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ANALYTICAL REPORT

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

Laboratory Job ID: 180-84164-1
Client Project/Site: BRF_BS_20181116_1B
Revision: 2

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

Attn: Amanda Cover

Authorized for release by:
4/30/2019 6:28:27 PM
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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: 180-84164-1

Laboratory: Eurofins TestAmerica, Pittsburgh

Narrative

Job Narrative
180-84164-1

Revised Report
This report was revised to correct the solid sample results for dry weight using the dry weight results from TA-Pittsburgh. This replaces the previous final report.

Receipt
The samples were received on 11/17/2018 9:30 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 2 coolers at receipt time were 2.1º C and 2.2º C.

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

Definitions/Glossary

Client: Environmental Standards Inc.
Project/Site: BRF_BS_20181116_1B

Job ID: 180-84164-1

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
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: BRF_BS_20181116_1B

Job ID: 180-84164-1

Laboratory: Eurofins TestAmerica, Pittsburgh

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

Authority	Program	EPA Region	Identification Number	Expiration Date
Arkansas DEQ	State Program	6	88-0690	06-27-19
California	State Program	9	2891	04-30-19 *
Connecticut	State Program	1	PH-0688	09-30-20
Florida	NELAP	4	E871008	06-30-19
Illinois	NELAP	5	200005	06-30-19
Kansas	NELAP	7	E-10350	01-31-20
Louisiana	NELAP	6	04041	06-30-19
Nevada	State Program	9	PA00164	07-31-19
New Hampshire	NELAP	1	2030	04-04-20
New Jersey	NELAP	2	PA005	06-30-19
New York	NELAP	2	11182	03-31-20
North Carolina (WW/SW)	State Program	4	434	12-31-19
Oregon	NELAP	10	PA-2151	02-06-20
Pennsylvania	NELAP	3	02-00416	04-30-20
South Carolina	State Program	4	89014	04-30-19 *
Texas	NELAP	6	T104704528-15-2	03-31-20
US Fish & Wildlife	Federal		LE94312A-1	07-31-19
USDA	Federal		P330-16-00211	06-26-19
Utah	NELAP	8	PA001462015-4	05-31-19 *
Virginia	NELAP	3	460189	09-14-19
West Virginia DEP	State Program	3	142	01-31-20
Wisconsin	State Program	5	998027800	08-31-19

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

Accreditation/Certification Summary

Client: Environmental Standards Inc.
Project/Site: BRF_BS_20181116_1B

Job ID: 180-84164-1

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	EPA Region	Identification Number	Expiration Date
Alaska	State Program	10	MO00054	06-30-19
ANAB	DoD / DOE		L2305	04-06-22
Arizona	State Program	9	AZ0813	12-08-19
California	State Program	9	2886	06-30-19 *
Connecticut	State Program	1	PH-0241	03-31-21
Florida	NELAP	4	E87689	06-30-19 *
Hawaii	State Program	9	NA	06-30-19
Illinois	NELAP	5	200023	11-30-19
Iowa	State Program	7	373	12-01-20
Kansas	NELAP	7	E-10236	10-31-19
Kentucky (DW)	State Program	4	KY90125	12-31-19
Louisiana	NELAP	6	04080	06-30-19
Louisiana (DW)	NELAP	6	LA011	12-31-19
Maryland	State Program	3	310	09-30-19
Michigan	State Program	5	9005	06-30-19
Missouri	State Program	7	780	06-30-19
Nevada	State Program	9	MO000542018-1	07-31-19
New Jersey	NELAP	2	MO002	06-30-19 *
New York	NELAP	2	11616	03-31-20
North Dakota	State Program	8	R207	06-30-19 *
NRC	NRC		24-24817-01	12-31-22
Oklahoma	State Program	6	9997	08-31-19
Pennsylvania	NELAP	3	68-00540	02-28-20
South Carolina	State Program	4	85002001	06-30-19
Texas	NELAP	6	T104704193-18-13	07-31-19
US Fish & Wildlife	Federal		058448	07-31-19
USDA	Federal		P330-17-0028	02-02-20
Utah	NELAP	8	MO000542018-10	07-31-19
Virginia	NELAP	3	460230	06-14-19 *
Washington	State Program	10	C592	08-30-19
West Virginia DEP	State Program	3	381	08-31-19

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

Sample Summary

Client: Environmental Standards Inc.
Project/Site: BRF_BS_20181116_1B

Job ID: 180-84164-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
180-84164-1	BRF-BS-BG04-1.2/3.2-20181116	Solid	11/16/18 11:23	11/17/18 09:30
180-84164-2	BRF-BS-DUP02-20181116	Solid	11/16/18 00:00	11/17/18 09:30
180-84164-3	BRF-BS-BG04-6.5/8.5-20181116	Solid	11/16/18 11:31	11/17/18 09:30
180-84164-4	BRF-BS-FB08-20181116	Water	11/16/18 11:10	11/17/18 09:30
180-84164-5	BRF-BS-BG04-10.3/12.3-20181116	Solid	11/16/18 11:43	11/17/18 09:30
180-84164-6	BRF-BS-EB03-20181116	Water	11/16/18 12:22	11/17/18 09:30
180-84164-7	BRF-BS-BG04-0.0/0.5-20181116	Solid	11/16/18 12:04	11/17/18 09:30

Method Summary

Client: Environmental Standards Inc.
Project/Site: BRF_BS_20181116_1B

Job ID: 180-84164-1

Method	Method Description	Protocol	Laboratory
901.1	Radium-226 & Other Gamma Emitters (GS)	EPA	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: BRF_BS_20181116_1B

Job ID: 180-84164-1

Client Sample ID: BRF-BS-BG04-1.2/3.2-20181116 — Lab Sample ID: 180-84164-1

Date Collected: 11/16/18 11:23 — **Matrix: Solid**
Date Received: 11/17/18 09:30

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			357.7 g	1.0 g	401912	11/20/18 15:32	PK	TAL SL
Total/NA	Analysis	901.1		1			404934	12/11/18 02:01	KLS	TAL SL
	Instrument ID:	GAMMAVISION								

Client Sample ID: BRF-BS-DUP02-20181116 — Lab Sample ID: 180-84164-2

Date Collected: 11/16/18 00:00 — **Matrix: Solid**
Date Received: 11/17/18 09:30

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			318.7 g	1.0 g	401912	11/20/18 15:32	PK	TAL SL
Total/NA	Analysis	901.1		1			404932	12/11/18 02:00	KLS	TAL SL
	Instrument ID:	GAMMAVISION								

Client Sample ID: BRF-BS-BG04-6.5/8.5-20181116 — Lab Sample ID: 180-84164-3

Date Collected: 11/16/18 11:31 — **Matrix: Solid**
Date Received: 11/17/18 09:30

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			296.9 g	1.0 g	401912	11/20/18 15:32	PK	TAL SL
Total/NA	Analysis	901.1		1			404933	12/11/18 02:02	KLS	TAL SL
	Instrument ID:	GAMMAVISION								

Client Sample ID: BRF-BS-FB08-20181116 — Lab Sample ID: 180-84164-4

Date Collected: 11/16/18 11:10 — **Matrix: Water**
Date Received: 11/17/18 09:30

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	403262	11/29/18 10:28	PK	TAL SL
Total/NA	Analysis	901.1		1			406794	12/20/18 20:13	KLS	TAL SL
	Instrument ID:	GAMMAVISION								

Client Sample ID: BRF-BS-BG04-10.3/12.3-20181116 — Lab Sample ID: 180-84164-5

Date Collected: 11/16/18 11:43 — **Matrix: Solid**
Date Received: 11/17/18 09:30

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			260.8 g	1.0 g	401912	11/20/18 15:32	PK	TAL SL
Total/NA	Analysis	901.1		1			404930	12/11/18 02:03	KLS	TAL SL
	Instrument ID:	GAMMAVISION								

Lab Chronicle

Client: Environmental Standards Inc.
Project/Site: BRF_BS_20181116_1B

Job ID: 180-84164-1

Client Sample ID: BRF-BS-EB03-20181116

Lab Sample ID: 180-84164-6

Date Collected: 11/16/18 12:22
Matrix: Water
Date Received: 11/17/18 09:30

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	403262	11/29/18 10:28	PK	TAL SL
Total/NA	Analysis	901.1		1			406795	12/20/18 20:12	KLS	TAL SL
	Instrument ID: GAMMAVISION									

Client Sample ID: BRF-BS-BG04-0.0/0.5-20181116

Lab Sample ID: 180-84164-7

Date Collected: 11/16/18 12:04
Matrix: Solid
Date Received: 11/17/18 09:30

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			319.2 g	1.0 g	401912	11/20/18 15:32	PK	TAL SL
Total/NA	Analysis	901.1		1			404936	12/11/18 01:59	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: Prep
  - PK = Pranav Kasinadhuni
- Batch Type: Analysis
  - KLS = Kody Saulters

Client Sample Results

Client: Environmental Standards Inc.
Project/Site: BRF_BS_20181116_1B

Job ID: 180-84164-1

Client Sample ID: BRF-BS-BG04-1.2/3.2-20181116

Lab Sample ID: 180-84164-1

Date Collected: 11/16/18 11:23

Matrix: Solid

Date Received: 11/17/18 09:30

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	0.882		0.165	0.189	1.00	0.152	pCi/g	11/20/18 15:32	12/11/18 02:01	1
Radium-228	1.55		0.240	0.288		0.148	pCi/g	11/20/18 15:32	12/11/18 02:01	1
Combined Radium 226 + 228	2.44		0.291	0.344			pCi/g	11/20/18 15:32	12/11/18 02:01	1

Client Sample Results

Client: Environmental Standards Inc.
Project/Site: BRF_BS_20181116_1B

Job ID: 180-84164-1

Client Sample ID: BRF-BS-DUP02-20181116

Lab Sample ID: 180-84164-2

Date Collected: 11/16/18 00:00

Matrix: Solid

Date Received: 11/17/18 09:30

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	0.0957	U	0.146	0.146	1.00	0.505	pCi/g	11/20/18 15:32	12/11/18 02:00	1
Radium-228	0.406	U	0.390	0.393		0.421	pCi/g	11/20/18 15:32	12/11/18 02:00	1
Combined Radium 226 + 228	0.502	U	0.416	0.419			pCi/g	11/20/18 15:32	12/11/18 02:00	1

Client Sample Results

Client: Environmental Standards Inc.
Project/Site: BRF_BS_20181116_1B

Job ID: 180-84164-1

Client Sample ID: BRF-BS-BG04-6.5/8.5-20181116

Lab Sample ID: 180-84164-3

Date Collected: 11/16/18 11:31
Date Received: 11/17/18 09:30

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	0.903		0.238	0.256	1.00	0.208	pCi/g	11/20/18 15:32	12/11/18 02:02	1
Radium-228	1.07		0.302	0.321		0.151	pCi/g	11/20/18 15:32	12/11/18 02:02	1
Combined Radium 226 + 228	1.97		0.385	0.411			pCi/g	11/20/18 15:32	12/11/18 02:02	1

Client Sample Results

Client: Environmental Standards Inc.
Project/Site: BRF_BS_20181116_1B

Job ID: 180-84164-1

Client Sample ID: BRF-BS-FB08-20181116

Lab Sample ID: 180-84164-4

Date Collected: 11/16/18 11:10

Matrix: Water

Date Received: 11/17/18 09:30

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	-9.17	U	20.5	20.5	50.0	34.8	pCi/L	11/29/18 10:28	12/20/18 20:13	1
Radium-228	4.87	U	19.9	19.9	50.0	25.4	pCi/L	11/29/18 10:28	12/20/18 20:13	1
Radium 226 and Radium 228	4.87	U	19.9	19.9			pCi/L	11/29/18 10:28	12/20/18 20:13	1

Client Sample Results

Client: Environmental Standards Inc.
Project/Site: BRF_BS_20181116_1B

Job ID: 180-84164-1

Client Sample ID: BRF-BS-BG04-10.3/12.3-20181116

Lab Sample ID: 180-84164-5

Date Collected: 11/16/18 11:43
Date Received: 11/17/18 09:30

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	0.901		0.248	0.265	1.00	0.240	pCi/g	11/20/18 15:32	12/11/18 02:03	1
Radium-228	1.50		0.542	0.563		0.501	pCi/g	11/20/18 15:32	12/11/18 02:03	1
Combined Radium 226 + 228	2.40		0.596	0.622			pCi/g	11/20/18 15:32	12/11/18 02:03	1

Client Sample Results

Client: Environmental Standards Inc.
Project/Site: BRF_BS_20181116_1B

Job ID: 180-84164-1

Client Sample ID: BRF-BS-EB03-20181116

Lab Sample ID: 180-84164-6

Date Collected: 11/16/18 12:22

Matrix: Water

Date Received: 11/17/18 09:30

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	-20.7	U	17.1	17.2	50.0	35.5	pCi/L	11/29/18 10:28	12/20/18 20:12	1
Radium-228	2.65	U	5.95	5.96	50.0	30.4	pCi/L	11/29/18 10:28	12/20/18 20:12	1
Radium 226 and Radium 228	2.65	U	5.95	5.96			pCi/L	11/29/18 10:28	12/20/18 20:12	1

Client Sample Results

Client: Environmental Standards Inc.
Project/Site: BRF_BS_20181116_1B

Job ID: 180-84164-1

Client Sample ID: BRF-BS-BG04-0.0/0.5-20181116

Lab Sample ID: 180-84164-7

Date Collected: 11/16/18 12:04

Matrix: Solid

Date Received: 11/17/18 09:30

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	**0.338**		0.128	0.133	1.00	0.128	pCi/g	11/20/18 15:32	12/11/18 01:59	1
Radium-228	0.287	U	0.248	0.250		0.315	pCi/g	11/20/18 15:32	12/11/18 01:59	1
Combined Radium 226 + 228	**0.626**		0.279	0.283			pCi/g	11/20/18 15:32	12/11/18 01:59	1

QC Sample Results

Client: Environmental Standards Inc.
Project/Site: BRF_BS_20181116_1B

Job ID: 180-84164-1

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

Lab Sample ID: MB 160-401912/1-A
Matrix: Solid
Analysis Batch: 404937

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 401912

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.007490	U	0.150	0.150	1.00	0.270	pCi/g	11/20/18 15:32	12/11/18 02:00	1
Radium-228	-0.06032	U	0.202	0.202		0.365	pCi/g	11/20/18 15:32	12/11/18 02:00	1
Combined Radium 226 + 228	-0.05283	U	0.252	0.252			pCi/g	11/20/18 15:32	12/11/18 02:00	1

Lab Sample ID: LCS 160-401912/2-A
Matrix: Solid
Analysis Batch: 404935

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 401912

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits
Americium-241	96.7	100.2		10.5		1.20	pCi/g	104	87 - 116
Cesium-137	28.0	28.41		3.07		0.280	pCi/g	101	87 - 120
Cobalt-60	12.3	12.37		1.32		0.0587	pCi/g	100	87 - 115

Lab Sample ID: 180-84164-7 DU
Matrix: Solid
Analysis Batch: 404937

Client Sample ID: BRF-BS-BG04-0.0/0.5-20181116
Prep Type: Total/NA
Prep Batch: 401912

Analyte	Sample Result	Sample Qual	DU Result	DU Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	RER	RER Limit
Radium-226	0.338		0.4437		0.163	1.00	0.145	pCi/g	0.36	1
Radium-228	0.287	U	0.1859	U	0.370		0.555	pCi/g	0.16	1
Combined Radium 226 + 228	0.626		0.6296		0.404			pCi/g	0.01	1

Lab Sample ID: MB 160-403262/1-A
Matrix: Water
Analysis Batch: 406794

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 403262

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	-9.168	U	21.5	21.5	50.0	36.5	pCi/L	11/29/18 10:28	12/20/18 10:39	1
Radium-228	22.33		16.1	16.2	50.0	18.5	pCi/L	11/29/18 10:28	12/20/18 10:39	1
Radium 226 and Radium 228	22.33	U	16.1	16.2			pCi/L	11/29/18 10:28	12/20/18 10:39	1

Lab Sample ID: LCS 160-403262/2-A
Matrix: Water
Analysis Batch: 406795

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 403262

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits
Americium-241	136000	130300		15100		279	pCi/L	96	90 - 111
Cesium-137	45100	44270		4430		73.7	pCi/L	98	90 - 111
Cobalt-60	31200	30160		2980		46.8	pCi/L	97	89 - 110

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

Lab Sample ID: 490-163317-A-9-B DU
Matrix: Water
Analysis Batch: 406794

Client Sample ID: Duplicate
Prep Type: Total/NA
Prep Batch: 403262

Analyte	Sample Result	Sample Qual		DU Result	DU Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit			RER	RER Limit
Radium-226	-12.2	U		7.337	U	16.1	50.0	17.2	pCi/L			0.54	1
Radium-228	23.2			10.88	U	19.8	50.0	30.7	pCi/L			0.32	1
Radium 226 and Radium 228	23.2	U		18.22	U	25.5			pCi/L			0.09	

QC Association Summary

Client: Environmental Standards Inc.
Project/Site: BRF_BS_20181116_1B

Job ID: 180-84164-1

Rad

Prep Batch: 401912

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-84164-1	BRF-BS-BG04-1.2/3.2-20181116	Total/NA	Solid	Fill_Geo-21	
180-84164-2	BRF-BS-DUP02-20181116	Total/NA	Solid	Fill_Geo-21	
180-84164-3	BRF-BS-BG04-6.5/8.5-20181116	Total/NA	Solid	Fill_Geo-21	
180-84164-5	BRF-BS-BG04-10.3/12.3-20181116	Total/NA	Solid	Fill_Geo-21	
180-84164-7	BRF-BS-BG04-0.0/0.5-20181116	Total/NA	Solid	Fill_Geo-21	
MB 160-401912/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-401912/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	
180-84164-7 DU	BRF-BS-BG04-0.0/0.5-20181116	Total/NA	Solid	Fill_Geo-21	

Prep Batch: 403262

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-84164-4	BRF-BS-FB08-20181116	Total/NA	Water	Fill_Geo-21	
180-84164-6	BRF-BS-EB03-20181116	Total/NA	Water	Fill_Geo-21	
MB 160-403262/1-A	Method Blank	Total/NA	Water	Fill_Geo-21	
LCS 160-403262/2-A	Lab Control Sample	Total/NA	Water	Fill_Geo-21	
490-163317-A-9-B DU	Duplicate	Total/NA	Water	Fill_Geo-21	

Tennessee Valley Authority

COOLER No.:	1	of	2
COC No:	BRF_BS_20181116_1B		
1 of 1 Pages			
Task Desc:	BRF_BS		

Chain-of-Custody / Analytical Request Document

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

Required Ship to Lab:		Required Project Information:		Required Sampler Information	
Lab Name:	TestAmerica Pittsburgh	Site ID #:	Bull Run Fossil Plant	Sampler:	W.Padgett, S.Bolden, M.Edmunds
Lab Address:	301 Alpha Drive	Project #:	175568274	Sampling Company:	Stantec
	Pittsburgh, PA 15238	Site Address	1265 Edgemoor Rd	Address	Warehouse Row North 1110 Market Street, Suite
		City	Clinton State, Zip: TN, 37716	City/State	Chattanooga Phone: 317-220-9374
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@envystd.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)	Sample Depth: Select Unit (End Depth)	MATRIX CODE	G= GRAB C=COMP	SAMPLE TYPE	SAMPLE DATE	SAMPLE TIME	# OF CONTAINERS	Comments/ Lab Sample I.D.	MS/MSD	Analysis: BACKGROUNDSOIL_RAD	Analysis: BACKGROUNDSOIL_BLANKS_RAD	Preserve: None	Preserve: HNO3	Filtered: N	Filtered: N
1	BRF-BS-BG04-1.2/3.2-20181116	BRF-BG-04	1.2	3.2	S	G	N	11/16/2018	1123	1		☐	X					
2	BRF-BS-DUP02-20181116	-	NA	NA	S	G	FD	11/16/2018	-	1		☐	X					
3	BRF-BS-BG04-6.5/8.5-20181116	BRF-BG-04	6.5	8.5	S	G	N	11/16/2018	1131	1		☐	X					
4	BRF-BS-FB08-20181116	BRF-BG-04	NA	NA	W	G	FB	11/16/2018	1110	3		☐		X				
5	BRF-BS-BG04-10.3/12.3-20181116	BRF-BG-04	10.3	12.3	S	G	N	11/16/2018	1143	1		☐	X					
6	BRF-BS-EB03-20181116	BRF-BG-04	NA	NA	W	G	EB	11/16/2018	1222	3		☐		X				
7	BRF-BS-BG04-0.0/0.5-20181116	BRF-BG-04	0.0	0.5	S	G	N	11/16/2018	1204	2		☑	X					

WP 11/16/2018

Additional Comments/Special Instructions:

WP 11/16/2018

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
Suama Bolden (Stantec)	11/16/2018	1430		11/17/18	930
WP 11/16/2018					
WP 11/16/2018					

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

SHIPPING METHOD:	SAMPLER NAME AND SIGNATURE
Courier	Walker Padgett
	Suama Bolden
	Matthew Edmunds

180-84164 Chain of Custody

Form TVA 30087A

Tennessee Valley Authority

COOLER No.:	2	of	2
COC No:	BRF_BS_20181116_1B		
1 of 1 Pages			
Task Desc:	BRF_BS		

Chain-of-Custody / Analytical Request Document

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

Required Ship to Lab:		Required Project Information:		Required Sampler Information	
Lab Name:	TestAmerica Pittsburgh	Site ID #:	Bull Run Fossil Plant	Sampler:	W.Padgett, S.Bolden, M.Edmunds
Lab Address:	301 Alpha Drive	Project #:	175568274	Sampling Company:	Stantec
	Pittsburgh, PA 15238	Site Address	1265 Edgemoor Rd	Address	Warehouse Row North 1110 Market Street, Suite
		City	Clinton State, Zip: TN, 37716	City/State	Chattanooga Phone: 317-220-9374
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: Start Depth (Depth Unit)	Sample Depth: End Depth (Select Unit)	MATRIX CODE	G= GRAB C=COMP	SAMPLE TYPE	SAMPLE DATE	SAMPLE TIME	# OF CONTAINERS	Comments/ Lab Sample I.D.	MS/MSD	Analysis: BACKGROUNDSOIL_RAD	Analysis: BACKGROUNDSOIL_BLANKS_RAD	Preserve: None	Preserve: HNO3	Filtered: N	Filtered: N
1	BRF-BS-BG04-1.2/3.2-20181116	BRF-BG-04	1.2	3.2	S	G	N	11/16/2018	1123	1		☐	X					
2	BRF-BS-DUP02-20181116	-	NA	NA	S	G	FD	11/16/2018	-	1		☐	X					
3	BRF-BS-BG04-6.5/8.5-20181116	BRF-BG-04	6.5	8.5	S	G	N	11/16/2018	1131	1		☐	X					
4	BRF-BS-FB08-20181116	BRF-BG-04	NA	NA	W	G	FB	11/16/2018	1110	3		☐		X				
5	BRF-BS-BG04-10.3/12.3-20181116	BRF-BG-04	10.3	12.3	S	G	N	11/16/2018	1143	1		☐	X					
6	BRF-BS-EB03-20181116	BRF-BG-04	NA	NA	W	G	EB	11/16/2018	1222	3		☐		X				
7	BRF-BS-BG04-0.0/0.5-20181116	BRF-BG-04	0.0	0.5	S	G	N	11/16/2018	1204	2		☑	X					

WP 11/16/2018

Additional Comments/Special Instructions:

WP 11/16/2018

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
Suama Bolden (Stantec)	11/16/2018	1430		11/17/18	930
WP 11/16/2018					
WP 11/16/2018					

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?

SHIPPING METHOD:	SAMPLER NAME AND SIGNATURE
Courier	Walker Padgett
	Suama Bolden
	Matthew Edmunds

Form TVA 30067A

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

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Client Information (Sub Contract Lab)	Sampler:	Lab PM: Lage, Gail	Carrier Tracking No(s):	COC No: 180-347806.1
Client Contact: Shipping/Receiving	Phone:	E-Mail: gail.lage@testamericainc.com	State of Origin: Tennessee	Page: Page 1 of 1
Company: TestAmerica Laboratories, Inc.		Accreditations Required (See note):		Job #: 180-84164-1
Address: 13715 Rider Trail North, ,	Due Date Requested: 12/20/2018			
City: Earth City	TAT Requested (days):			
State, Zip: MO, 63045				
Phone: 314-298-8566(Tel) 314-298-8757(Fax)	PO #:			
Email:	WO #:			
Project Name: TVA - BRF EIP - Stantec	Project #: 18019624			
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 (MOD) Radium-226/228	Total Number of containers	Special Instructions/Note:
			Preservation Code:						
BRF-BS-BG04-1.2/3.2-20181116 (180-84164-1)	11/16/18	11:23 Central		Solid			X	1	TVA
BRF-BS-DUP02-20181116 (180-84164-2)	11/16/18	Central		Solid			X	1	TVA
BRF-BS-BG04-6.5/8.5-20181116 (180-84164-3)	11/16/18	11:31 Central		Solid			X	1	TVA
BRF-BS-FB08-20181116 (180-84164-4)	11/16/18	11:10 Central		Water			X	3	TVA
BRF-BS-BG04-10.3/12.3-20181116 (180-84164-5)	11/16/18	11:43 Central		Solid			X	1	TVA
BRF-BS-EB03-20181116 (180-84164-6)	11/16/18	12:22 Central		Water			X	3	TVA
BRF-BS-BG04-0.0/0.5-20181116 (180-84164-7)	11/16/18	12:04 Central		Solid			X	1	TVA
BRF-BS-BG04-0.0/0.5-20181116 (180-84164-7DU)	11/16/18	12:04 Central	DU	Solid			X	1	TVA

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 *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: [signature]	Date/Time: 11/19/18 1200	Company: TA Pitt	Received by: Michael Fleen	Date/Time: 11/20/18 1000	Company: TA SR
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: 09/20/2016

Login Sample Receipt Checklist

Client: Environmental Standards Inc.

Job Number: 180-84164-1

Login Number: 84164
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.	True	
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: 180-84164-1

Login Number: 84164
List Number: 2
Creator: Hellm, Michael

List Source: Eurofins TestAmerica, St. Louis
List Creation: 11/20/18 12:27 PM

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.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	0.6, 1.4, 0.7
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.	N/A	
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: 180-84164-1

Login Number: 84164
List Number: 3
Creator: Hellm, Michael

List Source: Eurofins TestAmerica, St. Louis
List Creation: 11/20/18 12:37 PM

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.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	0.6, 1.4, 0.7
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	