

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: 160-17118-2

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

Rhonda Ridenhower

Authorized for release by:

5/23/2016 11:08:46 AM

Rhonda Ridenhower, Manager of Project Management
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Designee for

Ivan Vania, Project Manager II
(314)298-8566

ivan.vania@testamericainc.com

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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: 160-17118-2

Job ID: 160-17118-2

Laboratory: TestAmerica St. Louis

Narrative

CASE NARRATIVE

Client: Westinghouse Electric Company LLC

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

Report Number: 160-17118-2

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 04/26/2016; the samples arrived in good condition, properly preserved and on ice. The temperatures of the 3 coolers at receipt time were 19.0° C, 19.0° C and 19.0° C.

RADIUM-226 BY GAMMA SPEC (21 DAY INGROWTH)

Samples L08-14-18-T-E-B-00 (160-17118-1), L08-14-19-T-R-B-00 (160-17118-2), L08-14-20-T-R-B-00 (160-17118-3), L09-01-25-P-S-B-00 (160-17118-4), L09-02-19-P-S-S-00 (160-17118-5), L09-02-20-P-R-S-00 (160-17118-6), L09-02-21-P-E-S-00 (160-17118-7), L09-02-22-P-S-S-00 (160-17118-8), L09-02-23-P-R-S-00 (160-17118-9), L09-02-24-P-E-S-00 (160-17118-10), L09-02-25-P-S-B-00 (160-17118-11), L09-02-26-P-S-B-00 (160-17118-12) and L09-03-25-P-E-B-00 (160-17118-13) were analyzed for Radium-226 by gamma spec (21 day ingrowth) in accordance with EPA GA_01_R. The samples were dried on 04/26/2016, prepared on 04/28/2016 and analyzed on 05/20/2016 and 05/22/2016.

No 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

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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.	F-042616-01	Page	1/1
Project Name: Westinghouse Electric Company			
Contact Person: Clark Evers			
Phone Number: 314-810-3336			
Sampler Name: Donte Love			
Requested Analysis			
Comp (C) or Grab (G)	Gamma Spec	Isotopic Uranium	Tc-99
	Gamma Spec (21 day ingrow for Ra-226)		
Laboratory Name: TA-MO			
Laboratory Address: 13715 Rider Trail North			
Phone No. 314-298-8566			
Laboratory Contact Person: Ivan Vania			
Phone No. 708-870-8453			
Turn Around Time			
Rush		(7 days)	
Remarks			

Sample ID	Date	Time	Matrix	Comp (C) or Grab (G)	Gamma Spec	Isotopic Uranium	Tc-99	Gamma Spec (21 day ingrow for Ra-226)				Total Containers	Remarks
L08-14-18-T-E-B-00	4/19/2016	9:15	S	G	X		X	X				1	LSA 08-14 Sidewall Bias
L08-14-19-T-R-B-00	4/19/2016	9:30	S	G	X		X	X				1	LSA 08-14 Bias
L08-14-20-T-R-B-00	4/19/2016	9:35	S	G	X		X	X				1	LSA 08-14 Bias



Relinquished by: <i>C Gorsum</i> <i>Chy Li</i>	Date/Time 4-26-16 0915	Company Name: WEC	Received by: <i>RG 3815</i>	Date/Time 4-26-16 0915	Company Name: CROSSROADS	Total 3	Cooler Temperature: Ambient
Received by:	Date/Time	Company Name:	Relinquished by:	Date/Time	Company Name:	Cooler ID: 0426-01	Shipper and Number:
Received by: <i>M Gull</i> <i>3815</i>	Date/Time 4-26-16 10:45	Company Name: CROSSROADS	Received by: <i>Chy Clark</i>	Date/Time 4-26-16 1045	Company Name: TA STL	Comments: N/A	
						Verified By: <i>C. Gorsum</i> <i>Chy Li</i> 4-26-16	



Hematite Decommissioning Project

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

Revision: 4

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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. F-042616-03 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: Clark Evers																Laboratory Address: 13715 Rider Trail North	
Phone Number: 314-810-3336																Phone No. 314-298-8566	
Sampler Name: Donte Love																Laboratory Contact Person: Ivan Vania	
				Phone No. 708-870-8453													
				Turn Around Time													
				Rush (7 days)													
				Remarks													
Sample ID	Date	Time	Matrix														
L09-01-25-P-S-B-00	4/20/2016	8:15	S	G	X	X	X							1	LSA 09-01 Bias		
Relinquished by: Gorsun <i>Gorsun</i>		Date/Time 4-26-16 0915		Received by: <i>3815</i>		Date/Time 4-26-16 0915		Total 1		Cooler Temperature: Ambient							
Company Name: WEC				Company Name: CROSSROADS				Cooler ID: 0426-01		Shipper and Number:							
Received by:		Date/Time		Relinquished by:		Date/Time		Comments: N/A									
Company Name:				Company Name:													
Relinquished by: <i>3815</i>		Date/Time 4-26-16 10:45		Received by: <i>Clark</i>		Date/Time 4-26-16 1045		Verified By: C. Gorsun <i>Gorsun</i> 4-26-16									
Company Name: CROSSROADS				Company Name: TASTR													

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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.		F-042616-04		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: Clark Evers																			Laboratory Address: 13715 Rider Trail North	
Phone Number: 314-810-3336																			Phone No. 314-298-8566	
Sampler Name Donte Love																			Laboratory Contact Person: Ivan Vania	
							Phone No. 708-870-8453		Turn Around Time		Rush (7 days)		Remarks							
Sample ID	Date	Time	Matrix																	
L09-02-19-P-S-S-00	4/22/2016	9:00	S	G	X		X	X								1	LSA 09-02			
L09-02-20-P-R-S-00	4/22/2016	9:20	S	C	X		X	X								1	LSA 09-02			
L09-02-21-P-E-S-00	4/22/2016	9:25	S	G	X		X	X								1	LSA 09-02			
L09-02-22-P-S-S-00	4/22/2016	10:00	S	G	X		X	X								1	LSA 09-02			
L09-02-23-P-R-S-00	4/22/2016	10:15	S	C	X		X	X								1	LSA 09-02			
L09-02-24-P-E-S-00	4/22/2016	10:20	S	G	X		X	X								1	LSA 09-02			
L09-02-25-P-S-B-00	4/22/2016	10:25	S	G	X		X	X								1	LSA 09-02 Bias			
L09-02-26-P-S-B-00	4/22/2016	10:30	S	G	X		X	X								1	LSA 09-02 Sidewall Bias			
Relinquished by: <i>C. Gorsue</i>				Date/Time: <i>4-26-16 0915</i>		Received by: <i>R. Galt 3815</i>				Date/Time: <i>4-26-16 0915</i>		Total: <i>8</i>		Cooler Temperature: <i>Ambient</i>						
Company Name: <i>WEC</i>						Company Name: <i>CROSSROADS</i>						Cooler ID: <i>0426-01/02</i>		Shipper and Number:						
Received by:				Date/Time:		Relinquished by:				Date/Time:		Comments: <i>N/A</i>								
Company Name:						Company Name:														
Relinquished by: <i>R. Galt 3815</i>				Date/Time: <i>4-26-16 10:45</i>		Received by: <i>John Clarke</i>				Date/Time: <i>4-26-16 1045</i>		Verified By: <i>C. Gorsue</i>								
Company Name: <i>CROSSROADS</i>						Company Name: <i>TA 512</i>						<i>Clarke</i> 4-26-16								



Hematite Decommissioning Project

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

Revision: 4

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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. F-042616-02 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	Laboratory Name: TA-MO	
Contact Person: Clark Evers														Laboratory Address: 13715 Rider Trail North	
Phone Number: 314-810-3336														Phone No.: 314-298-8566	
Sampler Name: Jahmai Williams														Laboratory Contact Person: Ivan Vania	
				Phone No.: 708-870-8453											
				Turn Around Time											
				Rush (7 days)											
				Remarks											
Sample ID	Date	Time	Matrix												
L09-03-25-P-E-B-00	4/14/2016	15:00	S	G	X		X	X					1	LSA 09-03 Sidewall Bias	
Relinquished by: Gorsue <i>C Gorsue</i>		Date/Time 4-26-16 0915		Received by: <i>RG 3815</i>		Date/Time 4-26-16 0915		Total 1		Cooler Temperature: Ambient					
Company Name: WEC				Company Name: CROSSROADS				Cooler ID: 0426-01		Shipper and Number:					
Received by:		Date/Time		Relinquished by:		Date/Time		Comments: N/A							
Company Name:				Company Name:											
Relinquished by: <i>RG 3815</i>		Date/Time 4-26-16 10:45		Received by: <i>Clark</i>		Date/Time 4-26-16 1045		Verified By: C. Gorsue <i>C Gorsue</i> 4-26-16							
Company Name: CROSSROADS				Company Name: TA SR											

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Login Sample Receipt Checklist

Client: Westinghouse Electric Company LLC

Job Number: 160-17118-2

Login Number: 17118

List Source: TestAmerica St. Louis

List Number: 1

Creator: Clarke, Jill C

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	
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").	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: 160-17118-2

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: 160-17118-2

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: 160-17118-2

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
160-17118-1	L08-14-18-T-E-B-00	Solid	04/19/16 09:15	04/26/16 10:45
160-17118-2	L08-14-19-T-R-B-00	Solid	04/19/16 09:30	04/26/16 10:45
160-17118-3	L08-14-20-T-R-B-00	Solid	04/19/16 09:35	04/26/16 10:45
160-17118-4	L09-01-25-P-S-B-00	Solid	04/20/16 08:15	04/26/16 10:45
160-17118-5	L09-02-19-P-S-S-00	Solid	04/22/16 09:00	04/26/16 10:45
160-17118-6	L09-02-20-P-R-S-00	Solid	04/22/16 09:20	04/26/16 10:45
160-17118-7	L09-02-21-P-E-S-00	Solid	04/22/16 09:25	04/26/16 10:45
160-17118-8	L09-02-22-P-S-S-00	Solid	04/22/16 10:00	04/26/16 10:45
160-17118-9	L09-02-23-P-R-S-00	Solid	04/22/16 10:15	04/26/16 10:45
160-17118-10	L09-02-24-P-E-S-00	Solid	04/22/16 10:20	04/26/16 10:45
160-17118-11	L09-02-25-P-S-B-00	Solid	04/22/16 10:25	04/26/16 10:45
160-17118-12	L09-02-26-P-S-B-00	Solid	04/22/16 10:30	04/26/16 10:45
160-17118-13	L09-03-25-P-E-B-00	Solid	04/14/16 15:00	04/26/16 10:45

Client Sample Results

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

TestAmerica Job ID: 160-17118-2

Client Sample ID: L08-14-18-T-E-B-00

Lab Sample ID: 160-17118-1

Date Collected: 04/19/16 09:15

Matrix: Solid

Date Received: 04/26/16 10:45

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	1.02		0.148	0.181		0.104	pCi/g	04/28/16 09:00	05/20/16 07:51	1
Bismuth 212	1.51		0.570	0.592		0.480	pCi/g	04/28/16 09:00	05/20/16 07:51	1
Bismuth 214	0.925		0.122	0.156		0.0820	pCi/g	04/28/16 09:00	05/20/16 07:51	1
Lead 212	0.948		0.0782	0.145		0.0663	pCi/g	04/28/16 09:00	05/20/16 07:51	1
Lead 214	1.05		0.0960	0.145		0.0764	pCi/g	04/28/16 09:00	05/20/16 07:51	1
Potassium 40	16.4		1.29	2.12		0.345	pCi/g	04/28/16 09:00	05/20/16 07:51	1
Protactinium 231	0.000	U	0.339	0.339		2.52	pCi/g	04/28/16 09:00	05/20/16 07:51	1
Radium 226	0.925		0.122	0.156	1.00	0.0820	pCi/g	04/28/16 09:00	05/20/16 07:51	1
Thorium 232	1.02		0.148	0.181		0.104	pCi/g	04/28/16 09:00	05/20/16 07:51	1
Thorium 234	0.308	U	0.331	0.332		1.55	pCi/g	04/28/16 09:00	05/20/16 07:51	1
Uranium 235	-0.140	U	0.201	0.201		0.647	pCi/g	04/28/16 09:00	05/20/16 07:51	1
Americium 241	-0.0156	U	0.106	0.106		0.177	pCi/g	04/28/16 09:00	05/20/16 07:51	1
Protactinium 234m	2.19	U	3.24	3.24		10.3	pCi/g	04/28/16 09:00	05/20/16 07:51	1
Other Detected			Count	Total						
Radionuclides			Uncert.	Uncert.						
<i>Tl-208</i>	0.348		0.0545	0.0654		0.0397	pCi/g	04/28/16 09:00	05/20/16 07:51	1

Client Sample ID: L08-14-19-T-R-B-00

Lab Sample ID: 160-17118-2

Date Collected: 04/19/16 09:30

Matrix: Solid

Date Received: 04/26/16 10:45

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	1.00		0.116	0.153		0.104	pCi/g	04/28/16 09:00	05/20/16 07:52	1
Bismuth 212	1.09		0.296	0.316		0.267	pCi/g	04/28/16 09:00	05/20/16 07:52	1
Bismuth 214	1.03		0.0838	0.135		0.0459	pCi/g	04/28/16 09:00	05/20/16 07:52	1
Lead 212	1.00		0.0634	0.145		0.0588	pCi/g	04/28/16 09:00	05/20/16 07:52	1
Lead 214	1.06		0.0749	0.133		0.0568	pCi/g	04/28/16 09:00	05/20/16 07:52	1
Potassium 40	18.7		0.975	2.12		0.263	pCi/g	04/28/16 09:00	05/20/16 07:52	1
Protactinium 231	-0.337	U	1.32	1.32		2.20	pCi/g	04/28/16 09:00	05/20/16 07:52	1
Radium 226	1.03		0.0838	0.135	1.00	0.0459	pCi/g	04/28/16 09:00	05/20/16 07:52	1
Thorium 232	1.00		0.116	0.153		0.104	pCi/g	04/28/16 09:00	05/20/16 07:52	1
Thorium 234	4.52		0.589	0.756		0.814	pCi/g	04/28/16 09:00	05/20/16 07:52	1
Uranium 235	1.38		0.167	0.218		0.198	pCi/g	04/28/16 09:00	05/20/16 07:52	1
Americium 241	0.0324	U	0.0992	0.0992		0.164	pCi/g	04/28/16 09:00	05/20/16 07:52	1
Protactinium 234m	8.21		3.52	3.61		3.54	pCi/g	04/28/16 09:00	05/20/16 07:52	1
Other Detected			Count	Total						
Radionuclides			Uncert.	Uncert.						
<i>Tl-208</i>	0.316		0.0391	0.0508		0.0307	pCi/g	04/28/16 09:00	05/20/16 07:52	1

TestAmerica St. Louis

Client Sample Results

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

TestAmerica Job ID: 160-17118-2

Client Sample ID: L08-14-20-T-R-B-00

Lab Sample ID: 160-17118-3

Date Collected: 04/19/16 09:35

Matrix: Solid

Date Received: 04/26/16 10:45

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	1.02		0.141	0.175		0.127	pCi/g	04/28/16 09:00	05/20/16 07:53	1
Bismuth 212	0.863		0.505	0.513		0.533	pCi/g	04/28/16 09:00	05/20/16 07:53	1
Bismuth 214	0.752		0.0947	0.123		0.0655	pCi/g	04/28/16 09:00	05/20/16 07:53	1
Lead 212	1.05		0.0793	0.158		0.0593	pCi/g	04/28/16 09:00	05/20/16 07:53	1
Lead 214	0.789		0.114	0.140		0.0943	pCi/g	04/28/16 09:00	05/20/16 07:53	1
Potassium 40	16.7		1.29	2.15		0.308	pCi/g	04/28/16 09:00	05/20/16 07:53	1
Protactinium 231	-0.102	U	1.56	1.56		2.62	pCi/g	04/28/16 09:00	05/20/16 07:53	1
Radium 226	0.752		0.0947	0.123	1.00	0.0655	pCi/g	04/28/16 09:00	05/20/16 07:53	1
Thorium 232	1.02		0.141	0.175		0.127	pCi/g	04/28/16 09:00	05/20/16 07:53	1
Thorium 234	1.07		0.326	0.344		0.788	pCi/g	04/28/16 09:00	05/20/16 07:53	1
Uranium 235	0.168	U	0.166	0.166		0.216	pCi/g	04/28/16 09:00	05/20/16 07:53	1
Americium 241	0.0393	U	0.0873	0.0874		0.116	pCi/g	04/28/16 09:00	05/20/16 07:53	1
Protactinium 234m	1.98	U	4.46	4.46		12.5	pCi/g	04/28/16 09:00	05/20/16 07:53	1
Other Detected			Count	Total						
Radionuclides			Uncert.	Uncert.	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
<i>Tl-208</i>			<i>0.0593</i>	<i>0.0685</i>		<i>0.0468</i>	<i>pCi/g</i>	<i>04/28/16 09:00</i>	<i>05/20/16 07:53</i>	<i>1</i>

Client Sample ID: L09-01-25-P-S-B-00

Lab Sample ID: 160-17118-4

Date Collected: 04/20/16 08:15

Matrix: Solid

Date Received: 04/26/16 10:45

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	1.06		0.118	0.160		0.0958	pCi/g	04/28/16 09:00	05/20/16 08:38	1
Bismuth 212	1.10		0.384	0.401		0.356	pCi/g	04/28/16 09:00	05/20/16 08:38	1
Bismuth 214	0.936		0.105	0.143		0.0728	pCi/g	04/28/16 09:00	05/20/16 08:38	1
Lead 212	0.931		0.0681	0.138		0.0634	pCi/g	04/28/16 09:00	05/20/16 08:38	1
Lead 214	0.993		0.0813	0.131		0.0588	pCi/g	04/28/16 09:00	05/20/16 08:38	1
Potassium 40	13.6		0.977	1.70		0.286	pCi/g	04/28/16 09:00	05/20/16 08:38	1
Protactinium 231	0.368	U	1.06	1.07		1.78	pCi/g	04/28/16 09:00	05/20/16 08:38	1
Radium 226	0.936		0.105	0.143	1.00	0.0728	pCi/g	04/28/16 09:00	05/20/16 08:38	1
Thorium 232	1.06		0.118	0.160		0.0958	pCi/g	04/28/16 09:00	05/20/16 08:38	1
Thorium 234	0.652	U	0.242	0.252		0.657	pCi/g	04/28/16 09:00	05/20/16 08:38	1
Uranium 235	0.0252	U	0.186	0.186		0.312	pCi/g	04/28/16 09:00	05/20/16 08:38	1
Americium 241	-0.0149	U	0.0700	0.0700		0.0986	pCi/g	04/28/16 09:00	05/20/16 08:38	1
Protactinium 234m	1.59	U	2.81	2.81		7.57	pCi/g	04/28/16 09:00	05/20/16 08:38	1
Other Detected			Count	Total						
Radionuclides			Uncert.	Uncert.	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
<i>Tl-208</i>			<i>0.0457</i>	<i>0.0572</i>		<i>0.0344</i>	<i>pCi/g</i>	<i>04/28/16 09:00</i>	<i>05/20/16 08:38</i>	<i>1</i>

TestAmerica St. Louis

Client Sample Results

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

TestAmerica Job ID: 160-17118-2

Client Sample ID: L09-02-19-P-S-S-00

Lab Sample ID: 160-17118-5

Date Collected: 04/22/16 09:00

Matrix: Solid

Date Received: 04/26/16 10:45

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	0.0498	U	0.0530	0.0532		0.0597	pCi/g	04/28/16 09:00	05/22/16 16:59	1
Bismuth 212	0.0955	U	0.191	0.191		0.328	pCi/g	04/28/16 09:00	05/22/16 16:59	1
Bismuth 214	0.135		0.0402	0.0426		0.0303	pCi/g	04/28/16 09:00	05/22/16 16:59	1
Lead 212	0.0366		0.0170	0.0176		0.0226	pCi/g	04/28/16 09:00	05/22/16 16:59	1
Lead 214	0.132		0.0245	0.0281		0.0236	pCi/g	04/28/16 09:00	05/22/16 16:59	1
Potassium 40	0.451		0.414	0.417		0.445	pCi/g	04/28/16 09:00	05/22/16 16:59	1
Protactinium 231	0.0971	U	0.266	0.267		0.636	pCi/g	04/28/16 09:00	05/22/16 16:59	1
Radium 226	0.135		0.0402	0.0426	1.00	0.0303	pCi/g	04/28/16 09:00	05/22/16 16:59	1
Thorium 232	0.0498	U	0.0530	0.0532		0.0597	pCi/g	04/28/16 09:00	05/22/16 16:59	1
Thorium 234	0.281		0.212	0.214		0.281	pCi/g	04/28/16 09:00	05/22/16 16:59	1
Uranium 235	-0.0437	U	0.0576	0.0577		0.222	pCi/g	04/28/16 09:00	05/22/16 16:59	1
Americium 241	0.00670	U	0.0216	0.0217		0.0299	pCi/g	04/28/16 09:00	05/22/16 16:59	1
Protactinium 234m	0.0692	U	0.0889	0.0892		5.40	pCi/g	04/28/16 09:00	05/22/16 16:59	1
Other Detected Radionuclides			Count	Total						
	Result	Qualifier	Uncert.	Uncert.	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Other Detected Radionuclide	None						pCi/g	04/28/16 09:00	05/22/16 16:59	1

Client Sample ID: L09-02-20-P-R-S-00

Lab Sample ID: 160-17118-6

Date Collected: 04/22/16 09:20

Matrix: Solid

Date Received: 04/26/16 10:45

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	0.169		0.0483	0.0512		0.0318	pCi/g	04/28/16 09:00	05/20/16 08:40	1
Bismuth 212	0.0576	U	0.168	0.168		0.288	pCi/g	04/28/16 09:00	05/20/16 08:40	1
Bismuth 214	0.207		0.0341	0.0402		0.0242	pCi/g	04/28/16 09:00	05/20/16 08:40	1
Lead 212	0.105		0.0216	0.0255		0.0263	pCi/g	04/28/16 09:00	05/20/16 08:40	1
Lead 214	0.266		0.0338	0.0437		0.0222	pCi/g	04/28/16 09:00	05/20/16 08:40	1
Potassium 40	4.06		0.408	0.577		0.172	pCi/g	04/28/16 09:00	05/20/16 08:40	1
Protactinium 231	0.000	U	0.0628	0.0628		1.01	pCi/g	04/28/16 09:00	05/20/16 08:40	1
Radium 226	0.207		0.0341	0.0402	1.00	0.0242	pCi/g	04/28/16 09:00	05/20/16 08:40	1
Thorium 232	0.169		0.0483	0.0512		0.0318	pCi/g	04/28/16 09:00	05/20/16 08:40	1
Thorium 234	-0.00455	U	0.318	0.318		0.537	pCi/g	04/28/16 09:00	05/20/16 08:40	1
Uranium 235	0.0110	U	0.131	0.131		0.220	pCi/g	04/28/16 09:00	05/20/16 08:40	1
Americium 241	0.00802	U	0.0339	0.0339		0.0568	pCi/g	04/28/16 09:00	05/20/16 08:40	1
Protactinium 234m	0.673	U	1.48	1.49		3.35	pCi/g	04/28/16 09:00	05/20/16 08:40	1
Other Detected Radionuclides			Count	Total						
	Result	Qualifier	Uncert.	Uncert.	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Tl-208	0.0527		0.0124	0.0135		0.00975	pCi/g	04/28/16 09:00	05/20/16 08:40	1

TestAmerica St. Louis

Client Sample Results

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

TestAmerica Job ID: 160-17118-2

Client Sample ID: L09-02-21-P-E-S-00

Lab Sample ID: 160-17118-7

Date Collected: 04/22/16 09:25

Matrix: Solid

Date Received: 04/26/16 10:45

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	0.0774	U	0.0524	0.0530		0.0995	pCi/g	04/28/16 09:00	05/20/16 08:41	1
Bismuth 212	0.0791	U	0.203	0.203		0.351	pCi/g	04/28/16 09:00	05/20/16 08:41	1
Bismuth 214	0.209		0.0421	0.0473		0.0216	pCi/g	04/28/16 09:00	05/20/16 08:41	1
Lead 212	0.112		0.0249	0.0288		0.0273	pCi/g	04/28/16 09:00	05/20/16 08:41	1
Lead 214	0.265		0.0391	0.0478		0.0243	pCi/g	04/28/16 09:00	05/20/16 08:41	1
Potassium 40	2.91		0.465	0.552		0.219	pCi/g	04/28/16 09:00	05/20/16 08:41	1
Protactinium 231	0.161	U	0.404	0.404		0.933	pCi/g	04/28/16 09:00	05/20/16 08:41	1
Radium 226	0.209		0.0421	0.0473	1.00	0.0216	pCi/g	04/28/16 09:00	05/20/16 08:41	1
Thorium 232	0.0774	U	0.0524	0.0530		0.0995	pCi/g	04/28/16 09:00	05/20/16 08:41	1
Thorium 234	0.261	U	0.139	0.141		0.354	pCi/g	04/28/16 09:00	05/20/16 08:41	1
Uranium 235	-0.0538	U	0.0765	0.0767		0.285	pCi/g	04/28/16 09:00	05/20/16 08:41	1
Americium 241	0.0316	U	0.0312	0.0314		0.0408	pCi/g	04/28/16 09:00	05/20/16 08:41	1
Protactinium 234m	1.17	U	2.58	2.58		4.42	pCi/g	04/28/16 09:00	05/20/16 08:41	1
Other Detected Radionuclides			Count	Total						
	Result	Qualifier	Uncert.	Uncert.	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Tl-208	0.0491		0.0158	0.0166		0.0123	pCi/g	04/28/16 09:00	05/20/16 08:41	1

Client Sample ID: L09-02-22-P-S-S-00

Lab Sample ID: 160-17118-8

Date Collected: 04/22/16 10:00

Matrix: Solid

Date Received: 04/26/16 10:45

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	0.918		0.0975	0.135		0.0915	pCi/g	04/28/16 09:00	05/20/16 09:28	1
Bismuth 212	0.219	U	0.404	0.405		0.675	pCi/g	04/28/16 09:00	05/20/16 09:28	1
Bismuth 214	0.880		0.0906	0.129		0.0619	pCi/g	04/28/16 09:00	05/20/16 09:28	1
Lead 212	0.924		0.0609	0.134		0.0476	pCi/g	04/28/16 09:00	05/20/16 09:28	1
Lead 214	0.968		0.0709	0.123		0.0592	pCi/g	04/28/16 09:00	05/20/16 09:28	1
Potassium 40	16.4		0.969	1.94		0.259	pCi/g	04/28/16 09:00	05/20/16 09:28	1
Protactinium 231	-0.403	U	1.29	1.29		2.15	pCi/g	04/28/16 09:00	05/20/16 09:28	1
Radium 226	0.880		0.0906	0.129	1.00	0.0619	pCi/g	04/28/16 09:00	05/20/16 09:28	1
Thorium 232	0.918		0.0975	0.135		0.0915	pCi/g	04/28/16 09:00	05/20/16 09:28	1
Thorium 234	1.24		0.464	0.481		0.715	pCi/g	04/28/16 09:00	05/20/16 09:28	1
Uranium 235	0.0570	U	0.110	0.110		0.475	pCi/g	04/28/16 09:00	05/20/16 09:28	1
Americium 241	0.0165	U	0.0830	0.0830		0.138	pCi/g	04/28/16 09:00	05/20/16 09:28	1
Protactinium 234m	1.39	U	2.36	2.36		6.98	pCi/g	04/28/16 09:00	05/20/16 09:28	1
Other Detected Radionuclides			Count	Total						
	Result	Qualifier	Uncert.	Uncert.	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Tl-208	0.303		0.0404	0.0513		0.0317	pCi/g	04/28/16 09:00	05/20/16 09:28	1

TestAmerica St. Louis

Client Sample Results

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

TestAmerica Job ID: 160-17118-2

Client Sample ID: L09-02-23-P-R-S-00

Lab Sample ID: 160-17118-9

Date Collected: 04/22/16 10:15

Matrix: Solid

Date Received: 04/26/16 10:45

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		0.111	0.153		0.0705	pCi/g	04/28/16 09:00	05/20/16 09:32	1
Bismuth 212	1.06		0.443	0.456		0.439	pCi/g	04/28/16 09:00	05/20/16 09:32	1
Bismuth 214	0.721		0.0966	0.122		0.0673	pCi/g	04/28/16 09:00	05/20/16 09:32	1
Lead 212	0.968		0.0744	0.146		0.0645	pCi/g	04/28/16 09:00	05/20/16 09:32	1
Lead 214	0.838		0.0899	0.125		0.0668	pCi/g	04/28/16 09:00	05/20/16 09:32	1
Potassium 40	17.9		1.21	2.19		0.240	pCi/g	04/28/16 09:00	05/20/16 09:32	1
Protactinium 231	-0.433	U	1.26	1.26		2.10	pCi/g	04/28/16 09:00	05/20/16 09:32	1
Radium 226	0.721		0.0966	0.122	1.00	0.0673	pCi/g	04/28/16 09:00	05/20/16 09:32	1
Thorium 232	1.03		0.111	0.153		0.0705	pCi/g	04/28/16 09:00	05/20/16 09:32	1
Thorium 234	1.13		0.485	0.499		0.748	pCi/g	04/28/16 09:00	05/20/16 09:32	1
Uranium 235	-0.0443	U	0.0995	0.0996		0.299	pCi/g	04/28/16 09:00	05/20/16 09:32	1
Americium 241	0.00708	U	0.0734	0.0734		0.104	pCi/g	04/28/16 09:00	05/20/16 09:32	1
Protactinium 234m	3.11	U	4.67	4.68		8.45	pCi/g	04/28/16 09:00	05/20/16 09:32	1
Other Detected Radionuclides			Count	Total						
	Result	Qualifier	Uncert.	Uncert.	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
TI-208	0.380		0.0507	0.0643		0.0325	pCi/g	04/28/16 09:00	05/20/16 09:32	1

Client Sample ID: L09-02-24-P-E-S-00

Lab Sample ID: 160-17118-10

Date Collected: 04/22/16 10:20

Matrix: Solid

Date Received: 04/26/16 10:45

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	1.06		0.142	0.179		0.115	pCi/g	04/28/16 09:00	05/20/16 09:34	1
Bismuth 212	1.18		0.384	0.403		0.335	pCi/g	04/28/16 09:00	05/20/16 09:34	1
Bismuth 214	0.690		0.0970	0.121		0.0680	pCi/g	04/28/16 09:00	05/20/16 09:34	1
Lead 212	0.952		0.0755	0.145		0.0619	pCi/g	04/28/16 09:00	05/20/16 09:34	1
Lead 214	0.767		0.0803	0.113		0.0802	pCi/g	04/28/16 09:00	05/20/16 09:34	1
Potassium 40	15.3		1.21	1.98		0.360	pCi/g	04/28/16 09:00	05/20/16 09:34	1
Protactinium 231	0.465	U	1.40	1.41		2.35	pCi/g	04/28/16 09:00	05/20/16 09:34	1
Radium 226	0.690		0.0970	0.121	1.00	0.0680	pCi/g	04/28/16 09:00	05/20/16 09:34	1
Thorium 232	1.06		0.142	0.179		0.115	pCi/g	04/28/16 09:00	05/20/16 09:34	1
Thorium 234	1.32		0.567	0.584		0.882	pCi/g	04/28/16 09:00	05/20/16 09:34	1
Uranium 235	0.139	U	0.118	0.118		0.189	pCi/g	04/28/16 09:00	05/20/16 09:34	1
Americium 241	-0.00950	U	0.0984	0.0984		0.165	pCi/g	04/28/16 09:00	05/20/16 09:34	1
Protactinium 234m	-0.212	U	0.239	0.240		12.0	pCi/g	04/28/16 09:00	05/20/16 09:34	1
Other Detected Radionuclides			Count	Total						
	Result	Qualifier	Uncert.	Uncert.	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
TI-208	0.334		0.0509	0.0616		0.0344	pCi/g	04/28/16 09:00	05/20/16 09:34	1

TestAmerica St. Louis

Client Sample Results

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

TestAmerica Job ID: 160-17118-2

Client Sample ID: L09-02-25-P-S-B-00

Lab Sample ID: 160-17118-11

Date Collected: 04/22/16 10:25

Matrix: Solid

Date Received: 04/26/16 10:45

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	0.199		0.0599	0.0632		0.0920	pCi/g	04/28/16 09:00	05/20/16 09:35	1
Bismuth 212	0.129	U	0.254	0.254		0.427	pCi/g	04/28/16 09:00	05/20/16 09:35	1
Bismuth 214	0.287		0.0435	0.0526		0.0281	pCi/g	04/28/16 09:00	05/20/16 09:35	1
Lead 212	0.203		0.0283	0.0387		0.0276	pCi/g	04/28/16 09:00	05/20/16 09:35	1
Lead 214	0.317		0.0464	0.0570		0.0445	pCi/g	04/28/16 09:00	05/20/16 09:35	1
Potassium 40	8.56		0.644	1.08		0.208	pCi/g	04/28/16 09:00	05/20/16 09:35	1
Protactinium 231	-0.278	U	0.818	0.819		1.37	pCi/g	04/28/16 09:00	05/20/16 09:35	1
Radium 226	0.287		0.0435	0.0526	1.00	0.0281	pCi/g	04/28/16 09:00	05/20/16 09:35	1
Thorium 232	0.199		0.0599	0.0632		0.0920	pCi/g	04/28/16 09:00	05/20/16 09:35	1
Thorium 234	0.483		0.258	0.263		0.402	pCi/g	04/28/16 09:00	05/20/16 09:35	1
Uranium 235	0.0786	U	0.0716	0.0720		0.283	pCi/g	04/28/16 09:00	05/20/16 09:35	1
Americium 241	0.00880	U	0.0430	0.0430		0.0720	pCi/g	04/28/16 09:00	05/20/16 09:35	1
Protactinium 234m	-0.0822	U	2.22	2.22		3.96	pCi/g	04/28/16 09:00	05/20/16 09:35	1
Other Detected			Count	Total						
Radionuclides			Uncert.	Uncert.	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Tl-208			0.0813	0.0201		0.0186	pCi/g	04/28/16 09:00	05/20/16 09:35	1

Client Sample ID: L09-02-26-P-S-B-00

Lab Sample ID: 160-17118-12

Date Collected: 04/22/16 10:30

Matrix: Solid

Date Received: 04/26/16 10:45

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	1.22		0.205	0.240		0.125	pCi/g	04/28/16 09:00	05/20/16 09:38	1
Bismuth 212	1.16		0.405	0.422		0.502	pCi/g	04/28/16 09:00	05/20/16 09:38	1
Bismuth 214	0.943		0.124	0.158		0.0822	pCi/g	04/28/16 09:00	05/20/16 09:38	1
Lead 212	1.04		0.0826	0.158		0.0679	pCi/g	04/28/16 09:00	05/20/16 09:38	1
Lead 214	1.17		0.122	0.172		0.0947	pCi/g	04/28/16 09:00	05/20/16 09:38	1
Potassium 40	18.3		1.42	2.35		0.447	pCi/g	04/28/16 09:00	05/20/16 09:38	1
Protactinium 231	-0.410	U	1.69	1.69		2.83	pCi/g	04/28/16 09:00	05/20/16 09:38	1
Radium 226	0.943		0.124	0.158	1.00	0.0822	pCi/g	04/28/16 09:00	05/20/16 09:38	1
Thorium 232	1.22		0.205	0.240		0.125	pCi/g	04/28/16 09:00	05/20/16 09:38	1
Thorium 234	1.41		0.586	0.604		0.904	pCi/g	04/28/16 09:00	05/20/16 09:38	1
Uranium 235	0.0979	U	0.186	0.186		0.310	pCi/g	04/28/16 09:00	05/20/16 09:38	1
Americium 241	0.0812	U	0.0717	0.0722		0.0959	pCi/g	04/28/16 09:00	05/20/16 09:38	1
Protactinium 234m	1.78	U	3.87	3.87		10.6	pCi/g	04/28/16 09:00	05/20/16 09:38	1
Other Detected			Count	Total						
Radionuclides			Uncert.	Uncert.	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Tl-208			0.382	0.0558		0.0397	pCi/g	04/28/16 09:00	05/20/16 09:38	1

TestAmerica St. Louis

Client Sample Results

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

TestAmerica Job ID: 160-17118-2

Client Sample ID: L09-03-25-P-E-B-00

Lab Sample ID: 160-17118-13

Date Collected: 04/14/16 15:00

Matrix: Solid

Date Received: 04/26/16 10:45

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

Analyte	Result	Qualifier	Count	Total	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	1.09		0.126	0.168		0.0978	pCi/g	04/28/16 09:00	05/20/16 10:08	1
Bismuth 212	1.15		0.330	0.351		0.300	pCi/g	04/28/16 09:00	05/20/16 10:08	1
Bismuth 214	0.965		0.0890	0.134		0.0737	pCi/g	04/28/16 09:00	05/20/16 10:08	1
Lead 212	1.13		0.0706	0.162		0.0573	pCi/g	04/28/16 09:00	05/20/16 10:08	1
Lead 214	1.17		0.0930	0.153		0.0685	pCi/g	04/28/16 09:00	05/20/16 10:08	1
Potassium 40	19.3		1.10	2.26		0.327	pCi/g	04/28/16 09:00	05/20/16 10:08	1
Protactinium 231	-0.274	U	1.35	1.35		2.26	pCi/g	04/28/16 09:00	05/20/16 10:08	1
Radium 226	0.965		0.0890	0.134	1.00	0.0737	pCi/g	04/28/16 09:00	05/20/16 10:08	1
Thorium 232	1.09		0.126	0.168		0.0978	pCi/g	04/28/16 09:00	05/20/16 10:08	1
Thorium 234	1.33		0.524	0.542		0.815	pCi/g	04/28/16 09:00	05/20/16 10:08	1
Uranium 235	-0.102	U	0.307	0.307		0.510	pCi/g	04/28/16 09:00	05/20/16 10:08	1
Americium 241	-0.0429	U	0.0569	0.0571		0.154	pCi/g	04/28/16 09:00	05/20/16 10:08	1
Protactinium 234m	1.30	U	2.33	2.33		7.84	pCi/g	04/28/16 09:00	05/20/16 10:08	1
Other Detected Radionuclides			Count	Total						
	Result	Qualifier	Uncert.	Uncert.	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Tl-208	0.331		0.0407	0.0533		0.0302	pCi/g	04/28/16 09:00	05/20/16 10:08	1

QC Sample Results

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

TestAmerica Job ID: 160-17118-2

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

Lab Sample ID: MB 160-248509/1-A
Matrix: Solid
Analysis Batch: 252095

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 248509

Analyte	MB MB		Count	Total	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.01014	U	0.00823	0.00829		0.0560	pCi/g	04/28/16 09:00	05/20/16 07:49	1
Bismuth 212	0.0000	U	0.0764	0.0764		0.199	pCi/g	04/28/16 09:00	05/20/16 07:49	1
Bismuth 214	0.02625	U	0.0208	0.0209		0.0503	pCi/g	04/28/16 09:00	05/20/16 07:49	1
Lead 212	-0.002247	U	0.0158	0.0158		0.0283	pCi/g	04/28/16 09:00	05/20/16 07:49	1
Lead 214	0.003203	U	0.0158	0.0158		0.0447	pCi/g	04/28/16 09:00	05/20/16 07:49	1
Potassium 40	0.03836	U	0.0978	0.0979		0.175	pCi/g	04/28/16 09:00	05/20/16 07:49	1
Protactinium 231	0.1163	U	0.264	0.264		0.601	pCi/g	04/28/16 09:00	05/20/16 07:49	1
Radium 226	0.02625	U	0.0208	0.0209	1.00	0.0503	pCi/g	04/28/16 09:00	05/20/16 07:49	1
Thorium 232	0.01014	U	0.00823	0.00829		0.0560	pCi/g	04/28/16 09:00	05/20/16 07:49	1
Thorium 234	0.08008	U	0.136	0.136		0.213	pCi/g	04/28/16 09:00	05/20/16 07:49	1
Uranium 235	0.02480	U	0.0791	0.0791		0.134	pCi/g	04/28/16 09:00	05/20/16 07:49	1
Americium 241	-0.01329	U	0.0171	0.0171		0.0505	pCi/g	04/28/16 09:00	05/20/16 07:49	1
Protactinium 234m	-0.3414	U	1.94	1.94		2.41	pCi/g	04/28/16 09:00	05/20/16 07:49	1
Other Detected Radionuclides	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Other Detected Radionuclide	None						pCi/g	04/28/16 09:00	05/20/16 07:49	1

Lab Sample ID: LCS 160-248509/2-A
Matrix: Solid
Analysis Batch: 252101

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 248509

Analyte	Spike Added	LCS Result	LCS Qual	Total	RL	MDC	Unit	%Rec	%Rec.
				Uncert. (2σ+/-)					Limits
Americium 241	101	100.5		10.5		0.496	pCi/g	100	87 - 116
Cesium 137	34.0	33.01		3.46		0.161	pCi/g	97	87 - 120
Cobalt 60	31.2	30.20		3.05		0.0920	pCi/g	97	87 - 115

Lab Sample ID: 160-17118-1 DU
Matrix: Solid
Analysis Batch: 252095

Client Sample ID: L08-14-18-T-E-B-00
Prep Type: Total/NA
Prep Batch: 248509

Analyte	Sample Result	Sample Qual	DU Result	DU Qual	Total	RL	MDC	Unit	RER	RER
					Uncert. (2σ+/-)					Limit
Actinium 228	1.02		1.003		0.158		0.100	pCi/g	0.06	1
Bismuth 212	1.51		1.404		0.466		0.404	pCi/g	0.10	1
Bismuth 214	0.925		0.8889		0.131		0.0587	pCi/g	0.13	1
Lead 212	0.948		1.071		0.154		0.0498	pCi/g	0.41	1
Lead 214	1.05		1.066		0.141		0.0737	pCi/g	0.06	1
Potassium 40	16.4		18.14		2.15		0.336	pCi/g	0.41	1
Protactinium 231	0.000	U	-0.4116	U	1.29		2.16	pCi/g	0.25	1
Radium 226	0.925		0.8889		0.131	1.00	0.0587	pCi/g	0.13	1
Thorium 232	1.02		1.003		0.158		0.100	pCi/g	0.06	1
Thorium 234	0.308	U	0.7270	U	0.278		0.757	pCi/g	0.69	1
Uranium 235	-0.140	U	-0.09920	U	0.305		0.507	pCi/g	0.08	1
Americium 241	-0.0156	U	0.03348	U	0.103		0.171	pCi/g	0.23	1

TestAmerica St. Louis

QC Sample Results

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

TestAmerica Job ID: 160-17118-2

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

Lab Sample ID: 160-17118-1 DU
 Matrix: Solid
 Analysis Batch: 252095

Client Sample ID: L08-14-18-T-E-B-00
 Prep Type: Total/NA
 Prep Batch: 248509

Analyte	Sample Result	Sample Qual	DU Result	DU Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	RER	RER Limit
Protactinium 234m	2.19	U	-0.2135	U	0.268		9.06	pCi/g	0.68	1

Other Detected Radionuclides	Sample Result	Sample Qual	DU Result	DU Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	RER	RER Limit
Tl-208	0.348		0.3421		0.0561		0.0309	pCi/g	0.05	1



QC Association Summary

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

TestAmerica Job ID: 160-17118-2

Rad

Leach Batch: 247971

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-17118-1	L08-14-18-T-E-B-00	Total/NA	Solid	Dry and Grind	
160-17118-1 DU	L08-14-18-T-E-B-00	Total/NA	Solid	Dry and Grind	
160-17118-2	L08-14-19-T-R-B-00	Total/NA	Solid	Dry and Grind	
160-17118-3	L08-14-20-T-R-B-00	Total/NA	Solid	Dry and Grind	
160-17118-4	L09-01-25-P-S-B-00	Total/NA	Solid	Dry and Grind	
160-17118-5	L09-02-19-P-S-S-00	Total/NA	Solid	Dry and Grind	
160-17118-6	L09-02-20-P-R-S-00	Total/NA	Solid	Dry and Grind	
160-17118-7	L09-02-21-P-E-S-00	Total/NA	Solid	Dry and Grind	
160-17118-8	L09-02-22-P-S-S-00	Total/NA	Solid	Dry and Grind	
160-17118-9	L09-02-23-P-R-S-00	Total/NA	Solid	Dry and Grind	
160-17118-10	L09-02-24-P-E-S-00	Total/NA	Solid	Dry and Grind	
160-17118-11	L09-02-25-P-S-B-00	Total/NA	Solid	Dry and Grind	
160-17118-12	L09-02-26-P-S-B-00	Total/NA	Solid	Dry and Grind	
160-17118-13	L09-03-25-P-E-B-00	Total/NA	Solid	Dry and Grind	

Prep Batch: 248509

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-17118-1	L08-14-18-T-E-B-00	Total/NA	Solid	Fill_Geo-21	247971
160-17118-1 DU	L08-14-18-T-E-B-00	Total/NA	Solid	Fill_Geo-21	247971
160-17118-2	L08-14-19-T-R-B-00	Total/NA	Solid	Fill_Geo-21	247971
160-17118-3	L08-14-20-T-R-B-00	Total/NA	Solid	Fill_Geo-21	247971
160-17118-4	L09-01-25-P-S-B-00	Total/NA	Solid	Fill_Geo-21	247971
160-17118-5	L09-02-19-P-S-S-00	Total/NA	Solid	Fill_Geo-21	247971
160-17118-6	L09-02-20-P-R-S-00	Total/NA	Solid	Fill_Geo-21	247971
160-17118-7	L09-02-21-P-E-S-00	Total/NA	Solid	Fill_Geo-21	247971
160-17118-8	L09-02-22-P-S-S-00	Total/NA	Solid	Fill_Geo-21	247971
160-17118-9	L09-02-23-P-R-S-00	Total/NA	Solid	Fill_Geo-21	247971
160-17118-10	L09-02-24-P-E-S-00	Total/NA	Solid	Fill_Geo-21	247971
160-17118-11	L09-02-25-P-S-B-00	Total/NA	Solid	Fill_Geo-21	247971
160-17118-12	L09-02-26-P-S-B-00	Total/NA	Solid	Fill_Geo-21	247971
160-17118-13	L09-03-25-P-E-B-00	Total/NA	Solid	Fill_Geo-21	247971
LCS 160-248509/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	
MB 160-248509/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	