eurofins | Environment Testing TestAmerica

ANALYTICAL REPORT

Eurofins TestAmerica, Pittsburgh
301 Alpha Drive
RIDC Park
Pittsburgh, PA 15238
Tel: (412)963-7058

Laboratory Job ID: 180-95123-1
Client Project/Site: TVA CUF EIP - Stantec

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

Attn: Jennifer N. Gable

Authorized for release by:
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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.

PA Lab ID: 02-00416

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Job ID: 180-95123-1

Laboratory: Eurofins TestAmerica, Pittsburgh

Narrative

Job Narrative
180-95123-1

Receipt
The samples were received on 9/4/2019 9:00 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 20.1º C.

RAD
Method 901.1: Gamma Prep Batch 160-442539
The detection goal was not met for the following sample due to insufficient sample available for analysis: See prep NCM 160-177174CUF-SED-UT02-CORRB-0.0/0.5-20190821 ~ SED-UT02 (180-95123-6). Analytical results are reported with the detection limit achieved.

Method 901.1: Gamma Prep Batch 160-177174
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-UT03-CORCC-0.0/0.5-20190821 ~ SED-UT03 (180-95123-2), CUF-SED-UT03-CORLB-0.0/0.5-20190821 ~ SED-UT03 (180-95123-4), CUF-SED-UT02-CORCC-0.0/0.5-20190821 ~ SED-UT02 (180-95123-5), CUF-SED-UT02-CORRB-0.0/0.5-20190821 ~ SED-UT02 (180-95123-6), CUF-SED-UT01-CORRB-0.0/0.5-20190821 ~ SED-UT01 (180-95123-8), CUF-SED-UT01-CORLB-0.0/0.5-20190821 ~ SED-UT01 (180-95123-9), CUF-SED-UT01-CORCC-0.0/0.5-20190821 ~ SED-UT01 (180-95123-10), CUF-SED-UT01.5-CORCC-0.0/0.5-20190821 ~ SED-UT01 (180-95123-11), CUF-SED-UT01-DUP01-20190821 ~ NA (180-95123-12), (LCS 160-442539/2-A), (MB 160-442539/1-A) and (180-95123-A-12-D 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.

Method 901.1: Gamma Prep Batch 160-442539
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.

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

CUF-SED-UT03-CORCC-0.0/0.5-20190821 ~ SED-UT03 (180-95123-2), CUF-SED-UT03-CORLB-0.0/0.5-20190821 ~ SED-UT03 (180-95123-4), CUF-SED-UT02-CORCC-0.0/0.5-20190821 ~ SED-UT02 (180-95123-5), CUF-SED-UT02-CORRB-0.0/0.5-20190821 ~ SED-UT02 (180-95123-6), CUF-SED-UT01-CORRB-0.0/0.5-20190821 ~ SED-UT01 (180-95123-8), CUF-SED-UT01-CORLB-0.0/0.5-20190821 ~ SED-UT01 (180-95123-9), CUF-SED-UT01.5-CORCC-0.0/0.5-20190821 ~ SED-UT01 (180-95123-11), CUF-SED-UT01-DUP01-20190821 ~ NA (180-95123-12) and (180-95123-A-12-D DU)

Method 901.1: Gamma Prep Batch 160-442584
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.

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

CUF-SED-UT02-EB01-20190821 ~ NA (180-95123-1), (LCS 160-442584/2-A), (MB 160-442584/1-A) and (180-95123-A-1-B DU)

Job ID: 180-95123-1 (Continued)

Laboratory: Eurofins TestAmerica, Pittsburgh (Continued)

Method Fill_Geo-21: Gamma Prep Batch 160-442539: Insufficient samples were provided for the following samples to fit the geometry: CUF-SED-UT03-CORCC-0.0/0.5-20190821 ~ SED-UT03 (180-95123-2), CUF-SED-UT03-CORLB-0.0/0.5-20190821 ~ SED-UT03 (180-95123-4), CUF-SED-UT02-CORCC-0.0/0.5-20190821 ~ SED-UT02 (180-95123-5), CUF-SED-UT02-CORRB-0.0/0.5-20190821 ~ SED-UT02 (180-95123-6), CUF-SED-UT01-CORRB-0.0/0.5-20190821 ~ SED-UT01 (180-95123-8), CUF-SED-UT01-CORLB-0.0/0.5-20190821 ~ SED-UT01 (180-95123-9), CUF-SED-UT01-CORCC-0.0/0.5-20190821 ~ SED-UT01 (180-95123-10), CUF-SED-UT01.5-CORCC-0.0/0.5-20190821 ~ SED-UT01 (180-95123-11), CUF-SED-UT01-DUP01-20190821 ~ NA (180-95123-12) and (180-95123-A-12-A DU).

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

Definitions/Glossary

Client: Environmental Standards Inc.
Project/Site: TVA CUF EIP - Stantec

Job ID: 180-95123-1

Qualifiers

Rad

Qualifier	Qualifier Description
G	The Sample MDC is greater than the requested RL.
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
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)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
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)

Accreditation/Certification Summary

Client: Environmental Standards Inc.
Project/Site: TVA CUF EIP - Stantec

Job ID: 180-95123-1

Laboratory: Eurofins TestAmerica, Pittsburgh

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Arkansas DEQ	State	19-033-0	06-27-20
California	State	2891	04-30-20
Connecticut	State	PH-0688	09-30-20
Florida	NELAP	E871008	06-30-20
Georgia	State	PA 02-00416	04-30-20
Illinois	NELAP	004375	06-30-20
Kansas	NELAP	E-10350	03-31-20
Kentucky (UST)	State	162013	04-30-20
Kentucky (WW)	State	KY98043	12-31-19
Louisiana	NELAP	04041	06-30-20
Minnesota	NELAP	042-999-482	12-31-19
Nevada	State	PA00164	07-31-20
New Hampshire	NELAP	2030	04-04-20
New Hampshire	NELAP	2030	04-04-20
New Jersey	NELAP	PA005	06-30-20
New York	NELAP	11182	04-01-20
North Carolina (WW/SW)	State	434	12-31-19
North Dakota	State	R-227	04-30-20
Oregon	NELAP	PA-2151	02-06-20
Pennsylvania	NELAP	02-00416	04-30-20
Rhode Island	State	LAO00362	12-30-19
South Carolina	State	89014	04-30-20
Texas	NELAP	T104704528	03-31-20
US Fish & Wildlife	US Federal Programs	058448	07-31-20
USDA	Federal	P-Soil-01	06-26-22
USDA	US Federal Programs	P330-16-00211	06-26-22
Utah	NELAP	PA001462019-8	05-31-20
Virginia	NELAP	10043	09-15-20
West Virginia DEP	State	142	01-31-20
Wisconsin	State	998027800	08-31-20

Accreditation/Certification Summary

Client: Environmental Standards Inc.
Project/Site: TVA CUF EIP - Stantec

Job ID: 180-95123-1

Laboratory: Eurofins TestAmerica, St. Louis

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	Identification Number	Expiration Date
ANAB	Dept. of Defense ELAP	L2305	04-06-22
ANAB	Dept. of Energy	L2305.01	04-06-22
ANAB	ISO/IEC 17025	L2305	04-06-22
Arizona	State	AZ0813	12-08-19
California	Los Angeles County Sanitation Districts	10259	06-30-20
California	State	2886	06-30-20
Connecticut	State	PH-0241	03-31-21
HI - RadChem Recognition	State	n/a	06-30-20
Illinois	NELAP	004553	11-30-19
Iowa	State Program	373	12-01-20
Kansas	NELAP	E-10236	10-31-19 *
Kentucky (DW)	State	KY90125	12-31-19
Louisiana	NELAP	04080	06-30-20
Louisiana (DW)	State	LA011	12-31-19
Maryland	State	310	09-30-20
MI - RadChem Recognition	State	9005	06-30-20
Missouri	State	780	06-30-22
Nevada	State	MO000542020-1	07-31-20
New Jersey	NELAP	MO002	06-30-20
New York	NELAP	11616	04-01-20
North Dakota	State	R-207	06-30-20
NRC	NRC	24-24817-01	12-31-22
Oklahoma	State	9997	08-31-20
Pennsylvania	NELAP	68-00540	02-28-20
South Carolina	State	85002001	06-30-20
Texas	NELAP	T104704193-19-13	07-31-20
US Fish & Wildlife	US Federal Programs	058448	07-31-20
USDA	US Federal Programs	P330-17-00028	02-02-20
Utah	NELAP	MO000542019-11	07-31-20
Virginia	NELAP	10310	06-14-20
Washington	State	C592	08-30-20
Washington	State Program	C592	08-30-19 *
West Virginia DEP	State Program	381	10-31-19 *

* Accreditation/Certification renewal pending - accreditation/certification considered valid.

Sample Summary

Client: Environmental Standards Inc.
Project/Site: TVA CUF EIP - Stantec

Job ID: 180-95123-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
180-95123-1	CUF-SED-UT02-EB01-20190821 ~ NA	Water	08/21/19 17:00	09/04/19 09:00	
180-95123-2	CUF-SED-UT03-CORCC-0.0/0.5-20190821 ~ SED-UT03	Solid	08/21/19 15:10	09/04/19 09:00	
180-95123-4	CUF-SED-UT03-CORLB-0.0/0.5-20190821 ~ SED-UT03	Solid	08/21/19 15:25	09/04/19 09:00	
180-95123-5	CUF-SED-UT02-CORCC-0.0/0.5-20190821 ~ SED-UT02	Solid	08/21/19 15:45	09/04/19 09:00	
180-95123-6	CUF-SED-UT02-CORRB-0.0/0.5-20190821 ~ SED-UT02	Solid	08/21/19 16:15	09/04/19 09:00	
180-95123-8	CUF-SED-UT01-CORRB-0.0/0.5-20190821 ~ SED-UT01	Solid	08/21/19 16:50	09/04/19 09:00	
180-95123-9	CUF-SED-UT01-CORLB-0.0/0.5-20190821 ~ SED-UT01	Solid	08/21/19 17:10	09/04/19 09:00	
180-95123-10	CUF-SED-UT01-CORCC-0.0/0.5-20190821 ~ SED-UT01	Solid	08/21/19 17:00	09/04/19 09:00	
180-95123-11	CUF-SED-UT01.5-CORCC-0.0/0.5-20190821 ~ SED-UT01	Solid	08/21/19 17:20	09/04/19 09:00	
180-95123-12	CUF-SED-UT01-DUP01-20190821 ~ NA	Solid	08/21/19 00:00	09/04/19 09:00	

Method Summary

Client: Environmental Standards Inc.
Project/Site: TVA CUF EIP - Stantec

Job ID: 180-95123-1

Method	Method Description	Protocol	Laboratory
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

Lab Chronicle

Client: Environmental Standards Inc.
Project/Site: TVA CUF EIP - Stantec

Job ID: 180-95123-1

Client Sample ID: CUF-SED-UT02-EB01-20190821 ~ NA — Lab Sample ID: 180-95123-1

Date Collected: 08/21/19 17:00 — **Matrix: Water**
Date Received: 09/04/19 09:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	Fill_Geo-21			1000 mL	1.0 g	442584	09/11/19 00:36	KPP	TAL SL
Total/NA	Analysis	901.1		1			445237	10/07/19 11:27	KLS	TAL SL
	Instrument ID:	GAMMAVISION								

Client Sample ID: CUF-SED-UT03-CORCC-0.0/0.5-20190821 ~ SED-UT03 — Lab Sample ID: 180-95123-2

Date Collected: 08/21/19 15:10 — **Matrix: Solid**
Date Received: 09/04/19 09:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Leach	Dry and Grind			1.0 g	1.0 g	442163	09/09/19 01:13	SJS	TAL SL
Total/NA	Prep	Fill_Geo-21			124.4 g	1.0 g	442539	09/10/19 12:12	KRS	TAL SL
Total/NA	Analysis	901.1		1			444933	10/03/19 19:07	KLS	TAL SL
	Instrument ID:	GAMMAVISION								

Client Sample ID: CUF-SED-UT03-CORLB-0.0/0.5-20190821 ~ SED-UT03 — Lab Sample ID: 180-95123-4

Date Collected: 08/21/19 15:25 — **Matrix: Solid**
Date Received: 09/04/19 09:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Leach	Dry and Grind			1.0 g	1.0 g	442163	09/09/19 01:13	SJS	TAL SL
Total/NA	Prep	Fill_Geo-21			23 g	1.0 g	442539	09/10/19 12:12	KRS	TAL SL
Total/NA	Analysis	901.1		1			445971	10/12/19 10:49	KLS	TAL SL
	Instrument ID:	GAMMAVISION								

Client Sample ID: CUF-SED-UT02-CORCC-0.0/0.5-20190821 ~ SED-UT02 — Lab Sample ID: 180-95123-5

Date Collected: 08/21/19 15:45 — **Matrix: Solid**
Date Received: 09/04/19 09:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Leach	Dry and Grind			1.0 g	1.0 g	442163	09/09/19 01:13	SJS	TAL SL
Total/NA	Prep	Fill_Geo-21			22.1 g	1.0 g	442539	09/10/19 12:12	KRS	TAL SL
Total/NA	Analysis	901.1		1			445971	10/12/19 13:12	KLS	TAL SL
	Instrument ID:	GAMMAVISION								

Lab Chronicle

Client: Environmental Standards Inc.
Project/Site: TVA CUF EIP - Stantec

Job ID: 180-95123-1

Client Sample ID: CUF-SED-UT02-CORRB-0.0/0.5-20190821 ~ SED-UT02 — Lab Sample ID: 180-95123-6

Date Collected: 08/21/19 16:15 — **Matrix: Solid**
Date Received: 09/04/19 09:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Leach	Dry and Grind			1.0 g	1.0 g	442163	09/09/19 01:13	SJS	TAL SL
Total/NA	Prep	Fill_Geo-21			75.9 g	1.0 g	442539	09/10/19 12:12	KRS	TAL SL
Total/NA	Analysis	901.1		1			444934	10/03/19 22:40	KLS	TAL SL
	Instrument ID:	GAMMAVISION								

Client Sample ID: CUF-SED-UT01-CORRB-0.0/0.5-20190821 ~ SED-UT01 — Lab Sample ID: 180-95123-8

Date Collected: 08/21/19 16:50 — **Matrix: Solid**
Date Received: 09/04/19 09:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Leach	Dry and Grind			1.0 g	1.0 g	442163	09/09/19 01:13	SJS	TAL SL
Total/NA	Prep	Fill_Geo-21			79.4 g	1.0 g	442539	09/10/19 12:12	KRS	TAL SL
Total/NA	Analysis	901.1		1			444935	10/03/19 22:41	KLS	TAL SL
	Instrument ID:	GAMMAVISION								

Client Sample ID: CUF-SED-UT01-CORLB-0.0/0.5-20190821 ~ SED-UT01 — Lab Sample ID: 180-95123-9

Date Collected: 08/21/19 17:10 — **Matrix: Solid**
Date Received: 09/04/19 09:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Leach	Dry and Grind			1.0 g	1.0 g	442163	09/09/19 01:13	SJS	TAL SL
Total/NA	Prep	Fill_Geo-21			31.1000 g	1.0 g	442539	09/10/19 12:12	KRS	TAL SL
Total/NA	Analysis	901.1		1			444933	10/03/19 20:31	KLS	TAL SL
	Instrument ID:	GAMMAVISION								

Client Sample ID: CUF-SED-UT01-CORCC-0.0/0.5-20190821 ~ SED-UT01 — Lab Sample ID: 180-95123-10

Date Collected: 08/21/19 17:00 — **Matrix: Solid**
Date Received: 09/04/19 09:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Leach	Dry and Grind			1.0 g	1.0 g	442163	09/09/19 01:13	SJS	TAL SL
Total/NA	Prep	Fill_Geo-21			74.1 g	1.0 g	442539	09/10/19 12:12	KRS	TAL SL
Total/NA	Analysis	901.1		1			445362	10/08/19 23:11	KLS	TAL SL
	Instrument ID:	GAMMAVISION								

Lab Chronicle

Client: Environmental Standards Inc.
Project/Site: TVA CUF EIP - Stantec

Job ID: 180-95123-1

Client Sample ID: CUF-SED-UT01.5-CORCC-0.0/0.5-20190821 ~ SED-UT01

Lab Sample ID: 180-95123-11

Date Collected: 08/21/19 17:20
Date Received: 09/04/19 09:00

Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Leach	Dry and Grind			1.0 g	1.0 g	442163	09/09/19 01:13	SJS	TAL SL
Total/NA	Prep	Fill_Geo-21			24.2 g	1.0 g	442539	09/10/19 12:12	KRS	TAL SL
Total/NA	Analysis	901.1		1			445971	10/12/19 22:39	KLS	TAL SL
	Instrument ID:	GAMMAVISION								

Client Sample ID: CUF-SED-UT01-DUP01-20190821 ~ NA

Lab Sample ID: 180-95123-12

Date Collected: 08/21/19 00:00
Date Received: 09/04/19 09:00

Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Leach	Dry and Grind			1.0 g	1.0 g	442163	09/09/19 01:13	SJS	TAL SL
Total/NA	Prep	Fill_Geo-21			83.5 g	1.0 g	442539	09/10/19 12:12	KRS	TAL SL
Total/NA	Analysis	901.1		1			445363	10/08/19 23:13	KLS	TAL SL
	Instrument ID:	GAMMAVISION								

Laboratory References:

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

Analyst References:

Lab: TAL SL
- Batch Type: Leach
  - SJS = Sean Small
- Batch Type: Prep
  - KPP = Kaushal Patel
  - KRS = Kurt Slama
- Batch Type: Analysis
  - KLS = Kody Saulters

Client Sample Results

Client: Environmental Standards Inc.
Project/Site: TVA CUF EIP - Stantec

Job ID: 180-95123-1

Client Sample ID: CUF-SED-UT02-EB01-20190821 ~ NA

Lab Sample ID: 180-95123-1

Date Collected: 08/21/19 17:00
Date Received: 09/04/19 09:00

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	**20.2**		15.9	16.0	50.0	16.8	pCi/L	09/11/19 00:36	10/07/19 11:27	1
Radium-228	9.83	U	17.8	17.8	50.0	20.9	pCi/L	09/11/19 00:36	10/07/19 11:27	1
Radium 226 and Radium 228	**30.0**		23.9	23.9			pCi/L	09/11/19 00:36	10/07/19 11:27	1

Client Sample Results

Client: Environmental Standards Inc.
Project/Site: TVA CUF EIP - Stantec

Job ID: 180-95123-1

Client Sample ID: CUF-SED-UT03-CORCC-0.0/0.5-20190821 ~ SED-UT03

Lab Sample ID: 180-95123-2

Date Collected: 08/21/19 15:10
Date Received: 09/04/19 09:00

Matrix: Solid

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	0.838		0.168	0.188	1.00	0.136	pCi/g	09/10/19 12:12	10/03/19 19:07	1
Radium-228	0.737		0.311	0.320		0.299	pCi/g	09/10/19 12:12	10/03/19 19:07	1
Radium 226 and Radium 228	1.58		0.353	0.371			pCi/g	09/10/19 12:12	10/03/19 19:07	1

Client Sample Results

Client: Environmental Standards Inc.
Project/Site: TVA CUF EIP - Stantec

Job ID: 180-95123-1

Client Sample ID: CUF-SED-UT03-CORLB-0.0/0.5-20190821 ~ SED-UT03

Lab Sample ID: 180-95123-4

Date Collected: 08/21/19 15:25
Date Received: 09/04/19 09:00

Matrix: Solid

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	**0.654**		0.389	0.395	1.00	0.462	pCi/g	09/10/19 12:12	10/12/19 10:49	1
Radium-228	0.634	U	0.624	0.627		0.862	pCi/g	09/10/19 12:12	10/12/19 10:49	1
Radium 226 and Radium 228	**1.29**		0.735	0.741			pCi/g	09/10/19 12:12	10/12/19 10:49	1

Client Sample Results

Client: Environmental Standards Inc.
Project/Site: TVA CUF EIP - Stantec

Job ID: 180-95123-1

Client Sample ID: CUF-SED-UT02-CORCC-0.0/0.5-20190821 ~ SED-UT02

Lab Sample ID: 180-95123-5

Date Collected: 08/21/19 15:45
Date Received: 09/04/19 09:00

Matrix: Solid

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	**1.08**		0.422	0.435	1.00	0.492	pCi/g	09/10/19 12:12	10/12/19 13:12	1
Radium-228	0.840	U	0.573	0.579		0.897	pCi/g	09/10/19 12:12	10/12/19 13:12	1
Radium 226 and Radium 228	**1.92**		0.712	0.724			pCi/g	09/10/19 12:12	10/12/19 13:12	1

Client Sample Results

Client: Environmental Standards Inc.
Project/Site: TVA CUF EIP - Stantec

Job ID: 180-95123-1

Client Sample ID: CUF-SED-UT02-CORRB-0.0/0.5-20190821 ~ SED-UT02

Lab Sample ID: 180-95123-6

Date Collected: 08/21/19 16:15
Date Received: 09/04/19 09:00

Matrix: Solid

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	0.178	U G	0.618	0.619	1.00	1.03	pCi/g	09/10/19 12:12	10/03/19 22:40	1
Radium-228	**1.60**		0.411	0.439		0.256	pCi/g	09/10/19 12:12	10/03/19 22:40	1
Radium 226 and Radium 228	**1.78**		0.742	0.759			pCi/g	09/10/19 12:12	10/03/19 22:40	1

Client Sample Results

Client: Environmental Standards Inc.
Project/Site: TVA CUF EIP - Stantec

Job ID: 180-95123-1

Client Sample ID: CUF-SED-UT01-CORRB-0.0/0.5-20190821 ~ SED-UT01

Lab Sample ID: 180-95123-8

Date Collected: 08/21/19 16:50
Date Received: 09/04/19 09:00

Matrix: Solid

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	1.40		0.301	0.331	1.00	0.231	pCi/g	09/10/19 12:12	10/03/19 22:41	1
Radium-228	1.02		0.469	0.479		0.442	pCi/g	09/10/19 12:12	10/03/19 22:41	1
Radium 226 and Radium 228	2.42		0.557	0.582			pCi/g	09/10/19 12:12	10/03/19 22:41	1

Client Sample Results

Client: Environmental Standards Inc.
Project/Site: TVA CUF EIP - Stantec

Job ID: 180-95123-1

Client Sample ID: CUF-SED-UT01-CORLB-0.0/0.5-20190821 ~ SED-UT01

Lab Sample ID: 180-95123-9

Date Collected: 08/21/19 17:10
Date Received: 09/04/19 09:00

Matrix: Solid

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	1.25		0.325	0.350	1.00	0.301	pCi/g	09/10/19 12:12	10/03/19 20:31	1
Radium-228	1.06		0.324	0.341		0.517	pCi/g	09/10/19 12:12	10/03/19 20:31	1
Radium 226 and Radium 228	2.31		0.459	0.489			pCi/g	09/10/19 12:12	10/03/19 20:31	1

Client Sample Results

Client: Environmental Standards Inc.
Project/Site: TVA CUF EIP - Stantec

Job ID: 180-95123-1

Client Sample ID: CUF-SED-UT01-CORCC-0.0/0.5-20190821 ~ SED-UT01

Lab Sample ID: 180-95123-10

Date Collected: 08/21/19 17:00
Date Received: 09/04/19 09:00

Matrix: Solid

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	1.58		0.384	0.414	1.00	0.338	pCi/g	09/10/19 12:12	10/08/19 23:11	1
Radium-228	1.54		0.493	0.515		0.819	pCi/g	09/10/19 12:12	10/08/19 23:11	1
Radium 226 and Radium 228	3.12		0.625	0.661			pCi/g	09/10/19 12:12	10/08/19 23:11	1

Client Sample Results

Client: Environmental Standards Inc.
Project/Site: TVA CUF EIP - Stantec

Job ID: 180-95123-1

Client Sample ID: CUF-SED-UT01.5-CORCC-0.0/0.5-20190821 ~ SED-UT01

Lab Sample ID: 180-95123-11

Date Collected: 08/21/19 17:20
Date Received: 09/04/19 09:00

Matrix: Solid

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	**0.632**		0.378	0.383	1.00	0.449	pCi/g	09/10/19 12:12	10/12/19 22:39	1
Radium-228	0.597	U	0.725	0.727		0.854	pCi/g	09/10/19 12:12	10/12/19 22:39	1
Radium 226 and Radium 228	**1.23**		0.818	0.822			pCi/g	09/10/19 12:12	10/12/19 22:39	1

Client Sample Results

Client: Environmental Standards Inc.
Project/Site: TVA CUF EIP - Stantec

Job ID: 180-95123-1

Client Sample ID: CUF-SED-UT01-DUP01-20190821 ~ NA

Lab Sample ID: 180-95123-12

Date Collected: 08/21/19 00:00
Matrix: Solid
Date Received: 09/04/19 09:00

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	1.08		0.299	0.317	1.00	0.281	pCi/g	09/10/19 12:12	10/08/19 23:13	1
Radium-228	1.25		0.282	0.307		0.278	pCi/g	09/10/19 12:12	10/08/19 23:13	1
Radium 226 and Radium 228	2.33		0.411	0.441			pCi/g	09/10/19 12:12	10/08/19 23:13	1

QC Sample Results

Client: Environmental Standards Inc.
Project/Site: TVA CUF EIP - Stantec

Job ID: 180-95123-1

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

Lab Sample ID: MB 160-442539/1-A — **Client Sample ID: Method Blank**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 444595 — **Prep Batch: 442539**

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	-0.01238	U	0.267	0.267	1.00	0.470	pCi/g	09/10/19 12:12	10/01/19 22:41	1
Radium-228	0.09986	U	0.237	0.237		0.364	pCi/g	09/10/19 12:12	10/01/19 22:41	1
Radium 226 and Radium 228	0.09986	U	0.357	0.357			pCi/g	09/10/19 12:12	10/01/19 22:41	1

Lab Sample ID: LCS 160-442539/2-A — **Client Sample ID: Lab Control Sample**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 444748 — **Prep Batch: 442539**

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits
Americium-241	354	358.9		35.6		1.39	pCi/g	102	87 - 116
Cesium-137	118	118.4		11.7		0.578	pCi/g	100	87 - 120
Cobalt-60	76.1	77.36		7.48		0.352	pCi/g	102	87 - 115

Lab Sample ID: 180-95123-12 DU — **Client Sample ID: CUF-SED-UT01-DUP01-20190821 ~ NA**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 445476 — **Prep Batch: 442539**

Analyte	Sample Result	Sample Qual	DU Result	DU Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	RER	RER Limit
Radium-226	1.08		1.592		0.425	1.00	0.339	pCi/g	0.68	1
Radium-228	1.25		1.088		0.566		0.542	pCi/g	0.19	1
Radium 226 and Radium 228	2.33		2.680		0.708			pCi/g	0.30	

Lab Sample ID: MB 160-442584/1-A — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 444930 — **Prep Batch: 442584**

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	-26.70	U	18.4	18.6	50.0	46.3	pCi/L	09/11/19 00:36	10/03/19 06:12	1
Radium-228	12.31	U	22.2	22.2	50.0	26.0	pCi/L	09/11/19 00:36	10/03/19 06:12	1
Radium 226 and Radium 228	12.31	U	28.8	29.0			pCi/L	09/11/19 00:36	10/03/19 06:12	1

Lab Sample ID: LCS 160-442584/2-A — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 444931 — **Prep Batch: 442584**

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits
Americium-241	136000	130700		15100		278	pCi/L	96	90 - 111
Cesium-137	44300	44040		4410		71.4	pCi/L	100	90 - 111
Cobalt-60	28200	27350		2700		47.5	pCi/L	97	89 - 110

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

Lab Sample ID: 180-95123-1 DU
Matrix: Water
Analysis Batch: 445183

Client Sample ID: CUF-SED-UT02-EB01-20190821 ~ NA
Prep Type: Total/NA
Prep Batch: 442584

Analyte	Sample Result	Sample Qual		DU Result	DU Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit			RER	RER Limit
Radium-226	20.2			51.76		20.5	50.0	21.1	pCi/L			0.86	1
Radium-228	9.83	U		37.47		13.1	50.0	8.39	pCi/L			0.89	1
Radium 226 and Radium 228	30.0			89.23		24.3			pCi/L			1.23	

QC Association Summary

Client: Environmental Standards Inc.
Project/Site: TVA CUF EIP - Stantec

Job ID: 180-95123-1

Rad

Leach Batch: 442163

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-95123-2	CUF-SED-UT03-CORCC-0.0/0.5-20190821 ~ SE	Total/NA	Solid	Dry and Grind	
180-95123-4	CUF-SED-UT03-CORLB-0.0/0.5-20190821 ~ SEI	Total/NA	Solid	Dry and Grind	
180-95123-5	CUF-SED-UT02-CORCC-0.0/0.5-20190821 ~ SE	Total/NA	Solid	Dry and Grind	
180-95123-6	CUF-SED-UT02-CORRB-0.0/0.5-20190821 ~ SE	Total/NA	Solid	Dry and Grind	
180-95123-8	CUF-SED-UT01-CORRB-0.0/0.5-20190821 ~ SE	Total/NA	Solid	Dry and Grind	
180-95123-9	CUF-SED-UT01-CORLB-0.0/0.5-20190821 ~ SEI	Total/NA	Solid	Dry and Grind	
180-95123-10	CUF-SED-UT01-CORCC-0.0/0.5-20190821 ~ SE	Total/NA	Solid	Dry and Grind	
180-95123-11	CUF-SED-UT01.5-CORCC-0.0/0.5-20190821 ~ S	Total/NA	Solid	Dry and Grind	
180-95123-12	CUF-SED-UT01-DUP01-20190821 ~ NA	Total/NA	Solid	Dry and Grind	
180-95123-12 DU	CUF-SED-UT01-DUP01-20190821 ~ NA	Total/NA	Solid	Dry and Grind	

Prep Batch: 442539

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-95123-2	CUF-SED-UT03-CORCC-0.0/0.5-20190821 ~ SE	Total/NA	Solid	Fill_Geo-21	442163
180-95123-4	CUF-SED-UT03-CORLB-0.0/0.5-20190821 ~ SEI	Total/NA	Solid	Fill_Geo-21	442163
180-95123-5	CUF-SED-UT02-CORCC-0.0/0.5-20190821 ~ SE	Total/NA	Solid	Fill_Geo-21	442163
180-95123-6	CUF-SED-UT02-CORRB-0.0/0.5-20190821 ~ SE	Total/NA	Solid	Fill_Geo-21	442163
180-95123-8	CUF-SED-UT01-CORRB-0.0/0.5-20190821 ~ SE	Total/NA	Solid	Fill_Geo-21	442163
180-95123-9	CUF-SED-UT01-CORLB-0.0/0.5-20190821 ~ SEI	Total/NA	Solid	Fill_Geo-21	442163
180-95123-10	CUF-SED-UT01-CORCC-0.0/0.5-20190821 ~ SE	Total/NA	Solid	Fill_Geo-21	442163
180-95123-11	CUF-SED-UT01.5-CORCC-0.0/0.5-20190821 ~ S	Total/NA	Solid	Fill_Geo-21	442163
180-95123-12	CUF-SED-UT01-DUP01-20190821 ~ NA	Total/NA	Solid	Fill_Geo-21	442163
MB 160-442539/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-442539/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	
180-95123-12 DU	CUF-SED-UT01-DUP01-20190821 ~ NA	Total/NA	Solid	Fill_Geo-21	442163

Prep Batch: 442584

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-95123-1	CUF-SED-UT02-EB01-20190821 ~ NA	Total/NA	Water	Fill_Geo-21	
MB 160-442584/1-A	Method Blank	Total/NA	Water	Fill_Geo-21	
LCS 160-442584/2-A	Lab Control Sample	Total/NA	Water	Fill_Geo-21	
180-95123-1 DU	CUF-SED-UT02-EB01-20190821 ~ NA	Total/NA	Water	Fill_Geo-21	

TVA Environmental Investigations

Tennessee Valley Authority

COOLER No.:	1	of	1
COC No:	CUF_SED_20190821_1B		
1 of 1 Pages			
Task Desc:	CUF_SED		

Chain-of-Custody / Analytical Request Document

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

180-95123 Chain of Custody

Required Ship to Lab:		Required Project Information:		Required Sampler Information	
Lab Name:	TestAmerica Pittsburgh	Site ID #:	CUMBERLAND FOSSIL PLANT	Sampler: Tyler Baker	
Lab Address:	301 Alpha Drive	Project #:	0777010	Sampling Company: TVA	
	RIDC Park	Site Address	815 Cumberland City Road	Address: TVA Chickamauga Power Service Center, 4601 N. Access Road, 37415	
	Pittsburgh, PA 15238	City	Cumberland City State, Zip: TN, 37763	City/State: Chattanooga, TN 37415	Phone: 423-876-6733
Lab Manager Contact Information		Site PM Name:	Roy Quinn		
Lab PM:	Gail Lage	Phone/Fax:	423-751-3753	Sampling Team Number:	1
Phone/Fax:	615-301-5741/615-726-3404	Site PM Email:	jrquinn@tva.gov	Send EDD/Hard Copy to:	tva_deliverables@envstd.com
Lab Email:	Gail.Lage@testamericainc.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	End Depth	MATRIX CODE	G= GRAB C=COMP	SAMPLE TYPE	SAMPLE DATE	SAMPLE TIME	# OF CONTAINERS	Comments/ Lab Sample I.D.	MS/MSD	Filtered: CUF_SEDIMENT_RAD	Filtered: CUF_SEDIMENT_BLANKS_RAD
1	CUF-SED-UT02-EB01-20190821	NA		NA	NA	AQ	G	EB	8/21/2019	1700	~~1~~ 3	Hfb090319	☐		X
2	CUF-SED-UT03-CORCC-0.0/0.5-20190821	SED-UT03		0.0	0.5	SED	G	N	8/21/2019	1510	1		☐	X	
3	CUF-SED-UT03-CORCC-0.5/1.0-20190821	SED-UT03		0.5	1.0	SED	G	N	8/21/2019	1510	1	Hold	☐	X	
4	CUF-SED-UT03-CORLB-0.0/0.5-20190821	SED-UT03		0.0	0.5	SED	G	N	8/21/2019	1525	1		☐	X	
5	CUF-SED-UT02-CORCC-0.0/0.5-20190821	SED-UT02		0.0	0.5	SED	G	N	8/21/2019	1545	1		☐	X	
6	CUF-SED-UT02-CORRB-0.0/0.5-20190821	SED-UT02		0.0	0.5	SED	G	N	8/21/2019	1615	1		☐	X	
7	CUF-SED-UT02-CORRB-0.5/2.0-20190821	SED-UT02		0.5	2.0	SED	G	N	8/21/2019	1615	1	Hold	☐	X	
8	CUF-SED-UT01-CORRB-0.0/0.5-20190821	SED-UT01		0.0	0.5	SED	G	N	8/21/2019	1650	1		☐	X	
9	CUF-SED-UT01-CORLB-0.0/0.5-20190821	SED-UT01		0.0	0.5	SED	G	N	8/21/2019	1710	1		☐	X	
10	CUF-SED-UT01-CORCC-0.0/0.5-20190821	SED-UT01		0.0	0.5	SED	G	N	8/21/2019	1700	1		☐	X	
11	CUF-SED-UT01.5-CORCC-0.0/0.5-20190821	SED-UT01		0.0	0.5	SED	G	N	8/21/2019	1720	1		☐	X	
12	CUF-SED-UT01-DUP01-20190821	--		NA	NA	SED	G	FD	8/21/2019	--	1		☐	X	
13										Tyler Baker 9-3-19			☐		

Preserve: Tyler Baker 9-3-19

Analysis: Tyler Baker 9-3-19

Additional Comments/Special Instructions:

Samples designated "Hold" should not be analyzed until directed otherwise.

Custody Seal 641265

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
Tyler Baker / TVA	9-3-19	1500	[signature] MAPR	9/4/19	900

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

Form TVA 30067A

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_20190821_1B
1 of 1 Pages	
Task Desc:	CUF_SED

Rev 01 AEH 9/20/19

10/18/2019

Required Ship to Lab:

Lab Name:	TestAmerica Pittsburgh
Lab Address:	301 Alpha Drive RIDC Park Pittsburgh, PA 15238

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)

180-95123 Chain of Custody

ITEMS #	SAMPLE ID Samples IDs MUST BE UNIQUE	SAMPLE LOCATION	Sample Depth Depth Unit Meters: Start Depth	End Depth	MATRIX CODE	G= GRAB C=COMP	SAMPLE TYPE	SAMPLE DATE	SAMPLE TIME	# OF CONTAINERS	Comments/ Lab Sample I.D.	MS/MSD	Filtered	Preserve	Analysis: CUF_SEDIMENT_RAD	CUF_SEDIMENT_BLANKS_RAD
1	CUF-SED-UT02-EB01-20190821	NA	NA	NA	AQ	G	EB	8/21/2019	1700	~~1~~ 3	HB090319	☐				X
2	CUF-SED-UT03-CORCC-0.0/0.5-20190821	SED-UT03	0.0	0.5	SED	G	N	8/21/2019	1510	1		☐			X	
3	CUF-SED-UT03-CORCC-0.5/1.0-20190821	SED-UT03	0.5	1.0	SED	G	N	8/21/2019	1510	1	Hold	☐			X	
4	CUF-SED-UT03-CORLB-0.0/0.5-20190821	SED-UT03	0.0	0.5	SED	G	N	8/21/2019	1525	1		☐			X	
5	CUF-SED-UT02-CORCC-0.0/0.5-20190821	SED-UT02	0.0	0.5	SED	G	N	8/21/2019	1545	1		☐			X	
6	CUF-SED-UT02-CORRB-0.0/0.5-20190821	SED-UT02	0.0	0.5	SED	G	N	8/21/2019	1615	1		☐			X	
7	CUF-SED-UT02-CORRB-0.5/2.0-20190821	SED-UT02	0.5	2.0	SED	G	N	8/21/2019	1615	1	Hold	☐			X	
8	CUF-SED-UT01-CORRB-0.0/0.5-20190821	SED-UT01	0.0	0.5	SED	G	N	8/21/2019	1650	1		☐			X	
9	CUF-SED-UT01-CORLB-0.0/0.5-20190821	SED-UT01	0.0	0.5	SED	G	N	8/21/2019	1710	1		☐			X	
10	CUF-SED-UT01-CORCC-0.0/0.5-20190821	SED-UT01	0.0	0.5	SED	G	N	8/21/2019	1700	1		☐			X	
11	CUF-SED-UT01.5-CORCC-0.0/0.5-20190821	SED-UT01.5	0.0	0.5	SED	G	N	8/21/2019	1720	1		☐			X	
12	CUF-SED-UT01-DUP01-20190821	AEH 9/20/19	NA	NA	SED	G	FD	8/21/2019	--	1		☐			X	
13									Tyler Baker 9-3-19			☐				

Tyler Baker 9-3-19

Additional Comments/Special Instructions:

Samples designated "Hold" should not be analyzed until directed otherwise.

Custody Seal 641265

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
Tyler Baker / TVA	9-3-19	1500	[illegible]	9/4/19	9:05

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

Form TVA 30067A

Eurofins TestAmerica, Pittsburgh
301 Alpha Drive RIDC Park
Pittsburgh, PA 15238
Phone: 412-963-7058 Fax: 412-963-2468

Chain of Custody Record

eurofins | Environment Testing TestAmerica

10/18/2019

Client Information (Sub Contract Lab)	Sampler:	Lab PM: Lage, Gail	Carrier Tracking No(s):	COC No: 180-372755.1
Client Contact: Shipping/Receiving	Phone:	E-Mail: gail.lage@testamericainc.com	State of Origin: Tennessee	Page: Page 1 of 2
Company: TestAmerica Laboratories, Inc.		Accreditations Required (See note):		Job #: 180-95123-1
Address: 13715 Rider Trail North, ,	Due Date Requested: 10/4/2019			
City: Earth City	TAT Requested (days):			
State, Zip: MO, 63045				
Phone: 314-298-8566(Tel) 314-298-8757(Fax)	PO #:			
Email:	WO #:			
Project Name: CUF_SED_20190821_1B	Project #: 49014071			
Site:	SSOW#:			

Analysis Requested

Preservation Codes:
A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA
M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2O3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - pH 4-5, Z - other (specify)
Other:

Sample Identification - Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	901.1_Ra/Fill_Geo_21 Radium-226/228	901.1_Ra/Dry_Grind (MOD) Radium-226/228	Total Number of containers	Special Instructions/Note:
			Preservation Code:							
CUF-SED-UT02-EB01-20190821 ~ NA (180-95123-1)	8/21/19	17:00 Central		Water			X		3	TVA
CUF-SED-UT03-CORCC-0.0/0.5-20190821 ~ SED-UT03 (180-95	8/21/19	15:10 Central		Solid				X	1	TVA - Batch alone. Quarantine zone soils. Contact PM if insufficient volume for Tuna
CUF-SED-UT03-CORLB-0.0/0.5-20190821 ~ SED-UT03 (180-95	8/21/19	15:25 Central		Solid				X	1	TVA - Batch alone. Quarantine zone soils. Contact PM if insufficient volume for Tuna
CUF-SED-UT02-CORCC-0.0/0.5-20190821 ~ SED-UT02 (180-95	8/21/19	15:45 Central		Solid				X	1	TVA - Batch alone. Quarantine zone soils. Contact PM if insufficient volume for Tuna
CUF-SED-UT02-CORRB-0.0/0.5-20190821 ~ SED-UT02 (180-95	8/21/19	16:15 Central		Solid				X	1	TVA - Batch alone. Quarantine zone soils. Contact PM if insufficient volume for Tuna
CUF-SED-UT01-CORRB-0.0/0.5-20190821 ~ SED-UT01 (180-95	8/21/19	16:50 Central		Solid				X	1	TVA - Batch alone. Quarantine zone soils. Contact PM if insufficient volume for Tuna
CUF-SED-UT01-CORLB-0.0/0.5-20190821 ~ SED-UT01 (180-95	8/21/19	17:10 Central		Solid				X	1	TVA - Batch alone. Quarantine zone soils. Contact PM if insufficient volume for Tuna
CUF-SED-UT01-CORCC-0.0/0.5-20190821 ~ SED-UT01 (180-95	8/21/19	17:00 Central		Solid				X	1	TVA - Batch alone. Quarantine zone soils. Contact PM if insufficient volume for Tuna
CUF-SED-UT01.5-CORCC-0.0/0.5-20190821 ~ SED-UT01 (180-9	8/21/19	17:20 Central		Solid				X	1	TVA - Batch alone. Quarantine zone soils. Contact PM if insufficient volume for Tuna

Note: Since laboratory accreditations are subject to change, TestAmerica Laboratories, Inc. places the ownership of method, analyte & accreditation compliance upon out subcontract laboratories. This sample shipment is forwarded under chain-of-custody. If the laboratory does not currently maintain accreditation in the State of Origin listed above for analysis/tests/matrix being analyzed, the samples must be shipped back to the TestAmerica laboratory or other instructions will be provided. Any changes to accreditation status should be brought to TestAmerica Laboratories, Inc. attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said complicance to TestAmerica Laboratories, Inc.

Possible Hazard Identification	Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
Unconfirmed	☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months
Deliverable Requested: I, II, III, IV, Other (specify) Primary Deliverable Rank: 2	Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

Relinquished by	Date/Time	Company	Received by	Date/Time	Company
[signature]	9/6/19 1700	MAZ	[signature]	9-7-19 08:30	TA STL

Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:	Cooler Temperature(s) °C and Other Remarks:

Ver: 01/16/2019

Eurofins TestAmerica, Pittsburgh
301 Alpha Drive RIDC Park
Pittsburgh, PA 15238
Phone: 412-963-7058 Fax: 412-963-2468

Chain of Custody Record

eurofins | Environment Testing TestAmerica

Client Information (Sub Contract Lab)	Sampler:	Lab PM: Lage, Gail	Carrier Tracking No(s):	COC No: 180-372755.2
Client Contact: Shipping/Receiving	Phone:	E-Mail: gail.lage@testamericainc.com	State of Origin: Tennessee	Page: Page 2 of 2
Company: TestAmerica Laboratories, Inc.		Accreditations Required (See note):		Job #: 180-95123-1
Address: 13715 Rider Trail North, ,	Due Date Requested: 10/4/2019			
City: Earth City	TAT Requested (days):			
State, Zip: MO, 63045				
Phone: 314-298-8566(Tel) 314-298-8757(Fax)	PO #:			
Email:	WO #:			
Project Name: CUF_SED_20190821_1B	Project #: 49014071			
Site:	SSOW#:			

Analysis Requested

Preservation Codes:

A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2O3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - pH 4-5, Z - other (specify)

Other:

Sample Identification - Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	901.1_Ra/Fill_Geo_21 Radium-226/228	901.1_Ra/Dry_Grind (MOD) Radium-226/228	Total Number of containers	Special Instructions/Note:
			Preservation Code:							
CUF-SED-UT01-DUP01-20190821 ~ NA (180-95123-12)	8/21/19	Central		Solid				X	1	TVA - Batch alone. Quarantine zone soils. Contact PM if insufficient volume for Tuna

180-95123-01 Chain of Custody

Note: Since laboratory accreditations are subject to change, TestAmerica Laboratories, Inc. places the ownership of method, analyte & accreditation compliance upon out subcontract laboratories. This sample shipment is forwarded under chain-of-custody. I

Possible Hazard Identification
Unconfirmed

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ *Return To Client* ☐ *Disposal By Lab* ☐ *Archive For* _____ *Months*

Deliverable Requested: I, II, III, IV, Other (specify) Primary Deliverable Rank: 2

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:		
Relinquished by:	Date/Time: 9/6/19 1700	Company: TA	Received by:	Date/Time: 9-7-19 08:30	Company: TA STL
Relinquished by:	Date/Time:	Company:	Received by:	Date/Time:	Company:
Relinquished by:	Date/Time:	Company:	Received by:	Date/Time:	Company:
Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:		Cooler Temperature(s) °C and Other Remarks:		

Ver: 01/16/2019

10/18/2019

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING
St. Louis

180-95239 Login
PM: Rumble, Jennifer L
Company: Huntley & Huntley Energy Explorati

CONDITION UPON RECEIPT FORM

Client: Pittsburgh

Initiated by: MH Date: 9-7-19 Time: 08:30 Shipper: FE Package Quantity: 3

**Sample must be received at < 6°- If not, note contents below. Temperature variance does NOT affect the following: Metals-Liquid; Rad tests- Liquid or Solids. If samples are from West Virginia, temperature of EVERY SAMPLE that is temperature critical must be recorded on the COC.

	Shipping #(s):*	Thermometer #:	Package Temp:**	Document #:
1.	4818 7134 7668	19	20.0°C	
2.	↓ ↓ 7657	TR	0.1°C	
3.	7679	19	20.0°C	
4.				
5.				
6.				
7.				

Condition (Circle "Y" for yes, "N" for no and "N/A" for not applicable):

1.	Y N	Are there custody seals present on the cooler?	8.	Y N	Are there custody seals present on bottles?
2.	Y N N/A	Do custody seals on cooler appear to be tampered with?	9.	Y N N/A	Do custody seals on bottles appear to be tampered with?
3.	Y N	Were contents of cooler frisked after opening, but before unpacking?	10.	Y N N/A	Was sample received with proper pH[1]? (If not, make note below) pH strip lot #:
4.	Y N	Sample received with Chain of Custody?	11.	Y N N/A	Containers for Rn-222, C-14, Cl-36, H-3 & I-129/131 marked with "Do Not Preserve" label?
5.	Y N N/A	Does the Chain of Custody match sample ID's on the container(s)?	12.	Y N	Sample received in proper containers?
6.	Y N	Was sample received broken?	13.	Y N N/A	Headspace in VOA, or Rn-222 liquid samples? (>6mm) (If Yes, note sample ID's below)
7.	Y N	Is sample volume sufficient for analysis?	14.	Y N N/A	Soil containers for C-14, H-3,Tc-99 & I-129/131 marked with "Do Not Dry" label?

[1] For DOE-AL (Pantex, LANL, Sandia) sites, pH of ALL containers received must be verified, EXCEPT VOA, Oil & Grease, Rn-222 and soils.

Notes:

pH Adjustment (if needed)

Initial pH and pH strip lot#:

Final pH and pH strip lot#:

Date/Time of Preservation:

Preservative and lot#:

Amount of Preservative:

Sample Labels Applied By: Sc-180

Labels 2nd Reviewed By: MH

THIS FORM MUST BE COMPLETED AT THE TIME THE ITEMS ARE BEING CHECKED IN. IF ANY ITEM IS COMPLETED BY SOMEONE OTHER THAN THE INITIATOR, THEN THAT PERSON IS REQUIRED TO APPLY THEIR INITIAL AND THE DATE NEXT TO THAT ITEM.

Login Sample Receipt Checklist

Client: Environmental Standards Inc.

Job Number: 180-95123-1

Login Number: 95123
List Number: 1
Creator: Say, Thomas C

List Source: Eurofins TestAmerica, Pittsburgh

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.	False	
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	

Login Sample Receipt Checklist

Client: Environmental Standards Inc.

Job Number: 180-95123-1

Login Number: 95123
List Number: 2
Creator: Hellm, Michael

List Source: Eurofins TestAmerica, St. Louis
List Creation: 09/07/19 11:47 AM

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.	N/A	
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	0.1
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?	N/A	
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").	N/A	
Multiphasic samples are not present.	N/A	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Login Sample Receipt Checklist

Client: Environmental Standards Inc.

Job Number: 180-95123-1

Login Number: 95123
List Number: 3
Creator: Hellm, Michael

List Source: Eurofins TestAmerica, St. Louis
List Creation: 09/07/19 11:49 AM

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.	N/A	
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	20.0
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?	N/A	
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").	N/A	
Multiphasic samples are not present.	N/A	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	