ENVIRONMENTAL STANDARDS

Setting the Standards for Innovative Environmental Solutions

Data Validation Report
Tennessee Valley Authority
Bull Run Fossil Plant
Environmental Investigation Plan
Seep Soil Samples
Chain-of-Custody: BRF_SES_20190515_1B

This quality assurance (QA) review is based upon an examination of the data generated from the analyses of the five seep soil samples and two aqueous blanks collected on May 15, 2019, at the Tennessee Valley Authority (TVA) Bull Run Fossil Plant facility. These samples were collectively analyzed by TestAmerica Laboratories, Inc. (TestAmerica), of St. Louis, Missouri, for radium-226 and for radium-228 by US EPA Method 901.1.

This review was performed in accordance with the Environmental Investigation Plan for the Tennessee Valley Authority Bull Run Fossil Plant Environmental Investigation (BRF EIP; Revision 3, July 2018). This review was performed with guidance from the National Functional Guidelines for Inorganic Data Review (US EPA, October 2004); the US EPA Region IV Environmental Investigations Standard Operating Procedures and Quality Assurance Manual (November 2001); and the US EPA Region IV Data Validation Standard Operating Procedures These validation guidance documents specifically address analyses performed in accordance with the Contract Laboratory Program (CLP) analytical methods and are not completely applicable to the type of analyses and analytical protocols performed for the US EPA method utilized by the laboratory for these samples. Environmental Standards, Inc. (Environmental Standards) used professional judgment to determine the usability of the analytical results and compliance relative to the US EPA method utilized by the laboratory.

Summary

The analytical results and associated laboratory quality control (QC) samples were reviewed to determine the integrity of the reported analytical results and to ensure that the data met the established data quality objectives. This QA review includes all samples in TestAmerica Job Number 180-90260-1.

The samples that have undergone Stage 4 data validation are listed below:

Sample Identification	Laboratory Sample Identification	Job Number	Matrix	Date Sample Collected	Parameter(s) Examined
BRF-SES-04-20190515	180-90260-1	180-90260-1	Soil	5/15/19	Ra-226, Ra-228, Ra-226/228
BRF-SES-DUP01-20190515 (Field Duplicate of BRF-SES-04-20190515)	180-90260-2	180-90260-1	Soil	5/15/19	Ra-226, Ra-228, Ra-226/228
BRF-SES-FB01-20190515 (Field Blank)	180-90260-3	180-90260-1	Aq	5/15/19	Ra-226, Ra-228, Ra-226/228
BRF-SES-01-20190515	180-90260-4	180-90260-1	Soil	5/15/19	Ra-226, Ra-228, Ra-226/228
BRF-SES-02-20190515	180-90260-5	180-90260-1	Soil	5/15/19	Ra-226, Ra-228, Ra-226/228
BRF-SES-03-20190515	180-90260-6	180-90260-1	Soil	5/15/19	Ra-226, Ra-228, Ra-226/228
BRF-SES-EB01-20190515 (Equipment Blank)	180-90260-7	180-90260-1	Aq	5/15/19	Ra-226, Ra-228, Ra-226/228

Parameters Examined

Ra-226 - Radium-226 by US EPA Method 901.1.
Ra-228 - Radium-228 by US EPA Method 901.1.
Ra-226/228 - Radium-226/228 Calculation by US EPA Method 901.1.
Aq - Aqueous.

Items Reviewed	
Holding Times	Calibrations
Sample Preservation	Blank Results
Chain-of-Custody (COC) Records and Case Narratives	Sample Preparation
Laboratory Control Sample (LCS) Results	Laboratory and Field Duplicate Results
Quantitation of Positive Results	

Comments and Exceptions

- All analyses performed for the sampling event were in compliance with the requirements set forth in the EIP.

- Radium-226+228 was reported as the summation of the calculated activities for radium-226 and radium-228. The reported results for radium-226+228 for the samples included in this report may have been adjusted and/or qualified in accordance with the TVA reporting protocols and assigned an “S” reason code.

Qualifier Summary

- Any radium-226+228 result reported from the summation of one isotope activity less than the MDA (non-negative value) and one isotope activity greater than the MDA should be considered estimated and have been flagged “J” on the data tables.

Review performed by: Danielle Coles, Quality Assurance Chemist
Review reviewed by: Amanda J. Cover, Senior Quality Assurance Chemist
Review approved by: Andrew L. Piasecki, Senior Quality Assurance Chemist
Review approved by: Rock J. Vitale, CEAC, Technical Director of Chemistry/Principal
Date review completed: 8/22/19

SECTION 2

ANALYTICAL RESULTS

INORGANIC DATA QUALIFIERS

U* This result should be considered “not-detected” because it was detected in a rinsate blank or laboratory blank at a similar level.

UR Unreliable reporting limit; analyte may or may not be present in sample.

R Unreliable positive result; analyte may or may not be present in sample.

J Quantitation is approximate due to limitations identified during data validation.

UJ This analyte was not detected, but the reporting limit may or may not be higher due to a bias identified during data validation.

REASON CODES AND EXPLANATIONS

Reason Code	Explanation
BE	Equipment blank contamination. The result should be considered “not-detected.”
BF	Field blank contamination. The result should be considered “not-detected.”
BL	Laboratory blank contamination. The result should be considered “not-detected.”
BN	Negative laboratory blank contamination.
C	Initial and/or Continuing Calibration issue, indeterminate bias.
C+	Initial and/or Continuing Calibration issue. The result may be biased high.
C-	Initial and/or Continuing Calibration issue. The result may be biased low.
FD	Field duplicate imprecision.
FG	Total versus Dissolved Imprecision.
H	Holding time exceeded.
I	Internal standard recovery outside of acceptance limits.
L	LCS and LCSD recoveries outside of acceptance limits, indeterminate bias.
L+	LCS and/or LCSD recoveries outside of acceptance limits. The result may be biased high.
L-	LCS and/or LCSD recoveries outside of acceptance limits. The result may be biased low.
LD	Laboratory duplicate imprecision.
LP	LCS/LCSD imprecision.
M	MS and MSD recoveries outside of acceptance limits, indeterminate bias.
M+	MS and/or MSD recoveries outside of acceptance limits. The result may be biased high.
M-	MS and/or MSD recoveries outside of acceptance limits. The result may be biased low.
MP	MS/MSD imprecision.
P	Post-digestion spike recoveries outside of acceptance limits, indeterminate bias.
P+	Post-digestion spike recovery outside of acceptance limits. The result may be biased high.
P-	Post-digestion spike recovery outside of acceptance limits. The result may be biased low.
Q	Chemical Preservation issue.
R	RL standards outside of acceptance limits, indeterminate bias.
R+	RL standard(s) outside of acceptance limits. The result may be biased high.
R-	RL standard(s) outside of acceptance limits. The result may be biased low.
RL	Reported result between the MDL and the QL.
S	Radium-226+228 flagged due to reporting protocol for combine results.
T	Temperature preservation issue.
SD	Serial Dilution imprecision.
X	Percent solids < 50%.
Y+	Chemical Yield outside of acceptance limits. The result may be biased high.
Y-	Chemical yield outside of acceptance limits. The result may be biased low.
Z	ICP or ICP/MS Interference.
ZZ	Other.

TVA CCR Program
Facility: Bull Run Fossil Plant
SDG: 180902601

Lab Sample ID	180-90260-1
Sys Sample Code	BRF-SES-04-20190515
Sample Name	BRF-SeS-04-20190515
Sample Date	5/15/2019 9:15:00 AM
Location	AOI 4
Sample Type	N
Parent Sample	

Analytic Method	Chemical Name	CAS Rn	Fraction	Result Unit	Final Result	Final Qual	Reason code	Uncertainty	Final MDL	Final RL	Final QL	Final Detect	Final Report	DF	Basis
EPA 901.1	Radium 226 + radium 228	RA226/228	T	PCI/G	2.06			0.486				Y	Yes	1	NA
	Radium 228	15262-20-1	T	PCI/G	1.20			0.423	0.381	0.381	1.00	Y	Yes	1	NA
	Radium-226	13982-63-3	T	PCI/G	0.857			0.239	0.209	0.209	1.00	Y	Yes	1	NA

TVA CCR Program
Facility: Bull Run Fossil Plant
SDG: 180902601

Lab Sample ID	180-90260-2
Sys Sample Code	BRF-SES-DUP01-20190515
Sample Name	BRF-SeS-DUP01-20190515
Sample Date	5/15/2019 12:00:00 AM
Location	AOI 4
Sample Type	FD
Parent Sample	BRF-SES-04-20190515

Analytic Method	Chemical Name	CAS Rn	Fraction	Result Unit	Final Result	Final Qual	Reason code	Uncertainty	Final MDL	Final RL	Final QL	Final Detect	Final Report	DF	Basis
EPA 901.1	Radium 226 + radium 228	RA226/228	T	PCI/G	2.71			0.452				Y	Yes	1	NA
	Radium 228	15262-20-1	T	PCI/G	1.56			0.360	0.164	0.164	1.00	Y	Yes	1	NA
	Radium-226	13982-63-3	T	PCI/G	1.15			0.274	0.165	0.165	1.00	Y	Yes	1	NA

TVA CCR Program
Facility: Bull Run Fossil Plant
SDG: 180902601

Lab Sample ID	180-90260-3
Sys Sample Code	BRF-SES-FB01-20190515
Sample Name	BRF-SeS-FB01-20190515
Sample Date	5/15/2019 11:04:00 AM
Location	AOI 4
Sample Type	FB
Parent Sample	

Analytic Method	Chemical Name	CAS Rn	Fraction	Result Unit	Final Result	Final Qual	Reason code	Uncertainty	Final MDL	Final RL	Final QL	Final Detect	Final Report	DF	Basis
EPA 901.1	Radium 226 + radium 228	RA226/228	T	PCI/L	26.6	J	S	28.5				Y	Yes	1	NA
	Radium 228	15262-20-1	T	PCI/L	26.6			18.6	18.7	18.7	50.0	Y	Yes	1	NA
	Radium-226	13982-63-3	T	PCI/L	-2.07	U		21.6	36.7	36.7	50.0	N	Yes	1	NA

Lab Sample ID	180-90260-4
Sys Sample Code	BRF-SES-01-20190515
Sample Name	BRF-SeS-01-20190515
Sample Date	5/15/2019 1:52:00 PM
Location	AOI 1
Sample Type	N
Parent Sample	

Analytic Method	Chemical Name	CAS Rn	Fraction	Result Unit	Final Result	Final Qual	Reason code	Uncertainty	Final MDL	Final RL	Final QL	Final Detect	Final Report	DF	Basis
EPA 901.1	Radium 226 + radium 228	RA226/228	T	PCI/G	1.28			0.307				Y	Yes	1	NA
	Radium 228	15262-20-1	T	PCI/G	0.628			0.219	0.162	0.162	1.00	Y	Yes	1	NA
	Radium-226	13982-63-3	T	PCI/G	0.655			0.215	0.168	0.168	1.00	Y	Yes	1	NA

TVA CCR Program
Facility: Bull Run Fossil Plant
SDG: 180902601

Lab Sample ID	180-90260-5
Sys Sample Code	BRF-SES-02-20190515
Sample Name	BRF-SeS-02-20190515
Sample Date	5/15/2019 3:15:00 PM
Location	AOI 2
Sample Type	N
Parent Sample	

Analytic Method	Chemical Name	CAS Rn	Fraction	Result Unit	Final Result	Final Qual	Reason code	Uncertainty	Final MDL	Final RL	Final QL	Final Detect	Final Report	DF	Basis
EPA 901.1	Radium 226 + radium 228	RA226/228	T	PCI/G	0.951			0.208				Y	Yes	1	NA
	Radium 228	15262-20-1	T	PCI/G	0.479			0.157	0.0896	0.0896	1.00	Y	Yes	1	NA
	Radium-226	13982-63-3	T	PCI/G	0.472			0.136	0.131	0.131	1.00	Y	Yes	1	NA

TVA CCR Program
Facility: Bull Run Fossil Plant
SDG: 180902601

Lab Sample ID	180-90260-6
Sys Sample Code	BRF-SES-03-20190515
Sample Name	BRF-SeS-03-20190515
Sample Date	5/15/2019 3:47:00 PM
Location	AOI 3
Sample Type	N
Parent Sample	

Analytic Method	Chemical Name	CAS Rn	Fraction	Result Unit	Final Result	Final Qual	Reason code	Uncertainty	Final MDL	Final RL	Final QL	Final Detect	Final Report	DF	Basis
EPA 901.1	Radium 226 + radium 228	RA226/228	T	PCI/G	1.74			0.396				Y	Yes	1	NA
	Radium 228	15262-20-1	T	PCI/G	1.14			0.324	0.213	0.213	1.00	Y	Yes	1	NA
	Radium-226	13982-63-3	T	PCI/G	0.597			0.227	0.217	0.217	1.00	Y	Yes	1	NA

Lab Sample ID	180-90260-7
Sys Sample Code	BRF-SES-EB01-20190515
Sample Name	BRF-SeS-EB01-20190515
Sample Date	5/15/2019 6:02:00 PM
Location	AOI 3
Sample Type	EB
Parent Sample	

Analytic Method	Chemical Name	CAS Rn	Fraction	Result Unit	Final Result	Final Qual	Reason code	Uncertainty	Final MDL	Final RL	Final QL	Final Detect	Final Report	DF	Basis
EPA 901.1	Radium 226 + radium 228	RA226/228	T	PCI/L	6.07	U	S	24.9				N	Yes	1	NA
	Radium 228	15262-20-1	T	PCI/L	6.07	U		14.8	33.4	33.4	50.0	N	Yes	1	NA
	Radium-226	13982-63-3	T	PCI/L	-5.10	U		20.0	34.0	34.0	50.0	N	Yes	1	NA

SECTION 3

SUPPORTING DOCUMENTATION FOR QUALIFIERS

ENVIRONMENTAL STANDARDS

RADIOLOGICAL ANALYSIS SUPPORT DOCUMENTATION

ESI project name: TVA BRF EI Implementation
Sample Collection Dates: 5/15/19
Job Number: **20188395.A000**
Project Manager: AJC
Laboratory: TestAmerica-St. Louis

Reviewed by: Danielle Coles
Approved by: AJC
Completion Date: 8/19

Applicable Sample No's (X) — Refer to Table 1 in the Quality Assurance Review

Deliverable:			Sample No.	Lab Control No.
	Level IV (Full)	(X)	180-90260-1	
	Limited	( )		
	Other:			

The following table indicates criteria that were examined, the identified problems, and support documentation attachments

	Criteria Examined in Detail Check (√) if Yes or Footnote Letter for Comments Below					Problems Identified Check (√) if Yes or Footnote Letter for Comments Below					Support Documentation Attachments Check (√) if Yes or Footnote Letter for Comments Below				
	901.1					901.1					901.1				
Holding Times	X														
Blank Analysis Results	X														
Laboratory Control Standard (LCS)	X														
Tracer/Chemical Yield															
Duplicate Analysis: (X) Field (X) Lab	X														
Matrix Spike Results															
Quantitation of Results	X														
Detection Limit															
Efficiency/Energy Calibrations	X														
Initial Calibration Verifications	X														
Annual Calibration Verifications															
Continuing Calibration Checks	X														
Continuing Calibration Backgrounds	X														
Sample Preservation	X														
Condition on Receipt	X														
Others: Headspace	X														

Comments: All results are usable unless otherwise qualified.

Client Sample Results

Client: Environmental Standards Inc.
Project/Site: BRF_SES_20190515_1B

Job ID: 180-90260-1

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

Client Sample ID: BRF-SES-FB01-20190515
Date Collected: 05/15/19 11:04
Date Received: 05/17/19 09:00

Lab Sample ID: 180-90260-3
Matrix: Water

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium 226 and 228 (positive only)	26.6	U	18.4	18.6			pCi/L	05/28/19 16:16	06/20/19 06:19	1
Radium-226	-2.07	U	21.6	21.6	50.0	36.7	pCi/L	05/28/19 16:16	06/20/19 06:19	1
Radium-228	**26.6**	U,S	18.4	~~18.6~~ 28.5	50.0	18.7	pCi/L	05/28/19 16:16	06/20/19 06:19	1

all ND, no qual

Client Sample Results

Client: Environmental Standards Inc.
Project/Site: BRF_SES_20190515_1B

Job ID: 180-90260-1

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

Client Sample ID: BRF-SES-EB01-20190515
Date Collected: 05/15/19 18:02
Date Received: 05/17/19 09:00

Lab Sample ID: 180-90260-7
Matrix: Water

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium 226 and 228 (positive only)	6.07	U	14.8	14.8			pCi/L	05/28/19 16:16	06/20/19 08:48	1
Radium-226	-5.10	U	20.0	20.0	50.0	34.0	pCi/L	05/28/19 16:16	06/20/19 08:48	1
Radium-228	6.07	U,S	14.8	~~14.8~~ 29.9	50.0	33.4	pCi/L	05/28/19 16:16	06/20/19 08:48	1

all ND, no qual

SECTION 4

CASE NARRATIVE AND CHAIN-OF-CUSTODY RECORD

Job ID: 180-90260-1

Laboratory: Eurofins TestAmerica, Pittsburgh

Narrative

Job Narrative
180-90260-1

Receipt
The samples were received on 5/17/2019 9:00 AM; the samples arrived in good condition, properly preserved and on ice. The temperatures of the 5 coolers at receipt time were 2.4° C, 2.6° C, 2.8° C, 3.0° C and 3.0° C.

RAD
Method 901.1: Gamma Prep Batch 160-430196
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

BRF-SES-04-20190515 (180-90260-1), BRF-SES-DUP01-20190515 (180-90260-2), BRF-SES-01-20190515 (180-90260-4), BRF-SES-02-20190515 (180-90260-5), BRF-SES-03-20190515 (180-90260-6), BRF-SES-03-20190515 (180-90260-6[DU]), (LCS 160-430196/2-A) and (MB 160-430196/1-A)

Method 901.1: Gamma Prep Batch 160-430074
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

BRF-SES-FB01-20190515 (180-90260-3), BRF-SES-EB01-20190515 (180-90260-7), (LCS 160-430074/2-A), (MB 160-430074/1-A), (180-90101-A-1-A) and (180-90101-A-1-B DU)

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

Sample Summary

Client: Environmental Standards Inc.
Project/Site: BRF_SES_20190515_1B

Job ID: 180-90260-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
180-90260-1	BRF-SES-04-20190515	Solid	05/15/19 09:15	05/17/19 09:00	
180-90260-2	BRF-SES-DUP01-20190515	Solid	05/15/19 00:00	05/17/19 09:00	
180-90260-3	BRF-SES-FB01-20190515	Water	05/15/19 11:04	05/17/19 09:00	
180-90260-4	BRF-SES-01-20190515	Solid	05/15/19 13:52	05/17/19 09:00	
180-90260-5	BRF-SES-02-20190515	Solid	05/15/19 15:15	05/17/19 09:00	
180-90260-6	BRF-SES-03-20190515	Solid	05/15/19 15:47	05/17/19 09:00	
180-90260-7	BRF-SES-EB01-20190515	Water	05/15/19 18:02	05/17/19 09:00	

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.:	of 6
COC No:	BRF_SES_20190515_1B
1 of 1 Pages	
Task Desc:	BRF_SES

Rev 1 B3 5/20/19
Rev 2 7/19/19 B3

Required Ship to Lab:

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

Lab Manager Contact Information

Lab PM:	Gail Lage
Phone/Fax:	515-301-5741/615-726-3404
Lab Email:	Gail.Lage@testamericainc.com

Required Project Information:

Site ID #:	Bull Run Fossil Plant
Project #:	NA
Site Address	1265 Edgemoor Rd
City	Clinton State, Zip: TN, 37716
Site PM Name:	Roy Quinn
Phone/Fax:	423-751-3753
Site PM Email:	[illegible]

Required Sampler Information

Sampler:	S.Bolden, A.Wilson & D.Norman
Sampling Company:	Stantec
Address	501 Greenspace Park Ross, Suite 22
City/State	Nashville, TN Phone: (615) 885-1144
Sampling Team Number:	1
Send EDD/Hard Copy to:	[illegible]

Analysis Turnaround Time

* CALENDAR DAYS * WORKING DAYS

TAT if different from Below _____

- 24 Hours
- 3 Business Days
- 5 Business Days
- 10 Business Days

ITEMS #	SAMPLE ID Samples IDs MUST BE UNIQUE	SAMPLE LOCATION	Sample Depth Start Depth (Depth Unit: Select Unit)	Sample Depth End Depth	MATRIX CODE	G= GRAB C=COMP	SAMPLE TYPE	SAMPLE DATE	SAMPLE TIME	# OF CONTAINERS	Comments/ Lab Sample I.D.	MS/MSD	Analysis: SEP_SOIL_RAD	Analysis: SEP_SOIL_BLANK_RAD
1	BRF-SeS-04-20190515	~~SeS04~~	0.0	0.3	SES	C	N	5/15/2019	0915	2			X	
2	BRF-SeS-DUP01-20190515	NA	NA	NA	SES	C	FD	5/15/2019	NA	1			X	
3	BRF-SeS-FB01-20190515	~~SeS04~~	NA	NA	AQ	G	FB	5/15/2019	1104	3				X
4	BRF-SeS-01-20190515	~~SeS01~~	0.0	0.3	SES	C	N	5/15/2019	1352	1			X	
5	BRF-SeS-02-20190515	~~SeS02~~	0.0	0.3	SES	C	N	5/15/2019	1515	2			X	
6	BRF-SeS-03-20190515	~~SeS03~~	0.0	0.3	SES	C	N	5/15/2019	1547	3		X	X	
7	BRF-SeS-EB01-20190515	~~SeS06~~	NA	NA	AQ	G	EB	5/15/2019	1602	3				X

Analysis: Filtered? Preserved? Analysis: [illegible]

A104
A104
A101
A102
A103
A103

Additional Comments/Special Instructions:

Additional volume collected should be used for laboratory duplicate analysis.

B3 5/20/19

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
Susana Bolden / Stantec	5/16/2019	15:00	[illegible]		
			5/17/19	0700	

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	Susana Bolden / [illegible]
	Anna Wilson / [illegible]
	Dominic Norman / [illegible]

AOI Ø4 7588 - 3.0
AOI Ø4 7741 - 3.0
AOI Ø1 7352 - 2.8
AOI Ø2
B3 7/19/19

AOI Ø3 7363 - 2.6
AOI Ø3 7374 - 2.4
B3 7/19/19

180-90260 Chain of Custody

Form TVA 39067A

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 5
COC No:	BRF_SES_20190515_1B
Page	1 of 1 Pages
Task Desc:	BRF_SES

Rev 1 5/26/19

Required Ship to Lab:		Required Project Information:		Required Sampler Information	
Lab Name:	TestAmerica Pittsburgh	Site ID #:	Bull Run Fossil Plant	Sampler:	S.Bolden, A.Wilson & D. Norman
Lab Address:	301 Alpha Drive	Project #:	NA	Sampling Company:	Stantec
	Pittsburgh, PA 15238	Site Address	1299 Edgemoor Rd	Address	651 Grassmere Park Road, Suite 22
		City	Clinton State, Zip: TN, 37716	City/State	Nashville, TN Phone: (615) 885-1144
Lab Manager Contact Information		Site PM Name:	Roy Quinn		
Lab PM:	Gail Lage	Phone/Fax:	423-751-3753	Sampling Team Number:	1
Phone/Fax:	515-301-5741/615-726-3404	Site PM Email:	[illegible]	Send EDD/Hard Copy to:	[illegible]
Lab Email:	[illegible]				

Analysis Turnaround Time

- CALENDAR DAYS
- WORKING DAYS

TAT if different from Below _____

- 24 Hours
- 3 Business Days
- 5 Business Days
- 10 Business Days

ITEMS #	SAMPLE ID Samples IDs MUST BE UNIQUE	SAMPLE LOCATION	Sample Depth: Depth Unit / Select 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	Analytes: SEP_SOIL_RAD	SEP_SOIL_BLANKS_RAD	Filtered	Preservative
1	BRF-SeS-04-20190515	~~SeS04~~	0.0	0.3	SES	C	N	5/15/2019	0915	2			X			
2	BRF-SeS-DUP01-20190515	NA	NA	NA	SES	C	FD	5/15/2019	NA	1			X			
3	BRF-SeS-FB01-20190515	~~SeS04~~	NA	NA	AQ	G	FB	5/15/2019	1104	3				X		
4	~~BRF-SeS-01-20190515~~	~~SeS01~~	0.0	0.3	SES	C	N	5/15/2019	1352	1			X			
5	~~BRF-SeS-02-20190515~~	~~SeS02~~	0.0	0.3	SES	C	N	5/15/2019	1515	2			X			
6	BRF-SeS-03-20190515	~~SeS03~~	0.0	0.3	SES	C	N	5/15/2019	1547	3		X	X			
7	~~BRF-SeS-EB01-20190515~~	~~SeS05~~	NA	NA	AQ	G	EB	5/15/2019	1802	3				X		

A104
A104
A101
A102
A103
A103

Additional Comments/Special Instructions:

Additional volume collected should be used for laboratory duplicate analysis.

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
Suzana Bolden / Stantec	5/16/2019	15:00	[illegible]		
			5/17/19	0900	

SHIPPING METHOD	SAMPLER NAME AND SIGNATURE
Courier	Suzana Bolden / [illegible]
	Anna Wilson / [illegible]
	Dominic Norman / [illegible]

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

5/26/19

9582 - 3.0
7341 - 3.0
7352 - 2.8
7363 - 2.6
7374 - 2.4

180-90260 Chain of Custody

Form TVA 30087A

6/28/2019

Rev 1 BJ 5/26/19

TVA Environmental Investigations

Tennessee Valley Authority

COOLER No.:			of	5
COC No:	BRF_SES_20190515_1B			
1 of 1 Pages				
Task Desc:	BRF_SES			

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:

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

Lab Manager Contact Information

Lab PM:	Gail Lage
Phone/Fax:	515-301-5741/615-726-3404
Lab Email:	gail.lage@testamericainc.com

Required Project Information:

Site ID #:	Bull Run Fossil Plant
Project #:	NA
Site Address	1265 Edgemoor Rd
City	Clinton State, Zip: TN, 37716
Site PM Name:	Roy Quinn
Phone/Fax:	423-751-3753
Site PM Email:	[illegible]

Required Sampler Information

Sampler:	S.Belden, A.Wilson & D. Norman
Sampling Company:	Stantec
Address	601 Grassmere Park Road, Suite 22
City/State	Nashville, TN Phone: (615) 885-1144
Sampling Team Number:	1
Send EDD/Hard Copy to:	[illegible]

Analysis Turnaround Time

CALENDAR DAYS WORKING DAYS

TAT if different from Below _____

- 24 Hours
- 3 Business Days
- 5 Business Days
- 10 Business Days

ITEMS #	SAMPLE ID Samples IDs MUST BE UNIQUE	SAMPLE LOCATION	Sample Depth: Depth Unit	Sample 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: BRF_SOIL_RAD	Analysis: BRF_SOIL_BLANKS_RAD	Filtered	Preserve
1	BRF-SeS-04-20190515	~~SeS04~~	0.0	0.3	SES	C	N	5/15/2019	0915	2			X			
2	BRF-SeS-DUP01-20190515	NA	NA	NA	SES	C	FD	5/15/2019	NA	1			X			
3	BRF-SeS-FB01-20190515	~~SeS04~~	NA	NA	AQ	G	FB	5/15/2019	1104	3				X		
4	BRF-SeS-01-20190515	~~SeS01~~	0.0	0.3	SES	C	N	5/15/2019	1352	1			X			
5	BRF-SeS-02-20190515	~~SeS02~~	0.0	0.3	SES	C	N	5/15/2019	1515	2			X			
6	BRF-SeS-03-20190515	~~SeS03~~	0.0	0.3	SES	C	N	5/15/2019	1547	3		X	X			
7	BRF-SeS-EB01-20190515	~~SeS08~~	NA	NA	AQ	G	EB	5/15/2019	1802	3				X		

A104
A104
A101
A102
A103
A103

Additional Comments/Special Instructions:

Additional volume collected should be used for laboratory duplicate analysis.

BJ 5/26/19

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
Suama Belden / Stantec	5/16/2019	18:00	[illegible]		
			5/17/19	0900	

SHIPPING METHOD:	SAMPLER NAME AND SIGNATURE
Courier	Suama Belden / [illegible]
	Anna Wilson / [illegible]
	Dominic Norman / [illegible]

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

9582 - 3.0
7341 - 3.0
7352 - 2.8
7363 - 2.6
7374 - 2.4

180-90260 Chain of Custody

Form TVA 30087A

Tennessee Valley Authority

COOLER No.:	2	of	5
COC No:	BRF_SES_20190515_1B		
1 of 1 Pages			
Task Desc:	BRF_SES		

Rev 1 BB 5/26/19

6/28/2019

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:	S Belden, A Wilson AD Norman		
Lab Address:	301 Alpha Drive	Project #:	NA			Sampling Company:	Stantec		
	Pittsburgh, PA 15238	Site Address	1265 Edgemoor Rd			Address	601 Grassmere Park Road, Suite 22		
		City	Clinton	State, Zip:	TN, 37716	City/State	Nashville, TN	Phone:	(615) 885-1144
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:	[illegible]			Send EDD/Hard Copy to:	[illegible]		
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

ITEMS #	SAMPLE ID Samples IDs MUST BE UNIQUE	SAMPLE LOCATION	Sample Depth: Start Depth	Sample Depth: End Depth (Depth Unit / Select Unit)	MATRIX CODE	G= GRAB C=COMP	SAMPLE TYPE	SAMPLE DATE	SAMPLE TIME	# OF CONTAINERS	Comments/ Lab Sample I.D.	MS/MSD	Analysis: SEEP_SOIL_RAD	Analysis: SEEP_SOIL_BLANKS_RAD
1	BRF-SeS-04-20190515	~~SeS04~~	0.0	0.3	SES	C	N	5/15/2019	0915	2			X	
2	BRF-SeS-DUP01-20190515	NA	NA	NA	SES	C	FD	5/15/2019	NA	1			X	
3	BRF-SeS-FB01-20190515	~~SeS04~~	NA	NA	AQ	G	FB	5/15/2019	1104	3				X
4	BRF-SeS-01-20190515	~~SeS01~~	0.0	0.3	SES	C	N	5/15/2019	1352	1			X	
5	BRF-SeS-02-20190515	~~SeS02~~	0.0	0.3	SES	C	N	5/15/2019	1515	2			X	
6	BRF-SeS-03-20190515	~~SeS03~~	0.0	0.3	SES	C	N	5/15/2019	1547	3		X	X	
7	BRF-SeS-EB01-20190515	~~SeS03~~	NA	NA	AQ	G	EB	5/15/2019	1802	3				X

A104 A104 A101 A102 A103 A103

BB 5/26/19

Filtered: N N

Preserve: None HNO3

Analysis: Ra226/228

Additional Comments/Special Instructions:

Additional volume collected should be used for laboratory duplicate analysis.

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
Suanna Belden / Stantec	5/15/2019	16:00			

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	Suanna Belden /
	Anna Wilson /
	Dominic Norman /

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BB 5/26/19

TVA Environmental Investigations

Tennessee Valley Authority

COOLER No.:	3	of	5
COC No:	BRF_SES_20190515_1B		
1 of 1 Pages			
Task Desc:	BRF_SES		

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:	S Bolden, A Wilson & D. Norman
Lab Address:	301 Alpha Drive	Project #:	NA	Sampling Company:	Stantec
	Pittsburgh, PA 15238	Site Address	1205 Edgemoor Rd	Address	601 Grassmere Park Road, Suite 22
		City	Clinton State, Zip: TN, 37716	City/State	Nashville, TN Phone: (615) 885-1144
Lab Manager Contact Information		Site PM Name:	Roy Quinn		
Lab PM:	Gail Lage	Phone/Fax:	423-751-3753	Sampling Team Number:	1
Phone/Fax:	515-301-5741/615-726-3404	Site PM Email:	[redacted]	Send EDD/Hard Copy to:	[redacted]
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

ITEMS #	SAMPLE ID Samples IDs MUST BE UNIQUE	SAMPLE LOCATION	Sample Depth: Depth Unit / Select 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 (Y/N): SEDP_SOIL_RAD	Preserve (Y/N): HNO3	Analysis: SEDP_SOIL_BLANKS_RAD
1	BRF-SeS-04-20190515	~~SeS04~~	0.0	0.3	SES	C	N	5/15/2019	0915	2					X
2	BRF-SeS-DUP01-20190515	NA	NA	NA	SES	C	FD	5/15/2019	NA	1					X
3	BRF-SeS-FB01-20190515	~~SeS04~~	NA	NA	AQ	G	FB	5/15/2019	1104	3					X
4	BRF-SeS-01-20190515	~~SeS01~~	0.0	0.3	SES	C	N	5/15/2019	1352	1					X
5	BRF-SeS-02-20190515	~~SeS02~~	0.0	0.3	SES	C	N	5/15/2019	1515	2					X
6	BRF-SeS-03-20190515	~~SeS03~~	0.0	0.3	SES	C	N	5/15/2019	1547	3		X			X
7	BRF-SeS-EB01-20190515	~~SeS03~~	NA	NA	AQ	G	EB	5/15/2019	1802	3					X

A104
A104
A101
A102
A103
A103

BB 5/26/19

Additional Comments/Special Instructions:

Additional volume collected should be used for laboratory duplicate analysis.

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
Suama Bolden / Stantec	5/16/2019	16:00			

SHIPPING METHOD:	SAMPLER NAME AND SIGNATURE
Courier	Suama Bolden /
	Anna Wilson /
	Dominic Norman /

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

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.:	4	of	5
COC No:	BRF_SES_20190515_1B		
1 of 1 Pages			
Task Desc:	BRF_SES		

Rev 1 BJ 5/26/19

6/28/2019

Required Ship to Lab:

Lab Name:	TestAmerica Pittsburgh
Lab Address:	301 Alpha Drive 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 #:	Bull Run Fossil Plant		
Project #:	NA		
Site Address	1265 Edgemoor Rd		
City	Clinton	State, Zip:	TN, 37716
Site PM Name:	Roy Quinn		
Phone/Fax:	423-751-3753		
Site PM Email:	[illegible]		

Required Sampler Information

Sampler:	S Bolden, A.Wilson & D. Norman		
Sampling Company:	Stantec		
Address	601 Grassmere Park Road, Suite 22		
City/State	Nashville, TN	Phone:	(615) 885-1144
Sampling Team Number:	1		
Send EDD/Hard Copy to:	[illegible]		

Analysis Turnaround Time

- CALENDAR DAYS
- WORKING DAYS

TAT if different from Below _____

- 24 Hours
- 3 Business Days
- 5 Business Days
- 10 Business Days

ITEMS #	SAMPLE ID Samples IDs MUST BE UNIQUE	SAMPLE LOCATION	Sample Depth: Depth Unit	Sample 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: BRF_SES_BAD	Analysis: BRF_SES_BLANKS_BAD	Filtered	Preservative
1	BRF-SeS-04-20190515	~~SeS04~~ A104	0.0	0.3	SES	C	N	5/15/2019	0915	2			X			
2	BRF-SeS-DUP01-20190515	NA A104	NA	NA	SES	C	FD	5/15/2019	NA	1			X			
3	BRF-SeS-FB01-20190515	~~SeS04~~ A101	NA	NA	AQ	G	FB	5/15/2019	1104	3				X		
4	BRF-SeS-01-20190515	~~SeS01~~ A102	0.0	0.3	SES	C	N	5/15/2019	1352	1			X			
5	BRF-SeS-02-20190515	~~SeS02~~ A103	0.0	0.3	SES	C	N	5/15/2019	1515	2			X			
6	BRF-SeS-03-20190515	~~SeS03~~ A103	0.0	0.3	SES	C	N	5/15/2019	1547	3		X	X			
7	BRF-SeS-EB01-20190515	~~SeS03~~	NA	NA	AQ	G	EB	5/15/2019	1802	3				X		

BJ 5/26/19

AWS 06/07/19

AW 5/16/19

AW 5/16/19

Additional Comments/Special Instructions:

Additional volume collected should be used for laboratory duplicate analysis.

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
Suama Bolden / Stantec [illegible]	5/16/2019	15:00			

SHIPPING METHOD:	SAMPLER NAME AND SIGNATURE
Courier	Suama Bolden / [illegible]
	Anna Wilson / [illegible]
	Dominic Norman / [illegible]

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 39067A

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.:	5 of 5
COC No:	BRF_SES_20190515_1B
1 of 1 Pages	
Task Desc:	BRF_SES

Rev/ B3 5/26/19 6/28/2019

Required Ship to Lab:

Lab Name:	TestAmerica Pittsburgh
Lab Address:	301 Alpha Drive 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 #:	Bull Run Fossil Plant		
Project #:	NA		
Site Address	1265 Edgemoor Rd		
City	Clinton	State, Zip:	TN, 37716
Site PM Name:	Roy Quinn		
Phone/Fax:	423-751-3753		
Site PM Email:	[illegible]		

Required Sampler Information

Sampler:	S.Bolden, A.Wilson & D. Norman		
Sampling Company:	Stantec		
Address	661 Grassmere Park Road, Suite 22		
City/State	Nashville, TN	Phone:	(615) 885-1144
Sampling Team Number:	1		
Send EDD/Hard Copy to:	[illegible]		

Analysis Turnaround Time

- CALENDAR DAYS
- WORKING DAYS

TAT if different from Below _____

- 24 Hours
- 3 Business Days
- 5 Business Days
- 10 Business Days

ITEMS #	SAMPLE ID Samples IDs MUST BE UNIQUE	SAMPLE LOCATION	Sample Depth: Depth Unit	Sample 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: SEP_SOIL_RAD	Analysis: SEP_SOIL_BLANKS_RAD	Filtered: Yes	Filtered: No	Preserve: Yes	Preserve: No	Analysis: [illegible]	Analysis: [illegible]
1	BRF-SeS-04-20190515	~~SeS04~~ A104	0.0	0.3	SES	C	N	5/15/2019	0915	2			X							
2	BRF-SeS-DUP01-20190515	NA	NA	NA	SES	C	FD	5/15/2019	NA	1			X							
3	BRF-SeS-FB01-20190515	~~SeS04~~ A104	NA	NA	AQ	G	FB	5/15/2019	1104	3				X						
4	BRF-SeS-01-20190515	~~SeS01~~ A101	0.0	0.3	SES	C	N	5/15/2019	1352	1			X							
5	BRF-SeS-02-20190515	~~SeS02~~ A102	0.0	0.3	SES	C	N	5/15/2019	1515	2			X							
6	BRF-SeS-03-20190515	~~SeS03~~ A103	0.0	0.3	SES	C	N	5/15/2019	1547	3		X	X							
7	BRF-SeS-EB01-20190515	~~SeS03~~ A103	NA	NA	AQ	G	EB	5/15/2019	1802	3				X						

B3 05/26/19

Additional Comments/Special Instructions:

Additional volume collected should be used for laboratory duplicate analysis.

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
Suzana Bolden / Stantec	5/16/2019	15:00			

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	Suzana Bolden /
	Anna Wilson /
	Dominic Norman /

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.:	of 5
COC No:	BRF_SES_20190515_1B
1 of 1 Pages	
Task Desc:	BRF_SES

Required Ship to Lab:

Lab Name:	TestAmerica Pittsburgh
Lab Address:	301 Alpha Drive 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 #:	Bull Run Fossil Plant
Project #:	NA
Site Address	1265 Edgemoor Rd
City	Clinton State, Zip: TN, 37716
Site PM Name:	Roy Quinn
Phone/Fax:	423-751-3753
Site PM Email:	[illegible]

Required Sampler Information

Sampler:	S.Bolden, A.Wilson & D. Norman
Sampling Company:	Stantec
Address	601 Gressmere Park Road, Suite 22
City/State	Nashville, TN Phone: (615) 885-1144
Sampling Team Number:	1
Send EDD/Hard Copy to:	[illegible]

Analysis Turnaround Time

* CALENDAR DAYS * WORKING DAYS

TAT if different from Below _____

- 24 Hours
- 3 Business Days
- 5 Business Days
- 10 Business Days

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: MEP_SOIL_RAD	Analysis: MEP_SOIL_BLANKS_RAD	Filtered: N	Filtered: N	Preserve: None	Preserve: HNO3
1	BRF-SeS-04-20190515	SeS04	0.0	0.3	SES	C	N	5/15/2019	0915	2		*	X					
2	BRF-SeS-DUP01-20190515	NA	NA	NA	SES	C	FD	5/15/2019	NA	1		*	X					
3	BRF-SeS-FB01-20190515	SeS04	NA	NA	AQ	G	FB	5/15/2019	1104	3		*		X				
4	BRF-SeS-01-20190515	SeS01	0.0	0.3	SES	C	N	5/15/2019	1352	1		*	X					
5	BRF-SeS-02-20190515	SeS02	0.0	0.3	SES	C	N	5/15/2019	1515	2		*	X					
6	BRF-SeS-03-20190515	SeS03	0.0	0.3	SES	C	N	5/15/2019	1547	3		X	X					
7	BRF-SeS-EB01-20190515	SeS03	NA	NA	AQ	G	EB	5/15/2019	1802	3		*		X				

AW 5/16/2019

AW 5/16/2019

MNS/16/2019

Additional Comments/Special Instructions:

Additional volume collected should be used for laboratory duplicate analysis.

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
Suame Bolden / Stantec	5/16/2019	15:00	[illegible]		
			5/17/19	0900	

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	Suame Bolden / [illegible]
	Anna Wilson / [illegible]
	Dominic Norman / [illegible]

9582 - 3.0
7341 - 3.0
7352 - 2.8

7363 - 2.6
7374 - 2.4

180-90260 Chain of Custody

Form TVA 30067A

TVA Environmental Investigations

Tennessee Valley Authority

COOLER No.:	2	of	5
COC No:	BRF_SES_20190515_1B		
1 of 1 Pages			
Task Desc:	BRF_SES		

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:

Lab Name:	TestAmerica Pittsburgh
Lab Address:	301 Alpha Drive 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 #:	Bull Run Fossil Plant		
Project #:	NA		
Site Address	1265 Edgemoor Rd		
City	Clinton	State, Zip:	TN, 37716
Site PM Name:	Roy Quinn		
Phone/Fax:	423-751-3753		
Site PM Email:	[illegible]		

Required Sampler Information

Sampler:	S.Bolden, A.Wilson & D. Norman		
Sampling Company:	Stantec		
Address	601 Grassmere Park Road, Suite 22		
City/State	Nashville, TN	Phone:	(615) 885-1144
Sampling Team Number:	1		
Send EDD/Hard Copy to:	[illegible]		

Analysis Turnaround Time

- CALENDAR DAYS
- WORKING DAYS

TAT if different from Below _____

- 24 Hours
- 3 Business Days
- 5 Business Days
- 10 Business Days

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	Filtered N	Filtered N	Preserve None	Preserve DI/CO	Analysis SEP_SOIL_RAD	Analysis SEP_SOIL_BLANKS_RAD
1	BRF-SeS-04-20190515	SeS04	0.0	0.3	SES	C	N	5/15/2019	0915	2							X	
2	BRF-SeS-DUP01-20190515	NA	NA	NA	SES	C	FD	5/15/2019	NA	1							X	
3	BRF-SeS-FB01-20190515	SeS04	NA	NA	AQ	G	FB	5/15/2019	1104	3								X
4	BRF-SeS-01-20190515	SeS01	0.0	0.3	SES	C	N	5/15/2019	1352	1							X	
5	BRF-SeS-02-20190515	SeS02	0.0	0.3	SES	C	N	5/15/2019	1515	2							X	
6	BRF-SeS-03-20190515	SeS03	0.0	0.3	SES	C	N	5/15/2019	1547	3		X					X	
7	BRF-SeS-EB01-20190515	SeS03	NA	NA	AQ	G	EB	5/15/2019	1802	3								X

AW 5/16/2019

AW 5/16/2019

AW 5/16/2019

Additional Comments/Special Instructions:

Additional volume collected should be used for laboratory duplicate analysis.

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
Suama Bolden / Stantec [illegible]	5/16/2019	15:00			

SHIPPING METHOD	SAMPLER NAME AND SIGNATURE
Courier	Suama Bolden / [illegible]
	Anna Wilson / [illegible]
	Dominic Norman /

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 / NB

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.:	3 of 5
COC No:	BRF_SES_20190515_1B
1 of 1 Pages	
Task Desc:	BRF_SES

Required Ship to Lab:

Lab Name: TestAmerica Pittsburgh
Lab Address: 301 Alpha Drive, 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 #: Bull Run Fossil Plant
Project #: NA
Site Address: 1265 Edgemoor Rd
City: Clinton State, Zip: TN, 37716
Site PM Name: Roy Quinn
Phone/Fax: 423-751-3753
Site PM Email: [illegible]

Required Sampler Information

Sampler: S Bolden, A Wilson & D. Norman
Sampling Company: Stantec
Address: 801 Grassmere Park Road, Suite 22
City/State: Nashville, TN Phone: (615) 885-1144
Sampling Team Number: 1
Send EDD/Hard Copy to: [illegible]

Analysis Turnaround Time

CALENDAR DAYS WORKING DAYS

TAT if different from Below _____

- 24 Hours
- 3 Business Days
- 5 Business Days
- 10 Business Days

ITEMS #	SAMPLE ID Samples IDs MUST BE UNIQUE	SAMPLE LOCATION	Sample Depth: Depth Unit / Select 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	Analysis: SEP_SOIL_RAD	SEP_SOIL_BLANKS_RAD	Filtered: N	N	Preserve: None	HNO3
1	BRF-SeS-04-20190515	SeS04	0.0	0.3	SES	C	N	5/15/2019	0915	2			X					
2	BRF-SeS-DUP01-20190515	NA	NA	NA	SES	C	FD	5/15/2019	NA	1			X					
3	BRF-SeS-FB01-20190515	SeS04	NA	NA	AQ	G	FB	5/15/2019	1104	3				X				
4	BRF-SeS-01-20190515	SeS01	0.0	0.3	SES	C	N	5/15/2019	1352	1			X					
5	BRF-SeS-02-20190515	SeS02	0.0	0.3	SES	C	N	5/15/2019	1515	2			X					
6	BRF-SeS-03-20190515	SeS03	0.0	0.3	SES	C	N	5/15/2019	1547	3		X	X					
7	BRF-SeS-EB01-20190515	SeS03	NA	NA	AQ	G	EB	5/15/2019	1802	3				X				

AW 5/16/2019

Additional Comments/Special Instructions:

Additional volume collected should be used for laboratory duplicate analysis.

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
Suanna Bolden / Stantec	5/16/2019	16:00			

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	Suanna Bolden /
	Anna Wilson /
	Dominic Norman /

Form TVA 35067A

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.:	4 of 5
COC No:	BRF_SES_20190515_1B
1 of 1 Pages	
Task Desc:	BRF_SES

Required Ship to Lab:

Lab Name: TestAmerica Pittsburgh
Lab Address: 301 Alpha Drive, 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 #: Bull Run Fossil Plant
Project #: NA
Site Address: 1265 Edgemoor Rd
City: Clinton State, Zip: TN, 37716
Site PM Name: Roy Quinn
Phone/Fax: 423-751-3753
Site PM Email: [illegible]

Required Sampler Information

Sampler: S Bolden, A Wilson & D. Norman
Sampling Company: Stantec
Address: 601 Grassmere Park Road, Suite 22
City/State: Nashville, TN Phone: (615) 885-1144
Sampling Team Number: 1
Send EDD/Hard Copy to: [illegible]

Analysis Turnaround Time

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- WORKING DAYS

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- 24 Hours
- 3 Business Days
- 5 Business Days
- 10 Business Days

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	Filtered (Y/N)	Preserve Time (HNO3)	Analysis: MEP_SOIL_RAD	Analysis: MEP_SOIL_BLANKS_RAD
1	BRF-SeS-04-20190515	SeS04	0.0	0.3	SES	C	N	5/15/2019	0915	2					X	
2	BRF-SeS-DUP01-20190515	NA	NA	NA	SES	C	FD	5/15/2019	NA	1					X	
3	BRF-SeS-FB01-20190515	SeS04	NA	NA	AQ	G	FB	5/15/2019	1104	3						X
4	BRF-SeS-01-20190515	SeS01	0.0	0.3	SES	C	N	5/15/2019	1352	1					X	
5	BRF-SeS-02-20190515	SeS02	0.0	0.3	SES	C	N	5/15/2019	1515	2					X	
6	BRF-SeS-03-20190515	SeS03	0.0	0.3	SES	C	N	5/15/2019	1547	3		X			X	
7	BRF-SeS-EB01-20190515	SeS03	NA	NA	AQ	G	EB	5/15/2019	1802	3						X

AW 5/15/2019

AW 5/16/2019

AW 5/16/2019

Additional Comments/Special Instructions:

Additional volume collected should be used for laboratory duplicate analysis.

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
Suama Bolden / Stantec	5/16/2019	15:00			

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	Suama Bolden /
	Anna Wilson /
	Dominic Norman /

Form TVA 30067A

TVA Environmental Investigations

Tennessee Valley Authority

Chain-of-Custody / Analytical Request Document

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COOLER No.:	5 of 5
COC No:	BRF_SES_20190515_1B
1 of 1 Pages	
Task Desc:	BRF_SES

Required Ship to Lab:

Lab Name:	TestAmerica Pittsburgh
Lab Address:	301 Alpha Drive 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 #:	Bull Run Fossil Plant
Project #:	NA
Site Address	1265 Edgemoor Rd
City	Clinton State, Zip: TN 37716
Site PM Name:	Roy Quinn
Phone/Fax:	423-751-3753
Site PM Email:	[illegible]

Required Sampler Information

Sampler:	S.Bolden, A.Wilson & D. Norman
Sampling Company:	Stantec
Address	601 Grassmere Park Road, Suite 22
City/State	Nashville, TN Phone: (615) 885-1144
Sampling Team Number:	1
Send EDD/Hard Copy to:	[illegible]

Analysis Turnaround Time

* CALENDAR DAYS * WORKING DAYS

TAT if different from Below _____

- 24 Hours
- 3 Business Days
- 5 Business Days
- 10 Business Days

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	Filtered N	Preserve None	Preserve HNO3	Analysis SEP_SOIL_RAD	Analysis SEP_SOIL_BLANKS_RAD
1	BRF-SeS-04-20190515	SeS04	0.0	0.3	SES	C	N	5/15/2019	0915	2						X	
2	BRF-SeS-DUP01-20190515	NA	NA	NA	SES	C	FD	5/15/2019	NA	1						X	
3	BRF-SeS-FB01-20190515	SeS04	NA	NA	AQ	G	FB	5/15/2019	1104	3							X
4	BRF-SeS-01-20190515	SeS01	0.0	0.3	SES	C	N	5/15/2019	1352	1						X	
5	BRF-SeS-02-20190515	SeS02	0.0	0.3	SES	C	N	5/15/2019	1515	2						X	
6	BRF-SeS-03-20190515	SeS03	0.0	0.3	SES	C	N	5/15/2019	1547	3		X				X	
7	BRF-SeS-EB01-20190515	SeS03	NA	NA	AQ	G	EB	5/15/2019	1802	3							X

AW 5/16/2019

AW 5/16/2019

AW 5/16/2019

Additional Comments/Special Instructions:

Additional volume collected should be used for laboratory duplicate analysis.

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
Suanna Bolden / Stantec	5/16/2019	15:00			

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	Suanna Bolden /
	Anna Wilson /
	Dominic Norman /

Page 1 of 1

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

6/28/2019

Client Information (Sub Contract Lab)	Sampler:	Lab PM: Rumble, Jennifer L	Carrier Tracking No(s):	COC No: 180-363537.1
Client Contact: Shipping/Receiving	Phone:	E-Mail: jennifer.rumble@testamericainc.com	State of Origin: Tennessee	Page: Page 1 of 1
Company: TestAmerica Laboratories, Inc.		Accreditations Required (See note):		Job #: 180-90260-1
Address: 13715 Rider Trail North,	Due Date Requested: 6/19/2019			
City: Earth City	TAT Requested (days):			
State, Zip: MO, 63045				
Phone: 314-298-8566(Tel) 314-298-8757(Fax)	PO #:			
Email:	WO #:			
Project Name: BRF_SES_20190515_1B	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_RaDry_Grind Radium-226/228	901.1_RaFill_Geo_21 Radium-226/228	Total Number of containers	Special Instructions/Note:
			Preservation Code:							
BRF-SES-04-20190515 (180-90260-1)	5/15/19	09:15 Eastern		Solid			X		2	TVA - Batch alone. Quarantine zone soil. Contact PM if insufficient volume for Tuna
BRF-SES-DUP01-20190515 (180-90260-2)	5/15/19	Eastern		Solid			X		1	TVA - Batch alone. Quarantine zone soil. Contact PM if insufficient volume for Tuna
BRF-SES-FB01-20190515 (180-90260-3)	5/15/19	11:04 Eastern		Water				X	3	TVA - batch alone
BRF-SES-01-20190515 (180-90260-4)	5/15/19	13:52 Eastern		Solid			X		1	TVA - Batch alone. Quarantine zone soil. Contact PM if insufficient volume for Tuna
BRF-SES-02-20190515 (180-90260-5)	5/15/19	15:15 Eastern		Solid			X		2	TVA - Batch alone. Quarantine zone soil. Contact PM if insufficient volume for Tuna
BRF-SES-03-20190515 (180-90260-6)	5/15/19	15:47 Eastern		Solid			X		1	TVA - Batch alone. Quarantine zone soil. Contact PM if insufficient volume for Tuna
BRF-SES-03-20190515 (180-90260-6DU)	5/15/19	15:47 Eastern	DU	Solid			X		2	TVA - Batch alone. Quarantine zone soil. Contact PM if insufficient volume for Tuna
BRF-SES-EB01-20190515 (180-90260-7)	5/15/19	18:02 Eastern		Water				X	3	TVA - batch alone

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	Date/Time	Company	Received by	Date/Time	Company
[signature]	5/22/19 [illegible]	MSA	[signature]	5-23-19 09:30	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: △ Yes △ No Custody Seal No.:

Cooler Temperature(s) °C and Other Remarks:

Ver: 01/16/2019

Login Sample Receipt Checklist

Client: Environmental Standards Inc.

Job Number: 180-90260-1

Login Number: 90260
List Number: 1
Creator: DiNardo, Nicholas J

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: 180-90260-1

Login Number: 90260
List Number: 2
Creator: Hellm, Michael

List Source: Eurofins TestAmerica, St. Louis
List Creation: 05/23/19 10:49 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.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	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: 180-90260-1

Login Number: 90260
List Number: 3
Creator: Hellm, Michael

List Source: Eurofins TestAmerica, St. Louis
List Creation: 05/23/19 10:52 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	

SECTION 5

PROJECT CORRESPONDENCE

Amanda Cover

From: Lage, Gail <Gail.Lage@testamericainc.com>
Sent: Tuesday, July 30, 2019 1:09 PM
To: Jennifer Gable; Andrew Piasecki; CSO – TVA Projects
Cc: TVA_Deliverables; Amanda Cover; Danielle Coles; Ammie Martin; Rock J. Vitale; Vicinie, Rusty; Carnes, Jodie
Subject: RE: TVA TDEC - Method 901.1 Combined Rad Uncertainty Calc
Attachments: CAR 901.1 Ra-226 + Ra-228 Uncertainty.pdf; 901.1_uncertainties_072619.pdf

Jen – I apologize for the delay. Attached is the letter and updated table. Please let me know if you need anything else.

Thanks

Gail Lage
Senior Project Manager

Eurofins TestAmerica
2960 Foster Creighton Drive
Nashville, TN 37204
USA

Phone: 615-301-5741

From: Jennifer Gable [mailto:jgable@envstd.com]
Sent: Friday, July 26, 2019 11:34 AM
To: Andrew Piasecki; Lage, Gail; CSO – TVA Projects
Cc: TVA_Deliverables; Amanda Cover; Danielle Coles; Ammie Martin; Rock J. Vitale; Vicinie, Rusty; Carnes, Jodie
Subject: RE: TVA TDEC - Method 901.1 Combined Rad Uncertainty Calc
Importance: High

-External Email-

Can we please get an update on this issue? We are holding data finalization pending resolution.

Thanks
Jen

Jennifer N. Gable
Associate Principal Chemist
Environmental Standards, Inc.
(610) 935.5577 x 414

From: Andrew Piasecki <apiasecki@envstd.com>
Sent: Monday, July 22, 2019 5:02 PM
To: Lage, Gail <Gail.Lage@testamericainc.com>; Jennifer Gable <jgable@envstd.com>; CSO – TVA Projects <TVAProjects@testamericainc.com>
Cc: TVA_Deliverables <tva_deliverables@envstd.com>; Amanda Cover <ACover@envstd.com>; Danielle Coles <dcoles@envstd.com>; Ammie Martin <amartin@envstd.com>; Rock J. Vitale <rvitale@envstd.com>
Subject: RE: TVA TDEC - Method 901.1 Combined Rad Uncertainty Calc

Hi Gail,

Attached are outstanding email requests for the "older" radium samples. We need to have these radium data requests resolved by the end of this week (or sooner). This includes the combined radium uncertainty calcuation issues. Do you have any updates?

Thanks,
Andrew

From: Andrew Piasecki
Sent: Wednesday, July 17, 2019 4:45 PM
To: 'Lage, Gail' <Gail.Lage@testamericainc.com>; Jennifer Gable <jgable@envstd.com>; CSO – TVA Projects <TVAProjects@testamericainc.com>
Cc: TVA_Deliverables <tva_deliverables@envstd.com>; Amanda Cover <ACover@envstd.com>; Danielle Coles <dcoles@envstd.com>; Ammie Martin <amartin@envstd.com>; Rock J. Vitale <rvitale@envstd.com>
Subject: RE: TVA TDEC - Method 901.1 Combined Rad Uncertainty Calc

Hi Gail,

These samples were not included in the spreadsheet that I sent on July 5th. Please include them in your review:

Sample Name	analytic_method	lab_sdg	lab_sample_id	Reported Uncertainty for Radium-226+228	U
JOF-SED-BH02-CORRB-0.0/0.5-20190124	EPA 901.1	180861851	180-86185-60	0.200	
JSF-CCR-FB16-20190423	EPA 901.1	180894481	180-89448-5	19.1	
JSF-CCR-EB03-20190409	EPA 901.1	180888511	180-88851-4	15.2	
JSF-CCR-EB05-20190501	EPA 901.1	180896681	180-89668-1	12.2	
JSF-CCR-FB19-20190501	EPA 901.1	180896681	180-89668-5	0.00000	
JSF-CCR-FB20-20190513	EPA 901.1	180901011	180-90101-1	19.7	
JSF-CCR-FB21-20190514	EPA 901.1	180901041	180-90104-1	0.00000	

Thanks,
Andrew

From: Lage, Gail <Gail.Lage@testamericainc.com>
Sent: Wednesday, July 10, 2019 6:39 PM
To: Jennifer Gable <jgable@envstd.com>; Andrew Piasecki <apiasecki@envstd.com>; CSO – TVA Projects <TVAProjects@testamericainc.com>
Cc: TVA_Deliverables <tva_deliverables@envstd.com>; Amanda Cover <ACover@envstd.com>; Danielle Coles <dcoles@envstd.com>; Ammie Martin <amartin@envstd.com>; Rock J. Vitale <rvitale@envstd.com>
Subject: RE: TVA TDEC - Method 901.1 Combined Rad Uncertainty Calc

Jen – understood.

Thanks

Gail Lage

Senior Project Manager

Eurofins TestAmerica
2960 Foster Creighton Drive
Nashville, TN 37204
USA

Phone: 615-301-5741

From: Jennifer Gable [mailto:jgable@envstd.com]
Sent: Wednesday, July 10, 2019 5:25 PM
To: Andrew Piasecki; Lage, Gail; CSO – TVA Projects
Cc: TVA_Deliverables; Amanda Cover; Danielle Coles; Ammie Martin; Rock J. Vitale
Subject: RE: TVA TDEC - Method 901.1 Combined Rad Uncertainty Calc

-External Email-

Hi Gail,

To proceed with our proposed plan below, we need Eurofins TestAmerica to provide confirmation, on your letterhead, of the corrected uncertainties for the samples impacted by this issue. You're welcome to use our calculation spreadsheet or perform your own calculations, but we won't be able to perform any updates until this information is provided formally by Eurofins TestAmerica.

Please let me know if you have any questions.

Thanks
Jen

Jennifer N. Gable
Associate Principal Chemist
Environmental Standards, Inc.
(610) 935.5577 x 414

From: Andrew Piasecki
Sent: Friday, July 5, 2019 1:31 PM
To: Lage, Gail <Gail.Lage@testamericainc.com>; CSO – TVA Projects <TVAProjects@testamericainc.com>
Cc: TVA_Deliverables <tva_deliverables@envstd.com>; Jennifer Gable <jgable@envstd.com>; Amanda Cover <ACover@envstd.com>; Danielle Coles <dcoles@envstd.com>; Ammie Martin <amartin@envstd.com>; Rock J. Vitale <rvitale@envstd.com>
Subject: RE: TVA TDEC - Method 901.1 Combined Rad Uncertainty Calc

Hi Gail,

The uncertainties associated the negative results should be used to calculate the total uncertainty for combined radium 226+228 similar to the way it is being reported for methods 903.0 and 904.0. The reported uncertainty for combined radium-226+228 should be calculated as the combined uncertainty of the individual isotope results, calculated as the square root of the sum of the squared individual uncertainties (see the equation below).

Our plan is to write a memo and manually update the database with the correct uncertainties for combined radium 226+228. I've attached a spreadsheet comparing the currently reported uncertainties to the uncertainties calculated using the equation listed below. Please review the calculated uncertainties (column AG of the attachment), and confirm

that they are correct. Upon your confirmation, we will manually update the database. Also, please ensure that the uncertainties for combined rad 226+228 are calculated and reported correctly for all data going forward.

$$\text{Total uncertainty for combined Rad 226 and 228} = \sqrt{(\text{rad 226 uncertainty})^2 + (\text{rad 228 uncertainty})^2}$$

Thank you,

Andrew L. Piasecki
Quality Assurance Chemist
Environmental Standards, Inc.
1140 Valley Forge Road • PO Box 810 • Valley Forge, PA 19482
610.935.5577 ext. 433 • www.envstd.com • apiasecki@envstd.com

Emergency Response Quality Assurance Hotline: 855.374.7272

ENVIRONMENTAL® STANDARDS

From: Lage, Gail [mailto:Gail.Lage@testamericainc.com]
Sent: Wednesday, June 26, 2019 6:25 PM
To: Jennifer Gable <jgable@envstd.com>; Andrew Piasecki <apiasecki@envstd.com>; CSO – TVA Projects <TVAProjects@testamericainc.com>
Cc: TVA_Deliverables <tva_deliverables@envstd.com>; Amanda Cover <ACover@envstd.com>; Danielle Coles <dcoles@envstd.com>; Ammie Martin <amartin@envstd.com>; Rock J. Vitale <rvitale@envstd.com>
Subject: RE: TVA TDEC - Method 901.1 Combined Rad Uncertainty Calc

I know why it is doing what it is doing. For the results, only the positive numbers are used to calculate the total for TVA. Therefore it is not using the uncertainty from the negative result to calculate the total uncertainty.

Gail Lage
Senior Project Manager

Eurofins TestAmerica
2960 Foster Creighton Drive
Nashville, TN 37204
USA

Phone: 615-301-5741

From: Jennifer Gable [mailto:jgable@envstd.com]
Sent: Wednesday, June 26, 2019 1:22 PM
To: Andrew Piasecki; CSO – TVA Projects
Cc: TVA_Deliverables; Amanda Cover; Danielle Coles; Ammie Martin; Rock J. Vitale
Subject: RE: TVA TDEC - Method 901.1 Combined Rad Uncertainty Calc
Importance: High

-External Email-

Gail - please hold on this request for now, we have some thoughts on resolution that I'd like to discuss internally. We'll get back to you shortly.

Jennifer N. Gable
Associate Principal Chemist
Environmental Standards, Inc.
(610) 935.5577 x 414

From: Andrew Piasecki
Sent: Wednesday, June 26, 2019 1:40 PM
To: CSO – TVA Projects <TVAProjects@testamericainc.com>
Cc: TVA_Deliverables <tva_deliverables@envstd.com>; Amanda Cover <ACover@envstd.com>; Jennifer Gable <jgable@envstd.com>; Danielle Coles <dcoles@envstd.com>; Ammie Martin <amartin@envstd.com>; Rock J. Vitale <rvitale@envstd.com>
Subject: TVA TDEC - Method 901.1 Combined Rad Uncertainty Calc

Hi Gail,

For the Method 901.1 rad data, it appears that the total uncertainties for combined radium 226+228 were not reported correctly when a negative value was reported for one (or both) of the isotopes. In these instances, it appears that the uncertainty for the isotope was treated as zero instead of being calculated as part of the root sum square. For example, in SDG 180-87481-1, the results for sample 180-87481-2 were reported as:

Method 901.1	Result (pCI/g)	Uncertainty
Rad-226	0.391	0.173
Rad-228	-0.221	0.528
Combined Rad 226+228	0.391	0.173

According to the reporting protocols, the combined rad 226+228 uncertainty should have been reported as ~0.556 in this example.

I've attached a list of samples where this issue has been identified. Please review the total uncertainty calculations and revise the data as appropriate.

Thank you,

Andrew L. Piasecki
Quality Assurance Chemist
Environmental Standards, Inc.
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Emergency Response Quality Assurance Hotline: 855.374.7272

ENVIRONMENTAL® STANDARDS

From: Ammie Martin
Sent: Friday, June 21, 2019 2:10 PM
To: Andrew Piasecki <apiasecki@envstd.com>
Subject: Total Uncertainty Calculation Discrepancy

During review of report 180-87481-1, it was noted that the total uncertainty (2σ) for combined radium-226/-228 in the US EPA Method 901.1 portion of sample 180-87481-2 did not take into account the result from the radium-228 analysis. The total uncertainty (2σ) reported was equal to that of radium-226. This is not consistent with the calculation of the total uncertainty (2σ) for combined radium-226/-228 in the other methods or samples reported. It appears that the system used zero for the radium-228 total uncertainty (2σ) in the calculation in the same manner it used zero for the negative radium-228 activity when calculating the combined radium-226/-228 activity. For all US EPA Method 901.1 samples where both components were positive (whether > MDC or < MDC) and for all GFPC samples, the total uncertainty was correctly calculated as the root sum square (RSS; the square root of the sum of the squared individual uncertainties).

Ammie Martin
Corporate Quality Assurance and Training Specialist/
Senior Quality Assurance Chemist
Environmental Standards, Inc.
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<image001.gif>

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July 30, 2019

Environmental Standards, Inc.
1140 Valley Forge Road
Valley Forge, PA 19482

RE: EPA 901.1 Radium-226 + Radium-228, Incorrect Uncertainty Calculation

Dear Ms. Gable

It was recently discovered that sample uncertainty was being incorrectly calculated for the summation analyte Radium-226 + Radium-228 by EPA method 901.1. When either of the analyte results was negative, the uncertainty for that analyte was being set to zero.

Environmental Standards provided Eurofins TestAmerica with a spreadsheet of affected data that included the corrected uncertainty. This spreadsheet was then validated by the Quality Assurance Manager on July 26th, 2019. One error was found (sample JOF-SED-BH02-CORRB-0.0/0.5-20190124, lab ID 180-86185-60). This was corrected, and a PDF of the spreadsheet has been included (see attachment "901.1_uncertainties_072619").

The uncertainty calculation for Ra-226 + Ra-228 has been corrected by the Eurofins TestAmerica IT department, and has been verified by Terry Romanko, the Technical Director at the St. Louis facility.

Eurofins TestAmerica St. Louis prides itself on supplying its clients with reliable quality data. We deeply apologize for the calculation error and any difficulties this may have caused.

Regards,

Kristen Ely
Quality Assurance Manager
Kristen.Ely@testamericainc.com