eurofins | Environment Testing America

ANALYTICAL REPORT

Eurofins TestAmerica, St. Louis
13715 Rider Trail North
Earth City, MO 63045
Tel: (314)298-8566

Laboratory Job ID: 160-43030-1
Client Project/Site: CUF_SED_20210729_1B

For:
Environmental Standards Inc.
1140 Valley Forge Road
PO BOX 810
Valley Forge, Pennsylvania 19482-0810

Attn: Amanda Cover

Authorized for release by:
9/17/2021 1:21:36 PM

Jennifer Rumble, Project Manager I
(412)963-7058
Jennifer.Rumble@Eurofinset.com

LINKS

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www.eurofinsus.com/Env

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Job ID: 160-43030-1

Laboratory: Eurofins TestAmerica, St. Louis

Narrative

Job Narrative
160-43030-1

Receipt
The samples were received on 8/10/2021 8:45 AM. Unless otherwise noted below, the samples arrived in good condition. The temperature of the cooler at receipt was 26.6º C.

Receipt Exceptions
The following sample was received at the laboratory without a sample collection time documented on the chain of custody: CUF-SED-UT0.5-DUP01-20210729 (160-43030-3). The time was listed as N/A on the COC. We logged it as 12:00 a.m.

RAD
Method Fill_Geo-21: Gamma prep Batch 160-522665

Insufficient sample was provided for the following sample to fill a geometry (e.g. tuna can) calibrated for Ra-226 analysis by gamma spectroscopy: CUF-SED-UT0.5-CORCC-0.0/0.4-20210729 (160-43030-1). The use of a different geometry could potentially bias the results low due to the loss of radon into the headspace of the container.

Alt Geo used: 25mL Solid

Method Fill_Geo-21: Gamma Prep batch 160-522665
Insufficient samples were provided for the following samples to fill a geometry (e.g. tuna can) calibrated for Ra-226 analysis by gamma spectroscopy: CUF-SED-UT0.5-CORLB-0.0/0.3-20210729 (160-43030-2), CUF-SED-UT0.5-DUP01-20210729 (160-43030-3) and (160-43030-A-3-A DU). The use of a different geometry could potentially bias the results low due to the loss of radon into the headspace of the container.

Alt Geo used: 25mL D=1

Method 901.1: Gamma Prep Batch 160-522176

Many isotopes requested for analysis do not have any gamma emissions, or the gamma emissions they do have are very poor. Often, such analytes are reported by gamma spectrometry assuming secular equilibrium with a longer-lived parent. The client should ensure that such inference is acceptable for their sample based upon process knowledge. The following assumptions were made for this report:

Inferred from	Reported to Analyte
Ac-228	Ra-228
Bi-214	Ra-226

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative.

Radiochemistry sample results are reported with the count date/time applied as the Activity Reference Date.

CUF-SED-UT0.5-FB01-20210729 (160-43030-4), CUF-SED-UT0.5-EB01-20210729 (160-43030-5), CUF-SED-UT0.5-EB01-20210730 (160-43030-6), (LCS 160-522176/2-A), (MB 160-522176/1-A) and (160-43030-C-6-B DU)

Method 901.1: Gamma Prep Batch 160-522665
Results may be biased high for the following samples due to sample matrix preventing the sample from matching the calibrated density for the geometry: CUF-SED-UT0.5-CORLB-0.0/0.3-20210729 (160-43030-2), CUF-SED-UT0.5-DUP01-20210729 (160-43030-3) and (160-43030-A-3-C DU). A suitable calibrated geometry with density similar to the sample is not currently available; therefore, the reported results should be considered estimated.

Method 901.1: Gamma Prep Batch 160-522665
Many isotopes requested for analysis do not have any gamma emissions, or the gamma emissions they do have are very poor. Often,

Job ID: 160-43030-1 (Continued)

Laboratory: Eurofins TestAmerica, St. Louis (Continued)

such analytes are reported by gamma spectrometry assuming secular equilibrium with a longer-lived parent. The client should ensure that such inference is acceptable for their sample based upon process knowledge. The following assumptions were made for this report:

Inferred from	Reported to Analyte
Ac-228	Ra-228
Bi-214	Ra-226

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative.

Radiochemistry sample results are reported with the count date/time applied as the Activity Reference Date.
CUF-SED-UT0.5-CORCC-0.0/0.4-20210729 (160-43030-1), CUF-SED-UT0.5-CORLB-0.0/0.3-20210729 (160-43030-2), CUF-SED-UT0.5-DUP01-20210729 (160-43030-3), (LCS 160-522665/2-A), (MB 160-522665/1-A) and (160-43030-A-3-C DU)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

General Chemistry
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

TVA Environmental Investigations

Tennessee Valley Authority

Chain-of-Custody / Analytical Request Document

Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed and accurate

COOLER No.:	1 of 1
COC No:	CUF_SED_20210729_1B
1 of 1 Pages	
Task Desc:	CUF_SED

Required Ship to Lab:

Lab Name:	TestAmerica St. Louis
Lab Address:	13715 Rider Trail N Earth City, MO 63045

Lab Manager Contact Information

Lab PM:	Gail Lage
Phone/Fax:	615-301-5741/615-726-3404
Lab Email:	Gail.Lage@testamericainc.com

Required Project Information:

Site ID #:	CUMBERLAND FOSSIL PLANT		
Project #:	0777010		
Site Address	815 Cumberland City Road		
City	Cumberland City	State, Zip:	TN, 37763
Site PM Name:	Roy Quinn		
Phone/Fax:	423-751-3753		
Site PM Email:	jrquinn@tva.gov		

Required Sampler Information

Sampler: Tyler Baker			
Sampling Company: TVA			
Address: TVA Chickamauga Power Service Center, 4601 N. Access Road, 37415			
City/State: Chattanooga, TN 37415		Phone:	423-876-6733
Sampling Team Number:	1		
Send EDD/Hard Copy to:	tva_deliverables@envstd.com		

Analysis Turnaround Time

☐ CALENDAR DAYS ☑ WORKING DAYS

TAT if different from Below _____

☐ 24 Hours
☐ 3 Business Days
☐ 5 Business Days
☑ 10 Business Days (Standard)

ITEMS #	SAMPLE ID Samples IDs MUST BE UNIQUE	SAMPLE LOCATION	Sample Depth: Depth Unit	Sample Depth: Feet Start Depth	Sample Depth: Feet End Depth	MATRIX CODE	G= GRAB C=COMP	SAMPLE TYPE	SAMPLE DATE	SAMPLE TIME	# OF CONTAINERS	Comments/ Lab Sample I.D.	MS/MSD	Analysis: CUF_SEDIMENT_RAD	Analysis: CUF_SEDIMENT_BLANKS_RAD	Preserve	Filtered
1	CUF-SED-UT0 5-CORCC-0.0/0.4-20210729	SED-UT0.5		0.0	0.4	SED	C	N	7/29/2021	1235	1		☐	X			N
2	CUF-SED-UT0 5-CORLB-0.0/0.3-20210729	SED-UT0.5		0.0	0.3	SED	G	N	7/29/2021	1445	1		☐	X			N
3	CUF-SED-UT0.5-DUP01-20210729	SED-UT0.5		NA	NA	SED	N/A	FD	7/29/2021	N/A	1		☐	X			
4	CUF-SED-UT0 5-FB01-20210729	SED-UT0.5		NA	NA	AQ	G	FB	7/29/2021	1540	3		☐		X		
5	CUF-SED-UT0 5-EB01-20210729	SED-UT0.5		NA	NA	AQ	G	EB	7/29/2021	1545	3		☐		X		
6	CUF-SED-UT0 5-EB01-20210730	SED-UT0.5		NA	NA	AQ	G	EB	7/30/2021	1310	3		☐		X		
7													☐				
8													☐				
9													☐				
10													☐				
11													☐				
12													☐				
13													☐				

Tyler Baker 8-9-21

Additional Comments/Special Instructions:

160-43030 Chain of Custody

Custody Seal 510380

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
Tyler Baker / TVA Fed Ex	8-9-21	0612	Fed Ex		
			Michia Kemmling / MICHIA KEMMLING ETA SR	8/10/21	08:45

SHIPPING METHOD	SAMPLER NAME AND SIGNATURE
Fedex	Tyler Baker Tyler Baker

Sample Receipt Conditions			
☐Yes ☐No	☐Yes ☐No	☐Yes ☐No	☐Yes ☐No
☐Yes ☐No	☐Yes ☐No	☐Yes ☐No	☐Yes ☐No
☐Yes ☐No	☐Yes ☐No	☐Yes ☐No	☐Yes ☐No
☐Yes ☐No	☐Yes ☐No	☐Yes ☐No	☐Yes ☐No
Temperature in °C	Sample on Ice?	Sample Intact?	Trip Blank?

Form TVA 30067A

TVA Environmental Investigations

Tennessee Valley Authority

Chain-of-Custody / Analytical Request Document

Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed and accurate

COOLER No.:	1	of	1
COC No:	CUF_SED_20210729_1B		
1 of 1 Pages	[redacted]		
Task Desc:	CUF_SED		

Rev_01 tfbaker 081721

9/17/2021

Required Ship to Lab:

Lab Name	TestAmerica St. Louis
Lab Address:	13715 Rider Trail N Earth City, MO 63045

Lab Manager Contact Information

Lab PM:	Gail Lage
Phone/Fax:	615-301-5741/615-726-3404
Lab Email:	Gail.Lage@testamericainc.com

Required Project Information:

Site ID #:	CUMBERLAND FOSSIL PLANT		
Project #:	0777010		
Site Address	815 Cumberland City Road		
City	Cumberland City	State, Zip:	TN 37763
Site PM Name:	Roy Quinn		
Phone/Fax:	423-751-3753		
Site PM Email:	jrquinn@tva.gov		

Required Sampler Information

Sampler: Tyler Baker			
Sampling Company: TVA			
Address: TVA Chickamauga Power Service Center, 4601 N. Access Road, 37415			
City/State: Chattanooga, TN 37415		Phone:	423-876-6733
Sampling Team Number:	1		
Send EDD/Hard Copy to:	tva_deliverables@envsld.com		

Analysis Turnaround Time

☐ CALENDAR DAYS ☑ WORKING DAYS

TAT if different from Below _____

☐ 24 Hours
☐ 3 Business Days
☐ 5 Business Days
☑ 10 Business Days (Standard)

ITEMS #	SAMPLE ID Samples IDs MUST BE UNIQUE	SAMPLE LOCATION	Sample Depth: Depth Unit: Start Depth (Feet)	Sample Depth: Depth Unit: End Depth (Feet)	MATRIX CODE	G= GRAB C=COMP	SAMPLE TYPE	SAMPLE DATE	SAMPLE TIME	# OF CONTAINERS	Comments/ Lab Sample I.D.	MS/MSD	Analysis: CUF_SEDIMENT_RAD	Analysis: CUF_SEDIMENT_BLANKS_RAD	Filtered	Preserve
1	CUF-SED-UT0 5-CORCC-0 0/0 4-20210729	SED-UT0 5	0.0	0.4	SED	C	N	7/29/2021	1235	1		☐	X		N	
2	CUF-SED-UT0 5-CORLB-0 0/0 3-20210729	SED-UT0.5	0.0	0.3	SED	G	N	7/29/2021	1445	1		☐	X		N	
3	CUF-SED-UT0 5-DUP01-20210729	SED-UT0.5	NA	NA	SED	N/A	FD	7/29/2021	N/A	1		☐	X			
4	CUF-SED-UT0 5-FB01-20210729	SED-UT0.5	NA	NA	AQ	G	FB	7/29/2021	1540	3		☐		X		
5	CUF-SED-UT0 5-EB01-20210729	SED-UT0.5	NA	NA	AQ	G	EB	7/29/2021	1545	3		☐		X		
6	CUF-SED-UT0 5-EB01-20210730	SED-UT0.5	NA	NA	AQ	G	EB	7/30/2021	1310	3		☐		X		
7												☐				
8												☐				
9												☐				
10												☐				
11												☐				
12												☐				
13												☐				

Comp, tfb 081721

Tyler Baker 8-9-21

Additional Comments/Special Instructions:

160-43030 Chain of Custody

Custody Seal 510380

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
Tyler Baker / TVA FedEx	8-9-21	0812	FedEx MICHAEL KERNIKLIN / MICHAEL KERNIKLIN ETA SL	8/10/21	08:45

SHIPPING METHOD	SAMPLER NAME AND SIGNATURE
Fedex	Tyler Baker Tyler Baker

Sample Receipt Conditions

Temperature in °C	Sample on Ice?	Sample Intact?	Trip Blank?
☐Yes ☐No	☐Yes ☐No	☐Yes ☐No	☐Yes ☐No
☐Yes ☐No	☐Yes ☐No	☐Yes ☐No	☐Yes ☐No
☐Yes ☐No	☐Yes ☐No	☐Yes ☐No	☐Yes ☐No
☐Yes ☐No	☐Yes ☐No	☐Yes ☐No	☐Yes ☐No
☐Yes ☐No	☐Yes ☐No	☐Yes ☐No	☐Yes ☐No

Form TVA 30067A

Login Sample Receipt Checklist

Client: Environmental Standards Inc.

Job Number: 160-43030-1

Login Number: 43030
List Number: 1
Creator: Worthington, Sierra M

List Source: Eurofins TestAmerica, St. Louis

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

Definitions/Glossary

Client: Environmental Standards Inc.
Project/Site: CUF_SED_20210729_1B

Job ID: 160-43030-1

Qualifiers

Rad

Qualifier	Qualifier Description
U	Result is less than the sample detection limit.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Method Summary

Client: Environmental Standards Inc.
Project/Site: CUF_SED_20210729_1B

Job ID: 160-43030-1

Method	Method Description	Protocol	Laboratory
Moisture	Percent Moisture	EPA	TAL SL
901.1	Radium-226 & Other Gamma Emitters (GS)	EPA	TAL SL
Dry and Grind	Preparation, Dry and Grind	None	TAL SL
Fill_Geo-21	Fill Geometry, 21-Day In-Growth	None	TAL SL

Protocol References:

EPA = US Environmental Protection Agency
None = None

Laboratory References:

TAL SL = Eurofins TestAmerica, St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Sample Summary

Client: Environmental Standards Inc.
Project/Site: CUF_SED_20210729_1B

Job ID: 160-43030-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
160-43030-1	CUF-SED-UT0.5-CORCC-0.0/0.4-20210729	Solid	07/29/21 12:35	08/10/21 08:45
160-43030-2	CUF-SED-UT0.5-CORLB-0.0/0.3-20210729	Solid	07/29/21 14:45	08/10/21 08:45
160-43030-3	CUF-SED-UT0.5-DUP01-20210729	Solid	07/29/21 00:00	08/10/21 08:45
160-43030-4	CUF-SED-UT0.5-FB01-20210729	Water	07/29/21 15:40	08/10/21 08:45
160-43030-5	CUF-SED-UT0.5-EB01-20210729	Water	07/29/21 15:45	08/10/21 08:45
160-43030-6	CUF-SED-UT0.5-EB01-20210730	Water	07/30/21 13:10	08/10/21 08:45

Detection Summary

Client: Environmental Standards Inc.
Project/Site: CUF_SED_20210729_1B

Job ID: 160-43030-1

Client Sample ID: CUF-SED-UT0.5-CORCC-0.0/0.4-20210729 — Lab Sample ID: 160-43030-1

No Detections.

Client Sample ID: CUF-SED-UT0.5-CORLB-0.0/0.3-20210729 — Lab Sample ID: 160-43030-2

No Detections.

Client Sample ID: CUF-SED-UT0.5-DUP01-20210729 — Lab Sample ID: 160-43030-3

No Detections.

Client Sample ID: CUF-SED-UT0.5-FB01-20210729 — Lab Sample ID: 160-43030-4

No Detections.

Client Sample ID: CUF-SED-UT0.5-EB01-20210729 — Lab Sample ID: 160-43030-5

No Detections.

Client Sample ID: CUF-SED-UT0.5-EB01-20210730 — Lab Sample ID: 160-43030-6

No Detections.

This Detection Summary does not include radiochemical test results.

Client Sample Results

Client: Environmental Standards Inc.
Project/Site: CUF_SED_20210729_1B

Job ID: 160-43030-1

Client Sample ID: CUF-SED-UT0.5-CORCC-0.0/0.4-20210729 — Lab Sample ID: 160-43030-1

Date Collected: 07/29/21 12:35 — **Matrix: Solid**
Date Received: 08/10/21 08:45

Method: 901.1 - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium 226 and 228 (positive only)	2.64		0.503	0.538		0.318	pCi/g	08/13/21 15:05	09/15/21 22:31	1
Radium-226	1.17		0.321	0.342	1.00	0.318	pCi/g	08/13/21 15:05	09/15/21 22:31	1
Radium-228	1.47		0.387	0.415		0.302	pCi/g	08/13/21 15:05	09/15/21 22:31	1

Client Sample ID: CUF-SED-UT0.5-CORLB-0.0/0.3-20210729 — Lab Sample ID: 160-43030-2

Date Collected: 07/29/21 14:45 — **Matrix: Solid**
Date Received: 08/10/21 08:45

Method: 901.1 - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium 226 and 228 (positive only)	2.48		0.587	0.615		0.554	pCi/g	08/13/21 15:05	09/15/21 22:30	1
Radium-226	1.13		0.366	0.385	1.00	0.452	pCi/g	08/13/21 15:05	09/15/21 22:30	1
Radium-228	1.35		0.459	0.479		0.554	pCi/g	08/13/21 15:05	09/15/21 22:30	1

Client Sample ID: CUF-SED-UT0.5-DUP01-20210729 — Lab Sample ID: 160-43030-3

Date Collected: 07/29/21 00:00 — **Matrix: Solid**
Date Received: 08/10/21 08:45

Method: 901.1 - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium 226 and 228 (positive only)	2.63		0.963	0.985		1.00	pCi/g	08/13/21 15:05	09/14/21 23:54	1
Radium-226	1.73		0.548	0.577	1.00	0.553	pCi/g	08/13/21 15:05	09/14/21 23:54	1
Radium-228	0.902	U	0.792	0.798		1.00	pCi/g	08/13/21 15:05	09/14/21 23:54	1

Client Sample ID: CUF-SED-UT0.5-FB01-20210729 — Lab Sample ID: 160-43030-4

Date Collected: 07/29/21 15:40 — **Matrix: Water**
Date Received: 08/10/21 08:45

Method: 901.1 - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium 226 and 228 (positive only)	50.8		34.1	34.3		35.0	pCi/L	08/11/21 15:54	09/14/21 09:27	1
Radium-226	32.9		19.4	19.7	50.0	20.9	pCi/L	08/11/21 15:54	09/14/21 09:27	1
Radium-228	17.9	U	28.1	28.1	50.0	35.0	pCi/L	08/11/21 15:54	09/14/21 09:27	1

Client Sample Results

Client: Environmental Standards Inc.
Project/Site: CUF_SED_20210729_1B

Job ID: 160-43030-1

Client Sample ID: CUF-SED-UT0.5-EB01-20210729

Lab Sample ID: 160-43030-5

Date Collected: 07/29/21 15:45
Date Received: 08/10/21 08:45

Matrix: Water

Method: 901.1 - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium 226 and 228 (positive only)	40.6	U	23.2	23.5		44.9	pCi/L	08/11/21 15:54	09/14/21 11:39	1
Radium-226	15.4	U	6.42	6.67	50.0	44.9	pCi/L	08/11/21 15:54	09/14/21 11:39	1
Radium-228	**25.2**		22.3	22.5	50.0	24.0	pCi/L	08/11/21 15:54	09/14/21 11:39	1

Client Sample ID: CUF-SED-UT0.5-EB01-20210730

Lab Sample ID: 160-43030-6

Date Collected: 07/30/21 13:10
Date Received: 08/10/21 08:45

Matrix: Water

Method: 901.1 - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium 226 and 228 (positive only)	**27.6**		29.0	29.0		27.2	pCi/L	08/11/21 15:54	09/16/21 07:04	1
Radium-226	13.7	U	16.1	16.2	50.0	20.2	pCi/L	08/11/21 15:54	09/16/21 07:04	1
Radium-228	13.9	U	24.1	24.1	50.0	27.2	pCi/L	08/11/21 15:54	09/16/21 07:04	1

QC Sample Results

Client: Environmental Standards Inc.
Project/Site: CUF_SED_20210729_1B

Job ID: 160-43030-1

Method: 901.1 - Radium-226 & Other Gamma Emitters (GS)

Lab Sample ID: MB 160-522176/1-A — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 526599 — **Prep Batch: 522176**

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium 226 and 228 (positive only)	14.70	U	34.8	34.9		42.7	pCi/L	08/11/21 15:54	09/13/21 15:13	1
Radium-226	-17.32	U	23.8	23.9	50.0	42.7	pCi/L	08/11/21 15:54	09/13/21 15:13	1
Radium-228	14.70	U	25.4	25.4	50.0	30.1	pCi/L	08/11/21 15:54	09/13/21 15:13	1

Lab Sample ID: LCS 160-522176/2-A — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 526429 — **Prep Batch: 522176**

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits
Americium-241	135000	129600		15200		424	pCi/L	96	86 - 111
Cesium-137	42300	42180		4970		135	pCi/L	100	90 - 110
Cobalt-60	21800	21760		2570		113	pCi/L	100	89 - 110

Lab Sample ID: 160-43030-6 DU — **Client Sample ID: CUF-SED-UT0.5-EB01-20210730**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 527252 — **Prep Batch: 522176**

Analyte	Sample Result	Sample Qual	DU Result	DU Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	RER	RER Limit
Radium 226 and 228 (positive only)	27.6		14.21	U	25.7		31.5	pCi/L	0.24	
Radium-226	13.7	U	-3.799	U	18.6	50.0	31.5	pCi/L	0.50	1
Radium-228	13.9	U	14.21	U	17.7	50.0	21.4	pCi/L	0.01	1

Lab Sample ID: MB 160-522665/1-A — **Client Sample ID: Method Blank**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 526856 — **Prep Batch: 522665**

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium 226 and 228 (positive only)	0.2804	U	0.671	0.674		0.796	pCi/g	08/13/21 15:05	09/14/21 23:53	1
Radium-226	-0.3861	U	0.491	0.493	1.00	0.796	pCi/g	08/13/21 15:05	09/14/21 23:53	1
Radium-228	0.2804	U	0.458	0.459		0.479	pCi/g	08/13/21 15:05	09/14/21 23:53	1

Lab Sample ID: LCS 160-522665/2-A — **Client Sample ID: Lab Control Sample**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 527256 — **Prep Batch: 522665**

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits
Americium-241	99.8	96.83		10.2		0.595	pCi/g	97	87 - 116
Cesium-137	30.0	29.81		3.09		0.153	pCi/g	99	87 - 120
Cobalt-60	15.5	14.57		1.53		0.0946	pCi/g	94	87 - 115

Method: 901.1 - Radium-226 & Other Gamma Emitters (GS) (Continued)

Lab Sample ID: 160-43030-3 DU
Matrix: Solid
Analysis Batch: 527052

Client Sample ID: CUF-SED-UT0.5-DUP01-20210729
Prep Type: Total/NA
Prep Batch: 522665

Analyte	Sample Result	Sample Qual		DU Result	DU Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit			RER	RER Limit
Radium 226 and 228 (positive only)	2.63			3.250		0.885		0.696	pCi/g			0.33	
Radium-226	1.73			1.382		0.455	1.00	0.551	pCi/g			0.34	1
Radium-228	0.902	U		1.868		0.759		0.696	pCi/g			0.62	1

QC Association Summary

Client: Environmental Standards Inc.
Project/Site: CUF_SED_20210729_1B

Job ID: 160-43030-1

General Chemistry

Analysis Batch: 521991

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-43030-1	CUF-SED-UT0.5-CORCC-0.0/0.4-20210729	Total/NA	Solid	Moisture	
160-43030-2	CUF-SED-UT0.5-CORLB-0.0/0.3-20210729	Total/NA	Solid	Moisture	
160-43030-3	CUF-SED-UT0.5-DUP01-20210729	Total/NA	Solid	Moisture	
280-151468-A-6 DU	Duplicate	Total/NA	Solid	Moisture	

Rad

Prep Batch: 522176

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-43030-4	CUF-SED-UT0.5-FB01-20210729	Total/NA	Water	Fill_Geo-21	
160-43030-5	CUF-SED-UT0.5-EB01-20210729	Total/NA	Water	Fill_Geo-21	
160-43030-6	CUF-SED-UT0.5-EB01-20210730	Total/NA	Water	Fill_Geo-21	
MB 160-522176/1-A	Method Blank	Total/NA	Water	Fill_Geo-21	
LCS 160-522176/2-A	Lab Control Sample	Total/NA	Water	Fill_Geo-21	
160-43030-6 DU	CUF-SED-UT0.5-EB01-20210730	Total/NA	Water	Fill_Geo-21	

Leach Batch: 522177

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-43030-1	CUF-SED-UT0.5-CORCC-0.0/0.4-20210729	Total/NA	Solid	Dry and Grind	
160-43030-2	CUF-SED-UT0.5-CORLB-0.0/0.3-20210729	Total/NA	Solid	Dry and Grind	
160-43030-3	CUF-SED-UT0.5-DUP01-20210729	Total/NA	Solid	Dry and Grind	
160-43030-3 DU	CUF-SED-UT0.5-DUP01-20210729	Total/NA	Solid	Dry and Grind	

Prep Batch: 522665

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-43030-1	CUF-SED-UT0.5-CORCC-0.0/0.4-20210729	Total/NA	Solid	Fill_Geo-21	522177
160-43030-2	CUF-SED-UT0.5-CORLB-0.0/0.3-20210729	Total/NA	Solid	Fill_Geo-21	522177
160-43030-3	CUF-SED-UT0.5-DUP01-20210729	Total/NA	Solid	Fill_Geo-21	522177
MB 160-522665/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-522665/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	
160-43030-3 DU	CUF-SED-UT0.5-DUP01-20210729	Total/NA	Solid	Fill_Geo-21	522177