

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

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

TestAmerica Job ID: 160-17038-2

Client Project/Site: HDP RFP-CBA-022 (7 DAY TAT)

For:

Westinghouse Electric Company LLC
3300 State Road P
Festus, Missouri 63028

Attn: Mr. Martin Swanson



Authorized for release by:
5/16/2016 2:59:04 PM

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

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

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Case Narrative

Client: Westinghouse Electric Company LLC
Project/Site: HDP RFP-CBA-022 (7 DAY TAT)

TestAmerica Job ID: 160-17038-2

Job ID: 160-17038-2

Laboratory: TestAmerica St. Louis

Narrative

CASE NARRATIVE

Client: Westinghouse Electric Company LLC

Project: HDP RFP-CBA-022 (7 DAY TAT)

Report Number: 160-17038-2

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

TestAmerica St. Louis attests to the validity of the laboratory data generated by TestAmerica facilities reported herein. All analyses performed by TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an "as received" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

This laboratory report is confidential and is intended for the sole use of TestAmerica and its client.

RECEIPT

The samples were received on 4/19/2016 1:00 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 20.0° C.

RADIUM-226 BY GAMMA SPEC (21 DAY INGROWTH)

Samples 3875-SS-160418-00-01 (160-17038-1), 3875-SS-160418-00-02 (160-17038-2), 3875-SS-160418-00-03 (160-17038-3), 3875-SS-160418-00-04 (160-17038-4), 3875-SS-160418-00-05 (160-17038-5), 3875-SS-160418-00-06 (160-17038-6) and 3875-SS-160418-00-07 (160-17038-7) were analyzed for Radium-226 by gamma spec (21 day ingrowth) in accordance with EPA GA_01_R. The samples were leached on 04/20/2016, prepared on 04/21/2016 and analyzed on 05/12/2016.

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

Hematite
Decommissioning
Project

Procedure HDP-PR-QA-006, Chain of Custody

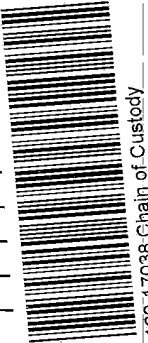
Revision: 4

Westinghouse Non-Proprietary Class 3

FORM HDP-PR-QA-006-1
CHAIN OF CUSTODY

Instructions: Each time the container is transferred to another organization, a person from each organization should sign the CoC. The Laboratory/End User must verify that the sample is correctly identified before the sample is released for use or analysis and send the completed CoC to HDP.

Chain of Custody ID No. 041816-01				Page 1/1				Requested Analysis										Laboratory Name:			
Project Name: Westinghouse Electric Company				Comp (C) or Grab (G)				Gamma Spec Isotopic Uranium Tc-99 Gamma Spec (21 day ingrow for Ra-226)										Total Containers		TA-MO	
Contact Person: W. Clark Evers																				Laboratory Address: 13715 Rider Trail North Earth City, MO 63045	
Phone Number: 314-810-3336																				Phone No. 314-298-8566	
Sampler Name: Mike Dekeyser																				Laboratory Contact Person: Ivan Vania Phone No. 708-870-8453	
																Turn Around Time					
																Rush (7 days)					
																Remarks					
Sample ID	Date	Time	Matrix																		
3875-SS-160418-00-01	3/31/2016	10:45	S	G	X		X	X								1	SWTP samples LSA 04-04				
3875-SS-160418-00-02	3/31/2016	13:40	S	G	X		X	X								1	SWTP samples LSA 08-15				
3875-SS-160418-00-03	4/13/2016	9:40	S	G	X		X	X								1	SWTP samples LSA 08-10				
3875-SS-160418-00-04	4/13/2016	11:05	S	G	X		X	X								1	SWTP samples LSA 08-10				
3875-SS-160418-00-05	4/14/2016	8:30	S	G	X		X	X								1	SWTP samples LSA 08-10				
3875-SS-160418-00-06	4/18/2016	8:55	S	G	X		X	X								1	SWTP samples LSA 08-15				
3875-SS-160418-00-07	4/18/2016	10:00	S	G	X		X	X								1	SWTP samples LSA 04-04				



160-17038 Chain of Custody

Relinquished by: <i>Gorski</i>	Date/Time: 4-19-16	Received by: <i>R. G...</i>	Date/Time: 4-19-16	Total Number of Containers: 7	Cooler Temperature: Ambient
Company Name: <i>WEC</i>	1150	Company Name: <i>Crossco AOS</i>	1150	Container ID: 0331-01	Shipper and Number:
Received by:	Date/Time:	Relinquished by:	Date/Time:	Comments: PO #4500404709	
Company Name:		Company Name:			
Relinquished by: <i>R. G...</i>	Date/Time: 4-19-16	Received by: <i>C. Dednor</i>	Date/Time: 4-19-16	Verified By: <i>C. Gorski</i> <i>Ch...</i> 4-19-16	
Company Name: <i>Crossroads</i>	13:00	Company Name: <i>TA-St. Louis</i>	1300		

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Login Sample Receipt Checklist

Client: Westinghouse Electric Company LLC

Job Number: 160-17038-2

Login Number: 17038

List Source: TestAmerica St. Louis

List Number: 1

Creator: Dedner, Connie L

Question	Answer	Comment
Radioactivity wasn't checked or is \leq 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	
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 $<6\text{mm}$ (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Definitions/Glossary

Client: Westinghouse Electric Company LLC
Project/Site: HDP RFP-CBA-022 (7 DAY TAT)

TestAmerica Job ID: 160-17038-2

Qualifiers

Rad

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

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
▫	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative error ratio
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Method Summary

Client: Westinghouse Electric Company LLC
Project/Site: HDP RFP-CBA-022 (7 DAY TAT)

TestAmerica Job ID: 160-17038-2

Method	Method Description	Protocol	Laboratory
GA-01-R	Radium-226 & Other Gamma Emitters (GS)	DOE	TAL SL

Protocol References:

DOE = U.S. Department of Energy

Laboratory References:

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



Sample Summary

Client: Westinghouse Electric Company LLC
Project/Site: HDP RFP-CBA-022 (7 DAY TAT)

TestAmerica Job ID: 160-17038-2

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
160-17038-1	3875-SS-160418-00-01	Solid	03/31/16 10:45	04/19/16 13:00
160-17038-2	3875-SS-160418-00-02	Solid	03/31/16 13:40	04/19/16 13:00
160-17038-3	3875-SS-160418-00-03	Solid	04/13/16 09:40	04/19/16 13:00
160-17038-4	3875-SS-160418-00-04	Solid	04/13/16 11:05	04/19/16 13:00
160-17038-5	3875-SS-160418-00-05	Solid	04/14/16 08:30	04/19/16 13:00
160-17038-6	3875-SS-160418-00-06	Solid	04/18/16 08:55	04/19/16 13:00
160-17038-7	3875-SS-160418-00-07	Solid	04/18/16 10:00	04/19/16 13:00

Client Sample Results

Client: Westinghouse Electric Company LLC
 Project/Site: HDP RFP-CBA-022 (7 DAY TAT)

TestAmerica Job ID: 160-17038-2

Client Sample ID: 3875-SS-160418-00-01

Lab Sample ID: 160-17038-1

Date Collected: 03/31/16 10:45

Matrix: Solid

Date Received: 04/19/16 13:00

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	1.03		0.150	0.183		0.132	pCi/g	04/21/16 12:38	05/12/16 14:32	1
Bismuth 212	0.788		0.380	0.388		0.538	pCi/g	04/21/16 12:38	05/12/16 14:32	1
Bismuth 214	1.09		0.125	0.169		0.0838	pCi/g	04/21/16 12:38	05/12/16 14:32	1
Lead 212	1.03		0.0806	0.156		0.0669	pCi/g	04/21/16 12:38	05/12/16 14:32	1
Lead 214	1.29		0.114	0.176		0.0882	pCi/g	04/21/16 12:38	05/12/16 14:32	1
Potassium 40	17.6		1.33	2.24		0.340	pCi/g	04/21/16 12:38	05/12/16 14:32	1
Protactinium 231	0.258	U	0.838	0.838		2.68	pCi/g	04/21/16 12:38	05/12/16 14:32	1
Radium 226	1.09		0.125	0.169	1.00	0.0838	pCi/g	04/21/16 12:38	05/12/16 14:32	1
Thorium 232	1.03		0.150	0.183		0.132	pCi/g	04/21/16 12:38	05/12/16 14:32	1
Thorium 234	1.39		0.609	0.626		0.951	pCi/g	04/21/16 12:38	05/12/16 14:32	1
Uranium 235	0.0781	U	0.150	0.151		0.589	pCi/g	04/21/16 12:38	05/12/16 14:32	1
Americium 241	0.0446	U	0.106	0.106		0.176	pCi/g	04/21/16 12:38	05/12/16 14:32	1
Protactinium 234m	2.25	U	3.82	3.83		10.4	pCi/g	04/21/16 12:38	05/12/16 14:32	1
Other Detected Radionuclides			Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Tl-208	0.276		0.0619	0.0682		0.0524	pCi/g	04/21/16 12:38	05/12/16 14:32	1

Client Sample ID: 3875-SS-160418-00-02

Lab Sample ID: 160-17038-2

Date Collected: 03/31/16 13:40

Matrix: Solid

Date Received: 04/19/16 13:00

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	1.16		0.147	0.188		0.116	pCi/g	04/21/16 12:38	05/12/16 14:33	1
Bismuth 212	1.41		0.408	0.433		0.377	pCi/g	04/21/16 12:38	05/12/16 14:33	1
Bismuth 214	1.23		0.119	0.174		0.0800	pCi/g	04/21/16 12:38	05/12/16 14:33	1
Lead 212	1.24		0.0738	0.177		0.0617	pCi/g	04/21/16 12:38	05/12/16 14:33	1
Lead 214	1.32		0.0921	0.166		0.0799	pCi/g	04/21/16 12:38	05/12/16 14:33	1
Potassium 40	21.2		1.14	2.42		0.318	pCi/g	04/21/16 12:38	05/12/16 14:33	1
Protactinium 231	0.337	U	0.958	0.959		2.17	pCi/g	04/21/16 12:38	05/12/16 14:33	1
Radium 226	1.23		0.119	0.174	1.00	0.0800	pCi/g	04/21/16 12:38	05/12/16 14:33	1
Thorium 232	1.16		0.147	0.188		0.116	pCi/g	04/21/16 12:38	05/12/16 14:33	1
Thorium 234	0.970		0.290	0.307		0.793	pCi/g	04/21/16 12:38	05/12/16 14:33	1
Uranium 235	0.129	U	0.248	0.249		0.520	pCi/g	04/21/16 12:38	05/12/16 14:33	1
Americium 241	0.00842	U	0.0985	0.0985		0.164	pCi/g	04/21/16 12:38	05/12/16 14:33	1
Protactinium 234m	4.13	U	4.78	4.80		7.34	pCi/g	04/21/16 12:38	05/12/16 14:33	1
Other Detected Radionuclides			Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Pb-210	1.74		0.492	0.533		0.725	pCi/g	04/21/16 12:38	05/12/16 14:33	1
Tl-208	0.395		0.0438	0.0597		0.0279	pCi/g	04/21/16 12:38	05/12/16 14:33	1

TestAmerica St. Louis

Client Sample Results

Client: Westinghouse Electric Company LLC
 Project/Site: HDP RFP-CBA-022 (7 DAY TAT)

TestAmerica Job ID: 160-17038-2

Client Sample ID: 3875-SS-160418-00-03

Lab Sample ID: 160-17038-3

Date Collected: 04/13/16 09:40

Matrix: Solid

Date Received: 04/19/16 13:00

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	1.04		0.131	0.168		0.105	pCi/g	04/21/16 12:38	05/12/16 15:11	1
Bismuth 212	1.13		0.370	0.388		0.452	pCi/g	04/21/16 12:38	05/12/16 15:11	1
Bismuth 214	1.13		0.111	0.161		0.0635	pCi/g	04/21/16 12:38	05/12/16 15:11	1
Lead 212	0.910		0.0797	0.142		0.0777	pCi/g	04/21/16 12:38	05/12/16 15:11	1
Lead 214	1.19		0.114	0.168		0.0807	pCi/g	04/21/16 12:38	05/12/16 15:11	1
Potassium 40	17.3		1.27	2.18		0.373	pCi/g	04/21/16 12:38	05/12/16 15:11	1
Protactinium 231	-0.460	U	1.40	1.40		2.33	pCi/g	04/21/16 12:38	05/12/16 15:11	1
Radium 226	1.13		0.111	0.161	1.00	0.0635	pCi/g	04/21/16 12:38	05/12/16 15:11	1
Thorium 232	1.04		0.131	0.168		0.105	pCi/g	04/21/16 12:38	05/12/16 15:11	1
Thorium 234	0.945		0.308	0.323		0.868	pCi/g	04/21/16 12:38	05/12/16 15:11	1
Uranium 235	0.0816	U	0.226	0.226		0.397	pCi/g	04/21/16 12:38	05/12/16 15:11	1
Americium 241	-0.00782	U	0.0839	0.0839		0.119	pCi/g	04/21/16 12:38	05/12/16 15:11	1
Protactinium 234m	3.01	U	5.38	5.38		8.14	pCi/g	04/21/16 12:38	05/12/16 15:11	1
Other Detected Radionuclides			Count	Total						
	Result	Qualifier	Uncert.	Uncert.	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Tl-208	0.320		0.0525	0.0621		0.0402	pCi/g	04/21/16 12:38	05/12/16 15:11	1

Client Sample ID: 3875-SS-160418-00-04

Lab Sample ID: 160-17038-4

Date Collected: 04/13/16 11:05

Matrix: Solid

Date Received: 04/19/16 13:00

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	1.03		0.140	0.176		0.161	pCi/g	04/21/16 12:38	05/12/16 15:12	1
Bismuth 212	0.310	U	0.566	0.567		0.947	pCi/g	04/21/16 12:38	05/12/16 15:12	1
Bismuth 214	1.09		0.107	0.156		0.0709	pCi/g	04/21/16 12:38	05/12/16 15:12	1
Lead 212	1.07		0.0782	0.159		0.0633	pCi/g	04/21/16 12:38	05/12/16 15:12	1
Lead 214	1.19		0.116	0.170		0.0862	pCi/g	04/21/16 12:38	05/12/16 15:12	1
Potassium 40	16.7		1.24	2.11		0.319	pCi/g	04/21/16 12:38	05/12/16 15:12	1
Protactinium 231	0.226	U	0.837	0.838		2.65	pCi/g	04/21/16 12:38	05/12/16 15:12	1
Radium 226	1.09		0.107	0.156	1.00	0.0709	pCi/g	04/21/16 12:38	05/12/16 15:12	1
Thorium 232	1.03		0.140	0.176		0.161	pCi/g	04/21/16 12:38	05/12/16 15:12	1
Thorium 234	1.18		0.579	0.592		0.914	pCi/g	04/21/16 12:38	05/12/16 15:12	1
Uranium 235	0.214	U	0.222	0.223		0.391	pCi/g	04/21/16 12:38	05/12/16 15:12	1
Americium 241	-0.0255	U	0.104	0.104		0.173	pCi/g	04/21/16 12:38	05/12/16 15:12	1
Protactinium 234m	2.30	U	3.77	3.78		10.0	pCi/g	04/21/16 12:38	05/12/16 15:12	1
Other Detected Radionuclides			Count	Total						
	Result	Qualifier	Uncert.	Uncert.	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Tl-208	0.318		0.0525	0.0620		0.0405	pCi/g	04/21/16 12:38	05/12/16 15:12	1

Client Sample Results

Client: Westinghouse Electric Company LLC
 Project/Site: HDP RFP-CBA-022 (7 DAY TAT)

TestAmerica Job ID: 160-17038-2

Client Sample ID: 3875-SS-160418-00-05

Lab Sample ID: 160-17038-5

Date Collected: 04/14/16 08:30

Matrix: Solid

Date Received: 04/19/16 13:00

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	1.28		0.122	0.177		0.126	pCi/g	04/21/16 12:38	05/12/16 15:13	1
Bismuth 212	2.14		0.435	0.487		0.311	pCi/g	04/21/16 12:38	05/12/16 15:13	1
Bismuth 214	1.27		0.106	0.168		0.0609	pCi/g	04/21/16 12:38	05/12/16 15:13	1
Lead 212	1.24		0.0753	0.177		0.0624	pCi/g	04/21/16 12:38	05/12/16 15:13	1
Lead 214	1.25		0.104	0.167		0.0744	pCi/g	04/21/16 12:38	05/12/16 15:13	1
Potassium 40	21.9		1.16	2.49		0.270	pCi/g	04/21/16 12:38	05/12/16 15:13	1
Protactinium 231	0.450	U	1.02	1.02		2.26	pCi/g	04/21/16 12:38	05/12/16 15:13	1
Radium 226	1.27		0.106	0.168	1.00	0.0609	pCi/g	04/21/16 12:38	05/12/16 15:13	1
Thorium 232	1.28		0.122	0.177		0.126	pCi/g	04/21/16 12:38	05/12/16 15:13	1
Thorium 234	1.44		0.548	0.569		0.854	pCi/g	04/21/16 12:38	05/12/16 15:13	1
Uranium 235	-0.126	U	0.355	0.356		0.589	pCi/g	04/21/16 12:38	05/12/16 15:13	1
Americium 241	0.0292	U	0.0992	0.0992		0.165	pCi/g	04/21/16 12:38	05/12/16 15:13	1
Protactinium 234m	-3.67	U	5.19	5.20		9.22	pCi/g	04/21/16 12:38	05/12/16 15:13	1
Other Detected Radionuclides			Count	Total						
	Result	Qualifier	Uncert.	Uncert.	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Tl-208	0.405		0.0519	0.0665		0.0392	pCi/g	04/21/16 12:38	05/12/16 15:13	1

Client Sample ID: 3875-SS-160418-00-06

Lab Sample ID: 160-17038-6

Date Collected: 04/18/16 08:55

Matrix: Solid

Date Received: 04/19/16 13:00

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	1.04		0.144	0.179		0.119	pCi/g	04/21/16 12:38	05/12/16 15:48	1
Bismuth 212	1.09		0.378	0.394		0.368	pCi/g	04/21/16 12:38	05/12/16 15:48	1
Bismuth 214	1.08		0.114	0.160		0.0734	pCi/g	04/21/16 12:38	05/12/16 15:48	1
Lead 212	0.978		0.0743	0.147		0.0680	pCi/g	04/21/16 12:38	05/12/16 15:48	1
Lead 214	1.25		0.0995	0.164		0.0713	pCi/g	04/21/16 12:38	05/12/16 15:48	1
Potassium 40	19.0		1.21	2.29		0.227	pCi/g	04/21/16 12:38	05/12/16 15:48	1
Protactinium 231	0.000	U	0.326	0.326		2.05	pCi/g	04/21/16 12:38	05/12/16 15:48	1
Radium 226	1.08		0.114	0.160	1.00	0.0734	pCi/g	04/21/16 12:38	05/12/16 15:48	1
Thorium 232	1.04		0.144	0.179		0.119	pCi/g	04/21/16 12:38	05/12/16 15:48	1
Thorium 234	0.893		0.290	0.305		0.811	pCi/g	04/21/16 12:38	05/12/16 15:48	1
Uranium 235	-0.0378	U	0.183	0.183		0.364	pCi/g	04/21/16 12:38	05/12/16 15:48	1
Americium 241	-0.0182	U	0.0810	0.0810		0.114	pCi/g	04/21/16 12:38	05/12/16 15:48	1
Protactinium 234m	1.63	U	2.75	2.76		9.75	pCi/g	04/21/16 12:38	05/12/16 15:48	1
Other Detected Radionuclides			Count	Total						
	Result	Qualifier	Uncert.	Uncert.	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Tl-208	0.308		0.0439	0.0543		0.0330	pCi/g	04/21/16 12:38	05/12/16 15:48	1

Client Sample Results

Client: Westinghouse Electric Company LLC
 Project/Site: HDP RFP-CBA-022 (7 DAY TAT)

TestAmerica Job ID: 160-17038-2

Client Sample ID: 3875-SS-160418-00-07

Lab Sample ID: 160-17038-7

Date Collected: 04/18/16 10:00

Matrix: Solid

Date Received: 04/19/16 13:00

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	1.13		0.138	0.179		0.110	pCi/g	04/21/16 12:38	05/12/16 15:47	1
Bismuth 212	1.86		0.401	0.444		0.313	pCi/g	04/21/16 12:38	05/12/16 15:47	1
Bismuth 214	1.18		0.101	0.158		0.0628	pCi/g	04/21/16 12:38	05/12/16 15:47	1
Lead 212	1.24		0.0726	0.177		0.0594	pCi/g	04/21/16 12:38	05/12/16 15:47	1
Lead 214	1.37		0.101	0.175		0.0701	pCi/g	04/21/16 12:38	05/12/16 15:47	1
Potassium 40	19.8		1.08	2.27		0.295	pCi/g	04/21/16 12:38	05/12/16 15:47	1
Protactinium 231	-0.270	U	1.33	1.33		2.22	pCi/g	04/21/16 12:38	05/12/16 15:47	1
Radium 226	1.18		0.101	0.158	1.00	0.0628	pCi/g	04/21/16 12:38	05/12/16 15:47	1
Thorium 232	1.13		0.138	0.179		0.110	pCi/g	04/21/16 12:38	05/12/16 15:47	1
Thorium 234	1.51		0.488	0.513		0.745	pCi/g	04/21/16 12:38	05/12/16 15:47	1
Uranium 235	-0.0146	U	0.0272	0.0273		0.555	pCi/g	04/21/16 12:38	05/12/16 15:47	1
Americium 241	-0.0512	U	0.0602	0.0604		0.154	pCi/g	04/21/16 12:38	05/12/16 15:47	1
Protactinium 234m	-3.59	U	4.43	4.44		10.5	pCi/g	04/21/16 12:38	05/12/16 15:47	1
Other Detected			Count	Total						
Radionuclides			Uncert.	Uncert.	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Tl-208			(2σ+/-)	(2σ+/-)		0.0306	pCi/g	04/21/16 12:38	05/12/16 15:47	1

QC Sample Results

Client: Westinghouse Electric Company LLC
 Project/Site: HDP RFP-CBA-022 (7 DAY TAT)

TestAmerica Job ID: 160-17038-2

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Lab Sample ID: MB 160-247176/1-A
Matrix: Solid
Analysis Batch: 250932

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 247176

Analyte	MB MB		Count	Total	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.006834	U	0.0145	0.0145		0.0747	pCi/g	04/21/16 12:38	05/13/16 15:44	1
Bismuth 212	-0.1342	U	0.260	0.260		0.441	pCi/g	04/21/16 12:38	05/13/16 15:44	1
Bismuth 214	-0.01151	U	0.0256	0.0256		0.0530	pCi/g	04/21/16 12:38	05/13/16 15:44	1
Lead 212	-0.002305	U	0.0174	0.0174		0.0311	pCi/g	04/21/16 12:38	05/13/16 15:44	1
Lead 214	0.006685	U	0.0183	0.0183		0.0313	pCi/g	04/21/16 12:38	05/13/16 15:44	1
Potassium 40	0.007858	U	0.230	0.230		0.313	pCi/g	04/21/16 12:38	05/13/16 15:44	1
Protactinium 231	0.06638	U	0.171	0.171		0.433	pCi/g	04/21/16 12:38	05/13/16 15:44	1
Radium 226	-0.01151	U	0.0256	0.0256	1.00	0.0530	pCi/g	04/21/16 12:38	05/13/16 15:44	1
Thorium 232	0.006834	U	0.0145	0.0145		0.0747	pCi/g	04/21/16 12:38	05/13/16 15:44	1
Thorium 234	-0.08972	U	0.176	0.176		0.321	pCi/g	04/21/16 12:38	05/13/16 15:44	1
Uranium 235	0.01727	U	0.0563	0.0564		0.110	pCi/g	04/21/16 12:38	05/13/16 15:44	1
Americium 241	-0.002746	U	0.0188	0.0188		0.0281	pCi/g	04/21/16 12:38	05/13/16 15:44	1
Protactinium 234m	-0.1440	U	1.79	1.79		4.40	pCi/g	04/21/16 12:38	05/13/16 15:44	1
Other Detected Radionuclides	MB MB		Count	Total	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Other Detected Radionuclide	None						pCi/g	04/21/16 12:38	05/13/16 15:44	1

Lab Sample ID: LCS 160-247176/2-A
Matrix: Solid
Analysis Batch: 250720

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 247176

Analyte	Spike Added	LCS Result	LCS Qual	Total	RL	MDC	Unit	%Rec	%Rec. Limits
				Uncert. (2σ+/-)					
Americium 241	101	91.38		9.52		0.606	pCi/g	91	87 - 116
Cesium 137	34.0	30.56		3.21		0.180	pCi/g	90	87 - 120
Cobalt 60	31.2	27.82		2.82		0.133	pCi/g	89	87 - 115

Lab Sample ID: 160-17033-A-1-G DU
Matrix: Solid
Analysis Batch: 250719

Client Sample ID: Duplicate
Prep Type: Total/NA
Prep Batch: 247176

Analyte	Sample Result	Sample Qual	DU Result	DU Qual	Total	RL	MDC	Unit	RER	RER Limit
					Uncert. (2σ+/-)					
Actinium 228	1.15		0.9760		0.152		0.0998	pCi/g	0.54	1
Bismuth 212	1.38		0.8747		0.345		0.456	pCi/g	0.70	1
Bismuth 214	1.23		1.163		0.158		0.0564	pCi/g	0.21	1
Lead 212	1.13		0.9392		0.140		0.0630	pCi/g	0.63	1
Lead 214	1.37		1.127		0.150		0.0813	pCi/g	0.76	1
Potassium 40	20.8		18.49		2.23		0.355	pCi/g	0.50	1
Protactinium 231	-0.457	U	0.2664	U	0.816		1.99	pCi/g	0.33	1
Radium 226	1.23		1.163		0.158	1.00	0.0564	pCi/g	0.21	1
Thorium 232	1.15		0.9760		0.152		0.0998	pCi/g	0.54	1
Thorium 234	1.08		1.226		0.512		0.769	pCi/g	0.14	1
Uranium 235	0.0925	U	0.05139	U	0.137		0.373	pCi/g	0.13	1
Americium 241	0.0296	U	-0.03654	U	0.0996		0.165	pCi/g	0.35	1

TestAmerica St. Louis

QC Sample Results

Client: Westinghouse Electric Company LLC
 Project/Site: HDP RFP-CBA-022 (7 DAY TAT)

TestAmerica Job ID: 160-17038-2

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Lab Sample ID: 160-17033-A-1-G DU
 Matrix: Solid
 Analysis Batch: 250719

Client Sample ID: Duplicate
 Prep Type: Total/NA
 Prep Batch: 247176

Analyte	Sample Result	Sample Qual	DU Result	DU Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	RER	RER Limit
Protactinium 234m	3.72	U	1.884	U	3.06		9.31	pCi/g	0.25	1
<i>Total</i>										
Other Detected Radionuclides	Sample Result	Sample Qual	DU Result	DU Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	RER	RER Limit
Tl-208	0.340		0.3485		0.0574		0.0315	pCi/g	0.08	1

QC Association Summary

Client: Westinghouse Electric Company LLC
Project/Site: HDP RFP-CBA-022 (7 DAY TAT)

TestAmerica Job ID: 160-17038-2

Rad

Leach Batch: 246909

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-17033-A-1-G DU	Duplicate	Total/NA	Solid	Dry and Grind	
160-17038-1	3875-SS-160418-00-01	Total/NA	Solid	Dry and Grind	
160-17038-2	3875-SS-160418-00-02	Total/NA	Solid	Dry and Grind	
160-17038-3	3875-SS-160418-00-03	Total/NA	Solid	Dry and Grind	
160-17038-4	3875-SS-160418-00-04	Total/NA	Solid	Dry and Grind	
160-17038-5	3875-SS-160418-00-05	Total/NA	Solid	Dry and Grind	
160-17038-6	3875-SS-160418-00-06	Total/NA	Solid	Dry and Grind	
160-17038-7	3875-SS-160418-00-07	Total/NA	Solid	Dry and Grind	

Prep Batch: 247176

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-17033-A-1-G DU	Duplicate	Total/NA	Solid	Fill_Geo-21	246909
160-17038-1	3875-SS-160418-00-01	Total/NA	Solid	Fill_Geo-21	246909
160-17038-2	3875-SS-160418-00-02	Total/NA	Solid	Fill_Geo-21	246909
160-17038-3	3875-SS-160418-00-03	Total/NA	Solid	Fill_Geo-21	246909
160-17038-4	3875-SS-160418-00-04	Total/NA	Solid	Fill_Geo-21	246909
160-17038-5	3875-SS-160418-00-05	Total/NA	Solid	Fill_Geo-21	246909
160-17038-6	3875-SS-160418-00-06	Total/NA	Solid	Fill_Geo-21	246909
160-17038-7	3875-SS-160418-00-07	Total/NA	Solid	Fill_Geo-21	246909
LCS 160-247176/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	
MB 160-247176/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	