				04/27/21 14:07				
	Matrix	Water		Water				Water				
MADEP VPH Revision 1.1 (LA)		Units Result	mg/L LOQ	Spike Added	Result	%R	Control Limits%R	Spike Added	Result	%R	RPD	RPD Limit
Aliphatic >C8-C10	GCSV-02-10	ND	0.020	0.100	0.107	107	60 - 140	0.100	0.106	106	1	30
Aliphatic C6-C8	GCSV-02-30	ND	0.030	0.150	0.156	104	60 - 140	0.150	0.154	103	1	30
Surrogate												
2,5-Dibromotoluene	615-59-8	.0482	96	.05	.0471	94	70 - 130	.05	.0472	94	NA	NA

Analytical Batch	Client ID	MB709543		LCS709543				LCSD709543				
709543	LAB ID	2177113		2177114				2177115				
	Sample Type	MB		LCS				LCSD				
	Prep Date											
	Analysis Date	04/27/21 17:37		04/27/21 13:09				04/27/21 14:07				
	Matrix	Water		Water				Water				
MADEP VPH Revision 1.1 (LA)		Units Result	mg/L LOQ	Spike Added	Result	%R	Control Limits%R	Spike Added	Result	%R	RPD	RPD Limit
Aromatic >C8-C10	GCSV-02-14	ND	0.030	0.150	0.131	87	60 - 140	0.150	0.133	89	2	30
Surrogate												
2,5-Dibromotoluene	615-59-8	.0425	85	.05	.0439	88	70 - 130	.05	.0421	84	NA	NA

GC Semi-Volatiles QC Summary

Analytical Batch	Client ID	MB709760	LCS709760	LCSD709760
709947	LAB ID	2178247	2178248	2178249
Prep Batch	Sample Type	MB	LCS	LCSD
709760	Prep Date	04/29/21 11:15	04/29/21 11:15	04/29/21 11:15
Prep Method	Analysis Date	04/30/21 20:09	05/03/21 11:51	05/03/21 12:09
MADEP EPH Revision 1.1 (LA)	Matrix	Water	Water	Water

MADEP EPH Revision 1.1 (LA)		Units Result	mg/L LOQ	Spike Added	Result	%R	Control Limits%R	Spike Added	Result	%R	RPD	RPD Limit
Aliphatic >C10-C12	GCSV-02-11	ND	0.100	0.400	0.312	78	30 - 140	0.400	0.221	55	34	40
Aliphatic >C12-C16	GCSV-02-12	ND	0.100	0.400	0.331	83	40 - 140	0.400	0.191	48	54*	40
Aliphatic >C16-C35	GCSV-02-31	ND	0.150	1.80	1.61	89	40 - 140	1.80	1.14	63	34	40
Surrogate												
1-Chlorooctadecane	3386-33-2	.0657	41	.16	.0765	48	40 - 140	.16	.0664	42	NA	NA

Analytical Batch	Client ID	MB709760	LCS709760	LCSD709760
709946	LAB ID	2178247	2178248	2178249
Prep Batch	Sample Type	MB	LCS	LCSD
709760	Prep Date	04/29/21 11:15	04/29/21 11:15	04/29/21 11:15
Prep Method	Analysis Date	04/30/21 19:33	04/30/21 20:09	04/30/21 20:23
MADEP EPH Revision 1.1 (LA)	Matrix	Water	Water	Water

MADEP EPH Revision 1.1 (LA)		Units Result	mg/L LOQ	Spike Added	Result	%R	Control Limits%R	Spike Added	Result	%R	RPD	RPD Limit
Aromatic >C21-C35	GCSV-05-18	ND	0.100	2.00	1.35	68	40 - 140	2.00	1.04	52	26	40
Unadjusted >C10-C12 Aromatics	GCSV-02-15	ND	0.100	0.200	0.142	71	30 - 140	0.200	0.145	73	2	40
Unadjusted >C12-C16 Aromatics	GCSV-02-16	ND	0.100	0.800	0.564	71	40 - 140	0.800	0.552	69	2	40
Unadjusted >C16-C21 Aromatics	GCSV-02-17	ND	0.100	0.400	0.285	71	40 - 140	0.400	0.269	67	6	40
Surrogate												
2-Bromonaphthalene	580-13-2	.184	115	.16	.146	91	40 - 140	.16	.21	131	NA	NA
2-Fluorobiphenyl	321-60-8	.183	114	.16	.15	94	40 - 140	.16	.212	133	NA	NA
o-Terphenyl	84-15-1	.0855	53	.16	.106	66	40 - 140	.16	.0871	54	NA	NA

Inorganics QC Summary

Analytical Batch	Client ID	MB709138		LCS709138				LCSD709138				
709420	LAB ID	2174882		2174884				2174883				
Prep Batch	Sample Type	MB		LCS				LCSD				
709138	Prep Date	04/22/21 11:00		04/22/21 11:00				04/22/21 11:00				
Prep Method	Analysis Date	04/27/21 13:29		04/27/21 13:33				04/27/21 13:31				
EPA 7470A	Matrix	Water		Water				Water				
EPA 7470A		Units Result	mg/L LOQ	Spike Added	Result	%R	Control Limits%R	Spike Added	Result	%R	RPD	RPD Limit
Mercury	7439-97-6	ND	0.00020	0.0050	0.0050	101	80 - 120	0.0050	0.0051	102	2	20

Analytical Batch	Client ID	MB709139		LCS709139			
709301	LAB ID	2174885		2174886			
Prep Batch	Sample Type	MB		LCS			
709139	Prep Date	04/22/21 14:30		04/22/21 14:30			
Prep Method	Analysis Date	04/23/21 15:18		04/23/21 14:19			
EPA 7470A	Matrix	Water		Water			
EPA 7470A Dissolved		Units Result	mg/L LOQ	Spike Added	Result	%R	Control Limits%R
Mercury	7439-97-6	ND	0.00020	0.0050	0.0054	107	80 - 120

Analytical Batch	Client ID	MB709135		LCS709135				LCSD709135				
709206	LAB ID	2174875		2174877				2174876				
Prep Batch	Sample Type	MB		LCS				LCSD				
709135	Prep Date	04/22/21 08:15		04/22/21 08:15				04/22/21 08:15				
Prep Method	Analysis Date	04/22/21 19:47		04/22/21 19:56				04/22/21 19:52				
EPA 3010A	Matrix	Water		Water				Water				
EPA 6020B		Units Result	mg/L LOQ	Spike Added	Result	%R	Control Limits%R	Spike Added	Result	%R	RPD	RPD Limit
Arsenic	7440-38-2	ND	0.0010	0.050	0.050	100	80 - 120	0.050	0.050	99	0	20
Barium	7440-39-3	ND	0.0010	0.050	0.048	96	80 - 120	0.050	0.047	95	2	20
Cadmium	7440-43-9	ND	0.0010	0.050	0.049	97	80 - 120	0.050	0.047	95	4	20
Calcium	7440-70-2	ND	0.50	25.0	24.8	99	80 - 120	25.0	24.9	100	0	20
Chromium	7440-47-3	ND	0.0010	0.050	0.050	100	80 - 120	0.050	0.050	100	0	20
Iron	7439-89-6	ND	0.10	5.00	5.08	102	80 - 120	5.00	5.02	100	1	20
Lead	7439-92-1	ND	0.0010	0.050	0.048	96	80 - 120	0.050	0.047	95	2	20
Magnesium	7439-95-4	ND	0.10	5.00	5.15	103	80 - 120	5.00	5.17	103	0	20
Manganese	7439-96-5	ND	0.0050	0.050	0.050	101	80 - 120	0.050	0.050	101	0	20
Potassium	7440-09-7	ND	0.10	5.00	5.05	101	80 - 120	5.00	5.04	101	0	20
Sodium	7440-23-5	ND	0.10	5.00	5.22	104	80 - 120	5.00	5.13	103	2	20
Strontium	7440-24-6	ND	0.0010	0.050	0.049	98	80 - 120	0.050	0.049	97	0	20
Zinc	7440-66-6	ND	0.020	1.00	1.00	100	80 - 120	1.00	1.02	102	2	20

Analytical Batch	Client ID	MB709133		LCS709133				LCSD709133				
709297	LAB ID	2174862		2174864				2174863				
Prep Batch	Sample Type	MB		LCS				LCSD				
709133	Prep Date	04/23/21 09:30		04/23/21 09:30				04/23/21 09:30				
Prep Method	Analysis Date	04/23/21 16:27		04/23/21 16:34				04/23/21 16:30				
EPA 3005A Dissolved	Matrix	Water		Water				Water				
EPA 6020B Dissolved		Units Result	mg/L LOQ	Spike Added	Result	%R	Control Limits%R	Spike Added	Result	%R	RPD	RPD Limit
Arsenic	7440-38-2	ND	0.0010	0.050	0.056	112	80 - 120	0.050	0.056	111	0	20
Barium	7440-39-3	ND	0.0010	0.050	0.050	101	80 - 120	0.050	0.051	102	2	20
Cadmium	7440-43-9	ND	0.0010	0.050	0.051	101	80 - 120	0.050	0.051	102	0	20
Chromium	7440-47-3	ND	0.0010	0.050	0.057	113	80 - 120	0.050	0.058	115	2	20
Iron	7439-89-6	ND	0.10	5.00	5.57	111	80 - 120	5.00	5.72	114	3	20
Lead	7439-92-1	ND	0.0010	0.050	0.051	103	80 - 120	0.050	0.052	104	2	20
Manganese	7439-96-5	ND	0.0050	0.050	0.057	113	80 - 120	0.050	0.057	115	0	20
Strontium	7440-24-6	ND	0.0010	0.050	0.052	104	80 - 120	0.050	0.053	105	2	20
Zinc	7440-66-6	ND	0.020	1.00	1.12	112	80 - 120	1.00	1.14	114	2	20

General Chemistry QC Summary

Analytical Batch	Client ID	MB710668		LCS710668				LCSD710668				
710668	LAB ID	2183679		2183680				2183865				
	Sample Type	MB		LCS				LCSD				
	Prep Date											
	Analysis Date	05/08/21 17:14		05/08/21 16:33				05/08/21 20:57				
	Matrix	Water		Water				Water				
EPA 9056A		Units Result	mg/L LOQ	Spike Added	Result	%R	Control Limits%R	Spike Added	Result	%R	RPD	RPD Limit
Chloride	16887-00-6	ND	0.200	2.50	2.54	102	80 - 120	2.50	2.52	101	1	15
Sulfate	14808-79-8	ND	0.200	2.50	2.52	101	80 - 120	2.50	2.50	100	1	15

Analytical Batch	Client ID	MB709345	
709345	LAB ID	2176215	
	Sample Type	MB	
	Prep Date		
	Analysis Date	04/24/21 12:31	
	Matrix	Water	
SM 2540 C-2011		Units Result	mg/L LOQ
Total Dissolved Solids(TDS)	WET-035	ND	10.0

Analytical Batch	Client ID	MB709552	
709552	LAB ID	2177141	
	Sample Type	MB	
	Prep Date		
	Analysis Date	04/27/21 13:44	
	Matrix	Water	
SM 2540 C-2011		Units Result	mg/L LOQ
Total Dissolved Solids(TDS)	WET-035	ND	10.0

CHAIN-OF-CUSTODY Analytical Request Document

Pace Analytical®

Chain-of-Custody is a LEGAL DOCUMENT - Complete all relevent fields

LAB USE ONLY- Affix Work

ALL SHAD

Client ID: 4271 - ERM-Baton Rouge

SDG: 221042166

PM: AMK

Company: ERM	Billing Information: SAME
Address: 3838 N. CAUSEWAY BLVD. STE. 3000 METAIRIE, LA 70002	
Report To: LANCE COOPER	Email To:
Copy To: KURT BOEHRINGER	Site Collection Info/Address:
Customer Project Name/Number: HENNING - 0526033	State: LA County/City: CALCASIEU Time Zone Collected: [ ] PT [ ] MT [✓] CT [ ] ET
Phone: Email: LANCE.COOPER@ERM.COM	Site/Facility ID #: Compliance Monitoring? [ ] Yes [ ] No
Collected By (print): KURT BOEHRINGER	Purchase Order #: Quote #: DW PWS ID #: DW Location Code:
Collected By (signature):	Turnaround Date Required: STANDARD Immediately Packed on Ice: [✓] Yes [ ] No
Sample Disposal: [✓] Dispose as appropriate [ ] Return [ ] Archive: [ ] Hold:	Rush: [ ] Same Day [ ] Next Day [ ] 2 Day [ ] 3 Day [ ] 4 Day [ ] 5 Day (Expedite Charges Apply) Field Filtered (if applicable): [ ] Yes [ ] No Analysis:

Container Preservative Type: 3 3 3 U 1 1

** Preservative Types: (1) nitric acid, (2) sulfuric acid, (3) hydrochloric acid, (4) sodium hydroxide, (5) zinc acetate, (6) methanol, (7) sodium bisulfate, (8) sodium thiosulfate, (9) hexane, (A) ascorbic acid, (B) ammonium sulfate, (C) ammonium hydroxide, (D) TSP, (U) Unpreserved, (O) Other

* Matrix Codes (Insert in Matrix box below): Drinking Water (DW), Ground Water (GW), Wastewater (WW), Product (P), Soil/Solid (SL), Oil (OL), Wipe (WP), Air (AR), Tissue (TS), Bioassay (B), Vapor (V), Other (OT)

Customer Sample ID	Matrix *	Comp / Grab	Collected (or Composite Start) Date	Collected (or Composite Start) Time	Composite End Date	Composite End Time	Res Cl	# of Ctns	VOCs - BTEX	EPH	VPH	TDS/Cl/SO4/Alk	Dissolved Metals	Total Metals					
H-20	GW	GRAB	4/19/21	1000				10	X	X	X	X	X	X					1
H-22	GW	GRAB	4/19/21	1110				10	X	X	X	X	X	X					2
H-23	GW	GRAB	4/19/21	1335				10	X	X	X	X	X	X					3
H-24	GW	GRAB	4/19/21	1500				10	X	X	X	X	X	X					4
H-25	GW	GRAB	4/20/21	1440				10	X	X	X	X	X						5
H-27	GW	GRAB	4/20/21	1400				10	X	X	X	X	X						6

Analyses

Lab Profile/Line:

Lab Sample Receipt Checklist:

Custody Seals Present/Intact	Y	N	NA
Custody Signatures Present	Y	N	NA
Collector Signature Present	Y	N	NA
Bottles Intact	Y	N	NA
Correct Bottles	Y	N	NA
Sufficient Volume	Y	N	NA
Samples Received on Ice	Y	N	NA
VOA - Headspace Acceptable	Y	N	NA
USDA Regulated Soils	Y	N	NA
Samples in Holding Time	Y	N	NA
Residual Chlorine Present	Y	N	NA
Cl Strips:			
Sample pH Acceptable	Y	N	NA
pH Strips:			
Sulfide Present	Y	N	NA
Lead Acetate Strips:			

LAB USE ONLY:
Lab Sample # / Comments:

Customer Remarks / Special Conditions / Possible Hazards:
METALS: As, Ba, Cd, Cr, Pb, Hg, Sr, Zn, Fe, Mn Ca, Mg, K, Na
DISS. METALS: As, Ba, Cd, Cr, Pb, Hg, Sr, Zn, Fe, Mn
ANIONS: CHLORIDE, SULFATE, CARBONATE + BICARB. ALK.

Type of Ice Used: Wet Blue Dry None

Packing Material Used:

Radchem sample(s) screened (<500 cpm): Y N NA

SHORT HOLDS PRESENT (<72 hours): Y N N/A

Lab Tracking #: 2636242

Samples received via: FEDEX UPS Client Courier Pace Courier

Lab Sample Temperature Info:
Temp Blank Received: Y N NA
Therm ID#:
Cooler 1 Temp Upon Receipt: ____oC
Cooler 1 Therm Corr. Factor: ____oC
Cooler 1 Corrected Temp: ____oC
Comments:
1.1 E34 41 CPM

Trip Blank Received: Y N NA
HCL MeOH TSP Other

Non Conformance(s): YES / NO

Page: ____ of: ____

Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:
ERM	4/21/21 1047		4/21/21 1047
	4/21/21 1317		4/21/21 1317

MTJL LAB USE ONLY
Table #:
Acctnum:
Template:
Prelogin:
PM:
PB:

SAMPLE RECEIVING CHECKLIST

SAMPLE DELIVERY GROUP 221042166	
Client **PM** AMK 4271 - ERM-Baton Rouge	**Transport Method** COURIER
Profile Number 282045	**Received By** McCune, Dodie N.
Line Item(s) 2 - Waters - BTEX	**Receive Date(s)** 04/21/21

CHECKLIST	YES	NO
Samples received with proper thermal preservation?	☑	☐
Radioactivity is <1600 cpm? If no, record cpm value in notes section.	☑	☐
COC relinquished and complete (including sampleIDs, collect times, and sampler)?	☑	☐
All containers received in good condition and within hold time?	☑	☐
All sample labels and containers received match the chain of custody?	☑	☐
Preservative added to any containers?	☐	☑
If received, was headspace for VOC water containers < 6mm?	☑	☐
Samples collected in containers provided by Pace Gulf Coast?	☑	☐

COOLERS

Airbill	Thermometer ID: E34	Temp °C
		1.1

DISCREPANCIES

None

LAB PRESERVATIONS

None

NOTES

LELAP CERTIFICATE NUMBER: 01955
DOD-ELAP ACCREDITATION NUMBER: 74960

ANALYTICAL RESULTS

PERFORMED BY

Pace Analytical Gulf Coast
7979 Innovation Park Dr.
Baton Rouge, LA 70820
(225) 769-4900

Report Date 09/16/2021

Report # 221082468

Project Henning-0526033

Samples Collected 8/23/21

Deliver To	***Additional Recipients***
Shawn Wiggins ERM 640 W Sam Houston Parkway Suite 600 Houston, TX 77024 971-303-2385	NONE

Laboratory Endorsement

Sample analysis was performed in accordance with approved methodologies provided by the Environmental Protection Agency or other recognized agencies. The samples and their corresponding extracts will be maintained for a period of 30 days unless otherwise arranged. Following this retention period the samples will be disposed in accordance with Pace Gulf Coast's Standard Operating Procedures.

Common Abbreviations that may be Utilized in this Report

ND	Indicates the result was Not Detected at the specified reporting limit
NO	Indicates the sample did not ignite when preliminary test performed for EPA Method 1030
DO	Indicates the result was Diluted Out
MI	Indicates the result was subject to Matrix Interference
TNTC	Indicates the result was Too Numerous To Count
SUBC	Indicates the analysis was Sub-Contracted
FLD	Indicates the analysis was performed in the Field
DL	Detection Limit
LOD	Limit of Detection
LOQ	Limit of Quantitation
RE	Re-analysis
CF	HPLC or GC Confirmation
00:01	Reported as a time equivalent to 12:00 AM

Reporting Flags that may be Utilized in this Report

J or I	Indicates the result is between the MDL and LOQ
J	DOD flag on analyte in the parent sample for MS/MSD outside acceptance criteria
U	Indicates the compound was analyzed for but not detected
B or V	Indicates the analyte was detected in the associated Method Blank
Q	Indicates a non-compliant QC Result (See Q Flag Application Report)
*****	Indicates a non-compliant or not applicable QC recovery or RPD – see narrative
E	Organics - The result is estimated because it exceeded the instrument calibration range
E	Metals - % diference for the serial dilution is > 10%
L	Reporting Limits adjusted to meet risk-based limit.
P	RPD between primary and confirmation result is greater than 40
DL	Diluted analysis – when appended to Client Sample ID

Sample receipt at Pace Gulf Coast is documented through the attached chain of custody. In accordance with NELAC, this report shall be reproduced only in full and with the written permission of Pace Gulf Coast. The results contained within this report relate only to the samples reported. The documented results are presented within this report.

This report pertains only to the samples listed in the Report Sample Summary and should be retained as a permanent record thereof. The results contained within this report are intended for the use of the client. Any unauthorized use of the information contained in this report is prohibited.

I certify that this data package is in compliance with The NELAC Institute (TNI) Standard 2009 and terms and conditions of the contract and Statement of Work both technically and for completeness, for other than the conditions in the case narrative. Release of the data contained in this hardcopy data package and in the computer readable data submitted has been authorized by the Quality Assurance Manager or his/her designee, as verified by the following signature.

Estimated uncertainty of measurement is available upon request. This report is in compliance with the DOD QSM as specified in the contract if applicable.

Authorized Signature
Pace Gulf Coast Report 221082468

Certifications

Certification	Certification Number
DOD ELAP	74960
Alabama	01955
Arkansas	88-0655
Colorado	01955
Delaware	01955
Florida	E87854
Georgia	01955
Hawaii	01955
Idaho	01955
Illinois	200048
Indiana	01955
Kansas	E-10354
Kentucky	95
Louisiana	01955
Maryland	01955
Massachusetts	01955
Michigan	01955
Mississippi	01955
Missouri	01955
Montana	N/A
Nebraska	01955
New Mexico	01955
North Carolina	618
North Dakota	R-195
Oklahoma	9403
South Carolina	73006001
South Dakota	01955
Tennessee	01955
Texas	T104704178
Vermont	01955
Virginia	460215
Washington	C929
USDA Soil Permit	P330-16-00234

Case Narrative

Client: ERM-Baton Rouge **Report:** 221082468

Pace Analytical Gulf Coast received and analyzed the sample(s) listed
on the Report Sample Summary page of this report. Receipt of the sample(s) is documented
by the attached chain of custody. This applies only to the sample(s) listed in this report.
No sample integrity or quality control exceptions were identified unless noted below.

SEMI-VOLATILES GAS CHROMATOGRAPHY

In the MADEP EPH Rev 1.1 (LA) RVT analysis, the recoveries for the surrogates, 2-Bromonaphthalene and 2-Fluorobiphenyl are above the upper control limit for sample 22108246801(H-34). No target analytes were detected in the sample.

Sample Summary

Lab ID	Client ID	Matrix	Collect Date	Receive Date
22108246801	H-34	Water	8/23/21 10:55	8/24/21 12:05
22108246802	H-32A	Water	8/23/21 12:00	8/24/21 12:05
22108246803	H-32B	Water	8/23/21 13:50	8/24/21 12:05
22108246804	H-33	Water	8/23/21 14:50	8/24/21 12:05

Sample Results

H-34

Collect Date	08/23/2021 10:55	**Lab ID**	22108246801
Receive Date	08/24/2021 12:05	**Matrix**	Water

EPA 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Run Date	Run Batch	Analyst	%Moisture
NA	NA	NA	1	08/26/21 18:15	719816	CJR	

CAS#	Parameter	Result	LOQ	Units
71-43-2	Benzene	ND	0.00500	mg/L
100-41-4	Ethylbenzene	ND	0.00500	mg/L
108-88-3	Toluene	ND	0.00500	mg/L
1330-20-7	Xylene (total)	ND	0.015	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	%Rec Limits
460-00-4	4-Bromofluorobenzene	0.05	.055	mg/L	110	78 - 130
1868-53-7	Dibromofluoromethane	0.05	.051	mg/L	102	77 - 127
2037-26-5	Toluene d8	0.05	.049	mg/L	98	76 - 134
17060-07-0	1,2-Dichloroethane-d4	0.05	.051	mg/L	102	71 - 127

MADEP VPH Rev 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Run Date	Run Batch	Analyst	%Moisture
NA	NA	NA	1	09/03/21 21:25	720115	JAR	

CAS#	Parameter	Result	LOQ	Units
GCSV-02-10	Aliphatic >C8-C10	ND	0.020	mg/L
GCSV-02-30	Aliphatic C6-C8	ND	0.030	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	%Rec Limits
615-59-8	2,5-Dibromotoluene	0.05	.063	mg/L	126	70 - 130

MADEP VPH Rev 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Run Date	Run Batch	Analyst	%Moisture
NA	NA	NA	1	09/03/21 21:25	720114	JAR	

CAS#	Parameter	Result	LOQ	Units
GCSV-02-14	Aromatic >C8-C10	ND	0.030	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	%Rec Limits
615-59-8	2,5-Dibromotoluene	0.05	.058	mg/L	116	70 - 130

MADEP EPH Rev 1.1 (LA) RVT Aliph

Prep Date	Prep Batch	Prep Method	Dilution	Run Date	Run Batch	Analyst	%Moisture
08/27/21 06:00	719863	MADEP EPH (LA)	1	08/27/21 21:51	720028	MFS	

CAS#	Parameter	Result	LOQ	Units
GCSV-02-11	Aliphatic >C10-C12	ND	0.100	mg/L
GCSV-02-12	Aliphatic >C12-C16	ND	0.100	mg/L
GCSV-02-31	Aliphatic >C16-C35	ND	0.150	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	%Rec Limits
3386-33-2	1-Chlorooctadecane	0.16	.071	mg/L	45	40 - 140

Sample Results

H-34

Collect Date	08/23/2021 10:55	**Lab ID**	22108246801
Receive Date	08/24/2021 12:05	**Matrix**	Water

MADEP EPH Rev 1.1 (LA) RVT Arom

Prep Date	Prep Batch	Prep Method	Dilution	Run Date	Run Batch	Analyst	%Moisture
08/27/21 06:00	719863	MADEP EPH (LA)	1	09/03/21 19:59	720199	MFS	

CAS#	Parameter	Result	LOQ	Units
GCSV-05-18	Aromatic >C21-C35	ND	0.100	mg/L
GCSV-02-15	Unadjusted >C10-C12 Aromatics	ND	0.100	mg/L
GCSV-02-16	Unadjusted >C12-C16 Aromatics	ND	0.100	mg/L
GCSV-02-17	Unadjusted >C16-C21 Aromatics	ND	0.100	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	%Rec Limits
84-15-1	o-Terphenyl	0.16	.108	mg/L	68	40 - 140
580-13-2	2-Bromonaphthalene	0.16	.281	mg/L	176*	40 - 140
321-60-8	2-Fluorobiphenyl	0.16	.264	mg/L	165*	40 - 140

EPA 6020B

Prep Date	Prep Batch	Prep Method	Dilution	Run Date	Run Batch	Analyst	%Moisture
08/26/21 06:15	719635	EPA 3010A	1	08/26/21 18:57	719806	LWZ	

CAS#	Parameter	Result	LOQ	Units
7440-38-2	Arsenic	ND	0.0010	mg/L
7440-39-3	Barium	0.16	0.0010	mg/L
7440-43-9	Cadmium	ND	0.0010	mg/L
7440-70-2	Calcium	79.5	0.50	mg/L
7440-47-3	Chromium	0.0058	0.0010	mg/L
7439-89-6	Iron	0.93	0.10	mg/L
7439-92-1	Lead	ND	0.0010	mg/L
7439-95-4	Magnesium	29.3	0.10	mg/L
7439-96-5	Manganese	0.090	0.0050	mg/L
7440-09-7	Potassium	1.78	0.10	mg/L
7440-24-6	Strontium	0.44	0.0010	mg/L
7440-66-6	Zinc	ND	0.020	mg/L

EPA 6020B

*Results And limits are adjusted for dilution.

Prep Date	Prep Batch	Prep Method	Dilution	Run Date	Run Batch	Analyst	%Moisture
08/26/21 06:15	719635	EPA 3010A	10	08/27/21 14:10	719939	LWZ	

CAS#	Parameter	Result	LOQ	Units
7440-23-5	Sodium	223	1.00	mg/L

EPA 6020B Dissolved

Prep Date	Prep Batch	Prep Method	Dilution	Run Date	Run Batch	Analyst	%Moisture
08/25/21 08:15	719414	EPA 3005A Dissolved	1	08/26/21 23:44	719806	LWZ	

CAS#	Parameter	Result	LOQ	Units
7440-38-2	Arsenic	ND	0.0010	mg/L
7440-39-3	Barium	0.14	0.0010	mg/L
7440-43-9	Cadmium	ND	0.0010	mg/L

Sample Results

H-34

Collect Date 08/23/2021 10:55 **Lab ID** 22108246801
Receive Date 08/24/2021 12:05 **Matrix** Water

EPA 6020B Dissolved (Continued)

Prep Date	Prep Batch	Prep Method	Dilution	Run Date	Run Batch	Analyst	%Moisture
08/25/21 08:15	719414	EPA 3005A Dissolved	1	08/26/21 23:44	719806	LWZ	

CAS#	Parameter	Result	LOQ	Units
7440-47-3	Chromium	0.0036	0.0010	mg/L
7439-89-6	Iron	ND	0.10	mg/L
7439-92-1	Lead	ND	0.0010	mg/L
7439-96-5	Manganese	0.071	0.0050	mg/L
7440-24-6	Strontium	0.42	0.0010	mg/L
7440-66-6	Zinc	ND	0.020	mg/L

EPA 7470A

Prep Date	Prep Batch	Prep Method	Dilution	Run Date	Run Batch	Analyst	%Moisture
08/25/21 07:30	719637	EPA 7470A	1	08/27/21 09:51	719934	BDP	

CAS#	Parameter	Result	LOQ	Units
7439-97-6	Mercury	ND	0.00020	mg/L

EPA 7470A Dissolved

Prep Date	Prep Batch	Prep Method	Dilution	Run Date	Run Batch	Analyst	%Moisture
08/25/21 07:30	719637	EPA 7470A Dissolved	1	08/27/21 09:56	719934	BDP	

CAS#	Parameter	Result	LOQ	Units
7439-97-6	Mercury	ND	0.00020	mg/L

EPA 9056A

*Results And limits are adjusted for dilution.

Prep Date	Prep Batch	Prep Method	Dilution	Run Date	Run Batch	Analyst	%Moisture
NA	NA	NA	100	09/09/21 19:28	720096	CJS	

CAS#	Parameter	Result	LOQ	Units
16887-00-6	Chloride	472	20.0	mg/L
14808-79-8	Sulfate	68.5	20.0	mg/L

SM 2320 B-2011

Prep Date	Prep Batch	Prep Method	Dilution	Run Date	Run Batch	Analyst	%Moisture
NA	NA	NA	1	09/05/21 09:41	720180	RYC	

CAS#	Parameter	Result	LOQ	Units
T-005-B	Bicarbonate Alkalinity	222	1.0	mg/L CaCO3

Sample Results

H-34

Collect Date 08/23/2021 10:55 **Lab ID** 22108246801
Receive Date 08/24/2021 12:05 **Matrix** Water

SM 2320 B-2011

Prep Date	Prep Batch	Prep Method	Dilution	Run Date	Run Batch	Analyst	%Moisture
NA	NA	NA	1	09/05/21 09:41	720180	RYC	

CAS#	Parameter	Result	LOQ	Units
T-005-C	Carbonate Alkalinity	ND	1.0	mg/L CaCO3

SM 2540 C-2011

Prep Date	Prep Batch	Prep Method	Dilution	Run Date	Run Batch	Analyst	%Moisture
NA	NA	NA	1	08/26/21 19:20	719844	KLO	

CAS#	Parameter	Result	LOQ	Units
WET-035	Total Dissolved Solids(TDS)	943	10.0	mg/L

H-32A

Collect Date 08/23/2021 12:00 **Lab ID** 22108246802
Receive Date 08/24/2021 12:05 **Matrix** Water

EPA 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Run Date	Run Batch	Analyst	%Moisture
NA	NA	NA	1	08/26/21 18:37	719816	CJR	

CAS#	Parameter	Result	LOQ	Units
71-43-2	Benzene	ND	0.00500	mg/L
100-41-4	Ethylbenzene	ND	0.00500	mg/L
108-88-3	Toluene	ND	0.00500	mg/L
1330-20-7	Xylene (total)	ND	0.015	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	%Rec Limits
460-00-4	4-Bromofluorobenzene	0.05	.055	mg/L	109	78 - 130
1868-53-7	Dibromofluoromethane	0.05	.051	mg/L	102	77 - 127
2037-26-5	Toluene d8	0.05	.049	mg/L	98	76 - 134
17060-07-0	1,2-Dichloroethane-d4	0.05	.051	mg/L	102	71 - 127

MADEP VPH Rev 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Run Date	Run Batch	Analyst	%Moisture
NA	NA	NA	1	09/03/21 21:40	720115	JAR	

CAS#	Parameter	Result	LOQ	Units
GCSV-02-10	Aliphatic >C8-C10	ND	0.020	mg/L
GCSV-02-30	Aliphatic C6-C8	ND	0.030	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	%Rec Limits
615-59-8	2,5-Dibromotoluene	0.05	.057	mg/L	114	70 - 130

Sample Results

H-32A

Collect Date	08/23/2021 12:00	**Lab ID**	22108246802
Receive Date	08/24/2021 12:05	**Matrix**	Water

MADEP VPH Rev 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Run Date	Run Batch	Analyst	%Moisture
NA	NA	NA	1	09/03/21 21:40	720114	JAR	

CAS#	Parameter	Result	LOQ	Units
GCSV-02-14	Aromatic >C8-C10	ND	0.030	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	%Rec Limits
615-59-8	2,5-Dibromotoluene	0.05	.053	mg/L	106	70 - 130

MADEP EPH Rev 1.1 (LA) RVT Aliph

Prep Date	Prep Batch	Prep Method	Dilution	Run Date	Run Batch	Analyst	%Moisture
08/27/21 06:00	719863	MADEP EPH (LA)	1	08/27/21 22:09	720028	MFS	

CAS#	Parameter	Result	LOQ	Units
GCSV-02-11	Aliphatic >C10-C12	ND	0.100	mg/L
GCSV-02-12	Aliphatic >C12-C16	ND	0.100	mg/L
GCSV-02-31	Aliphatic >C16-C35	ND	0.150	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	%Rec Limits
3386-33-2	1-Chlorooctadecane	0.16	.092	mg/L	58	40 - 140

MADEP EPH Rev 1.1 (LA) RVT Arom

Prep Date	Prep Batch	Prep Method	Dilution	Run Date	Run Batch	Analyst	%Moisture
08/27/21 06:00	719863	MADEP EPH (LA)	1	08/27/21 22:09	720027	MFS	

CAS#	Parameter	Result	LOQ	Units
GCSV-05-18	Aromatic >C21-C35	ND	0.100	mg/L
GCSV-02-15	Unadjusted >C10-C12 Aromatics	ND	0.100	mg/L
GCSV-02-16	Unadjusted >C12-C16 Aromatics	ND	0.100	mg/L
GCSV-02-17	Unadjusted >C16-C21 Aromatics	ND	0.100	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	%Rec Limits
84-15-1	o-Terphenyl	0.16	.084	mg/L	53	40 - 140
580-13-2	2-Bromonaphthalene	0.16	.098	mg/L	61	40 - 140
321-60-8	2-Fluorobiphenyl	0.16	.094	mg/L	58	40 - 140

EPA 6020B

Prep Date	Prep Batch	Prep Method	Dilution	Run Date	Run Batch	Analyst	%Moisture
08/26/21 06:15	719635	EPA 3010A	1	08/26/21 19:00	719806	LWZ	

CAS#	Parameter	Result	LOQ	Units
7440-38-2	Arsenic	ND	0.0010	mg/L
7440-39-3	Barium	0.082	0.0010	mg/L
7440-43-9	Cadmium	ND	0.0010	mg/L
7440-70-2	Calcium	52.5	0.50	mg/L
7440-47-3	Chromium	ND	0.0010	mg/L
7439-89-6	Iron	0.41	0.10	mg/L
7439-92-1	Lead	ND	0.0010	mg/L
7439-95-4	Magnesium	18.7	0.10	mg/L
7439-96-5	Manganese	0.23	0.0050	mg/L
7440-09-7	Potassium	1.71	0.10	mg/L

Sample Results

H-32A

Collect Date	08/23/2021 12:00	**Lab ID**	22108246802
Receive Date	08/24/2021 12:05	**Matrix**	Water

EPA 6020B (Continued)

Prep Date	Prep Batch	Prep Method	Dilution	Run Date	Run Batch	Analyst	%Moisture
08/26/21 06:15	719635	EPA 3010A	1	08/26/21 19:00	719806	LWZ	

CAS#	Parameter	Result	LOQ	Units
7440-24-6	Strontium	0.29	0.0010	mg/L
7440-66-6	Zinc	ND	0.020	mg/L

EPA 6020B

*Results And limits are adjusted for dilution.

Prep Date	Prep Batch	Prep Method	Dilution	Run Date	Run Batch	Analyst	%Moisture
08/26/21 06:15	719635	EPA 3010A	10	08/27/21 14:13	719939	LWZ	

CAS#	Parameter	Result	LOQ	Units
7440-23-5	Sodium	233	1.00	mg/L

EPA 6020B Dissolved

Prep Date	Prep Batch	Prep Method	Dilution	Run Date	Run Batch	Analyst	%Moisture
08/25/21 08:15	719414	EPA 3005A Dissolved	1	08/26/21 23:47	719806	LWZ	

CAS#	Parameter	Result	LOQ	Units
7440-38-2	Arsenic	ND	0.0010	mg/L
7440-39-3	Barium	0.074	0.0010	mg/L
7440-43-9	Cadmium	ND	0.0010	mg/L
7440-47-3	Chromium	ND	0.0010	mg/L
7439-89-6	Iron	ND	0.10	mg/L
7439-92-1	Lead	ND	0.0010	mg/L
7439-96-5	Manganese	0.16	0.0050	mg/L
7440-24-6	Strontium	0.28	0.0010	mg/L
7440-66-6	Zinc	ND	0.020	mg/L

EPA 7470A

Prep Date	Prep Batch	Prep Method	Dilution	Run Date	Run Batch	Analyst	%Moisture
08/25/21 07:30	719637	EPA 7470A	1	08/27/21 09:58	719934	BDP	

CAS#	Parameter	Result	LOQ	Units
7439-97-6	Mercury	ND	0.00020	mg/L

Sample Results

H-32A

Collect Date	08/23/2021 12:00	**Lab ID**	22108246802
Receive Date	08/24/2021 12:05	**Matrix**	Water

EPA 7470A Dissolved

Prep Date	Prep Batch	Prep Method	Dilution	Run Date	Run Batch	Analyst	%Moisture
08/25/21 07:30	719637	EPA 7470A Dissolved	1	08/27/21 10:01	719934	BDP	

CAS#	Parameter	Result	LOQ	Units
7439-97-6	Mercury	ND	0.00020	mg/L

EPA 9056A

*Results And limits are adjusted for dilution.

Prep Date	Prep Batch	Prep Method	Dilution	Run Date	Run Batch	Analyst	%Moisture
NA	NA	NA	100	09/09/21 20:05	720096	CJS	

CAS#	Parameter	Result	LOQ	Units
16887-00-6	Chloride	312	20.0	mg/L
14808-79-8	Sulfate	77.0	20.0	mg/L

SM 2320 B-2011

Prep Date	Prep Batch	Prep Method	Dilution	Run Date	Run Batch	Analyst	%Moisture
NA	NA	NA	1	09/05/21 09:41	720180	RYC	

CAS#	Parameter	Result	LOQ	Units
T-005-B	Bicarbonate Alkalinity	301	1.0	mg/L CaCO3

SM 2320 B-2011

Prep Date	Prep Batch	Prep Method	Dilution	Run Date	Run Batch	Analyst	%Moisture
NA	NA	NA	1	09/05/21 09:41	720180	RYC	

CAS#	Parameter	Result	LOQ	Units
T-005-C	Carbonate Alkalinity	ND	1.0	mg/L CaCO3

SM 2540 C-2011

Prep Date	Prep Batch	Prep Method	Dilution	Run Date	Run Batch	Analyst	%Moisture
NA	NA	NA	1	08/26/21 19:20	719844	KLO	

CAS#	Parameter	Result	LOQ	Units
WET-035	Total Dissolved Solids(TDS)	762	10.0	mg/L

Sample Results

H-32B

Collect Date	08/23/2021 13:50	**Lab ID**	22108246803
Receive Date	08/24/2021 12:05	**Matrix**	Water

EPA 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Run Date	Run Batch	Analyst	%Moisture
NA	NA	NA	1	08/26/21 18:59	719816	CJR	

CAS#	Parameter	Result	LOQ	Units
71-43-2	Benzene	ND	0.00500	mg/L
100-41-4	Ethylbenzene	ND	0.00500	mg/L
108-88-3	Toluene	ND	0.00500	mg/L
1330-20-7	Xylene (total)	ND	0.015	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	%Rec Limits
460-00-4	4-Bromofluorobenzene	0.05	.056	mg/L	111	78 - 130
1868-53-7	Dibromofluoromethane	0.05	.051	mg/L	101	77 - 127
2037-26-5	Toluene d8	0.05	.049	mg/L	98	76 - 134
17060-07-0	1,2-Dichloroethane-d4	0.05	.051	mg/L	101	71 - 127

MADEP VPH Rev 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Run Date	Run Batch	Analyst	%Moisture
NA	NA	NA	1	09/03/21 21:55	720115	JAR	

CAS#	Parameter	Result	LOQ	Units
GCSV-02-10	Aliphatic >C8-C10	ND	0.020	mg/L
GCSV-02-30	Aliphatic C6-C8	ND	0.030	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	%Rec Limits
615-59-8	2,5-Dibromotoluene	0.05	.061	mg/L	122	70 - 130

MADEP VPH Rev 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Run Date	Run Batch	Analyst	%Moisture
NA	NA	NA	1	09/03/21 21:55	720114	JAR	

CAS#	Parameter	Result	LOQ	Units
GCSV-02-14	Aromatic >C8-C10	ND	0.030	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	%Rec Limits
615-59-8	2,5-Dibromotoluene	0.05	.056	mg/L	113	70 - 130

MADEP EPH Rev 1.1 (LA) RVT Aliph

Prep Date	Prep Batch	Prep Method	Dilution	Run Date	Run Batch	Analyst	%Moisture
08/27/21 06:00	719863	MADEP EPH (LA)	1	08/27/21 22:27	720028	MFS	

CAS#	Parameter	Result	LOQ	Units
GCSV-02-11	Aliphatic >C10-C12	ND	0.100	mg/L
GCSV-02-12	Aliphatic >C12-C16	ND	0.100	mg/L
GCSV-02-31	Aliphatic >C16-C35	ND	0.150	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	%Rec Limits
3386-33-2	1-Chlorooctadecane	0.16	.073	mg/L	45	40 - 140

Sample Results

H-32B

Collect Date	08/23/2021 13:50	**Lab ID**	22108246803
Receive Date	08/24/2021 12:05	**Matrix**	Water

MADEP EPH Rev 1.1 (LA) RVT Arom

Prep Date	Prep Batch	Prep Method	Dilution	Run Date	Run Batch	Analyst	%Moisture
08/27/21 06:00	719863	MADEP EPH (LA)	1	08/27/21 22:27	720027	MFS	

CAS#	Parameter	Result	LOQ	Units
GCSV-05-18	Aromatic >C21-C35	ND	0.100	mg/L
GCSV-02-15	Unadjusted >C10-C12 Aromatics	ND	0.100	mg/L
GCSV-02-16	Unadjusted >C12-C16 Aromatics	ND	0.100	mg/L
GCSV-02-17	Unadjusted >C16-C21 Aromatics	ND	0.100	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	%Rec Limits
84-15-1	o-Terphenyl	0.16	.109	mg/L	68	40 - 140
580-13-2	2-Bromonaphthalene	0.16	.191	mg/L	119	40 - 140
321-60-8	2-Fluorobiphenyl	0.16	.176	mg/L	110	40 - 140

EPA 6020B

Prep Date	Prep Batch	Prep Method	Dilution	Run Date	Run Batch	Analyst	%Moisture
08/26/21 06:15	719635	EPA 3010A	1	08/26/21 19:04	719806	LWZ	

CAS#	Parameter	Result	LOQ	Units
7440-38-2	Arsenic	0.0012	0.0010	mg/L
7440-39-3	Barium	0.041	0.0010	mg/L
7440-43-9	Cadmium	ND	0.0010	mg/L
7440-70-2	Calcium	91.2	0.50	mg/L
7440-47-3	Chromium	ND	0.0010	mg/L
7439-89-6	Iron	0.34	0.10	mg/L
7439-92-1	Lead	ND	0.0010	mg/L
7439-95-4	Magnesium	40.8	0.10	mg/L
7439-96-5	Manganese	0.62	0.0050	mg/L
7440-09-7	Potassium	2.84	0.10	mg/L
7440-24-6	Strontium	0.56	0.0010	mg/L
7440-66-6	Zinc	ND	0.020	mg/L

EPA 6020B

*Results And limits are adjusted for dilution.

Prep Date	Prep Batch	Prep Method	Dilution	Run Date	Run Batch	Analyst	%Moisture
08/26/21 06:15	719635	EPA 3010A	10	08/27/21 14:17	719939	LWZ	

CAS#	Parameter	Result	LOQ	Units
7440-23-5	Sodium	254	1.00	mg/L

EPA 6020B Dissolved

Prep Date	Prep Batch	Prep Method	Dilution	Run Date	Run Batch	Analyst	%Moisture
08/25/21 08:15	719414	EPA 3005A Dissolved	1	08/26/21 23:51	719806	LWZ	

CAS#	Parameter	Result	LOQ	Units
7440-38-2	Arsenic	ND	0.0010	mg/L
7440-39-3	Barium	0.035	0.0010	mg/L
7440-43-9	Cadmium	ND	0.0010	mg/L

Sample Results

H-32B

Collect Date 08/23/2021 13:50 **Lab ID** 22108246803
Receive Date 08/24/2021 12:05 **Matrix** Water

EPA 6020B Dissolved (Continued)

Prep Date	Prep Batch	Prep Method	Dilution	Run Date	Run Batch	Analyst	%Moisture
08/25/21 08:15	719414	EPA 3005A Dissolved	1	08/26/21 23:51	719806	LWZ	

CAS#	Parameter	Result	LOQ	Units
7440-47-3	Chromium	ND	0.0010	mg/L
7439-89-6	Iron	ND	0.10	mg/L
7439-92-1	Lead	ND	0.0010	mg/L
7439-96-5	Manganese	0.56	0.0050	mg/L
7440-24-6	Strontium	0.54	0.0010	mg/L
7440-66-6	Zinc	ND	0.020	mg/L

EPA 7470A

Prep Date	Prep Batch	Prep Method	Dilution	Run Date	Run Batch	Analyst	%Moisture
08/25/21 07:30	719637	EPA 7470A	1	08/27/21 10:04	719934	BDP	

CAS#	Parameter	Result	LOQ	Units
7439-97-6	Mercury	ND	0.00020	mg/L

EPA 7470A Dissolved

Prep Date	Prep Batch	Prep Method	Dilution	Run Date	Run Batch	Analyst	%Moisture
08/25/21 07:30	719637	EPA 7470A Dissolved	1	08/27/21 10:07	719934	BDP	

CAS#	Parameter	Result	LOQ	Units
7439-97-6	Mercury	ND	0.00020	mg/L

EPA 9056A

*Results And limits are adjusted for dilution.

Prep Date	Prep Batch	Prep Method	Dilution	Run Date	Run Batch	Analyst	%Moisture
NA	NA	NA	100	09/09/21 20:41	720096	CJS	

CAS#	Parameter	Result	LOQ	Units
16887-00-6	Chloride	254	20.0	mg/L
14808-79-8	Sulfate	315	20.0	mg/L

SM 2320 B-2011

Prep Date	Prep Batch	Prep Method	Dilution	Run Date	Run Batch	Analyst	%Moisture
NA	NA	NA	1	09/05/21 09:41	720180	RYC	

CAS#	Parameter	Result	LOQ	Units
T-005-B	Bicarbonate Alkalinity	375	1.0	mg/L CaCO3

Sample Results

H-32B

Collect Date 08/23/2021 13:50 **Lab ID** 22108246803
Receive Date 08/24/2021 12:05 **Matrix** Water

SM 2320 B-2011

Prep Date	Prep Batch	Prep Method	Dilution	Run Date	Run Batch	Analyst	%Moisture
NA	NA	NA	1	09/05/21 09:41	720180	RYC	

CAS#	Parameter	Result	LOQ	Units
T-005-C	Carbonate Alkalinity	ND	1.0	mg/L CaCO3

SM 2540 C-2011

Prep Date	Prep Batch	Prep Method	Dilution	Run Date	Run Batch	Analyst	%Moisture
NA	NA	NA	1	08/26/21 19:20	719844	KLO	

CAS#	Parameter	Result	LOQ	Units
WET-035	Total Dissolved Solids(TDS)	1100	10.0	mg/L

H-33

Collect Date 08/23/2021 14:50 **Lab ID** 22108246804
Receive Date 08/24/2021 12:05 **Matrix** Water

EPA 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Run Date	Run Batch	Analyst	%Moisture
NA	NA	NA	1	08/26/21 19:21	719816	CJR	

CAS#	Parameter	Result	LOQ	Units
71-43-2	Benzene	ND	0.00500	mg/L
100-41-4	Ethylbenzene	ND	0.00500	mg/L
108-88-3	Toluene	ND	0.00500	mg/L
1330-20-7	Xylene (total)	ND	0.015	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	%Rec Limits
460-00-4	4-Bromofluorobenzene	0.05	.056	mg/L	111	78 - 130
1868-53-7	Dibromofluoromethane	0.05	.051	mg/L	101	77 - 127
2037-26-5	Toluene d8	0.05	.049	mg/L	99	76 - 134
17060-07-0	1,2-Dichloroethane-d4	0.05	.051	mg/L	103	71 - 127

MADEP VPH Rev 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Run Date	Run Batch	Analyst	%Moisture
NA	NA	NA	1	09/03/21 22:11	720115	JAR	

CAS#	Parameter	Result	LOQ	Units
GCSV-02-10	Aliphatic >C8-C10	ND	0.020	mg/L
GCSV-02-30	Aliphatic C6-C8	ND	0.030	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	%Rec Limits
615-59-8	2,5-Dibromotoluene	0.05	.057	mg/L	114	70 - 130

Sample Results

H-33

Collect Date	08/23/2021 14:50	**Lab ID**	22108246804
Receive Date	08/24/2021 12:05	**Matrix**	Water

MADEP VPH Rev 1.1 (LA)

Prep Date	Prep Batch	Prep Method	Dilution	Run Date	Run Batch	Analyst	%Moisture
NA	NA	NA	1	09/03/21 22:11	720114	JAR	

CAS#	Parameter	Result	LOQ	Units
GCSV-02-14	Aromatic >C8-C10	ND	0.030	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	%Rec Limits
615-59-8	2,5-Dibromotoluene	0.05	.053	mg/L	106	70 - 130

MADEP EPH Rev 1.1 (LA) RVT Aliph

Prep Date	Prep Batch	Prep Method	Dilution	Run Date	Run Batch	Analyst	%Moisture
08/27/21 06:00	719863	MADEP EPH (LA)	1	08/27/21 22:44	720028	MFS	

CAS#	Parameter	Result	LOQ	Units
GCSV-02-11	Aliphatic >C10-C12	ND	0.100	mg/L
GCSV-02-12	Aliphatic >C12-C16	ND	0.100	mg/L
GCSV-02-31	Aliphatic >C16-C35	ND	0.150	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	%Rec Limits
3386-33-2	1-Chlorooctadecane	0.16	.069	mg/L	43	40 - 140

MADEP EPH Rev 1.1 (LA) RVT Arom

Prep Date	Prep Batch	Prep Method	Dilution	Run Date	Run Batch	Analyst	%Moisture
08/27/21 06:00	719863	MADEP EPH (LA)	1	08/27/21 22:44	720027	MFS	

CAS#	Parameter	Result	LOQ	Units
GCSV-05-18	Aromatic >C21-C35	ND	0.100	mg/L
GCSV-02-15	Unadjusted >C10-C12 Aromatics	ND	0.100	mg/L
GCSV-02-16	Unadjusted >C12-C16 Aromatics	ND	0.100	mg/L
GCSV-02-17	Unadjusted >C16-C21 Aromatics	ND	0.100	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	%Rec Limits
84-15-1	o-Terphenyl	0.16	.069	mg/L	43	40 - 140
580-13-2	2-Bromonaphthalene	0.16	.1	mg/L	62	40 - 140
321-60-8	2-Fluorobiphenyl	0.16	.092	mg/L	57	40 - 140

EPA 6020B

Prep Date	Prep Batch	Prep Method	Dilution	Run Date	Run Batch	Analyst	%Moisture
08/26/21 06:15	719635	EPA 3010A	1	08/26/21 19:07	719806	LWZ	

CAS#	Parameter	Result	LOQ	Units
7440-38-2	Arsenic	ND	0.0010	mg/L
7440-39-3	Barium	0.043	0.0010	mg/L
7440-43-9	Cadmium	ND	0.0010	mg/L
7440-70-2	Calcium	102	0.50	mg/L
7440-47-3	Chromium	ND	0.0010	mg/L
7439-89-6	Iron	0.43	0.10	mg/L
7439-92-1	Lead	ND	0.0010	mg/L
7439-95-4	Magnesium	38.9	0.10	mg/L
7439-96-5	Manganese	0.20	0.0050	mg/L
7440-09-7	Potassium	1.79	0.10	mg/L

Sample Results

H-33				
	Collect Date	08/23/2021 14:50	**Lab ID**	22108246804
	Receive Date	08/24/2021 12:05	**Matrix**	Water

EPA 6020B (Continued)

Prep Date	Prep Batch	Prep Method	Dilution	Run Date	Run Batch	Analyst	%Moisture
08/26/21 06:15	719635	EPA 3010A	1	08/26/21 19:07	719806	LWZ	

CAS#	Parameter	Result	LOQ	Units
7440-24-6	Strontium	0.55	0.0010	mg/L
7440-66-6	Zinc	ND	0.020	mg/L

EPA 6020B

*Results And limits are adjusted for dilution.

Prep Date	Prep Batch	Prep Method	Dilution	Run Date	Run Batch	Analyst	%Moisture
08/26/21 06:15	719635	EPA 3010A	10	08/27/21 14:20	719939	LWZ	

CAS#	Parameter	Result	LOQ	Units
7440-23-5	Sodium	383	1.00	mg/L

EPA 6020B Dissolved

Prep Date	Prep Batch	Prep Method	Dilution	Run Date	Run Batch	Analyst	%Moisture
08/25/21 08:15	719414	EPA 3005A Dissolved	1	08/26/21 23:54	719806	LWZ	

CAS#	Parameter	Result	LOQ	Units
7440-38-2	Arsenic	ND	0.0010	mg/L
7440-39-3	Barium	0.037	0.0010	mg/L
7440-43-9	Cadmium	ND	0.0010	mg/L
7440-47-3	Chromium	ND	0.0010	mg/L
7439-89-6	Iron	ND	0.10	mg/L
7439-92-1	Lead	ND	0.0010	mg/L
7439-96-5	Manganese	0.15	0.0050	mg/L
7440-24-6	Strontium	0.52	0.0010	mg/L
7440-66-6	Zinc	ND	0.020	mg/L

EPA 7470A

Prep Date	Prep Batch	Prep Method	Dilution	Run Date	Run Batch	Analyst	%Moisture
08/25/21 07:30	719637	EPA 7470A	1	08/27/21 10:10	719934	BDP	

CAS#	Parameter	Result	LOQ	Units
7439-97-6	Mercury	ND	0.00020	mg/L

Sample Results

H-33

Collect Date	08/23/2021 14:50	**Lab ID**	22108246804
Receive Date	08/24/2021 12:05	**Matrix**	Water

EPA 7470A Dissolved

Prep Date	Prep Batch	Prep Method	Dilution	Run Date	Run Batch	Analyst	%Moisture
08/25/21 07:30	719637	EPA 7470A Dissolved	1	08/27/21 10:13	719934	BDP	

CAS#	Parameter	Result	LOQ	Units
7439-97-6	Mercury	ND	0.00020	mg/L

EPA 9056A

*Results And limits are adjusted for dilution.

Prep Date	Prep Batch	Prep Method	Dilution	Run Date	Run Batch	Analyst	%Moisture
NA	NA	NA	100	09/09/21 21:18	720096	CJS	

CAS#	Parameter	Result	LOQ	Units
16887-00-6	Chloride	629	20.0	mg/L
14808-79-8	Sulfate	156	20.0	mg/L

SM 2320 B-2011

Prep Date	Prep Batch	Prep Method	Dilution	Run Date	Run Batch	Analyst	%Moisture
NA	NA	NA	1	09/05/21 09:41	720180	RYC	

CAS#	Parameter	Result	LOQ	Units
T-005-B	Bicarbonate Alkalinity	325	1.0	mg/L CaCO3

SM 2320 B-2011

Prep Date	Prep Batch	Prep Method	Dilution	Run Date	Run Batch	Analyst	%Moisture
NA	NA	NA	1	09/05/21 09:41	720180	RYC	

CAS#	Parameter	Result	LOQ	Units
T-005-C	Carbonate Alkalinity	ND	1.0	mg/L CaCO3

SM 2540 C-2011

Prep Date	Prep Batch	Prep Method	Dilution	Run Date	Run Batch	Analyst	%Moisture
NA	NA	NA	1	08/26/21 19:20	719844	KLO	

CAS#	Parameter	Result	LOQ	Units
WET-035	Total Dissolved Solids(TDS)	1310	10.0	mg/L

GC/MS Volatiles QC Summary

Analytical Batch 719816	Client ID	MB719816		LCS719816				LCSD719816				
	Lab ID	2232612		2232613				2232614				
	Sample Type	MB		LCS				LCSD				
	Prep Date	NA		NA				NA				
	Analysis Date	08/26/21 12:13		08/26/21 10:23				08/26/21 10:45				
	Matrix	Water		Water				Water				
EPA 8260B		Units Result	mg/L LOQ	Spike Added	Result	%R	Control Limits%R	Spike Added	Result	%R	RPD	RPD Limit
Benzene	71-43-2	ND	0.00500	0.050	0.050	100	70 - 129	0.050	0.050	99	0	20
Ethylbenzene	100-41-4	ND	0.00500	0.050	0.050	101	74 - 126	0.050	0.051	102	2	30
Toluene	108-88-3	ND	0.00500	0.050	0.049	97	72 - 120	0.050	0.049	99	0	20
Xylene (total)	1330-20-7	ND	0.015	0.150	0.152	101	74 - 127	0.150	0.152	101	0	30
Surrogate												
1,2-Dichloroethane-d4	17060-07-0	.0508	102	.05	.0494	99	71 - 127	.05	.05	100	NA	NA
4-Bromofluorobenzene	460-00-4	.0555	111	.05	.0553	111	78 - 130	.05	.0554	111	NA	NA
Dibromofluoromethane	1868-53-7	.051	102	.05	.0516	103	77 - 127	.05	.0515	103	NA	NA
Toluene d8	2037-26-5	.0487	97	.05	.0479	96	76 - 134	.05	.0486	97	NA	NA

GC Volatiles QC Summary

Analytical Batch 720115	Client ID	MB720115		LCS720115				LCSD720115				
	Lab ID	2234279		2234280				2234281				
	Sample Type	MB		LCS				LCSD				
	Prep Date	NA		NA				NA				
	Analysis Date	09/03/21 21:09		09/03/21 19:29				09/03/21 20:23				
	Matrix	Water		Water				Water				
MADEP VPH Rev 1.1 (LA)		Units Result	mg/L LOQ	Spike Added	Result	%R	Control Limits%R	Spike Added	Result	%R	RPD	RPD Limit
Aliphatic >C8-C10	GCSV-02-10	ND	0.020	0.100	0.106	106	60 - 140	0.100	0.123	123	15	30
Aliphatic C6-C8	GCSV-02-30	ND	0.030	0.150	0.175	117	60 - 140	0.150	0.188	125	7	30
Surrogate												
2,5-Dibromotoluene	615-59-8	.0635	127	.05	.0632	126	70 - 130	.05	.0611	122	NA	NA

Analytical Batch 720114	Client ID	MB720114		LCS720114				LCSD720114				
	Lab ID	2234276		2234277				2234278				
	Sample Type	MB		LCS				LCSD				
	Prep Date	NA		NA				NA				
	Analysis Date	09/03/21 21:09		09/03/21 19:29				09/03/21 20:23				
	Matrix	Water		Water				Water				
MADEP VPH Rev 1.1 (LA)		Units Result	mg/L LOQ	Spike Added	Result	%R	Control Limits%R	Spike Added	Result	%R	RPD	RPD Limit
Aromatic >C8-C10	GCSV-02-14	ND	0.030	0.150	0.153	102	60 - 140	0.150	0.163	109	6	30
Surrogate												
2,5-Dibromotoluene	615-59-8	.0596	119	.05	.0591	118	70 - 130	.05	.0581	116	NA	NA

GC Semi-Volatiles QC Summary

Analytical Batch	Client ID	MB719863	LCS719863	LCSD719863
720028	Lab ID	2232796	2232797	2232798
Prep Batch	Sample Type	MB	LCS	LCSD
719863	Prep Date	08/27/21 06:00	08/27/21 06:00	08/27/21 06:00
Prep Method	Analysis Date	08/27/21 18:16	08/27/21 18:34	08/27/21 18:52
MADEP EPH Rev 1.1 (LA) RVT	Matrix	Water	Water	Water

MADEP EPH Rev 1.1 (LA) RVT		Units Result	mg/L LOQ	Spike Added	Result	%R	Control Limits%R	Spike Added	Result	%R	RPD	RPD Limit
Aliphatic >C10-C12	GCSV-02-11	ND	0.100	0.400	0.331	83	30 - 140	0.400	0.319	80	4	25
Aliphatic >C12-C16	GCSV-02-12	ND	0.100	0.400	0.347	87	40 - 140	0.400	0.324	81	7	25
Aliphatic >C16-C35	GCSV-02-31	ND	0.150	1.80	1.69	94	40 - 140	1.80	1.72	96	2	25
Surrogate												
1-Chlorooctadecane	3386-33-2	.0767	48	.16	.131	82	40 - 140	.16	.127	79	NA	NA

Analytical Batch	Client ID	MB719863	LCS719863	LCSD719863
720027	Lab ID	2232796	2232797	2232798
Prep Batch	Sample Type	MB	LCS	LCSD
719863	Prep Date	08/27/21 06:00	08/27/21 06:00	08/27/21 06:00
Prep Method	Analysis Date	08/27/21 18:16	08/27/21 18:34	08/27/21 18:52
MADEP EPH Rev 1.1 (LA) RVT	Matrix	Water	Water	Water

MADEP EPH Rev 1.1 (LA) RVT		Units Result	mg/L LOQ	Spike Added	Result	%R	Control Limits%R	Spike Added	Result	%R	RPD	RPD Limit
Aromatic >C21-C35	GCSV-05-18	ND	0.100	2.00	1.45	73	40 - 140	2.00	1.68	84	15	25
Unadjusted >C10-C12 Aromatics	GCSV-02-15	ND	0.100	0.200	0.169	85	30 - 140	0.200	0.206	103	20	25
Unadjusted >C12-C16 Aromatics	GCSV-02-16	ND	0.100	0.800	0.652	82	40 - 140	0.800	0.781	98	18	25
Unadjusted >C16-C21 Aromatics	GCSV-02-17	ND	0.100	0.400	0.307	77	40 - 140	0.400	0.367	92	18	25
Surrogate												
2-Bromonaphthalene	580-13-2	.193	121	.16	.203	127	40 - 140	.16	.2	125	NA	NA
2-Fluorobiphenyl	321-60-8	.187	117	.16	.213	133	40 - 140	.16	.207	129	NA	NA
o-Terphenyl	84-15-1	.14	88	.16	.131	82	40 - 140	.16	.144	90	NA	NA

Inorganics QC Summary

Analytical Batch	Client ID	MB719637		LCS719637				LCSD719637				
719934	Lab ID	2231713		2231715				2231714				
Prep Batch	Sample Type	MB		LCS				LCSD				
719637	Prep Date	08/25/21 07:30		08/25/21 07:30				08/25/21 07:30				
Prep Method	Analysis Date	08/27/21 09:46		08/27/21 09:53				08/27/21 09:48				
EPA 7470A	Matrix	Water		Water				Water				
EPA 7470A		Units Result	mg/L LOQ	Spike Added	Result	%R	Control Limits%R	Spike Added	Result	%R	RPD	RPD Limit
Mercury	7439-97-6	ND	0.00020	0.0050	0.0048	96	80 - 120	0.0050	0.0048	96	0	20

Analytical Batch	Client ID	MB719637		LCS719637				LCSD719637				
719934	Lab ID	2231713		2231715				2231714				
Prep Batch	Sample Type	MB		LCS				LCSD				
719637	Prep Date	08/25/21 07:30		08/25/21 07:30				08/25/21 07:30				
Prep Method	Analysis Date	08/27/21 09:46		08/27/21 09:53				08/27/21 09:48				
EPA 7470A	Matrix	Water		Water				Water				
EPA 7470A Dissolved		Units Result	mg/L LOQ	Spike Added	Result	%R	Control Limits%R	Spike Added	Result	%R	RPD	RPD Limit
Mercury	7439-97-6	ND	0.00020	0.0050	0.0048	96	80 - 120	0.0050	0.0048	96	0	20

Analytical Batch	Client ID	MB719635		LCS719635			
719806	Lab ID	2231708		2231709			
Prep Batch	Sample Type	MB		LCS			
719635	Prep Date	08/26/21 06:15		08/26/21 06:15			
Prep Method	Analysis Date	08/26/21 15:33		08/26/21 15:36			
EPA 3010A	Matrix	Water		Water			
EPA 6020B		Units Result	mg/L LOQ	Spike Added	Result	%R	Control Limits%R
Arsenic	7440-38-2	ND	0.0010	0.050	0.048	97	80 - 120
Barium	7440-39-3	ND	0.0010	0.050	0.050	100	80 - 120
Cadmium	7440-43-9	ND	0.0010	0.050	0.050	101	80 - 120
Calcium	7440-70-2	ND	0.50	25.0	24.1	96	80 - 120
Chromium	7440-47-3	ND	0.0010	0.050	0.050	100	80 - 120
Iron	7439-89-6	ND	0.10	5.00	4.93	99	80 - 120
Lead	7439-92-1	ND	0.0010	0.050	0.051	101	80 - 120
Magnesium	7439-95-4	ND	0.10	5.00	5.01	100	80 - 120
Manganese	7439-96-5	ND	0.0050	0.050	0.049	97	80 - 120
Potassium	7440-09-7	ND	0.10	5.00	4.81	96	80 - 120
Sodium	7440-23-5	ND	0.10	5.00	5.13	103	80 - 120
Strontium	7440-24-6	ND	0.0010	0.050	0.052	103	80 - 120
Zinc	7440-66-6	ND	0.020	1.00	0.99	99	80 - 120

Analytical Batch	Client ID	MB719414		LCS719414				LCSD719414				
719806	Lab ID	2230589		2230591				2230590				
Prep Batch	Sample Type	MB		LCS				LCSD				
719414	Prep Date	08/25/21 08:15		08/25/21 08:15				08/25/21 08:15				
Prep Method	Analysis Date	08/26/21 22:34		08/26/21 22:41				08/26/21 22:37				
EPA 3005A Dissolved	Matrix	Water		Water				Water				
EPA 6020B Dissolved		Units Result	mg/L LOQ	Spike Added	Result	%R	Control Limits%R	Spike Added	Result	%R	RPD	RPD Limit
Arsenic	7440-38-2	ND	0.0010	0.050	0.048	97	80 - 120	0.050	0.047	94	2	20
Barium	7440-39-3	ND	0.0010	0.050	0.048	95	80 - 120	0.050	0.048	97	0	20
Cadmium	7440-43-9	ND	0.0010	0.050	0.048	95	80 - 120	0.050	0.049	98	2	20
Chromium	7440-47-3	ND	0.0010	0.050	0.050	100	80 - 120	0.050	0.049	98	2	20
Iron	7439-89-6	ND	0.10	5.00	4.90	98	80 - 120	5.00	4.76	95	3	20
Lead	7439-92-1	ND	0.0010	0.050	0.048	97	80 - 120	0.050	0.050	100	4	20
Manganese	7439-96-5	ND	0.0050	0.050	0.048	95	80 - 120	0.050	0.047	94	2	20
Strontium	7440-24-6	ND	0.0010	0.050	0.051	101	80 - 120	0.050	0.051	103	0	20
Zinc	7440-66-6	ND	0.020	1.00	0.99	99	80 - 120	1.00	0.96	96	3	20

General Chemistry QC Summary

Analytical Batch	Client ID	MB720096		LCS720096				LCSD720096				
720096	Lab ID	2234141		2234142				2236982				
	Sample Type	MB		LCS				LCSD				
	Prep Date	NA		NA				NA				
	Analysis Date	09/10/21 03:07		09/10/21 02:48				09/10/21 14:35				
	Matrix	Water		Water				Water				
EPA 9056A		Units Result	mg/L LOQ	Spike Added	Result	%R	Control Limits%R	Spike Added	Result	%R	RPD	RPD Limit
Chloride	16887-00-6	ND	0.200	2.50	2.63	105	80 - 120	2.50	2.64	105	0	15
Sulfate	14808-79-8	ND	0.200	2.50	2.53	101	80 - 120	2.50	2.46	98	3	15

Analytical Batch	Client ID	MB719844	
719844	Lab ID	2232730	
	Sample Type	MB	
	Prep Date	NA	
	Analysis Date	08/26/21 19:20	
	Matrix	Water	
SM 2540 C-2011		Units Result	mg/L LOQ
Total Dissolved Solids(TDS)	WET-035	ND	10.0

Analytical Batch	Client ID	MW-2S		2232671DUP		
719844	Lab ID	22108267404		2232779		
	Sample Type	NE		DUP		
	Prep Date	NA		NA		
	Analysis Date	08/26/2021 19:20		08/26/21 19:20		
	Matrix	Water		Water		
SM 2540 C-2011		Units Result	mg/L LOQ	Result	RPD	RPD Limit
Total Dissolved Solids(TDS)	WET-035	835	10.0	818	2	5.4

Pace Analytical®

CHAIN-OF-CUSTODY Analytical Request Document

Chain-of-Custody is a LEGAL DOCUMENT - Complete all relevent fields

LAB USE ONLY- Affix Wo

ALL SHA

Client ID: 4271 - ERM-Baton Rouge
SDG: 221082468
PM: AMK

Company: ERM	Billing Information: same
Address: Houston, TX	
Report To: Shawn Wiggins	Email To:
Copy To:	Site Collection Info/Address:
Customer Project Name/Number: Henning - 05226033	State: / County/City: Time Zone Collected: [ ] PT [ ] MT [ ] CT [ ] ET
Phone: 971-303-2385 Email: shawn.wiggins@erm.com	Site/Facility ID #: Compliance Monitoring? [ ] Yes [ ] No
Collected By (print): Holly Midkiff	Purchase Order #: Quote #: DW PWS ID #: DW Location Code:
Collected By (Signature):	Turnaround Date Required: Immediately Packed on Ice: [✓] Yes [ ] No
Sample Disposal: [ ] Dispose as appropriate [ ] Return [ ] Archive: [ ] Hold:	Rush: [ ] Same Day [ ] Next Day [ ] 2 Day [ ] 3 Day [ ] 4 Day [ ] 5 Day (Expedite Charges Apply)
	Field Filtered (if applicable): [ ] Yes [ ] No Analysis:

** Preservative Types: (1) nitric acid, (2) sulfuric acid, (3) hydrochloric acid, (4) sodium hydroxide, (5) zinc acetate, (6) methanol, (7) sodium bisulfate, (8) sodium thiosulfate, (9) hexane, (A) ascorbic acid, (B) ammonium sulfate, (C) ammonium hydroxide, (D) TSP, (U) Unpreserved, (O) Other _____

* Matrix Codes (Insert in Matrix box below): Drinking Water (DW), Ground Water (GW), Wastewater (WW), Product (P), Soil/Solid (SL), Oil (OL), Wipe (WP), Air (AR), Tissue (TS), Bioassay (B), Vapor (V), Other (OT)

Customer Sample ID	Matrix *	Comp / Grab	Collected (or Composite Start) Date	Collected (or Composite Start) Time	Composite End Date	Composite End Time	Res Cl	# of Ctns	VOCs - BTEX	EPH	VPH	TDS/Cl/SO4/Alk	Diss. Metals	Tot Metals	Analyses	Lab Profile/Line:
H-34	GW	G	8/23/21	1055				10	/	/	/	/	/	/		1
H-32A	"	"	"	1200				10	/	/	/	/	/	/		2
H-32B	"	"	"	1350				10	/	/	/	/	/	/		3
H-33	"	"	"	1450				10	/	/	/	/	/	/		4

Lab Sample Receipt Checklist:

Custody Seals Present/Intact	Y N NA
Custody Signatures Present	Y N NA
Collector Signature Present	Y N NA
Bottles Intact	Y N NA
Correct Bottles	Y N NA
Sufficient Volume	Y N NA
Samples Received on Ice	Y N NA
VOA - Headspace Acceptable	Y N NA
USDA Regulated Soils	Y N NA
Samples in Holding Time	Y N NA
Residual Chlorine Present	Y N NA
Cl Strips: _____	
Sample pH Acceptable	Y N NA
pH Strips: _____	
Sulfide Present	Y N NA
Lead Acetate Strips: _____	

LAB USE ONLY:
Lab Sample # / Comments:

Customer Remarks / Special Conditions / Possible Hazards:
metals - As, Ba, Cd, Cr, Pb, Hg, Sr, Zn, Fe, Mn, Ca, Mg, K, Na
Diss - As, Ba, Cd, Cr, Pb, Hg, Sr, Zn, Fe, Mn
Anions - chloride, fluoride, sulfate, carbonate, Alk, Bi. carb

Type of Ice Used: Wet Blue Dry None

Packing Material Used:

Radchem sample(s) screened (<500 cpm): Y N NA

SHORT HOLDS PRESENT (<72 hours): Y N N/A

Lab Tracking #: 2639257

Samples received via: FEDEX UPS Client Courier Pace Courier

Lab Sample Temperature Info:
Temp Blank Received: Y N NA
Therm ID#: _____
Cooler 1 Temp Upon Receipt: _____oC
Cooler 1 Therm Corr. Factor: _____oC
Cooler 1 Corrected Temp: _____oC
Comments:
0.8E34 44cpm

Trip Blank Received: Y N NA
HCL MeOH TSP Other

Non Conformance(s): YES / NO

Page: _____ of: _____

Relinquished by/Company: (Signature) ERM	Date/Time: 8/24/21 1205	Received by/Company: (Signature) Mark Jenkins	Date/Time: 8/24/21 1205
Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:
Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:

MTJL LAB USE ONLY
Table #:
Acctnum:
Template:
Prelogin:
PM:
PB:

SAMPLE RECEIVING CHECKLIST

SAMPLE DELIVERY GROUP 221082468	
Client **PM** AMK 4271 - ERM-Baton Rouge	**Transport Method** COURIER
Profile Number 294127	**Received By** Jenkins, Mark A.
Line Item(s) 1 - Waters - BTEX	**Receive Date(s)** 08/24/21

CHECKLIST	YES	NO
Samples received with proper thermal preservation?	☑	☐
Radioactivity is <1600 cpm? If no, record cpm value in notes section.	☑	☐
COC relinquished and complete (including sampleIDs, collect times, and sampler)?	☑	☐
All containers received in good condition and within hold time?	☑	☐
All sample labels and containers received match the chain of custody?	☑	☐
Preservative added to any containers?	☐	☑
If received, was headspace for VOC water containers < 6mm?	☑	☐
Samples collected in containers provided by Pace Gulf Coast?	☑	☐

COOLERS

Airbill	Thermometer ID: E34	Temp °C
		0.8

DISCREPANCIES

None

LAB PRESERVATIONS

None

NOTES