

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: 160-16591-2

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:
4/13/2016 3:36:19 PM

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: 160-16591-2

Job ID: 160-16591-2

Laboratory: TestAmerica St. Louis

Narrative

CASE NARRATIVE

Client: Westinghouse Electric Company LLC

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

Report Number: 160-16591-2

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 3/18/2016 11:10 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 2 coolers at receipt time were 20.0° C and 20.0° C.

RADIUM-226 BY GAMMA SPEC (21 DAY INGROWTH)

Samples L04-02-01-P-S-S-00 (160-16591-1), L04-02-01-P-S-Q-00 (160-16591-2), L04-02-02-P-R-S-00 (160-16591-3), L04-02-04-P-S-S-00 (160-16591-4), L04-02-05-P-R-S-00 (160-16591-5), L04-02-07-P-S-S-00 (160-16591-6), L04-02-08-P-R-S-00 (160-16591-7), L04-02-10-P-S-S-00 (160-16591-8), L04-02-11-P-R-S-00 (160-16591-9), L04-02-13-P-S-S-00 (160-16591-10), L04-02-14-P-R-S-00 (160-16591-11), L04-02-16-P-S-S-00 (160-16591-12), L04-02-16-P-S-Q-00 (160-16591-13), L04-02-17-P-R-S-00 (160-16591-14), L04-02-19-P-S-S-00 (160-16591-15), L04-02-20-P-R-S-00 (160-16591-16), L04-02-22-P-S-S-00 (160-16591-17) and L04-02-23-P-R-S-00 (160-16591-18) were analyzed for Radium-226 by gamma spec (21 day ingrowth) in accordance with EPA GA_01_R. The samples were leached on 03/18/2016, prepared on 03/22/2016 and analyzed on 04/12/2016.

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

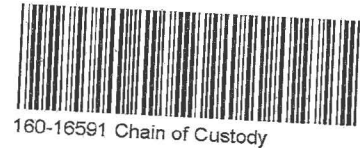
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Westinghouse Non-Proprietary Class 3

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-031716-02 Page 1/2				Requested Analysis								Laboratory Name: TA-MO			
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 Address: 13715 Rider Trail North	
Contact Person: Clark Evers														Phone No. 314-298-8566	
Phone Number: 314-810-3336														Laboratory Contact Person: Ivan Vania	
Sampler Name: John Michel														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)							
L04-02-01-P-S-S-00	3/16/2016	9:34	S	G	X	X	X						1	LSA 04-02	
L04-02-01-P-S-Q-00	3/16/2016	9:34	S	G	X	X	X						1	LSA 04-02	
L04-02-02-P-R-S-00	3/16/2016	9:53	S	C	X	X	X						1	LSA 04-02	
L04-02-04-P-S-S-00	3/16/2016	10:00	S	G	X	X	X						1	LSA 04-02	
L04-02-05-P-R-S-00	3/16/2016	10:21	S	C	X	N/L	X	X					1	LSA 04-02	
L04-02-07-P-S-S-00	3/16/2016	10:27	S	G	X	X	X						1	LSA 04-02	
L04-02-08-P-R-S-00	3/16/2016	10:46	S	C	X	X	X						1	LSA 04-02	
L04-02-10-P-S-S-00	3/16/2016	15:25	S	G	X	X	X						1	LSA 04-02	
L04-02-11-P-R-S-00	3/16/2016	16:08	S	C	X	X	X						1	LSA 04-02	
L04-02-13-P-S-S-00	3/16/2016	10:54	S	G	X	X	X						1	LSA 04-02	
L04-02-14-P-R-S-00	3/16/2016	13:05	S	C	X	X	X						1	LSA 04-02	
L04-02-16-P-S-S-00	3/16/2016	13:12	S	G	X	X	X						1	LSA 04-02	
Relinquished by: Thomas York <i>Tom York</i>				Date/Time: 3-18-16 09:25		Received by: KIMMY 3815 <i>KIMMY 3815</i>		Date/Time: 3-18-16 09:25		Total: 18		Cooler Temperature: Ambient			
Company Name: WEC						Company Name: CROSS ROADS				Cooler ID: 031603/04		Shipper and Number:			
Received by:				Date/Time:		Relinquished by:		Date/Time:		Comments: N/A					
Company Name:						Company Name:									
Relinquished by: KIMMY 3815 <i>KIMMY 3815</i>				Date/Time: 3-18-16 11:10		Received by: KIMMY 3815 <i>KIMMY 3815</i>		Date/Time: 3-18-16 11:10		Verified By: Thomas York <i>Tom York</i>					
Company Name: CROSS ROADS						Company Name: CROSS ROADS									



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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-031716-02 Page 2/2				Requested Analysis								Laboratory Name: TA-MO			
Project Name: Westinghouse Electric Company				Comp (C) or Grab (G)	Gamma Spec	Isotopic Uranium	U-99	Gamma Spec (21 day ingrow for Ra-226)					Total Containers	Laboratory Address: 13715 Rider Trail North	
Contact Person: Clark Evers														Phone No. 314-298-8566	
Phone Number: 314-810-3336														Laboratory Contact Person: Ivan Vania	
Sampler Name John Michel														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	U-99	Gamma Spec (21 day ingrow for Ra-226)							
L04-02-16-P-S-Q-00	3/16/2016	13:10	S	G	X	X	X	X					1	LSA 04-02	
L04-02-17-P-R-S-00	3/16/2016	13:12	S	C	X	X	X	X					1	LSA 04-02	
L04-02-19-P-S-S-00	3/16/2016	13:45	S	G	X	X	X	X					1	LSA 04-02	
L04-02-20-P-R-S-00	3/16/2016	14:03	S	C	X	X	X	X					1	LSA 04-02	
L04-02-22-P-S-S-00	3/16/2016	14:15	S	G	X	X	X	X					1	LSA 04-02	
L04-02-23-P-R-S-00	3/16/2016	14:33	S	C	X	X	X	X					1	LSA 04-02	
				N											
Relinquished by: <i>[Signature]</i>				Date/Time 3-18-16		Received by: <i>[Signature]</i> 3815		Date/Time 3-18-16		Total 18		Cooler Temperature: Ambient			
Company Name: WEC				Date/Time 09:25		Company Name: CROSS ROADS		Date/Time 09:25		Cooler ID:		Shipper and Number:			
Received by:				Date/Time		Relinquished by:		Date/Time		Comments: N/A					
Company Name:				Date/Time		Company Name:		Date/Time							
Relinquished by: <i>[Signature]</i> 3815				Date/Time 3-18-16		Received by: <i>[Signature]</i> 1110		Date/Time 3-18-16		Verified By:					
Company Name: CROSS ROADS				Date/Time 11:10		Company Name: TASTELUX		Date/Time 11:10							



Login Sample Receipt Checklist

Client: Westinghouse Electric Company LLC

Job Number: 160-16591-2

Login Number: 16591

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 <math><6\text{mm}</math> (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: 160-16591-2

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: 160-16591-2

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: 160-16591-2

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
160-16591-1	L04-02-01-P-S-S-00	Solid	03/16/16 09:34	03/18/16 11:10
160-16591-2	L04-02-01-P-S-Q-00	Solid	03/16/16 09:34	03/18/16 11:10
160-16591-3	L04-02-02-P-R-S-00	Solid	03/16/16 09:53	03/18/16 11:10
160-16591-4	L04-02-04-P-S-S-00	Solid	03/16/16 10:00	03/18/16 11:10
160-16591-5	L04-02-05-P-R-S-00	Solid	03/16/16 10:21	03/18/16 11:10
160-16591-6	L04-02-07-P-S-S-00	Solid	03/16/16 10:27	03/18/16 11:10
160-16591-7	L04-02-08-P-R-S-00	Solid	03/16/16 10:46	03/18/16 11:10
160-16591-8	L04-02-10-P-S-S-00	Solid	03/16/16 15:25	03/18/16 11:10
160-16591-9	L04-02-11-P-R-S-00	Solid	03/16/16 16:08	03/18/16 11:10
160-16591-10	L04-02-13-P-S-S-00	Solid	03/16/16 10:54	03/18/16 11:10
160-16591-11	L04-02-14-P-R-S-00	Solid	03/16/16 13:05	03/18/16 11:10
160-16591-12	L04-02-16-P-S-S-00	Solid	03/16/16 13:12	03/18/16 11:10
160-16591-13	L04-02-16-P-S-Q-00	Solid	03/16/16 13:10	03/18/16 11:10
160-16591-14	L04-02-17-P-R-S-00	Solid	03/16/16 13:12	03/18/16 11:10
160-16591-15	L04-02-19-P-S-S-00	Solid	03/16/16 13:45	03/18/16 11:10
160-16591-16	L04-02-20-P-R-S-00	Solid	03/16/16 14:03	03/18/16 11:10
160-16591-17	L04-02-22-P-S-S-00	Solid	03/16/16 14:15	03/18/16 11:10
160-16591-18	L04-02-23-P-R-S-00	Solid	03/16/16 14:33	03/18/16 11:10

Client Sample Results

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

TestAmerica Job ID: 160-16591-2

Client Sample ID: L04-02-01-P-S-S-00

Lab Sample ID: 160-16591-1

Date Collected: 03/16/16 09:34

Matrix: Solid

Date Received: 03/18/16 11:10

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	0.888		0.140	0.167		0.0974	pCi/g	03/22/16 09:46	04/12/16 15:54	1
Bismuth 212	0.977		0.297	0.314		0.341	pCi/g	03/22/16 09:46	04/12/16 15:54	1
Bismuth 214	0.837		0.102	0.134		0.0681	pCi/g	03/22/16 09:46	04/12/16 15:54	1
Lead 212	0.907		0.0748	0.139		0.0633	pCi/g	03/22/16 09:46	04/12/16 15:54	1
Lead 214	0.840		0.0795	0.118		0.0681	pCi/g	03/22/16 09:46	04/12/16 15:54	1
Potassium 40	15.4		1.06	1.90		0.213	pCi/g	03/22/16 09:46	04/12/16 15:54	1
Protactinium 231	-0.652	U	0.635	0.638		1.03	pCi/g	03/22/16 09:46	04/12/16 15:54	1
Radium 226	0.837		0.102	0.134	1.00	0.0681	pCi/g	03/22/16 09:46	04/12/16 15:54	1
Thorium 232	0.888		0.140	0.167		0.0974	pCi/g	03/22/16 09:46	04/12/16 15:54	1
Thorium 234	2.23		0.535	0.584		0.790	pCi/g	03/22/16 09:46	04/12/16 15:54	1
Uranium 235	0.547		0.162	0.171		0.208	pCi/g	03/22/16 09:46	04/12/16 15:54	1
Americium 241	0.0141	U	0.0585	0.0585		0.0981	pCi/g	03/22/16 09:46	04/12/16 15:54	1
Protactinium 234m	3.58	U	3.06	3.08		5.12	pCi/g	03/22/16 09:46	04/12/16 15:54	1
Other Detected			Count	Total						
Radionuclides			Uncert.	Uncert.						
<i>Tl-208</i>	0.336		0.0486	0.0597		0.0374	pCi/g	03/22/16 09:46	04/12/16 15:54	1

Client Sample ID: L04-02-01-P-S-Q-00

Lab Sample ID: 160-16591-2

Date Collected: 03/16/16 09:34

Matrix: Solid

Date Received: 03/18/16 11:10

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	0.993		0.111	0.150		0.108	pCi/g	03/22/16 09:46	04/12/16 15:51	1
Bismuth 212	0.861		0.355	0.366		0.348	pCi/g	03/22/16 09:46	04/12/16 15:51	1
Bismuth 214	0.980		0.0970	0.141		0.0655	pCi/g	03/22/16 09:46	04/12/16 15:51	1
Lead 212	0.941		0.0793	0.145		0.0693	pCi/g	03/22/16 09:46	04/12/16 15:51	1
Lead 214	1.08		0.0752	0.135		0.0626	pCi/g	03/22/16 09:46	04/12/16 15:51	1
Potassium 40	17.2		0.967	2.01		0.229	pCi/g	03/22/16 09:46	04/12/16 15:51	1
Protactinium 231	-0.511	U	0.645	0.647		1.06	pCi/g	03/22/16 09:46	04/12/16 15:51	1
Radium 226	0.980		0.0970	0.141	1.00	0.0655	pCi/g	03/22/16 09:46	04/12/16 15:51	1
Thorium 232	0.993		0.111	0.150		0.108	pCi/g	03/22/16 09:46	04/12/16 15:51	1
Thorium 234	2.95		0.717	0.780		0.846	pCi/g	03/22/16 09:46	04/12/16 15:51	1
Uranium 235	0.585		0.134	0.147		0.175	pCi/g	03/22/16 09:46	04/12/16 15:51	1
Americium 241	0.00304	U	0.0644	0.0644		0.108	pCi/g	03/22/16 09:46	04/12/16 15:51	1
Protactinium 234m	2.06	U	2.96	2.97		4.37	pCi/g	03/22/16 09:46	04/12/16 15:51	1
Other Detected			Count	Total						
Radionuclides			Uncert.	Uncert.						
<i>Tl-208</i>	0.332		0.0414	0.0538		0.0303	pCi/g	03/22/16 09:46	04/12/16 15:51	1

Client Sample Results

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

TestAmerica Job ID: 160-16591-2

Client Sample ID: L04-02-02-P-R-S-00

Lab Sample ID: 160-16591-3

Date Collected: 03/16/16 09:53

Matrix: Solid

Date Received: 03/18/16 11:10

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	1.05		0.123	0.163		0.0940	pCi/g	03/22/16 09:46	04/12/16 15:50	1
Bismuth 212	1.10		0.378	0.395		0.345	pCi/g	03/22/16 09:46	04/12/16 15:50	1
Bismuth 214	1.00		0.106	0.149		0.0627	pCi/g	03/22/16 09:46	04/12/16 15:50	1
Lead 212	0.998		0.0881	0.156		0.0748	pCi/g	03/22/16 09:46	04/12/16 15:50	1
Lead 214	1.10		0.0989	0.151		0.0891	pCi/g	03/22/16 09:46	04/12/16 15:50	1
Potassium 40	15.9		1.17	2.00		0.214	pCi/g	03/22/16 09:46	04/12/16 15:50	1
Protactinium 231	-0.578	U	0.755	0.758		1.25	pCi/g	03/22/16 09:46	04/12/16 15:50	1
Radium 226	1.00		0.106	0.149	1.00	0.0627	pCi/g	03/22/16 09:46	04/12/16 15:50	1
Thorium 232	1.05		0.123	0.163		0.0940	pCi/g	03/22/16 09:46	04/12/16 15:50	1
Thorium 234	1.31		0.546	0.563		0.861	pCi/g	03/22/16 09:46	04/12/16 15:50	1
Uranium 235	0.280		0.170	0.172		0.219	pCi/g	03/22/16 09:46	04/12/16 15:50	1
Americium 241	0.00642	U	0.0648	0.0648		0.109	pCi/g	03/22/16 09:46	04/12/16 15:50	1
Protactinium 234m	1.35	U	3.43	3.44		6.60	pCi/g	03/22/16 09:46	04/12/16 15:50	1
Other Detected			Count	Total						
Radionuclides			Uncert.	Uncert.	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Tl-208			0.0540	0.0649		0.0384	pCi/g	03/22/16 09:46	04/12/16 15:50	1

Client Sample ID: L04-02-04-P-S-S-00

Lab Sample ID: 160-16591-4

Date Collected: 03/16/16 10:00

Matrix: Solid

Date Received: 03/18/16 11:10

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	1.19		0.123	0.173		0.132	pCi/g	03/22/16 09:46	04/12/16 17:25	1
Bismuth 212	1.93		0.474	0.515		0.383	pCi/g	03/22/16 09:46	04/12/16 17:25	1
Bismuth 214	0.953		0.0893	0.133		0.0566	pCi/g	03/22/16 09:46	04/12/16 17:25	1
Lead 212	1.18		0.0811	0.172		0.0661	pCi/g	03/22/16 09:46	04/12/16 17:25	1
Lead 214	1.14		0.0971	0.153		0.0697	pCi/g	03/22/16 09:46	04/12/16 17:25	1
Potassium 40	21.9		1.18	2.53		0.365	pCi/g	03/22/16 09:46	04/12/16 17:25	1
Protactinium 231	0.222	U	0.408	0.409		0.686	pCi/g	03/22/16 09:46	04/12/16 17:25	1
Radium 226	0.953		0.0893	0.133	1.00	0.0566	pCi/g	03/22/16 09:46	04/12/16 17:25	1
Thorium 232	1.19		0.123	0.173		0.132	pCi/g	03/22/16 09:46	04/12/16 17:25	1
Thorium 234	0.932		0.302	0.317		0.915	pCi/g	03/22/16 09:46	04/12/16 17:25	1
Uranium 235	0.115	U	0.146	0.146		0.257	pCi/g	03/22/16 09:46	04/12/16 17:25	1
Americium 241	0.0689	U	0.0637	0.0641		0.0833	pCi/g	03/22/16 09:46	04/12/16 17:25	1
Protactinium 234m	1.49	U	2.82	2.82		4.83	pCi/g	03/22/16 09:46	04/12/16 17:25	1
Other Detected			Count	Total						
Radionuclides			Uncert.	Uncert.	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Tl-208			0.0430	0.0585		0.0301	pCi/g	03/22/16 09:46	04/12/16 17:25	1

Client Sample Results

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

TestAmerica Job ID: 160-16591-2

Client Sample ID: L04-02-05-P-R-S-00

Lab Sample ID: 160-16591-5

Date Collected: 03/16/16 10:21

Matrix: Solid

Date Received: 03/18/16 11:10

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	1.30		0.154	0.202		0.132	pCi/g	03/22/16 09:46	04/12/16 17:23	1
Bismuth 212	1.27		0.507	0.524		0.463	pCi/g	03/22/16 09:46	04/12/16 17:23	1
Bismuth 214	1.19		0.103	0.160		0.0684	pCi/g	03/22/16 09:46	04/12/16 17:23	1
Lead 212	1.21		0.0799	0.176		0.0669	pCi/g	03/22/16 09:46	04/12/16 17:23	1
Lead 214	1.33		0.0947	0.168		0.0736	pCi/g	03/22/16 09:46	04/12/16 17:23	1
Potassium 40	21.7		1.13	2.45		0.307	pCi/g	03/22/16 09:46	04/12/16 17:23	1
Protactinium 231	-0.638	U	0.708	0.711		1.16	pCi/g	03/22/16 09:46	04/12/16 17:23	1
Radium 226	1.19		0.103	0.160	1.00	0.0684	pCi/g	03/22/16 09:46	04/12/16 17:23	1
Thorium 232	1.30		0.154	0.202		0.132	pCi/g	03/22/16 09:46	04/12/16 17:23	1
Thorium 234	1.15		0.501	0.515		0.799	pCi/g	03/22/16 09:46	04/12/16 17:23	1
Uranium 235	0.146	U	0.138	0.139		0.240	pCi/g	03/22/16 09:46	04/12/16 17:23	1
Americium 241	0.00476	U	0.0593	0.0593		0.100	pCi/g	03/22/16 09:46	04/12/16 17:23	1
Protactinium 234m	2.75	U	3.10	3.11		5.06	pCi/g	03/22/16 09:46	04/12/16 17:23	1
Other Detected Radionuclides			Count	Total						
	Result	Qualifier	Uncert.	Uncert.	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Tl-208	0.417		0.0474	0.0639		0.0341	pCi/g	03/22/16 09:46	04/12/16 17:23	1

Client Sample ID: L04-02-07-P-S-S-00

Lab Sample ID: 160-16591-6

Date Collected: 03/16/16 10:27

Matrix: Solid

Date Received: 03/18/16 11:10

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	0.997		0.110	0.150		0.0980	pCi/g	03/22/16 09:46	04/12/16 17:24	1
Bismuth 212	1.31		0.441	0.461		0.412	pCi/g	03/22/16 09:46	04/12/16 17:24	1
Bismuth 214	0.859		0.0957	0.131		0.0666	pCi/g	03/22/16 09:46	04/12/16 17:24	1
Lead 212	0.964		0.0702	0.143		0.0547	pCi/g	03/22/16 09:46	04/12/16 17:24	1
Lead 214	1.03		0.0827	0.135		0.0651	pCi/g	03/22/16 09:46	04/12/16 17:24	1
Potassium 40	16.2		1.01	1.94		0.261	pCi/g	03/22/16 09:46	04/12/16 17:24	1
Protactinium 231	0.301	U	0.177	0.180		0.995	pCi/g	03/22/16 09:46	04/12/16 17:24	1
Radium 226	0.859		0.0957	0.131	1.00	0.0666	pCi/g	03/22/16 09:46	04/12/16 17:24	1
Thorium 232	0.997		0.110	0.150		0.0980	pCi/g	03/22/16 09:46	04/12/16 17:24	1
Thorium 234	1.26		0.322	0.348		0.813	pCi/g	03/22/16 09:46	04/12/16 17:24	1
Uranium 235	0.267		0.149	0.152		0.196	pCi/g	03/22/16 09:46	04/12/16 17:24	1
Americium 241	0.00737	U	0.0585	0.0585		0.0984	pCi/g	03/22/16 09:46	04/12/16 17:24	1
Protactinium 234m	2.87	U	2.76	2.77		4.47	pCi/g	03/22/16 09:46	04/12/16 17:24	1
Other Detected Radionuclides			Count	Total						
	Result	Qualifier	Uncert.	Uncert.	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Pb-210	1.56		0.665	0.690		0.807	pCi/g	03/22/16 09:46	04/12/16 17:24	1
Tl-208	0.298		0.0477	0.0568		0.0385	pCi/g	03/22/16 09:46	04/12/16 17:24	1

Client Sample Results

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

TestAmerica Job ID: 160-16591-2

Client Sample ID: L04-02-08-P-R-S-00

Lab Sample ID: 160-16591-7

Date Collected: 03/16/16 10:46

Matrix: Solid

Date Received: 03/18/16 11:10

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	0.778		0.144	0.164		0.0872	pCi/g	03/22/16 09:46	04/12/16 17:26	1
Bismuth 212	1.17		0.434	0.451		0.356	pCi/g	03/22/16 09:46	04/12/16 17:26	1
Bismuth 214	0.904		0.104	0.140		0.0522	pCi/g	03/22/16 09:46	04/12/16 17:26	1
Lead 212	0.824		0.0764	0.131		0.0634	pCi/g	03/22/16 09:46	04/12/16 17:26	1
Lead 214	1.01		0.0925	0.140		0.0754	pCi/g	03/22/16 09:46	04/12/16 17:26	1
Potassium 40	12.8		1.11	1.72		0.348	pCi/g	03/22/16 09:46	04/12/16 17:26	1
Protactinium 231	0.397	U	0.348	0.350		1.19	pCi/g	03/22/16 09:46	04/12/16 17:26	1
Radium 226	0.904		0.104	0.140	1.00	0.0522	pCi/g	03/22/16 09:46	04/12/16 17:26	1
Thorium 232	0.778		0.144	0.164		0.0872	pCi/g	03/22/16 09:46	04/12/16 17:26	1
Thorium 234	0.989		0.281	0.300		0.792	pCi/g	03/22/16 09:46	04/12/16 17:26	1
Uranium 235	0.296		0.162	0.164		0.189	pCi/g	03/22/16 09:46	04/12/16 17:26	1
Americium 241	-0.0197	U	0.0498	0.0498		0.0834	pCi/g	03/22/16 09:46	04/12/16 17:26	1
Protactinium 234m	0.844	U	3.03	3.03		5.36	pCi/g	03/22/16 09:46	04/12/16 17:26	1
Other Detected			Count	Total						
Radionuclides			Uncert.	Uncert.	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
<i>Tl-208</i>			<i>0.0439</i>	<i>0.0505</i>		<i>0.0326</i>	<i>pCi/g</i>	<i>03/22/16 09:46</i>	<i>04/12/16 17:26</i>	<i>1</i>

Client Sample ID: L04-02-10-P-S-S-00

Lab Sample ID: 160-16591-8

Date Collected: 03/16/16 15:25

Matrix: Solid

Date Received: 03/18/16 11:10

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	0.606		0.0903	0.109		0.0669	pCi/g	03/22/16 09:46	04/12/16 18:10	1
Bismuth 212	0.791		0.280	0.292		0.239	pCi/g	03/22/16 09:46	04/12/16 18:10	1
Bismuth 214	0.466		0.0710	0.0859		0.0562	pCi/g	03/22/16 09:46	04/12/16 18:10	1
Lead 212	0.569		0.0558	0.0924		0.0490	pCi/g	03/22/16 09:46	04/12/16 18:10	1
Lead 214	0.576		0.0581	0.0834		0.0504	pCi/g	03/22/16 09:46	04/12/16 18:10	1
Potassium 40	10.8		0.747	1.34		0.221	pCi/g	03/22/16 09:46	04/12/16 18:10	1
Protactinium 231	0.291	U	0.158	0.161		0.736	pCi/g	03/22/16 09:46	04/12/16 18:10	1
Radium 226	0.466		0.0710	0.0859	1.00	0.0562	pCi/g	03/22/16 09:46	04/12/16 18:10	1
Thorium 232	0.606		0.0903	0.109		0.0669	pCi/g	03/22/16 09:46	04/12/16 18:10	1
Thorium 234	1.05		0.362	0.379		0.558	pCi/g	03/22/16 09:46	04/12/16 18:10	1
Uranium 235	0.164		0.100	0.102		0.141	pCi/g	03/22/16 09:46	04/12/16 18:10	1
Americium 241	0.00939	U	0.0402	0.0402		0.0676	pCi/g	03/22/16 09:46	04/12/16 18:10	1
Protactinium 234m	0.304	U	1.82	1.82		3.30	pCi/g	03/22/16 09:46	04/12/16 18:10	1
Other Detected			Count	Total						
Radionuclides			Uncert.	Uncert.	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
<i>Tl-208</i>			<i>0.0276</i>	<i>0.0338</i>		<i>0.0209</i>	<i>pCi/g</i>	<i>03/22/16 09:46</i>	<i>04/12/16 18:10</i>	<i>1</i>

Client Sample Results

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

TestAmerica Job ID: 160-16591-2

Client Sample ID: L04-02-11-P-R-S-00

Lab Sample ID: 160-16591-9

Date Collected: 03/16/16 16:08

Matrix: Solid

Date Received: 03/18/16 11:10

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	1.08		0.119	0.162		0.124	pCi/g	03/22/16 09:46	04/12/16 18:11	1
Bismuth 212	1.22		0.556	0.570		0.524	pCi/g	03/22/16 09:46	04/12/16 18:11	1
Bismuth 214	0.996		0.107	0.149		0.0674	pCi/g	03/22/16 09:46	04/12/16 18:11	1
Lead 212	1.06		0.0839	0.161		0.0729	pCi/g	03/22/16 09:46	04/12/16 18:11	1
Lead 214	1.16		0.0934	0.152		0.0820	pCi/g	03/22/16 09:46	04/12/16 18:11	1
Potassium 40	18.6		1.23	2.27		0.337	pCi/g	03/22/16 09:46	04/12/16 18:11	1
Protactinium 231	0.499	U	0.329	0.333		1.20	pCi/g	03/22/16 09:46	04/12/16 18:11	1
Radium 226	0.996		0.107	0.149	1.00	0.0674	pCi/g	03/22/16 09:46	04/12/16 18:11	1
Thorium 232	1.08		0.119	0.162		0.124	pCi/g	03/22/16 09:46	04/12/16 18:11	1
Thorium 234	0.995		0.505	0.516		0.805	pCi/g	03/22/16 09:46	04/12/16 18:11	1
Uranium 235	0.0803	U	0.134	0.134		0.224	pCi/g	03/22/16 09:46	04/12/16 18:11	1
Americium 241	0.0290	U	0.0615	0.0615		0.102	pCi/g	03/22/16 09:46	04/12/16 18:11	1
Protactinium 234m	0.407	U	3.31	3.31		5.80	pCi/g	03/22/16 09:46	04/12/16 18:11	1
Other Detected			Count	Total						
Radionuclides			Uncert.	Uncert.	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
<i>Tl-208</i>			<i>0.0542</i>	<i>0.0660</i>		<i>0.0433</i>	<i>pCi/g</i>	<i>03/22/16 09:46</i>	<i>04/12/16 18:11</i>	<i>1</i>

Client Sample ID: L04-02-13-P-S-S-00

Lab Sample ID: 160-16591-10

Date Collected: 03/16/16 10:54

Matrix: Solid

Date Received: 03/18/16 11:10

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	1.09		0.130	0.170		0.0770	pCi/g	03/22/16 09:46	04/12/16 18:11	1
Bismuth 212	0.779		0.282	0.293		0.388	pCi/g	03/22/16 09:46	04/12/16 18:11	1
Bismuth 214	0.975		0.0862	0.132		0.0516	pCi/g	03/22/16 09:46	04/12/16 18:11	1
Lead 212	0.973		0.0803	0.150		0.0685	pCi/g	03/22/16 09:46	04/12/16 18:11	1
Lead 214	1.12		0.0906	0.148		0.0713	pCi/g	03/22/16 09:46	04/12/16 18:11	1
Potassium 40	18.4		1.00	2.11		0.292	pCi/g	03/22/16 09:46	04/12/16 18:11	1
Protactinium 231	0.309	U	0.174	0.177		1.05	pCi/g	03/22/16 09:46	04/12/16 18:11	1
Radium 226	0.975		0.0862	0.132	1.00	0.0516	pCi/g	03/22/16 09:46	04/12/16 18:11	1
Thorium 232	1.09		0.130	0.170		0.0770	pCi/g	03/22/16 09:46	04/12/16 18:11	1
Thorium 234	1.17		0.266	0.293		0.752	pCi/g	03/22/16 09:46	04/12/16 18:11	1
Uranium 235	0.240		0.153	0.155		0.224	pCi/g	03/22/16 09:46	04/12/16 18:11	1
Americium 241	0.00663	U	0.0556	0.0556		0.0936	pCi/g	03/22/16 09:46	04/12/16 18:11	1
Protactinium 234m	1.14	U	2.38	2.39		4.06	pCi/g	03/22/16 09:46	04/12/16 18:11	1
Other Detected			Count	Total						
Radionuclides			Uncert.	Uncert.	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
<i>Tl-208</i>			<i>0.0399</i>	<i>0.0521</i>		<i>0.0305</i>	<i>pCi/g</i>	<i>03/22/16 09:46</i>	<i>04/12/16 18:11</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: 160-16591-2

Client Sample ID: L04-02-14-P-R-S-00

Lab Sample ID: 160-16591-11

Date Collected: 03/16/16 13:05

Matrix: Solid

Date Received: 03/18/16 11:10

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		0.108	0.151		0.114	pCi/g	03/22/16 09:46	04/12/16 18:12	1
Bismuth 212	1.31		0.500	0.518		0.459	pCi/g	03/22/16 09:46	04/12/16 18:12	1
Bismuth 214	1.05		0.101	0.149		0.0663	pCi/g	03/22/16 09:46	04/12/16 18:12	1
Lead 212	1.08		0.0818	0.162		0.0683	pCi/g	03/22/16 09:46	04/12/16 18:12	1
Lead 214	1.23		0.0784	0.150		0.0606	pCi/g	03/22/16 09:46	04/12/16 18:12	1
Potassium 40	18.3		1.05	2.15		0.327	pCi/g	03/22/16 09:46	04/12/16 18:12	1
Protactinium 231	-0.461	U	0.575	0.577		0.947	pCi/g	03/22/16 09:46	04/12/16 18:12	1
Radium 226	1.05		0.101	0.149	1.00	0.0663	pCi/g	03/22/16 09:46	04/12/16 18:12	1
Thorium 232	1.04		0.108	0.151		0.114	pCi/g	03/22/16 09:46	04/12/16 18:12	1
Thorium 234	1.10		0.488	0.501		0.778	pCi/g	03/22/16 09:46	04/12/16 18:12	1
Uranium 235	0.109	U	0.123	0.123		0.223	pCi/g	03/22/16 09:46	04/12/16 18:12	1
Americium 241	0.0117	U	0.0536	0.0536		0.0899	pCi/g	03/22/16 09:46	04/12/16 18:12	1
Protactinium 234m	-0.705	U	4.90	4.90		3.83	pCi/g	03/22/16 09:46	04/12/16 18:12	1
Other Detected			Count	Total						
Radionuclides			Uncert.	Uncert.	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
<i>Tl-208</i>			<i>0.0478</i>	<i>0.0619</i>		<i>0.0342</i>	<i>pCi/g</i>	<i>03/22/16 09:46</i>	<i>04/12/16 18:12</i>	<i>1</i>

Client Sample ID: L04-02-16-P-S-S-00

Lab Sample ID: 160-16591-12

Date Collected: 03/16/16 13:12

Matrix: Solid

Date Received: 03/18/16 11:10

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		0.154	0.187		0.159	pCi/g	03/22/16 09:46	04/12/16 19:07	1
Bismuth 212	1.09		0.434	0.449		0.382	pCi/g	03/22/16 09:46	04/12/16 19:07	1
Bismuth 214	0.979		0.114	0.152		0.0747	pCi/g	03/22/16 09:46	04/12/16 19:07	1
Lead 212	0.978		0.0830	0.151		0.0694	pCi/g	03/22/16 09:46	04/12/16 19:07	1
Lead 214	1.08		0.108	0.155		0.0752	pCi/g	03/22/16 09:46	04/12/16 19:07	1
Potassium 40	16.7		1.24	2.11		0.229	pCi/g	03/22/16 09:46	04/12/16 19:07	1
Protactinium 231	-0.644	U	0.819	0.822		1.35	pCi/g	03/22/16 09:46	04/12/16 19:07	1
Radium 226	0.979		0.114	0.152	1.00	0.0747	pCi/g	03/22/16 09:46	04/12/16 19:07	1
Thorium 232	1.04		0.154	0.187		0.159	pCi/g	03/22/16 09:46	04/12/16 19:07	1
Thorium 234	1.27		0.528	0.545		0.829	pCi/g	03/22/16 09:46	04/12/16 19:07	1
Uranium 235	0.0798	U	0.142	0.143		0.264	pCi/g	03/22/16 09:46	04/12/16 19:07	1
Americium 241	0.00764	U	0.0672	0.0672		0.113	pCi/g	03/22/16 09:46	04/12/16 19:07	1
Protactinium 234m	2.95	U	3.48	3.50		5.69	pCi/g	03/22/16 09:46	04/12/16 19:07	1
Other Detected			Count	Total						
Radionuclides			Uncert.	Uncert.	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
<i>Tl-208</i>			<i>0.0587</i>	<i>0.0700</i>		<i>0.0453</i>	<i>pCi/g</i>	<i>03/22/16 09:46</i>	<i>04/12/16 19:07</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: 160-16591-2

Client Sample ID: L04-02-16-P-S-Q-00

Lab Sample ID: 160-16591-13

Date Collected: 03/16/16 13:10

Matrix: Solid

Date Received: 03/18/16 11:10

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	0.890		0.101	0.136		0.0971	pCi/g	03/22/16 09:46	04/12/16 19:15	1
Bismuth 212	0.989		0.433	0.445		0.385	pCi/g	03/22/16 09:46	04/12/16 19:15	1
Bismuth 214	0.969		0.0815	0.130		0.0476	pCi/g	03/22/16 09:46	04/12/16 19:15	1
Lead 212	0.901		0.0575	0.130		0.0501	pCi/g	03/22/16 09:46	04/12/16 19:15	1
Lead 214	1.09		0.0763	0.136		0.0558	pCi/g	03/22/16 09:46	04/12/16 19:15	1
Potassium 40	16.3		0.911	1.90		0.302	pCi/g	03/22/16 09:46	04/12/16 19:15	1
Protactinium 231	0.305	U	0.162	0.166		0.938	pCi/g	03/22/16 09:46	04/12/16 19:15	1
Radium 226	0.969		0.0815	0.130	1.00	0.0476	pCi/g	03/22/16 09:46	04/12/16 19:15	1
Thorium 232	0.890		0.101	0.136		0.0971	pCi/g	03/22/16 09:46	04/12/16 19:15	1
Thorium 234	0.759		0.257	0.269		0.713	pCi/g	03/22/16 09:46	04/12/16 19:15	1
Uranium 235	0.182		0.120	0.121		0.162	pCi/g	03/22/16 09:46	04/12/16 19:15	1
Americium 241	0.0215	U	0.0536	0.0537		0.0893	pCi/g	03/22/16 09:46	04/12/16 19:15	1
Protactinium 234m	3.64	U	2.61	2.63		3.90	pCi/g	03/22/16 09:46	04/12/16 19:15	1
Other Detected			Count	Total						
Radionuclides			Uncert.	Uncert.	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
<i>Tl-208</i>			<i>0.0308</i>	<i>0.0426</i>		<i>0.0254</i>	<i>pCi/g</i>	<i>03/22/16 09:46</i>	<i>04/12/16 19:15</i>	<i>1</i>

Client Sample ID: L04-02-17-P-R-S-00

Lab Sample ID: 160-16591-14

Date Collected: 03/16/16 13:12

Matrix: Solid

Date Received: 03/18/16 11:10

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	1.05		0.162	0.194		0.103	pCi/g	03/22/16 09:46	04/12/16 19:17	1
Bismuth 212	1.37		0.449	0.471		0.403	pCi/g	03/22/16 09:46	04/12/16 19:17	1
Bismuth 214	1.17		0.117	0.169		0.0804	pCi/g	03/22/16 09:46	04/12/16 19:17	1
Lead 212	1.01		0.0823	0.154		0.0710	pCi/g	03/22/16 09:46	04/12/16 19:17	1
Lead 214	1.17		0.0865	0.149		0.0644	pCi/g	03/22/16 09:46	04/12/16 19:17	1
Potassium 40	18.2		1.15	2.19		0.210	pCi/g	03/22/16 09:46	04/12/16 19:17	1
Protactinium 231	0.465	U	0.245	0.250		1.04	pCi/g	03/22/16 09:46	04/12/16 19:17	1
Radium 226	1.17		0.117	0.169	1.00	0.0804	pCi/g	03/22/16 09:46	04/12/16 19:17	1
Thorium 232	1.05		0.162	0.194		0.103	pCi/g	03/22/16 09:46	04/12/16 19:17	1
Thorium 234	1.10		0.493	0.507		0.780	pCi/g	03/22/16 09:46	04/12/16 19:17	1
Uranium 235	0.0328	U	0.140	0.140		0.235	pCi/g	03/22/16 09:46	04/12/16 19:17	1
Americium 241	-0.0261	U	0.0578	0.0579		0.0964	pCi/g	03/22/16 09:46	04/12/16 19:17	1
Protactinium 234m	0.551	U	2.86	2.86		4.94	pCi/g	03/22/16 09:46	04/12/16 19:17	1
Other Detected			Count	Total						
Radionuclides			Uncert.	Uncert.	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
<i>Tl-208</i>			<i>0.0469</i>	<i>0.0573</i>		<i>0.0373</i>	<i>pCi/g</i>	<i>03/22/16 09:46</i>	<i>04/12/16 19:17</i>	<i>1</i>

Client Sample Results

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

TestAmerica Job ID: 160-16591-2

Client Sample ID: L04-02-19-P-S-S-00

Lab Sample ID: 160-16591-15

Date Collected: 03/16/16 13:45

Matrix: Solid

Date Received: 03/18/16 11:10

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	1.10		0.130	0.170		0.102	pCi/g	03/22/16 09:46	04/12/16 19:18	1
Bismuth 212	1.30		0.412	0.433		0.389	pCi/g	03/22/16 09:46	04/12/16 19:18	1
Bismuth 214	0.932		0.0832	0.127		0.0481	pCi/g	03/22/16 09:46	04/12/16 19:18	1
Lead 212	1.05		0.0777	0.157		0.0681	pCi/g	03/22/16 09:46	04/12/16 19:18	1
Lead 214	1.10		0.0876	0.145		0.0656	pCi/g	03/22/16 09:46	04/12/16 19:18	1
Potassium 40	20.9		1.08	2.37		0.300	pCi/g	03/22/16 09:46	04/12/16 19:18	1
Protactinium 231	0.152	U	0.458	0.458		0.776	pCi/g	03/22/16 09:46	04/12/16 19:18	1
Radium 226	0.932		0.0832	0.127	1.00	0.0481	pCi/g	03/22/16 09:46	04/12/16 19:18	1
Thorium 232	1.10		0.130	0.170		0.102	pCi/g	03/22/16 09:46	04/12/16 19:18	1
Thorium 234	1.14		0.276	0.300		0.712	pCi/g	03/22/16 09:46	04/12/16 19:18	1
Uranium 235	0.279		0.140	0.143		0.171	pCi/g	03/22/16 09:46	04/12/16 19:18	1
Americium 241	0.0183	U	0.0537	0.0537		0.0900	pCi/g	03/22/16 09:46	04/12/16 19:18	1
Protactinium 234m	1.35	U	2.66	2.66		4.49	pCi/g	03/22/16 09:46	04/12/16 19:18	1
Other Detected			Count	Total						
Radionuclides			Uncert.	Uncert.	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Pb-210	1.39		0.580	0.603		0.708	pCi/g	03/22/16 09:46	04/12/16 19:18	1
Tl-208	0.359		0.0371	0.0523		0.0242	pCi/g	03/22/16 09:46	04/12/16 19:18	1

Client Sample ID: L04-02-20-P-R-S-00

Lab Sample ID: 160-16591-16

Date Collected: 03/16/16 14:03

Matrix: Solid

Date Received: 03/18/16 11:10

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	1.11		0.120	0.165		0.0979	pCi/g	03/22/16 09:46	04/12/16 19:21	1
Bismuth 212	1.02		0.343	0.359		0.464	pCi/g	03/22/16 09:46	04/12/16 19:21	1
Bismuth 214	1.10		0.114	0.162		0.0786	pCi/g	03/22/16 09:46	04/12/16 19:21	1
Lead 212	1.11		0.0786	0.164		0.0634	pCi/g	03/22/16 09:46	04/12/16 19:21	1
Lead 214	1.13		0.0829	0.144		0.0640	pCi/g	03/22/16 09:46	04/12/16 19:21	1
Potassium 40	18.2		1.09	2.16		0.328	pCi/g	03/22/16 09:46	04/12/16 19:21	1
Protactinium 231	0.000	U	23.9	23.9		1.11	pCi/g	03/22/16 09:46	04/12/16 19:21	1
Radium 226	1.10		0.114	0.162	1.00	0.0786	pCi/g	03/22/16 09:46	04/12/16 19:21	1
Thorium 232	1.11		0.120	0.165		0.0979	pCi/g	03/22/16 09:46	04/12/16 19:21	1
Thorium 234	1.10		0.517	0.529		0.828	pCi/g	03/22/16 09:46	04/12/16 19:21	1
Uranium 235	0.0780	U	0.132	0.133		0.213	pCi/g	03/22/16 09:46	04/12/16 19:21	1
Americium 241	-0.00351	U	0.0553	0.0553		0.0933	pCi/g	03/22/16 09:46	04/12/16 19:21	1
Protactinium 234m	1.51	U	3.09	3.09		5.29	pCi/g	03/22/16 09:46	04/12/16 19:21	1
Other Detected			Count	Total						
Radionuclides			Uncert.	Uncert.	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Tl-208	0.348		0.0457	0.0582		0.0337	pCi/g	03/22/16 09:46	04/12/16 19:21	1

TestAmerica St. Louis

Client Sample Results

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

TestAmerica Job ID: 160-16591-2

Client Sample ID: L04-02-22-P-S-S-00

Lab Sample ID: 160-16591-17

Date Collected: 03/16/16 14:15

Matrix: Solid

Date Received: 03/18/16 11:10

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	1.18		0.146	0.189		0.144	pCi/g	03/22/16 09:46	04/12/16 19:52	1
Bismuth 212	1.72		0.478	0.510		0.379	pCi/g	03/22/16 09:46	04/12/16 19:52	1
Bismuth 214	1.15		0.122	0.171		0.0710	pCi/g	03/22/16 09:46	04/12/16 19:52	1
Lead 212	1.07		0.103	0.173		0.0912	pCi/g	03/22/16 09:46	04/12/16 19:52	1
Lead 214	1.22		0.105	0.165		0.0882	pCi/g	03/22/16 09:46	04/12/16 19:52	1
Potassium 40	19.2		1.32	2.37		0.227	pCi/g	03/22/16 09:46	04/12/16 19:52	1
Protactinium 231	0.291	U	0.233	0.235		1.35	pCi/g	03/22/16 09:46	04/12/16 19:52	1
Radium 226	1.15		0.122	0.171	1.00	0.0710	pCi/g	03/22/16 09:46	04/12/16 19:52	1
Thorium 232	1.18		0.146	0.189		0.144	pCi/g	03/22/16 09:46	04/12/16 19:52	1
Thorium 234	1.60		0.344	0.383		0.936	pCi/g	03/22/16 09:46	04/12/16 19:52	1
Uranium 235	0.472		0.170	0.177		0.285	pCi/g	03/22/16 09:46	04/12/16 19:52	1
Americium 241	0.00872	U	0.0646	0.0646		0.109	pCi/g	03/22/16 09:46	04/12/16 19:52	1
Protactinium 234m	-0.673	U	2.10	2.11		6.50	pCi/g	03/22/16 09:46	04/12/16 19:52	1
Other Detected Radionuclides			Count	Total						
	Result	Qualifier	Uncert.	Uncert.	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Tl-208	0.397		0.0621	0.0745		0.0453	pCi/g	03/22/16 09:46	04/12/16 19:52	1

Client Sample ID: L04-02-23-P-R-S-00

Lab Sample ID: 160-16591-18

Date Collected: 03/16/16 14:33

Matrix: Solid

Date Received: 03/18/16 11:10

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	1.19		0.126	0.175		0.101	pCi/g	03/22/16 09:46	04/12/16 19:53	1
Bismuth 212	1.48		0.384	0.414		0.325	pCi/g	03/22/16 09:46	04/12/16 19:53	1
Bismuth 214	1.15		0.100	0.156		0.0618	pCi/g	03/22/16 09:46	04/12/16 19:53	1
Lead 212	1.02		0.0784	0.154		0.0675	pCi/g	03/22/16 09:46	04/12/16 19:53	1
Lead 214	1.22		0.0842	0.152		0.0658	pCi/g	03/22/16 09:46	04/12/16 19:53	1
Potassium 40	19.7		1.04	2.26		0.240	pCi/g	03/22/16 09:46	04/12/16 19:53	1
Protactinium 231	0.398	U	0.471	0.473		0.773	pCi/g	03/22/16 09:46	04/12/16 19:53	1
Radium 226	1.15		0.100	0.156	1.00	0.0618	pCi/g	03/22/16 09:46	04/12/16 19:53	1
Thorium 232	1.19		0.126	0.175		0.101	pCi/g	03/22/16 09:46	04/12/16 19:53	1
Thorium 234	1.19		0.482	0.498		0.761	pCi/g	03/22/16 09:46	04/12/16 19:53	1
Uranium 235	0.101	U	0.141	0.141		0.238	pCi/g	03/22/16 09:46	04/12/16 19:53	1
Americium 241	0.00938	U	0.0592	0.0592		0.0993	pCi/g	03/22/16 09:46	04/12/16 19:53	1
Protactinium 234m	6.79		2.20	2.31		4.69	pCi/g	03/22/16 09:46	04/12/16 19:53	1
Other Detected Radionuclides			Count	Total						
	Result	Qualifier	Uncert.	Uncert.	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Tl-208	0.313		0.0393	0.0509		0.0302	pCi/g	03/22/16 09:46	04/12/16 19:53	1

QC Sample Results

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

TestAmerica Job ID: 160-16591-2

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

Lab Sample ID: MB 160-241602/1-A
Matrix: Solid
Analysis Batch: 245577

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 241602

Analyte	MB MB		Count	Total	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.006901	U	0.0197	0.0197		0.0508	pCi/g	03/22/16 09:46	04/12/16 13:24	1
Bismuth 212	0.0000	U	0.0538	0.0538		0.0809	pCi/g	03/22/16 09:46	04/12/16 13:24	1
Bismuth 214	-0.008973	U	0.663	0.663		0.0369	pCi/g	03/22/16 09:46	04/12/16 13:24	1
Lead 212	-0.006434	U	0.257	0.257		0.0289	pCi/g	03/22/16 09:46	04/12/16 13:24	1
Lead 214	-0.007817	U	0.327	0.327		0.0293	pCi/g	03/22/16 09:46	04/12/16 13:24	1
Potassium 40	-0.001289	U	0.113	0.113		0.249	pCi/g	03/22/16 09:46	04/12/16 13:24	1
Protactinium 231	-0.06569	U	0.196	0.196		0.346	pCi/g	03/22/16 09:46	04/12/16 13:24	1
Radium 226	-0.008973	U	0.663	0.663	1.00	0.0369	pCi/g	03/22/16 09:46	04/12/16 13:24	1
Thorium 232	0.006901	U	0.0197	0.0197		0.0508	pCi/g	03/22/16 09:46	04/12/16 13:24	1
Thorium 234	-0.004119	U	0.152	0.152		0.296	pCi/g	03/22/16 09:46	04/12/16 13:24	1
Uranium 235	0.01009	U	0.0145	0.0145		0.0577	pCi/g	03/22/16 09:46	04/12/16 13:24	1
Americium 241	0.009580	U	0.0131	0.0131		0.0217	pCi/g	03/22/16 09:46	04/12/16 13:24	1
Protactinium 234m	-0.1186	U	0.939	0.939		2.15	pCi/g	03/22/16 09:46	04/12/16 13:24	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	03/22/16 09:46	04/12/16 13:24	1

Lab Sample ID: LCS 160-241602/2-A
Matrix: Solid
Analysis Batch: 245573

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 241602

Analyte	Spike Added	LCS Result	LCS Qual	Total	RL	MDC	Unit	%Rec	%Rec.
				Uncert. (2σ+/-)					Limits
Americium 241	101	104.4		10.9		0.603	pCi/g	104	87 - 116
Cesium 137	34.1	34.98		3.67		0.194	pCi/g	103	87 - 120
Cobalt 60	31.6	31.26		3.16		0.138	pCi/g	99	87 - 115

Lab Sample ID: 160-16590-A-1-I DU
Matrix: Solid
Analysis Batch: 245579

Client Sample ID: Duplicate
Prep Type: Total/NA
Prep Batch: 241602

Analyte	Sample Result	Sample Qual	DU Result	DU Qual	Total	RL	MDC	Unit	RER	RER
					Uncert. (2σ+/-)					Limit
Actinium 228	1.01		0.9502		0.181		0.119	pCi/g	0.18	1
Bismuth 212	1.36		1.382		0.455		0.386	pCi/g	0.03	1
Bismuth 214	1.04		1.061		0.160		0.0814	pCi/g	0.07	1
Lead 212	0.960		1.089		0.162		0.0662	pCi/g	0.42	1
Lead 214	1.22		1.203		0.156		0.0662	pCi/g	0.04	1
Potassium 40	17.8		18.29		2.19		0.205	pCi/g	0.13	1
Protactinium 231	0.307	U	0.3524	U	0.209		1.08	pCi/g	0.11	1
Radium 226	1.04		1.061		0.160	1.00	0.0814	pCi/g	0.07	1
Thorium 232	1.01		0.9502		0.181		0.119	pCi/g	0.18	1
Thorium 234	0.900		1.153		0.504		0.770	pCi/g	0.33	1
Uranium 235	0.0656	U	0.1391	U	0.138		0.228	pCi/g	0.26	1
Americium 241	0.0108	U	0.03359	U	0.0565		0.0936	pCi/g	0.20	1

TestAmerica St. Louis

QC Sample Results

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

TestAmerica Job ID: 160-16591-2

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

Lab Sample ID: 160-16590-A-1-I DU
 Matrix: Solid
 Analysis Batch: 245579

Client Sample ID: Duplicate
 Prep Type: Total/NA
 Prep Batch: 241602

Analyte	Sample Result	Sample Qual	DU Result	DU Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	RER	RER Limit
Protactinium 234m	1.75	U	5.286		2.50		5.14	pCi/g	0.71	1
<i>Total</i>										
Other Detected Radionuclides	Sample Result	Sample Qual	DU Result	DU Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	RER	RER Limit
Pb-210	1.38		1.304		0.509		0.644	pCi/g	0.07	1
Tl-208	0.345		0.3413		0.0573		0.0339	pCi/g	0.03	1



QC Association Summary

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

TestAmerica Job ID: 160-16591-2

Rad

Leach Batch: 241252

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-16590-A-1-I DU	Duplicate	Total/NA	Solid	Dry and Grind	
160-16591-1	L04-02-01-P-S-S-00	Total/NA	Solid	Dry and Grind	
160-16591-2	L04-02-01-P-S-Q-00	Total/NA	Solid	Dry and Grind	
160-16591-3	L04-02-02-P-R-S-00	Total/NA	Solid	Dry and Grind	
160-16591-4	L04-02-04-P-S-S-00	Total/NA	Solid	Dry and Grind	
160-16591-5	L04-02-05-P-R-S-00	Total/NA	Solid	Dry and Grind	
160-16591-6	L04-02-07-P-S-S-00	Total/NA	Solid	Dry and Grind	
160-16591-7	L04-02-08-P-R-S-00	Total/NA	Solid	Dry and Grind	
160-16591-8	L04-02-10-P-S-S-00	Total/NA	Solid	Dry and Grind	
160-16591-9	L04-02-11-P-R-S-00	Total/NA	Solid	Dry and Grind	
160-16591-10	L04-02-13-P-S-S-00	Total/NA	Solid	Dry and Grind	
160-16591-11	L04-02-14-P-R-S-00	Total/NA	Solid	Dry and Grind	
160-16591-12	L04-02-16-P-S-S-00	Total/NA	Solid	Dry and Grind	
160-16591-13	L04-02-16-P-S-Q-00	Total/NA	Solid	Dry and Grind	
160-16591-14	L04-02-17-P-R-S-00	Total/NA	Solid	Dry and Grind	
160-16591-15	L04-02-19-P-S-S-00	Total/NA	Solid	Dry and Grind	
160-16591-16	L04-02-20-P-R-S-00	Total/NA	Solid	Dry and Grind	
160-16591-17	L04-02-22-P-S-S-00	Total/NA	Solid	Dry and Grind	
160-16591-18	L04-02-23-P-R-S-00	Total/NA	Solid	Dry and Grind	

Prep Batch: 241602

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-16590-A-1-I DU	Duplicate	Total/NA	Solid	Fill_Geo-21	241252
160-16591-1	L04-02-01-P-S-S-00	Total/NA	Solid	Fill_Geo-21	241252
160-16591-2	L04-02-01-P-S-Q-00	Total/NA	Solid	Fill_Geo-21	241252
160-16591-3	L04-02-02-P-R-S-00	Total/NA	Solid	Fill_Geo-21	241252
160-16591-4	L04-02-04-P-S-S-00	Total/NA	Solid	Fill_Geo-21	241252
160-16591-5	L04-02-05-P-R-S-00	Total/NA	Solid	Fill_Geo-21	241252
160-16591-6	L04-02-07-P-S-S-00	Total/NA	Solid	Fill_Geo-21	241252
160-16591-7	L04-02-08-P-R-S-00	Total/NA	Solid	Fill_Geo-21	241252
160-16591-8	L04-02-10-P-S-S-00	Total/NA	Solid	Fill_Geo-21	241252
160-16591-9	L04-02-11-P-R-S-00	Total/NA	Solid	Fill_Geo-21	241252
160-16591-10	L04-02-13-P-S-S-00	Total/NA	Solid	Fill_Geo-21	241252
160-16591-11	L04-02-14-P-R-S-00	Total/NA	Solid	Fill_Geo-21	241252
160-16591-12	L04-02-16-P-S-S-00	Total/NA	Solid	Fill_Geo-21	241252
160-16591-13	L04-02-16-P-S-Q-00	Total/NA	Solid	Fill_Geo-21	241252
160-16591-14	L04-02-17-P-R-S-00	Total/NA	Solid	Fill_Geo-21	241252
160-16591-15	L04-02-19-P-S-S-00	Total/NA	Solid	Fill_Geo-21	241252
160-16591-16	L04-02-20-P-R-S-00	Total/NA	Solid	Fill_Geo-21	241252
160-16591-17	L04-02-22-P-S-S-00	Total/NA	Solid	Fill_Geo-21	241252
160-16591-18	L04-02-23-P-R-S-00	Total/NA	Solid	Fill_Geo-21	241252
LCS 160-241602/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	
MB 160-241602/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	