ENVIRONMENTAL STANDARDS

Setting the Standards for Innovative Environmental Solutions

Data Validation Report
Tennessee Valley Authority
Johnsonville Fossil Plant
Environmental Investigation Plan
Background Soil Samples
Chain-of-Custody Number: JOF_BS_20190529_1B

This quality assurance (QA) review is based upon an examination of the data generated from the analyses of the 13 background soil samples and one aqueous blank collected on May 29, 2019, at the Tennessee Valley Authority (TVA) Johnsonville Fossil Plant facility. These samples were collectively analyzed by Eurofins TestAmerica (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 Johnsonville Fossil Plant Environmental Investigation (JOF EIP, Revision 4, December 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 Methods 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 Methods 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 180-90755-1.

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

Sample Identification	Laboratory Sample Identification	Job Number	Matrix	Date Sample Collected	Parameters Examined
JOF-BS-BG04-0.0/0.5-20190529	180-90775-1	180-90775-1	Soil	5/29/19	Ra-226, Ra-228, Ra-226/228
JOF-BS-BG04-11.5/13.5-20190529	180-90775-2	180-90775-1	Soil	5/29/19	Ra-226, Ra-228, Ra-226/228
JOF-BS-DUP01-20190529 (Field Duplicate of JOF-BS-BG04-0.0/0.5-20190529)	180-90775-3	180-90775-1	Soil	5/29/19	Ra-226, Ra-228, Ra-226/228
JOF-BS-BG04-16.5/18.5-20190529	180-90775-4	180-90775-1	Soil	5/29/19	Ra-226, Ra-228, Ra-226/228
JOF-BS-BG04-21.5/23.5-20190529	180-90775-5	180-90775-1	Soil	5/29/19	Ra-226, Ra-228, Ra-226/228
JOF-BS-BG04-25.0/28.5-20190529	180-90775-6	180-90775-1	Soil	5/29/19	Ra-226, Ra-228, Ra-226/228
JOF-BS-BG04-1.5/3.5-20190529	180-90775-7	180-90775-1	Soil	5/29/19	Ra-226, Ra-228, Ra-226/228
JOF-BS-BG04-6.5/8.5-20190529	180-90775-8	180-90775-1	Soil	5/29/19	Ra-226, Ra-228, Ra-226/228
JOF-BS-FB04-20190529 (Field Blank)	180-90775-9	180-90775-1	Aq	5/29/19	Ra-226, Ra-228, Ra-226/228
JOF-BS-BG03-0.0/0.5-20190529	180-90775-10	180-90775-1	Soil	5/29/19	Ra-226, Ra-228, Ra-226/228
JOF-BS-BG03-6.5/8.5-20190529	180-90775-11	180-90775-1	Soil	5/29/19	Ra-226, Ra-228, Ra-226/228
JOF-BS-BG03-11.5/13.5-20190529	180-90775-12	180-90775-1	Soil	5/29/19	Ra-226, Ra-228, Ra-226/228
JOF-BS-BG03-16.5/18.5-20190529	180-90775-13	180-90775-1	Soil	5/29/19	Ra-226, Ra-228, Ra-226/228
JOF-BS-BG03-1.5/3.5-20190529	180-90775-14	180-90775-1	Soil	5/29/19	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	Field and Laboratory 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

Analyte(s)	Job Number	Sample(s)	Validation Qualifier(s)	Reason(s) for Qualification
Ra-226/Ra-228 and Ra-228	180-90755-1	JOF-BS-BG04-0.0/0.5-20190529 and JOF-BS-DUP01-20190529	J	FD

- 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

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.
S	Radium-226+228 flagged due to reporting protocol for combined 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.

SECTION 2

ANALYTICAL RESULTS

TVA CCR Program
Facility: Johnsonville Fossil Plant
SDG: 180907551

Lab Sample ID	180-90755-1
Sys Sample Code	JOF-BS-BG04-0.0/0.5-20190529
Sample Name	JOF-BS-BG04-0.0/0.5-20190529
Sample Date	5/29/2019 9:55:00 AM
Location	BG04
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	1.51	J	FD	0.334				Y	Yes	1	NA
	Radium 228	15262-20-1	T	PCI/G	0.652	J	FD	0.253	0.237	0.237	1.00	Y	Yes	1	NA
	Radium-226	13982-63-3	T	PCI/G	0.858			0.218	0.168	0.168	1.00	Y	Yes	1	NA

TVA CCR Program
Facility: Johnsonville Fossil Plant
SDG: 180907551

Lab Sample ID	180-90755-10
Sys Sample Code	JOF-BS-BG03-0.0/0.5-20190529
Sample Name	JOF-BS-BG03-0.0/0.5-20190529
Sample Date	5/29/2019 2:17:00 PM
Location	BG03
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	2.07			0.418				Y	Yes	1	NA
	Radium 228	15262-20-1	T	PCI/G	1.04			0.318	0.160	0.160	1.00	Y	Yes	1	NA
	Radium-226	13982-63-3	T	PCI/G	1.03			0.271	0.198	0.198	1.00	Y	Yes	1	NA

TVA CCR Program
Facility: Johnsonville Fossil Plant
SDG: 180907551

Lab Sample ID	180-90755-11
Sys Sample Code	JOF-BS-BG03-6.5/8.5-20190529
Sample Name	JOF-BS-BG03-6.5/8.5-20190529
Sample Date	5/29/2019 2:37:00 PM
Location	BG03
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	1.77			0.385				Y	Yes	1	NA
	Radium 228	15262-20-1	T	PCI/G	1.05			0.306	0.144	0.144	1.00	Y	Yes	1	NA
	Radium-226	13982-63-3	T	PCI/G	0.722			0.233	0.269	0.269	1.00	Y	Yes	1	NA

TVA CCR Program
Facility: Johnsonville Fossil Plant
SDG: 180907551

Lab Sample ID	180-90755-12
Sys Sample Code	JOF-BS-BG03-11.5/13.5-20190529
Sample Name	JOF-BS-BG03-11.5/13.5-20190529
Sample Date	5/29/2019 2:52:00 PM
Location	BG03
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	1.38			0.349				Y	Yes	1	NA
	Radium 228	15262-20-1	T	PCI/G	0.452			0.257	0.274	0.274	1.00	Y	Yes	1	NA
	Radium-226	13982-63-3	T	PCI/G	0.923			0.236	0.185	0.185	1.00	Y	Yes	1	NA

TVA CCR Program
Facility: Johnsonville Fossil Plant
SDG: 180907551

Lab Sample ID	180-90755-13
Sys Sample Code	JOF-BS-BG03-16.5/18.5-20190529
Sample Name	JOF-BS-BG03-16.5/18.5-20190529
Sample Date	5/29/2019 3:09:00 PM
Location	BG03
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	1.25			0.234				Y	Yes	1	NA
	Radium 228	15262-20-1	T	PCI/G	0.591			0.181	0.161	0.161	1.00	Y	Yes	1	NA
	Radium-226	13982-63-3	T	PCI/G	0.659			0.149	0.0836	0.0836	1.00	Y	Yes	1	NA

TVA CCR Program
Facility: Johnsonville Fossil Plant
SDG: 180907551

Lab Sample ID	180-90755-14
Sys Sample Code	JOF-BS-BG03-1.5/3.5-20190529
Sample Name	JOF-BS-BG03-1.5/3.5-20190529
Sample Date	5/29/2019 3:39:00 PM
Location	BG03
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	2.42			0.427				Y	Yes	1	NA
	Radium 228	15262-20-1	T	PCI/G	1.36			0.325	0.238	0.238	1.00	Y	Yes	1	NA
	Radium-226	13982-63-3	T	PCI/G	1.06			0.277	0.215	0.215	1.00	Y	Yes	1	NA

TVA CCR Program
Facility: Johnsonville Fossil Plant
SDG: 180907551

Lab Sample ID	180-90755-2
Sys Sample Code	JOF-BS-BG04-11.5/13.5-20190529
Sample Name	JOF-BS-BG04-11.5/13.5-20190529
Sample Date	5/29/2019 11:00:00 AM
Location	BG04
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	1.94			0.439				Y	Yes	1	NA
	Radium 228	15262-20-1	T	PCI/G	0.943			0.381	0.323	0.323	1.00	Y	Yes	1	NA
	Radium-226	13982-63-3	T	PCI/G	0.999			0.219	0.0935	0.0935	1.00	Y	Yes	1	NA

Lab Sample ID	180-90755-3
Sys Sample Code	JOF-BS-DUP01-20190529
Sample Name	JOF-BS-DUP01-20190529
Sample Date	5/29/2019 12:00:00 AM
Location	BG04
Sample Type	FD
Parent Sample	JOF-BS-BG04-0.0/0.5-20190529

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	1.96	J	FD	0.416				Y	Yes	1	NA
	Radium 228	15262-20-1	T	PCI/G	1.10	J	FD	0.329	0.443	0.443	1.00	Y	Yes	1	NA
	Radium-226	13982-63-3	T	PCI/G	0.864			0.254	0.205	0.205	1.00	Y	Yes	1	NA

TVA CCR Program
Facility: Johnsonville Fossil Plant
SDG: 180907551

Lab Sample ID	180-90755-4
Sys Sample Code	JOF-BS-BG04-16.5/18.5-20190529
Sample Name	JOF-BS-BG04-16.5/18.5-20190529
Sample Date	5/29/2019 11:18:00 AM
Location	BG04
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	2.54			0.381				Y	Yes	1	NA
	Radium 228	15262-20-1	T	PCI/G	1.55			0.325	0.0959	0.0959	1.00	Y	Yes	1	NA
	Radium-226	13982-63-3	T	PCI/G	0.988			0.198	0.128	0.128	1.00	Y	Yes	1	NA

TVA CCR Program
Facility: Johnsonville Fossil Plant
SDG: 180907551

Lab Sample ID	180-90755-5
Sys Sample Code	JOF-BS-BG04-21.5/23.5-20190529
Sample Name	JOF-BS-BG04-21.5/23.5-20190529
Sample Date	5/29/2019 11:35:00 AM
Location	BG04
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	2.07			0.390				Y	Yes	1	NA
	Radium 228	15262-20-1	T	PCI/G	0.813			0.282	0.353	0.353	1.00	Y	Yes	1	NA
	Radium-226	13982-63-3	T	PCI/G	1.26			0.269	0.169	0.169	1.00	Y	Yes	1	NA

TVA CCR Program
Facility: Johnsonville Fossil Plant
SDG: 180907551

Lab Sample ID	180-90755-6
Sys Sample Code	JOF-BS-BG04-25.0/28.5-20190529
Sample Name	JOF-BS-BG04-25.0/28.5-20190529
Sample Date	5/29/2019 11:48:00 AM
Location	BG04
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	0.913	J	S	0.224				Y	Yes	1	NA
	Radium 228	15262-20-1	T	PCI/G	0.273	U		0.143	0.413	0.413	1.00	N	Yes	1	NA
	Radium-226	13982-63-3	T	PCI/G	0.640			0.172	0.124	0.124	1.00	Y	Yes	1	NA

TVA CCR Program
Facility: Johnsonville Fossil Plant
SDG: 180907551

Lab Sample ID	180-90755-7
Sys Sample Code	JOF-BS-BG04-1.5/3.5-20190529
Sample Name	JOF-BS-BG04-1.5/3.5-20190529
Sample Date	5/29/2019 12:14:00 PM
Location	BG04
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	1.83			0.351				Y	Yes	1	NA
	Radium 228	15262-20-1	T	PCI/G	0.962			0.265	0.193	0.193	1.00	Y	Yes	1	NA
	Radium-226	13982-63-3	T	PCI/G	0.872			0.230	0.184	0.184	1.00	Y	Yes	1	NA

TVA CCR Program
Facility: Johnsonville Fossil Plant
SDG: 180907551

Lab Sample ID	180-90755-8
Sys Sample Code	JOF-BS-BG04-6.5/8.5-20190529
Sample Name	JOF-BS-BG04-6.5/8.5-20190529
Sample Date	5/29/2019 12:37:00 PM
Location	BG04
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	2.52			0.470				Y	Yes	1	NA
	Radium 228	15262-20-1	T	PCI/G	1.36			0.368	0.207	0.207	1.00	Y	Yes	1	NA
	Radium-226	13982-63-3	T	PCI/G	1.16			0.292	0.166	0.166	1.00	Y	Yes	1	NA

TVA CCR Program
Facility: Johnsonville Fossil Plant
SDG: 180907551

Lab Sample ID	180-90755-9
Sys Sample Code	JOF-BS-FB04-20190529
Sample Name	JOF-BS-FB04-20190529
Sample Date	5/29/2019 12:45:00 PM
Location	BG04
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	8.18	U	S	24.1				N	Yes	1	NA
	Radium 228	15262-20-1	T	PCI/L	8.18	U		18.2	33.5	33.5	50.0	N	Yes	1	NA
	Radium-226	13982-63-3	T	PCI/L	-8.98	U		15.8	42.8	42.8	50.0	N	Yes	1	NA

SECTION 3

SUPPORTING DOCUMENTATION FOR QUALIFIERS

ENVIRONMENTAL STANDARDS

RADIOLOGICAL ANALYSIS SUPPORT DOCUMENTATION

ESI project name: TVA JOF EI Implementation

Sample Collection Dates: 5/29/19

Job Number: **20188360.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: Level IV (Full) (X)

Limited ( )

Other:

Sample No.	Lab Control No.
180-90755-1	

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					X					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.

RADIOLOGICAL FIELD DUPLICATE EVALUATION

Replicate Error Ratio (RER) = $\frac{\text{ABS (Sample Activity - Duplicate Activity)}}{\sqrt{(\text{Sample } 2\sigma \text{ Error})^2 + (\text{Duplicate } 2\sigma \text{ Error})^2}}$

2σ RER = RER × 2

Laboratory SDG	**180-90755-1**
Qualification Limit: <	2
Qualifier	J/UJ

Sample ID	Duplicate ID	Analyte	Sample Activity	Sample 2σ Error*	Duplicate Activity	Duplicate 2σ Error*	2σ RER	Qualifier
180-90755-1	180-90755-1 DU	radium-226	0.858	0.218	0.9439	0.268	0.5	
180-90755-1	180-90755-1 DU	radium-228	0.652	0.253	0.7981	0.302	0.7	
180-90755-1	180-90755-1 DU	radium-226+228	1.51	0.334	1.742	0.404	0.9	
180-90755-11	180-90755-11 DU	radium-226	0.722	0.233	0.915	0.212	1.2	
180-90755-11	180-90755-11 DU	radium-228	1.05	0.306	0.95	0.23	0.5	
180-90755-11	180-90755-11 DU	radium-226+228	1.77	0.385	1.865	0.313	0.4	
180-90755-1	180-90755-3	radium-226	0.858	0.218	0.864	0.254	0.0	
180-90755-1	180-90755-3	radium-228	0.652	0.253	1.1	0.329	2.2	J/UJ
180-90755-1	180-90755-3	radium-226+228	1.51	0.334	1.96	0.416	1.7	

* TPU 2σ or CSU 2σ. Not the counting error.

Client Sample Results

Client: Environmental Standards Inc.
Project/Site: JOF_BS_20190529_1B

Job ID: 180-90755-1

Client Sample ID: JOF-BS-BG04-25.0/28.5-20190529

Lab Sample ID: 180-90755-6

Date Collected: 05/29/19 11:48
Date Received: 05/31/19 09:00

Matrix: Solid

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

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium 226 and 228 (positive only)	**0.913**	J,S	0.212	0.224			pCi/g	06/07/19 12:29	06/28/19 14:02	1
Radium-226	**0.640**		0.159	0.172	1.00	0.124	pCi/g	06/07/19 12:29	06/28/19 14:02	1
Radium-228	0.273	U	0.140	0.143		0.413	pCi/g	06/07/19 12:29	06/28/19 14:02	1

SECTION 4

CASE NARRATIVE AND CHAIN-OF-CUSTODY RECORD

Case Narrative

Client: Environmental Standards Inc.
Project/Site: JOF_BS_20190529_1B

Job ID: 180-90755-1

Job ID: 180-90755-1

Laboratory: Eurofins TestAmerica, Pittsburgh

Narrative

Job Narrative
180-90755-1

Comments
No additional comments.

Receipt
The samples were received on 5/31/2019 9:00 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 4 coolers at receipt time were 2.1° C, 3.1° C, 3.9° C and 4.4° C.

RAD
Method(s) 901.1: Gamma Prep Batch 160-430858
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

JOF-BS-FB04-20190529 (180-90755-9), (LCS 160-430858/2-A), (MB 160-430858/1-A), (180-90766-A-8-A) and (180-90766-A-8-B DU)

Method(s) 901.1: Gamma Prep Batch 160-431172
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

JOF-BS-BG04-0.0/0.5-20190529 (180-90755-1), JOF-BS-BG04-11.5/13.5-20190529 (180-90755-2), JOF-BS-DUP01-20190529 (180-90755-3), JOF-BS-BG04-16.5/18.5-20190529 (180-90755-4), JOF-BS-BG04-21.5/23.5-20190529 (180-90755-5), JOF-BS-BG04-25.0/28.5-20190529 (180-90755-6), JOF-BS-BG04-1.5/3.5-20190529 (180-90755-7), JOF-BS-BG04-6.5/8.5-20190529 (180-90755-8), JOF-BS-BG03-0.0/0.5-20190529 (180-90755-10), JOF-BS-BG03-11.5/13.5-20190529 (180-90755-12), JOF-BS-BG03-16.5/18.5-20190529 (180-90755-13), JOF-BS-BG03-1.5/3.5-20190529 (180-90755-14), (LCS 160-431172/2-A), (MB 160-431172/1-A) and (180-90755-A-1-C DU)

Method(s) 901.1: Gamma Prep Batch 160-431201
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:

Job ID: 180-90755-1 (Continued)

Laboratory: Eurofins TestAmerica, Pittsburgh (Continued)

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

JOF-BS-BG03-6.5/8.5-20190529 (180-90755-11), (LCS 160-431201/2-A), (MB 160-431201/1-A) and (180-90755-A-11-D DU)

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

General Chemistry

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

Sample Summary

Client: Environmental Standards Inc.
Project/Site: JOF_BS_20190529_1B

Job ID: 180-90755-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
180-90755-1	JOF-BS-BG04-0.0/0.5-20190529	Solid	05/29/19 09:55	05/31/19 09:00	
180-90755-2	JOF-BS-BG04-11.5/13.5-20190529	Solid	05/29/19 11:00	05/31/19 09:00	
180-90755-3	JOF-BS-DUP01-20190529	Solid	05/29/19 00:00	05/31/19 09:00	
180-90755-4	JOF-BS-BG04-16.5/18.5-20190529	Solid	05/29/19 11:18	05/31/19 09:00	
180-90755-5	JOF-BS-BG04-21.5/23.5-20190529	Solid	05/29/19 11:35	05/31/19 09:00	
180-90755-6	JOF-BS-BG04-25.0/28.5-20190529	Solid	05/29/19 11:48	05/31/19 09:00	
180-90755-7	JOF-BS-BG04-1.5/3.5-20190529	Solid	05/29/19 12:14	05/31/19 09:00	
180-90755-8	JOF-BS-BG04-6.5/8.5-20190529	Solid	05/29/19 12:37	05/31/19 09:00	
180-90755-9	JOF-BS-FB04-20190529	Water	05/29/19 12:45	05/31/19 09:00	
180-90755-10	JOF-BS-BG03-0.0/0.5-20190529	Solid	05/29/19 14:17	05/31/19 09:00	
180-90755-11	JOF-BS-BG03-6.5/8.5-20190529	Solid	05/29/19 14:37	05/31/19 09:00	
180-90755-12	JOF-BS-BG03-11.5/13.5-20190529	Solid	05/29/19 14:52	05/31/19 09:00	
180-90755-13	JOF-BS-BG03-16.5/18.5-20190529	Solid	05/29/19 15:09	05/31/19 09:00	
180-90755-14	JOF-BS-BG03-1.5/3.5-20190529	Solid	05/29/19 15:39	05/31/19 09:00	

Tennessee Valley Authority

TVA Environmental Investigations

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 4
COC No:	JOF_BS_20190529_1B
1 of 1 Pages	
Task Desc:	JOF_BS

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 #: Johnsonville Fossil Plant
Project #: 16020000
Site Address: 535 Steam Plant Road
City: New Johnsonville State, Zip: TN, 37134
Site PM Name: Roy Quinn
Phone/Fax: 423-751-3753
Site PM Email: rquinn@tva.gov

Required Sampler Information

Sampler:
Sampling Company: Stantec
Address:
City/State: Phone:
Sampling Team Number: 1
Send EDD/Hard Copy to: lea_dalvecastes@envsid.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 (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: N	Preserve: None	Preserve: HNO3	Analysis: BACKGROUNDSOIL_RAD	Analysis: BACKGROUNDSOIL_BLANKS_RAD
1	JOF-BS-BG04-0.0/0.5-20190529	BG04	0.0	0.5	BS	G	N	5/29/2019	0955	2		☐				X	
2	JOF-BS-BG04-11.5/13.5-20190529	BG04	11.5	13.5	BS	G	N	5/29/2019	1100	2		☐				X	
3	JOF-BS-DUP01-20190529	-	-	-	BS	G	FD	5/29/2019	-	2		☐				X	
4	JOF-BS-BG04-16.5/18.5-20190529	BG04	16.5	18.5	BS	G	N	5/29/2019	1118	2		☐				X	
5	JOF-BS-BG04-21.5/23.5-20190529	BG04	21.5	23.5	BS	G	N	5/29/2019	1135	2		☐				X	
6	JOF-BS-BG04-25.0/28.5-20190529	BG04	25.0	28.5	BS	G	N	5/29/2019	1148	2		☐				X	
7	JOF-BS-BG04-1.5/3.5-20190529	BG04	1.5	3.5	BS	G	N	5/29/2019	1214	2		☐				X	
8	JOF-BS-BG04-6.5/8.5-20190529	BG04	6.5	8.5	BS	G	N	5/29/2019	1237	2		☐				X	
9	JOF-BS-FB04-20190529	BG04	NA	NA	AQ	G	FB	5/29/2019	1245	3		☐					X
10	JOF-BS-BG03-0.0/0.5-20190529	BG03	0.0	0.5	BS	G	N	5/29/2019	1417	2		☐				X	
11	JOF-BS-BG03-6.5/8.5-20190529	BG03	6.5	8.5	BS	G	N	5/29/2019	1437	2		☐				X	
12	JOF-BS-BG03-11.5/13.5-20190529	BG03	11.5	13.5	BS	G	N	5/29/2019	1452	2		☐				X	
13	JOF-BS-BG03-16.5/18.5-20190529	BG03	16.5	18.5	BS	G	N	5/29/2019	1509	2		☐				X	
14	JOF-BS-BG03-1.5/3.5-20190529	BG03	1.5	3.5	BS	G	N	5/29/2019	1539	2		☐				X	

Additional Comments/Special Instructions:

Additional volume collected should be used for laboratory duplicate analysis.

WP 5/30/19

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
Walker Padgett/Stantec Walker Padgett	5/30/2019	900	[signature]	5/31/19	900
WP 5/30/19			WP 5/30/19		

SHIPPING METHOD:	SAMPLER NAME AND SIGNATURE
Courier	Walker Padgett Walker Padgett
WP 5/30/19	WP 5/30/19

Sample Receipt Conditions: Temperature in °C; Sample on Ice?; Sample Intact?; Is Blank?

180-90755 Chain of Custody

Page 1 of 1

Form TVA 30057A

Tennessee Valley Authority

TVA Environmental Investigations

COOLER No.:	2 of 4
COC No:	JOF_BS_20190529_1B
1 of 1 Pages	
Task Desc:	JOF_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 #:	Johnsonville Fossil Plant	Sampler:	
Lab Address:	301 Alpha Drive	Project #:	18020000	Sampling Company:	Stantec
	Pittsburgh, PA 15238	Site Address	535 Steam Plant Road	Address	
		City	New Johnsonville State, Zip: TN, 37134	City/State	Phone:
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:	rquinn@tva.gov	Send EDD/Hard Copy to:	tvl_environmental@stantec.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

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: BACKGROUNDSOIL_RAD	BACKGROUNDSOIL_BLANKS_RAD	Filtered: N	N	Preserve: None	HNO3
1	JOF-BS-BG04-0.0/0.5-20190529	BG04	0.0	0.5	BS	G	N	5/29/2019	0955	2		☐	X					
2	JOF-BS-BG04-11.5/13.5-20190529	BG04	11.5	13.5	BS	G	N	5/29/2019	1100	2		☐	X					
3	JOF-BS-DUP01-20190529	-	-	-	BS	G	FD	5/29/2019	-	2		☐	X					
4	JOF-BS-BG04-16.5/18.5-20190529	BG04	16.5	18.5	BS	G	N	5/29/2019	1118	2		☐	X					
5	JOF-BS-BG04-21.5/23.5-20190529	BG04	21.5	23.5	BS	G	N	5/29/2019	1135	2		☐	X					
6	JOF-BS-BG04-25.0/28.5-20190529	BG04	25.0	28.5	BS	G	N	5/29/2019	1148	2		☐	X					
7	JOF-BS-BG04-1.5/3.5-20190529	BG04	1.5	3.5	BS	G	N	5/29/2019	1214	2		☐	X					
8	JOF-BS-BG04-6.5/8.5-20190529	BG04	6.5	8.5	BS	G	N	5/29/2019	1237	2		☐	X					
9	JOF-BS-FB04-20190529	BG04	NA	NA	AQ	G	FB	5/29/2019	1245	3		☐		X				
10	JOF-BS-BG03-0.0/0.5-20190529	BG03	0.0	0.5	BS	G	N	5/29/2019	1417	2		☐	X					
11	JOF-BS-BG03-6.5/8.5-20190529	BG03	6.5	8.5	BS	G	N	5/29/2019	1437	2		☐	X					
12	JOF-BS-BG03-11.5/13.5-20190529	BG03	11.5	13.5	BS	G	N	5/29/2019	1452	2		☐	X					
13	JOF-BS-BG03-16.5/18.5-20190529	BG03	16.5	18.5	BS	G	N	5/29/2019	1509	2		☐	X					
14	JOF-BS-BG03-1.5/3.5-20190529	BG03	1.5	3.5	BS	G	N	5/29/2019	1539	2		☐	X					

WP 5/30/19

Additional Comments/Special Instructions:

Additional volume collected should be used for laboratory duplicate analysis.

WP 5/30/19

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
Walker Padgett/Stantec Walker Padgett	5/30/2019	0900	[signature]	5/31/19	9:00
WP 5/30/19			WP 5/30/19		

SHIPPING METHOD:	SAMPLER NAME AND SIGNATURE
Courier	Walker Padgett Walker Padgett
WP 5/30/19	WP 5/30/19

Sample Receipt Conditions

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

Form TVA 30067A

Tennessee Valley Authority

TVA Environmental Investigations

COOLER No.:	3	of	4
COC No:	JOF_BS_20190529_1B		
1 of 1 Pages			
Task Desc:	JOF_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 #:	Johnsonville Fossil Plant	Sampler:	
Lab Address:	301 Alpha Drive	Project #:	18020000	Sampling Company:	Stantec
	Pittsburgh, PA 15238	Site Address	535 Steam Plant Road	Address	
		City	New Johnsonville State, Zip: TN, 37134	City/State	Phone:
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:	rquinn@tva.gov	Send EDD/Hard Copy to:	tva_deliverables@erwatd.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**

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	Filtered: N	Filtered: N	Preserve: None	Preserve: HNO3	Analysis: BACKGROUNDSOIL_RAD	Analysis: BACKGROUNDSOIL_BLANKS_RAD
1	JOF-BS-BG04-0.0/0.5-20190529	BG04	0.0	0.5	BS	G	N	5/29/2019	0955	2		☐					X	
2	JOF-BS-BG04-11.5/13.5-20190529	BG04	11.5	13.5	BS	G	N	5/29/2019	1100	2		☐					X	
3	JOF-BS-DUP01-20190529	-	-	-	BS	G	FD	5/29/2019	-	2		☐					X	
4	JOF-BS-BG04-16.5/18.5-20190529	BG04	16.5	18.5	BS	G	N	5/29/2019	1118	2		☐					X	
5	JOF-BS-BG04-21.5/23.5-20190529	BG04	21.5	23.5	BS	G	N	5/29/2019	1135	2		☐					X	
6	JOF-BS-BG04-25.0/28.5-20190529	BG04	25.0	28.5	BS	G	N	5/29/2019	1148	2		☐					X	
7	JOF-BS-BG04-1.5/3.5-20190529	BG04	1.5	3.5	BS	G	N	5/29/2019	1214	2		☐					X	
8	JOF-BS-BG04-6.5/8.5-20190529	BG04	6.5	8.5	BS	G	N	5/29/2019	1237	2		☐					X	
9	JOF-BS-FB04-20190529	BG04	NA	NA	AQ	G	FB	5/29/2019	1245	3		☐						X
10	JOF-BS-BG03-0.0/0.5-20190529	BG03	0.0	0.5	BS	G	N	5/29/2019	1417	2		☐					X	
11	JOF-BS-BG03-6.5/8.5-20190529	BG03	6.5	8.5	BS	G	N	5/29/2019	1437	2		☐					X	
12	JOF-BS-BG03-11.5/13.5-20190529	BG03	11.5	13.5	BS	G	N	5/29/2019	1452	2		☐					X	
13	JOF-BS-BG03-16.5/18.5-20190529	BG03	16.5	18.5	BS	G	N	5/29/2019	1509	2		☐					X	
14	JOF-BS-BG03-1.5/3.5-20190529	BG03	1.5	3.5	BS	G	N	5/29/2019	1539	2		☐					X	

Additional Comments/Special Instructions:

Additional volume collected should be used for laboratory duplicate analysis.

WP 5/30/19

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
Walker Padgett/Stantec Walker Padgett	5/30/2019	0900	[signature]	5/31/19	9:00
WP 5/30/19			WP 5/30/19		

SHIPPING METHOD:	SAMPLER NAME AND SIGNATURE
Courier WP 5/30/19	Walker Padgett Walker Padgett WP 5/30/19

Sample Receipt Conditions

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

Form TVA 30067A

Tennessee Valley Authority

TVA Environmental Investigations

COOLER No.:	4	of	4
COC No:	JOF_BS_20190529_1B		
1	of	1	Pages
Task Desc:	JOF_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 #:	Johnsonville Fossil Plant	Sampler:	
Lab Address:	301 Alpha Drive	Project #:	18020000	Sampling Company:	Stantec
	Pittsburgh, PA 15238	Site Address	535 Steam Plant Road	Address	
		City	New Johnsonville State, Zip: TN, 37134	City/State	Phone:
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:	rquinn@tva.gov	Send EDD/Hard Copy to:	tva_deliverables@stantec.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**

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: BACKGROUNDSOIL_RAD	BACKGROUNDSOIL_BLANKS_RAD	Filtered: N	Preserve: None	HNO3
1	JOF-BS-BG04-0.0/0.5-20190529	BG04	0.0	0.5	BS	G	N	5/29/2019	0955	2		☐	X				
2	JOF-BS-BG04-11.5/13.5-20190529	BG04	11.5	13.5	BS	G	N	5/29/2019	1100	2		☐	X				
3	JOF-BS-DUP01-20190529	-	-	-	BS	G	FD	5/29/2019	-	2		☐	X				
4	JOF-BS-BG04-16.5/18.5-20190529	BG04	16.5	18.5	BS	G	N	5/29/2019	1118	2		☐	X				
5	JOF-BS-BG04-21.5/23.5-20190529	BG04	21.5	23.5	BS	G	N	5/29/2019	1135	2		☐	X				
6	JOF-BS-BG04-25.0/28.5-20190529	BG04	25.0	28.5	BS	G	N	5/29/2019	1148	2		☐	X				
7	JOF-BS-BG04-1.5/3.5-20190529	BG04	1.5	3.5	BS	G	N	5/29/2019	1214	2		☐	X				
8	JOF-BS-BG04-6.5/8.5-20190529	BG04	6.5	8.5	BS	G	N	5/29/2019	1237	2		☐	X				
9	JOF-BS-FB04-20190529	BG04	NA	NA	AQ	G	FB	5/29/2019	1245	3		☐		X			
10	JOF-BS-BG03-0.0/0.5-20190529	BG03	0.0	0.5	BS	G	N	5/29/2019	1417	2		☐	X				
11	JOF-BS-BG03-6.5/8.5-20190529	BG03	6.5	8.5	BS	G	N	5/29/2019	1437	2		☐	X				
12	JOF-BS-BG03-11.5/13.5-20190529	BG03	11.5	13.5	BS	G	N	5/29/2019	1452	2		☐	X				
13	JOF-BS-BG03-16.5/18.5-20190529	BG03	16.5	18.5	BS	G	N	5/29/2019	1509	2		☐	X				
14	JOF-BS-BG03-1.5/3.5-20190529	BG03	1.5	3.5	BS	G	N	5/29/2019	1539	2		☐	X				

Additional Comments/Special Instructions:

Additional volume collected should be used for laboratory duplicate analysis.

WP 5/30/19

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
Walker Padgett/Stantec Walker Padgett	5/30/2019	0900	[illegible]	5/31/19	[illegible]
WP 5/30/19			WP 5/30/19		

SHIPPING METHOD:	SAMPLER NAME AND SIGNATURE
Courier	Walker Padgett Walker Padgett
WP 5/30/19	WP 5/30/19

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

WP 5/30/19

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

Client Information (Sub Contract Lab)	Sampler:	Lab PM: Lage, Gail	Carrier Tracking No(s):	COC No: 180-364668.1
Client Contact: Shipping/Receiving	Phone:	E-Mail: gail.lage@testamericainc.com	State of Origin: Tennessee	Page: Page 1 of 2
Company: TestAmerica Laboratories, Inc.		Accreditations Required (See note):		Job #: 180-90755-1
Address: 13715 Rider Trail North, ,	Due Date Requested: 7/2/2019			
City: Earth City	TAT Requested (days):			
State, Zip: MO, 63045				
Phone: 314-298-8566(Tel) 314-298-8757(Fax)	PO #:			
Email:	WO #:			
Project Name: JOF_BS_20190529_1B	Project #: 18020000			
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_RadDry_Grind Positive Combined Radium-226/228	901.1_RaFill_Geo_21 Positive Combined Radium-226/228	Total Number of containers	Special Instructions/Note:
			Preservation Code:							
JOF-BS-BG04-0.0/0.5-20190529 (180-90755-1) ✓	5/29/19	09:55 Central ✓		Solid			X		2	TVA - Batch alone. Quarantine zone soil. Contact PM if insufficient volume for Tuna
JOF-BS-BG04-11.5/13.5-20190529 (180-90755-2) ✓	5/29/19	11:00 Central ✓		Solid			X		2	TVA - Batch alone. Quarantine zone soil. Contact PM if insufficient volume for Tuna
JOF-BS-DUP01-20190529 (180-90755-3) ✓	5/29/19	Central ✓		Solid			X		2	TVA - Batch alone. Quarantine zone soil. Contact PM if insufficient volume for Tuna
JOF-BS-BG04-16.5/18.5-20190529 (180-90755-4) ✓	5/29/19	11:18 Central ✓		Solid			X		2	TVA - Batch alone. Quarantine zone soil. Contact PM if insufficient volume for Tuna
JOF-BS-BG04-21.5/23.5-20190529 (180-90755-5) ✓	5/29/19	11:35 Central ✓		Solid			X		2	TVA - Batch alone. Quarantine zone soil. Contact PM if insufficient volume for Tuna
JOF-BS-BG04-25.0/28.5-20190529 (180-90755-6) ✓	5/29/19	11:48 Central ✓		Solid			X		2	TVA - Batch alone. Quarantine zone soil. Contact PM if insufficient volume for Tuna
JOF-BS-BG04-1.5/3.5-20190529 (180-90755-7) ✓	5/29/19	12:14 Central ✓		Solid			X		2	TVA - Batch alone. Quarantine zone soil. Contact PM if insufficient volume for Tuna
JOF-BS-BG04-6.5/8.5-20190529 (180-90755-8) ✓	5/29/19	12:37 Central ✓		Solid			X		2	TVA - Batch alone. Quarantine zone soil. Contact PM if insufficient volume for Tuna
JOF-BS-FB04-20190529 (180-90755-9) ✓	5/29/19 ✓	12:45 Central ✓		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 compliance to TestAmerica Laboratories, Inc.

Possible Hazard Identification
Unconfirmed

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

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

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:		
Relinquished by:	Date/Time: 6/3/19 1700	Company: TA PIT	Received by:	Date/Time: 6/4/19 09:25	Company: FA STL
Relinquished by:	Date/Time:	Company:	Received by:	Date/Time:	Company:
Relinquished by:	Date/Time:	Company:	Received by:	Date/Time:	Company:
Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:		Cooler Temperature(s) °C and Other Remarks:		

Ver. 01/16/2019

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

Chain of Custody Record

eurofins | Environment Testing TestAmerica

Client Information (Sub Contract Lab)	Sampler:	Lab PM: Lage, Gail	Carrier Tracking No(s):	COC No: 180-364668.2
Client Contact: Shipping/Receiving	Phone:	E-Mail: gail.lage@testamericainc.com	State of Origin: Tennessee	Page: Page 2 of 2
Company: TestAmerica Laboratories, Inc.		Accreditations Required (See note):		Job #: 180-90755-1
Address: 13715 Rider Trail North,	Due Date Requested: 7/2/2019			
City: Earth City	TAT Requested (days):			
State, Zip: MO, 63045				
Phone: 314-298-8566(Tel) 314-298-8757(Fax)	PO #:			
Email:	WO #:			
Project Name: JOF_BS_20190529_1B	Project #: 18020000			
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/Dry_Grind Positive Combined Radium-226/228	901.1_Ra/Fill_Geo_21 Positive Combined Radium-226/228	Total Number of containers	Special Instructions/Note:
			Preservation Code:							
JOF-BS-BG03-0.0/0.5-20190529 (180-90755-10)	5/29/19	14:17 Central		Solid			X		2	TVA - Batch alone. Quarantine zone soil. Contact PM if insufficient volume for Tuna
JOF-BS-BG03-6.5/8.5-20190529 (180-90755-11)	5/29/19	14:37 Central		Solid			X		2	TVA - Batch alone. Quarantine zone soil. Contact PM if insufficient volume for Tuna
JOF-BS-BG03-11.5/13.5-20190529 (180-90755-12)	5/29/19	14:52 Central		Solid			X		2	TVA - Batch alone. Quarantine zone soil. Contact PM if insufficient volume for Tuna
JOF-BS-BG03-16.5/18.5-20190529 (180-90755-13)	5/29/19	15:09 Central		Solid			X		2	TVA - Batch alone. Quarantine zone soil. Contact PM if insufficient volume for Tuna
JOF-BS-BG03-1.5/3.5-20190529 (180-90755-14)	5/29/19	15:39 Central		Solid			X		2	TVA - Batch alone. Quarantine zone soil. Contact PM if insufficient volume for Tuna

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

Possible Hazard Identification
Unconfirmed

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

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

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:		Method of Shipment:	
Relinquished by:	Date/Time: 6/3/19 1700	Company: TA	Received by:	Date/Time: 6/4/19 09:23	Company: TA STL
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No | Custody Seal No.:

Cooler Temperature(s) °C and Other Remarks:

Ver: 01/16/2019

Login Sample Receipt Checklist

Client: Environmental Standards Inc.

Job Number: 180-90755-1

Login Number: 90755
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: 180-90755-1

Login Number: 90755
List Number: 2
Creator: Harris, Lorin C

List Source: Eurofins TestAmerica, St. Louis
List Creation: 06/04/19 03:03 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.	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	1.3
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?	False	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	N/A	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Login Sample Receipt Checklist

Client: Environmental Standards Inc.

Job Number: 180-90755-1

Login Number: 90755
List Number: 3
Creator: Harris, Lorin C

List Source: Eurofins TestAmerica, St. Louis
List Creation: 06/04/19 03:08 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.	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?	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	