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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: 160-17387-2

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:

6/8/2016 2:16:34 PM

Ivan Vania, Project Manager II
(314)298-8566
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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: 160-17387-2

Job ID: 160-17387-2

Laboratory: TestAmerica St. Louis

Narrative

CASE NARRATIVE

Client: Westinghouse Electric Company LLC

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

Report Number: 160-17387-2

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 5/13/2016 3:30 PM; 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 L12-07-01-P-S-S-00 (160-17387-1), L12-07-02-P-R-S-00 (160-17387-2), L12-07-04-P-S-S-00 (160-17387-3), L12-07-05-P-R-S-00 (160-17387-4), L12-07-07-P-S-S-00 (160-17387-5), L12-07-08-P-R-S-00 (160-17387-6), L12-07-10-P-S-S-00 (160-17387-7), L12-07-11-P-R-S-00 (160-17387-8), L12-07-13-P-S-S-00 (160-17387-9), L12-07-14-P-R-S-00 (160-17387-10), L12-07-16-P-S-S-00 (160-17387-11), L12-07-16-P-S-Q-00 (160-17387-12), L12-07-17-P-R-S-00 (160-17387-13), L12-07-19-P-S-S-00 (160-17387-14), L12-07-19-P-S-Q-00 (160-17387-15), L12-07-20-P-R-S-00 (160-17387-16), L12-07-22-P-S-S-00 (160-17387-17) and L12-07-23-P-R-S-00 (160-17387-18) were analyzed for Radium-226 by gamma spec (21 day ingrowth) in accordance with EPA GA_01_R. The samples were leached on 05/16/2016, prepared on 05/17/2016 and analyzed on 06/07/2016.

Preparation Batch 160-251623:

Lead-214 analyzed by gamma spectroscopy was detected above the MDC in the method blank. Variations in Compton backgrounds and

Case Narrative

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

TestAmerica Job ID: 160-17387-2

Job ID: 160-17387-2 (Continued)

Laboratory: TestAmerica St. Louis (Continued)

statistical analyses allow for small area counts in the regions of interest of this nuclide. Other uranium decay chain products are not present in the blank to support lead-214 identification. The data is reported. L12-07-01-P-S-S-00 (160-17387-1), L12-07-02-P-R-S-00 (160-17387-2), L12-07-04-P-S-S-00 (160-17387-3), L12-07-05-P-R-S-00 (160-17387-4), L12-07-07-P-S-S-00 (160-17387-5), L12-07-08-P-R-S-00 (160-17387-6), L12-07-10-P-S-S-00 (160-17387-7), L12-07-11-P-R-S-00 (160-17387-8), L12-07-13-P-S-S-00 (160-17387-9), L12-07-14-P-R-S-00 (160-17387-10), L12-07-16-P-S-S-00 (160-17387-11), L12-07-16-P-S-Q-00 (160-17387-12), L12-07-17-P-R-S-00 (160-17387-13), L12-07-19-P-S-S-00 (160-17387-14), L12-07-19-P-S-Q-00 (160-17387-15), L12-07-20-P-R-S-00 (160-17387-16), L12-07-22-P-S-S-00 (160-17387-17), L12-07-23-P-R-S-00 (160-17387-18), (LCS 160-251623/2-A), (MB 160-251623/1-A) and (160-17387-A-2-H DU)

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	Page 1 of 1
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-051216-01	Page 1 of 2	Requested Analysis	Laboratory Name:
Project Name:	Westinghouse Electric Company			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 Vanila
			Phone No.	708-870-8453
			Turn Around Time	
			Rush	(7 days)
Sample ID	Date	Time	Matrix	Remarks
L12-07-01-P-S-S-00	5/12/2016	14:40	S	X X X X
L12-07-02-P-R-S-00	5/12/2016	14:55	S	X X X X
L12-07-04-P-S-S-00	5/11/2016	10:55	S	X X X X
L12-07-05-P-R-S-00	5/11/2016	11:05	S	X X X X
L12-07-07-P-S-S-00	5/12/2016	14:10	S	X X X X
L12-07-08-P-R-S-00	5/12/2016	14:20	S	X X X X
L12-07-10-P-S-S-00	5/11/2016	10:10	S	X X X X
L12-07-11-P-R-S-00	5/11/2016	10:20	S	X X X X
L12-07-13-P-S-S-00	5/11/2016	9:10	S	X X X X
L12-07-14-P-R-S-00	5/11/2016	9:25	S	X X X X
L12-07-16-P-S-S-00	5/11/2016	8:20	S	X X X X
L12-07-16-P-S-Q-00	5/11/2016	8:20	S	X X X X
Relinquished by:	Date/Time	Received by:	Date/Time	Total Cooler Temperature:
M. Dekeyser	5-13-16 12:50	1 Day Interim CDER Backs Cover	5/13/16 12:55	18
Company Name: WEC		Company Name: CDER Backs Cover	Cooler ID: 0512-02/03	Shipper and Number:
Received by:	Date/Time	Relinquished by:	Date/Time	Comments: N/A
Company Name:		Company Name: CDER Backs Cover	5/13/16 3:30	
Relinquished by:	Date/Time	Received by:	Date/Time	Verified By: Michael Dekeyser
Company Name:		Company Name: CDER Backs Cover	5/13/16 15:30	<i>2</i> <i>5/13/16</i>

160-17387 Chain of Custody

Login Sample Receipt Checklist

Client: Westinghouse Electric Company LLC

Job Number: 160-17387-2

Login Number: 17387

List Source: TestAmerica St. Louis

List Number: 1

Creator: Dedner, Connie L

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
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: 160-17387-2

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: 160-17387-2

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: 160-17387-2

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
160-17387-1	L12-07-01-P-S-S-00	Solid	05/12/16 14:40	05/13/16 15:30
160-17387-2	L12-07-02-P-R-S-00	Solid	05/12/16 14:55	05/13/16 15:30
160-17387-3	L12-07-04-P-S-S-00	Solid	05/11/16 10:55	05/13/16 15:30
160-17387-4	L12-07-05-P-R-S-00	Solid	05/11/16 11:05	05/13/16 15:30
160-17387-5	L12-07-07-P-S-S-00	Solid	05/12/16 14:10	05/13/16 15:30
160-17387-6	L12-07-08-P-R-S-00	Solid	05/12/16 14:20	05/13/16 15:30
160-17387-7	L12-07-10-P-S-S-00	Solid	05/11/16 10:10	05/13/16 15:30
160-17387-8	L12-07-11-P-R-S-00	Solid	05/11/16 10:20	05/13/16 15:30
160-17387-9	L12-07-13-P-S-S-00	Solid	05/11/16 09:10	05/13/16 15:30
160-17387-10	L12-07-14-P-R-S-00	Solid	05/11/16 09:25	05/13/16 15:30
160-17387-11	L12-07-16-P-S-S-00	Solid	05/11/16 08:20	05/13/16 15:30
160-17387-12	L12-07-16-P-S-Q-00	Solid	05/11/16 08:20	05/13/16 15:30
160-17387-13	L12-07-17-P-R-S-00	Solid	05/11/16 08:35	05/13/16 15:30
160-17387-14	L12-07-19-P-S-S-00	Solid	05/10/16 15:40	05/13/16 15:30
160-17387-15	L12-07-19-P-S-Q-00	Solid	05/10/16 15:40	05/13/16 15:30
160-17387-16	L12-07-20-P-R-S-00	Solid	05/10/16 15:50	05/13/16 15:30
160-17387-17	L12-07-22-P-S-S-00	Solid	05/10/16 15:10	05/13/16 15:30
160-17387-18	L12-07-23-P-R-S-00	Solid	05/10/16 15:30	05/13/16 15:30

TestAmerica St. Louis

Client Sample Results

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

TestAmerica Job ID: 160-17387-2

Client Sample ID: L12-07-01-P-S-S-00

Date Collected: 05/12/16 14:40

Date Received: 05/13/16 15:30

Lab Sample ID: 160-17387-1

Matrix: Solid

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	1.12		0.157	0.191		0.0992	pCi/g	05/17/16 13:08	06/07/16 08:46	1
Bismuth 212	-0.364	U	0.592	0.593		0.985	pCi/g	05/17/16 13:08	06/07/16 08:46	1
Bismuth 214	0.733		0.106	0.128		0.0837	pCi/g	05/17/16 13:08	06/07/16 08:46	1
Lead 212	0.945		0.0784	0.128		0.0682	pCi/g	05/17/16 13:08	06/07/16 08:46	1
Lead 214	0.837		0.104	0.132		0.0761	pCi/g	05/17/16 13:08	06/07/16 08:46	1
Potassium 40	18.3		1.26	2.17		0.408	pCi/g	05/17/16 13:08	06/07/16 08:46	1
Protactinium 231	0.459	U	0.991	0.992		2.23	pCi/g	05/17/16 13:08	06/07/16 08:46	1
Radium 226	0.733		0.106	0.128	1.00	0.0837	pCi/g	05/17/16 13:08	06/07/16 08:46	1
Thorium 232	1.12		0.157	0.191		0.0992	pCi/g	05/17/16 13:08	06/07/16 08:46	1
Thorium 234	0.840	U	0.339	0.349		0.900	pCi/g	05/17/16 13:08	06/07/16 08:46	1
Uranium 235	0.0805	U	0.281	0.281		0.468	pCi/g	05/17/16 13:08	06/07/16 08:46	1
Americium 241	-0.0426	U	0.0736	0.0738		0.161	pCi/g	05/17/16 13:08	06/07/16 08:46	1
Protactinium 234m	2.45	U	4.78	4.79		8.06	pCi/g	05/17/16 13:08	06/07/16 08:46	1
<i>Other Detected</i>			Count	Total						
<i>Radionuclides</i>			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Pb-210	1.73		0.712	0.746		0.839	pCi/g	05/17/16 13:08	06/07/16 08:46	1
Tl-208	0.301		0.0478	0.0560		0.0357	pCi/g	05/17/16 13:08	06/07/16 08:46	1

Client Sample ID: L12-07-02-P-R-S-00

Date Collected: 05/12/16 14:55

Date Received: 05/13/16 15:30

Lab Sample ID: 160-17387-2

Matrix: Solid

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	1.03		0.134	0.171		0.152	pCi/g	05/17/16 13:08	06/07/16 08:45	1
Bismuth 212	1.79		0.556	0.587		0.444	pCi/g	05/17/16 13:08	06/07/16 08:45	1
Bismuth 214	1.10		0.133	0.175		0.0868	pCi/g	05/17/16 13:08	06/07/16 08:45	1
Lead 212	1.09		0.0822	0.163		0.0645	pCi/g	05/17/16 13:08	06/07/16 08:45	1
Lead 214	1.20		0.105	0.162		0.0858	pCi/g	05/17/16 13:08	06/07/16 08:45	1
Potassium 40	19.2		1.39	2.41		0.265	pCi/g	05/17/16 13:08	06/07/16 08:45	1
Protactinium 231	0.000	U	0.475	0.475		2.69	pCi/g	05/17/16 13:08	06/07/16 08:45	1
Radium 226	1.10		0.133	0.175	1.00	0.0868	pCi/g	05/17/16 13:08	06/07/16 08:45	1
Thorium 232	1.03		0.134	0.171		0.152	pCi/g	05/17/16 13:08	06/07/16 08:45	1
Thorium 234	0.984	U	0.755	0.762		0.989	pCi/g	05/17/16 13:08	06/07/16 08:45	1
Uranium 235	0.318		0.191	0.194		0.219	pCi/g	05/17/16 13:08	06/07/16 08:45	1
Americium 241	0.0398	U	0.0869	0.0870		0.145	pCi/g	05/17/16 13:08	06/07/16 08:45	1
Protactinium 234m	4.95	U	6.00	6.02		8.22	pCi/g	05/17/16 13:08	06/07/16 08:45	1
<i>Other Detected</i>			Count	Total						
<i>Radionuclides</i>			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Tl-208	0.362		0.0632	0.0735		0.0464	pCi/g	05/17/16 13:08	06/07/16 08:45	1

TestAmerica St. Louis

Client Sample Results

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

TestAmerica Job ID: 160-17387-2

Client Sample ID: L12-07-04-P-S-S-00

Date Collected: 05/11/16 10:55

Date Received: 05/13/16 15:30

Lab Sample ID: 160-17387-3

Matrix: Solid

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

Analyte	Result	Qualifier	Count	Total	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	(2σ+/-)						
Actinium 228	0.876		0.144	0.170		0.127	pCi/g	05/17/16 13:08	06/07/16 09:25	1
Bismuth 212	1.09		0.486	0.499		0.458	pCi/g	05/17/16 13:08	06/07/16 09:25	1
Bismuth 214	0.848		0.112	0.143		0.0748	pCi/g	05/17/16 13:08	06/07/16 09:25	1
Lead 212	0.862		0.0780	0.136		0.0675	pCi/g	05/17/16 13:08	06/07/16 09:25	1
Lead 214	0.953		0.103	0.143		0.0857	pCi/g	05/17/16 13:08	06/07/16 09:25	1
Potassium 40	16.1		1.38	2.15		0.499	pCi/g	05/17/16 13:08	06/07/16 09:25	1
Protactinium 231	-0.541	U	1.63	1.63		2.73	pCi/g	05/17/16 13:08	06/07/16 09:25	1
Radium 226	0.848		0.112	0.143	1.00	0.0748	pCi/g	05/17/16 13:08	06/07/16 09:25	1
Thorium 232	0.876		0.144	0.170		0.127	pCi/g	05/17/16 13:08	06/07/16 09:25	1
Thorium 234	0.475	U	0.285	0.290		1.55	pCi/g	05/17/16 13:08	06/07/16 09:25	1
Uranium 235	-0.145	U	0.209	0.209		0.672	pCi/g	05/17/16 13:08	06/07/16 09:25	1
Americium 241	-0.0476	U	0.108	0.108		0.179	pCi/g	05/17/16 13:08	06/07/16 09:25	1
Protactinium 234m	2.77	U	6.00	6.01		9.41	pCi/g	05/17/16 13:08	06/07/16 09:25	1
<i>Other Detected</i>			Count	Total						
<i>Radionuclides</i>			Uncert.	Uncert.						
Tl-208	0.289		0.0506	0.0588		0.0369	pCi/g	05/17/16 13:08	06/07/16 09:25	1

Client Sample ID: L12-07-05-P-R-S-00

Date Collected: 05/11/16 11:05

Date Received: 05/13/16 15:30

Lab Sample ID: 160-17387-4

Matrix: Solid

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

Analyte	Result	Qualifier	Count	Total	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	(2σ+/-)						
Actinium 228	1.13		0.129	0.172		0.119	pCi/g	05/17/16 13:08	06/07/16 09:29	1
Bismuth 212	1.41		0.341	0.371		0.278	pCi/g	05/17/16 13:08	06/07/16 09:29	1
Bismuth 214	0.965		0.0842	0.130		0.0489	pCi/g	05/17/16 13:08	06/07/16 09:29	1
Lead 212	1.07		0.0642	0.154		0.0524	pCi/g	05/17/16 13:08	06/07/16 09:29	1
Lead 214	1.10		0.0809	0.140		0.0641	pCi/g	05/17/16 13:08	06/07/16 09:29	1
Potassium 40	20.1		1.05	2.28		0.308	pCi/g	05/17/16 13:08	06/07/16 09:29	1
Protactinium 231	-0.464	U	1.38	1.38		2.30	pCi/g	05/17/16 13:08	06/07/16 09:29	1
Radium 226	0.965		0.0842	0.130	1.00	0.0489	pCi/g	05/17/16 13:08	06/07/16 09:29	1
Thorium 232	1.13		0.129	0.172		0.119	pCi/g	05/17/16 13:08	06/07/16 09:29	1
Thorium 234	0.887		0.267	0.283		0.766	pCi/g	05/17/16 13:08	06/07/16 09:29	1
Uranium 235	-0.115	U	0.112	0.112		0.495	pCi/g	05/17/16 13:08	06/07/16 09:29	1
Americium 241	0.0301	U	0.0802	0.0802		0.133	pCi/g	05/17/16 13:08	06/07/16 09:29	1
Protactinium 234m	3.40	U	4.07	4.09		6.53	pCi/g	05/17/16 13:08	06/07/16 09:29	1
<i>Other Detected</i>			Count	Total						
<i>Radionuclides</i>			Uncert.	Uncert.						
Tl-208	0.368		0.0425	0.0569		0.0296	pCi/g	05/17/16 13:08	06/07/16 09:29	1

TestAmerica St. Louis

Client Sample Results

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

TestAmerica Job ID: 160-17387-2

Client Sample ID: L12-07-07-P-S-S-00

Date Collected: 05/12/16 14:10

Date Received: 05/13/16 15:30

Lab Sample ID: 160-17387-5

Matrix: Solid

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

Analyte	Result	Qualifier	Count	Total	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	1.06		0.153	0.184		0.123	pCi/g	05/17/16 13:08	06/07/16 10:03	1
Bismuth 212	0.827		0.319	0.329		0.426	pCi/g	05/17/16 13:08	06/07/16 10:03	1
Bismuth 214	0.837		0.106	0.133		0.0763	pCi/g	05/17/16 13:08	06/07/16 10:03	1
Lead 212	0.937		0.0706	0.123		0.0570	pCi/g	05/17/16 13:08	06/07/16 10:03	1
Lead 214	0.975		0.0894	0.130		0.0577	pCi/g	05/17/16 13:08	06/07/16 10:03	1
Potassium 40	17.5		1.18	2.06		0.454	pCi/g	05/17/16 13:08	06/07/16 10:03	1
Protactinium 231	0.396	U	0.475	0.477		0.781	pCi/g	05/17/16 13:08	06/07/16 10:03	1
Radium 226	0.837		0.106	0.133	1.00	0.0763	pCi/g	05/17/16 13:08	06/07/16 10:03	1
Thorium 232	1.06		0.153	0.184		0.123	pCi/g	05/17/16 13:08	06/07/16 10:03	1
Thorium 234	1.33		0.489	0.506		0.745	pCi/g	05/17/16 13:08	06/07/16 10:03	1
Uranium 235	-0.0181	U	0.262	0.262		0.421	pCi/g	05/17/16 13:08	06/07/16 10:03	1
Americium 241	-0.0484	U	0.0625	0.0627		0.149	pCi/g	05/17/16 13:08	06/07/16 10:03	1
Protactinium 234m	3.50	U	4.21	4.22		6.42	pCi/g	05/17/16 13:08	06/07/16 10:03	1
<i>Other Detected</i>			Count	Total						
<i>Radionuclides</i>			Uncert.	Uncert.						
Tl-208	0.282		(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
			0.0460	0.0536		0.0388	pCi/g	05/17/16 13:08	06/07/16 10:03	1

Client Sample ID: L12-07-08-P-R-S-00

Date Collected: 05/12/16 14:20

Date Received: 05/13/16 15:30

Lab Sample ID: 160-17387-6

Matrix: Solid

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

Analyte	Result	Qualifier	Count	Total	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	1.20		0.164	0.204		0.126	pCi/g	05/17/16 13:08	06/07/16 09:32	1
Bismuth 212	0.348	U	0.545	0.546		0.908	pCi/g	05/17/16 13:08	06/07/16 09:32	1
Bismuth 214	1.16		0.134	0.180		0.0684	pCi/g	05/17/16 13:08	06/07/16 09:32	1
Lead 212	1.05		0.0879	0.161		0.0808	pCi/g	05/17/16 13:08	06/07/16 09:32	1
Lead 214	1.21		0.111	0.167		0.0995	pCi/g	05/17/16 13:08	06/07/16 09:32	1
Potassium 40	18.9		1.43	2.40		0.284	pCi/g	05/17/16 13:08	06/07/16 09:32	1
Protactinium 231	-0.722	U	2.30	2.30		3.83	pCi/g	05/17/16 13:08	06/07/16 09:32	1
Radium 226	1.16		0.134	0.180	1.00	0.0684	pCi/g	05/17/16 13:08	06/07/16 09:32	1
Thorium 232	1.20		0.164	0.204		0.126	pCi/g	05/17/16 13:08	06/07/16 09:32	1
Thorium 234	0.840	U	0.331	0.342		0.965	pCi/g	05/17/16 13:08	06/07/16 09:32	1
Uranium 235	-0.136	U	0.207	0.208		0.697	pCi/g	05/17/16 13:08	06/07/16 09:32	1
Americium 241	0.0432	U	0.0961	0.0962		0.128	pCi/g	05/17/16 13:08	06/07/16 09:32	1
Protactinium 234m	2.55	U	3.67	3.68		10.7	pCi/g	05/17/16 13:08	06/07/16 09:32	1
<i>Other Detected</i>			Count	Total						
<i>Radionuclides</i>			Uncert.	Uncert.	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Tl-208	0.367		(2σ+/-)	(2σ+/-)	0.0737	0.0466	pCi/g	05/17/16 13:08	06/07/16 09:32	1

TestAmerica St. Louis

Client Sample Results

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

TestAmerica Job ID: 160-17387-2

Client Sample ID: L12-07-10-P-S-S-00

Date Collected: 05/11/16 10:10

Date Received: 05/13/16 15:30

Lab Sample ID: 160-17387-7

Matrix: Solid

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

Analyte	Result	Qualifier	Count	Total	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	(2σ+/-)						
Actinium 228	0.885		0.0912	0.128		0.0901	pCi/g	05/17/16 13:08	06/07/16 10:00	1
Bismuth 212	1.13		0.279	0.303		0.226	pCi/g	05/17/16 13:08	06/07/16 10:00	1
Bismuth 214	0.789		0.0880	0.120		0.0616	pCi/g	05/17/16 13:08	06/07/16 10:00	1
Lead 212	0.838		0.0623	0.125		0.0567	pCi/g	05/17/16 13:08	06/07/16 10:00	1
Lead 214	0.993		0.0782	0.129		0.0474	pCi/g	05/17/16 13:08	06/07/16 10:00	1
Potassium 40	15.6		0.966	1.86		0.289	pCi/g	05/17/16 13:08	06/07/16 10:00	1
Protactinium 231	0.000	U	0.191	0.191		2.02	pCi/g	05/17/16 13:08	06/07/16 10:00	1
Radium 226	0.789		0.0880	0.120	1.00	0.0616	pCi/g	05/17/16 13:08	06/07/16 10:00	1
Thorium 232	0.885		0.0912	0.128		0.0901	pCi/g	05/17/16 13:08	06/07/16 10:00	1
Thorium 234	1.37		0.483	0.504		0.740	pCi/g	05/17/16 13:08	06/07/16 10:00	1
Uranium 235	0.314		0.125	0.129		0.196	pCi/g	05/17/16 13:08	06/07/16 10:00	1
Americium 241	-0.0383	U	0.0892	0.0893		0.148	pCi/g	05/17/16 13:08	06/07/16 10:00	1
Protactinium 234m	2.86	U	3.31	3.32		4.87	pCi/g	05/17/16 13:08	06/07/16 10:00	1
<i>Other Detected</i>			Count	Total						
<i>Radionuclides</i>			Uncert.	Uncert.						
Tl-208	0.260		0.0455	0.0529		0.0369	pCi/g	05/17/16 13:08	06/07/16 10:00	1

Client Sample ID: L12-07-11-P-R-S-00

Date Collected: 05/11/16 10:20

Date Received: 05/13/16 15:30

Lab Sample ID: 160-17387-8

Matrix: Solid

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

Analyte	Result	Qualifier	Count	Total	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	(2σ+/-)						
Actinium 228	0.937		0.199	0.220		0.162	pCi/g	05/17/16 13:08	06/07/16 10:01	1
Bismuth 212	1.29		0.472	0.490		0.446	pCi/g	05/17/16 13:08	06/07/16 10:01	1
Bismuth 214	0.962		0.121	0.157		0.0820	pCi/g	05/17/16 13:08	06/07/16 10:01	1
Lead 212	1.03		0.0823	0.157		0.0656	pCi/g	05/17/16 13:08	06/07/16 10:01	1
Lead 214	1.20		0.108	0.165		0.0849	pCi/g	05/17/16 13:08	06/07/16 10:01	1
Potassium 40	18.2		1.36	2.30		0.186	pCi/g	05/17/16 13:08	06/07/16 10:01	1
Protactinium 231	0.500	U	1.60	1.60		2.68	pCi/g	05/17/16 13:08	06/07/16 10:01	1
Radium 226	0.962		0.121	0.157	1.00	0.0820	pCi/g	05/17/16 13:08	06/07/16 10:01	1
Thorium 232	0.937		0.199	0.220		0.162	pCi/g	05/17/16 13:08	06/07/16 10:01	1
Thorium 234	0.683	U	0.273	0.282		1.59	pCi/g	05/17/16 13:08	06/07/16 10:01	1
Uranium 235	-0.00939	U	0.371	0.371		0.626	pCi/g	05/17/16 13:08	06/07/16 10:01	1
Americium 241	0.0464	U	0.109	0.109		0.180	pCi/g	05/17/16 13:08	06/07/16 10:01	1
Protactinium 234m	4.08	U	5.97	5.98		9.90	pCi/g	05/17/16 13:08	06/07/16 10:01	1
<i>Other Detected</i>			Count	Total						
<i>Radionuclides</i>			Uncert.	Uncert.						
Tl-208	0.374		0.0583	0.0700		0.0413	pCi/g	05/17/16 13:08	06/07/16 10:01	1

TestAmerica St. Louis

Client Sample Results

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

TestAmerica Job ID: 160-17387-2

Client Sample ID: L12-07-13-P-S-S-00

Date Collected: 05/11/16 09:10

Date Received: 05/13/16 15:30

Lab Sample ID: 160-17387-9

Matrix: Solid

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

Analyte	Result	Qualifier	Count	Total	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	(2σ+/-)						
Actinium 228	0.961		0.120	0.155		0.132	pCi/g	05/17/16 13:08	06/07/16 10:06	1
Bismuth 212	1.38		0.427	0.450		0.355	pCi/g	05/17/16 13:08	06/07/16 10:06	1
Bismuth 214	0.942		0.105	0.143		0.0564	pCi/g	05/17/16 13:08	06/07/16 10:06	1
Lead 212	0.915		0.0717	0.138		0.0593	pCi/g	05/17/16 13:08	06/07/16 10:06	1
Lead 214	1.03		0.0933	0.142		0.0839	pCi/g	05/17/16 13:08	06/07/16 10:06	1
Potassium 40	17.2		1.23	2.15		0.233	pCi/g	05/17/16 13:08	06/07/16 10:06	1
Protactinium 231	-0.542	U	1.70	1.70		2.83	pCi/g	05/17/16 13:08	06/07/16 10:06	1
Radium 226	0.942		0.105	0.143	1.00	0.0564	pCi/g	05/17/16 13:08	06/07/16 10:06	1
Thorium 232	0.961		0.120	0.155		0.132	pCi/g	05/17/16 13:08	06/07/16 10:06	1
Thorium 234	0.791		0.290	0.301		0.780	pCi/g	05/17/16 13:08	06/07/16 10:06	1
Uranium 235	0.0869	U	0.332	0.332		0.552	pCi/g	05/17/16 13:08	06/07/16 10:06	1
Americium 241	0.00937	U	0.0875	0.0875		0.117	pCi/g	05/17/16 13:08	06/07/16 10:06	1
Protactinium 234m	3.75	U	6.30	6.31		9.67	pCi/g	05/17/16 13:08	06/07/16 10:06	1
<i>Other Detected</i>			Count	Total						
<i>Radionuclides</i>			Uncert.	Uncert.						
Tl-208	0.373		0.0557	0.0678		0.0381	pCi/g	05/17/16 13:08	06/07/16 10:06	1

Client Sample ID: L12-07-14-P-R-S-00

Date Collected: 05/11/16 09:25

Date Received: 05/13/16 15:30

Lab Sample ID: 160-17387-10

Matrix: Solid

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

Analyte	Result	Qualifier	Count	Total	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	(2σ+/-)						
Actinium 228	1.13		0.130	0.174		0.0856	pCi/g	05/17/16 13:08	06/07/16 10:43	1
Bismuth 212	0.259	U	0.453	0.454		0.755	pCi/g	05/17/16 13:08	06/07/16 10:43	1
Bismuth 214	1.01		0.0883	0.137		0.0637	pCi/g	05/17/16 13:08	06/07/16 10:43	1
Lead 212	1.10		0.0692	0.158		0.0538	pCi/g	05/17/16 13:08	06/07/16 10:43	1
Lead 214	1.17		0.0871	0.150		0.0681	pCi/g	05/17/16 13:08	06/07/16 10:43	1
Potassium 40	18.3		1.07	2.16		0.276	pCi/g	05/17/16 13:08	06/07/16 10:43	1
Protactinium 231	-0.443	U	1.41	1.41		2.35	pCi/g	05/17/16 13:08	06/07/16 10:43	1
Radium 226	1.01		0.0883	0.137	1.00	0.0637	pCi/g	05/17/16 13:08	06/07/16 10:43	1
Thorium 232	1.13		0.130	0.174		0.0856	pCi/g	05/17/16 13:08	06/07/16 10:43	1
Thorium 234	0.819		0.326	0.337		0.816	pCi/g	05/17/16 13:08	06/07/16 10:43	1
Uranium 235	0.0855	U	0.0940	0.0944		0.512	pCi/g	05/17/16 13:08	06/07/16 10:43	1
Americium 241	0.0386	U	0.0888	0.0889		0.147	pCi/g	05/17/16 13:08	06/07/16 10:43	1
Protactinium 234m	3.59	U	4.33	4.34		6.99	pCi/g	05/17/16 13:08	06/07/16 10:43	1
<i>Other Detected</i>			Count	Total						
<i>Radionuclides</i>			Uncert.	Uncert.						
Tl-208	0.357		0.0451	0.0584		0.0320	pCi/g	05/17/16 13:08	06/07/16 10:43	1

TestAmerica St. Louis

Client Sample Results

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

TestAmerica Job ID: 160-17387-2

Client Sample ID: L12-07-16-P-S-S-00

Lab Sample ID: 160-17387-11

Matrix: Solid

Date Collected: 05/11/16 08:20

Date Received: 05/13/16 15:30

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

Analyte	Result	Qualifier	Count	Total	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	(2σ+/-)						
Actinium 228	0.985		0.110	0.149		0.101	pCi/g	05/17/16 13:08	06/07/16 10:43	1
Bismuth 212	1.10		0.386	0.403		0.346	pCi/g	05/17/16 13:08	06/07/16 10:43	1
Bismuth 214	0.841		0.0987	0.132		0.0717	pCi/g	05/17/16 13:08	06/07/16 10:43	1
Lead 212	0.885		0.0668	0.133		0.0591	pCi/g	05/17/16 13:08	06/07/16 10:43	1
Lead 214	1.00		0.0851	0.134		0.0721	pCi/g	05/17/16 13:08	06/07/16 10:43	1
Potassium 40	17.0		1.10	2.05		0.223	pCi/g	05/17/16 13:08	06/07/16 10:43	1
Protactinium 231	-0.135	U	1.11	1.11		1.87	pCi/g	05/17/16 13:08	06/07/16 10:43	1
Radium 226	0.841		0.0987	0.132	1.00	0.0717	pCi/g	05/17/16 13:08	06/07/16 10:43	1
Thorium 232	0.985		0.110	0.149		0.101	pCi/g	05/17/16 13:08	06/07/16 10:43	1
Thorium 234	1.50		0.491	0.516		0.745	pCi/g	05/17/16 13:08	06/07/16 10:43	1
Uranium 235	0.116	U	0.194	0.194		0.343	pCi/g	05/17/16 13:08	06/07/16 10:43	1
Americium 241	-0.0317	U	0.0778	0.0779		0.109	pCi/g	05/17/16 13:08	06/07/16 10:43	1
Protactinium 234m	3.30	U	4.33	4.35		7.28	pCi/g	05/17/16 13:08	06/07/16 10:43	1
<i>Other Detected</i>			Count	Total						
<i>Radionuclides</i>			Uncert.	Uncert.						
Th-208	0.297		0.0465	0.0558		0.0368	pCi/g	05/17/16 13:08	06/07/16 10:43	1

Client Sample ID: L12-07-16-P-S-Q-00

Lab Sample ID: 160-17387-12

Matrix: Solid

Date Collected: 05/11/16 08:20

Date Received: 05/13/16 15:30

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

Analyte	Result	Qualifier	Count	Total	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	(2σ+/-)						
Actinium 228	0.959		0.146	0.175		0.115	pCi/g	05/17/16 13:08	06/07/16 10:44	1
Bismuth 212	1.49		0.401	0.430		0.305	pCi/g	05/17/16 13:08	06/07/16 10:44	1
Bismuth 214	0.850		0.111	0.142		0.0762	pCi/g	05/17/16 13:08	06/07/16 10:44	1
Lead 212	0.908		0.0715	0.137		0.0607	pCi/g	05/17/16 13:08	06/07/16 10:44	1
Lead 214	0.955		0.0981	0.140		0.0718	pCi/g	05/17/16 13:08	06/07/16 10:44	1
Potassium 40	14.6		1.14	1.88		0.303	pCi/g	05/17/16 13:08	06/07/16 10:44	1
Protactinium 231	-0.426	U	1.40	1.40		2.33	pCi/g	05/17/16 13:08	06/07/16 10:44	1
Radium 226	0.850		0.111	0.142	1.00	0.0762	pCi/g	05/17/16 13:08	06/07/16 10:44	1
Thorium 232	0.959		0.146	0.175		0.115	pCi/g	05/17/16 13:08	06/07/16 10:44	1
Thorium 234	1.99		0.841	0.866		0.960	pCi/g	05/17/16 13:08	06/07/16 10:44	1
Uranium 235	0.268		0.127	0.130		0.185	pCi/g	05/17/16 13:08	06/07/16 10:44	1
Americium 241	-0.0435	U	0.101	0.101		0.168	pCi/g	05/17/16 13:08	06/07/16 10:44	1
Protactinium 234m	3.31	U	3.91	3.93		6.10	pCi/g	05/17/16 13:08	06/07/16 10:44	1
<i>Other Detected</i>			Count	Total						
<i>Radionuclides</i>			Uncert.	Uncert.						
Th-208	0.294		0.0493	0.0580		0.0335	pCi/g	05/17/16 13:08	06/07/16 10:44	1

TestAmerica St. Louis

Client Sample Results

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

TestAmerica Job ID: 160-17387-2

Client Sample ID: L12-07-17-P-R-S-00

Lab Sample ID: 160-17387-13

Matrix: Solid

Date Collected: 05/11/16 08:35

Date Received: 05/13/16 15:30

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

Analyte	Result	Qualifier	Count	Total	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	1.08		0.118	0.160		0.114	pCi/g	05/17/16 13:08	06/07/16 10:45	1
Bismuth 212	0.934		0.286	0.301		0.373	pCi/g	05/17/16 13:08	06/07/16 10:45	1
Bismuth 214	0.946		0.0807	0.126		0.0583	pCi/g	05/17/16 13:08	06/07/16 10:45	1
Lead 212	1.07		0.0643	0.153		0.0523	pCi/g	05/17/16 13:08	06/07/16 10:45	1
Lead 214	1.13		0.0904	0.149		0.0644	pCi/g	05/17/16 13:08	06/07/16 10:45	1
Potassium 40	19.9		1.04	2.26		0.301	pCi/g	05/17/16 13:08	06/07/16 10:45	1
Protactinium 231	-0.452	U	1.36	1.36		2.26	pCi/g	05/17/16 13:08	06/07/16 10:45	1
Radium 226	0.946		0.0807	0.126	1.00	0.0583	pCi/g	05/17/16 13:08	06/07/16 10:45	1
Thorium 232	1.08		0.118	0.160		0.114	pCi/g	05/17/16 13:08	06/07/16 10:45	1
Thorium 234	0.628	U	0.199	0.210		1.33	pCi/g	05/17/16 13:08	06/07/16 10:45	1
Uranium 235	0.0986	U	0.108	0.108		0.176	pCi/g	05/17/16 13:08	06/07/16 10:45	1
Americium 241	-0.0237	U	0.0673	0.0673		0.153	pCi/g	05/17/16 13:08	06/07/16 10:45	1
Protactinium 234m	1.16	U	1.70	1.70		8.54	pCi/g	05/17/16 13:08	06/07/16 10:45	1
<i>Other Detected</i>			Count	Total						
<i>Radionuclides</i>			Uncert.	Uncert.						
Pb-210	1.53		0.693	0.716		0.788	pCi/g	05/17/16 13:08	06/07/16 10:45	1
Tl-208	0.323		0.0425	0.0539		0.0339	pCi/g	05/17/16 13:08	06/07/16 10:45	1

Client Sample ID: L12-07-19-P-S-S-00

Lab Sample ID: 160-17387-14

Matrix: Solid

Date Collected: 05/10/16 15:40

Date Received: 05/13/16 15:30

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

Analyte	Result	Qualifier	Count	Total	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.984		0.129	0.163		0.119	pCi/g	05/17/16 13:08	06/07/16 10:47	1
Bismuth 212	1.05		0.438	0.451		0.464	pCi/g	05/17/16 13:08	06/07/16 10:47	1
Bismuth 214	0.952		0.114	0.151		0.0759	pCi/g	05/17/16 13:08	06/07/16 10:47	1
Lead 212	1.03		0.0755	0.153		0.0621	pCi/g	05/17/16 13:08	06/07/16 10:47	1
Lead 214	1.16		0.0928	0.152		0.0730	pCi/g	05/17/16 13:08	06/07/16 10:47	1
Potassium 40	16.6		1.24	2.11		0.368	pCi/g	05/17/16 13:08	06/07/16 10:47	1
Protactinium 231	0.000	U	0.509	0.509		2.58	pCi/g	05/17/16 13:08	06/07/16 10:47	1
Radium 226	0.952		0.114	0.151	1.00	0.0759	pCi/g	05/17/16 13:08	06/07/16 10:47	1
Thorium 232	0.984		0.129	0.163		0.119	pCi/g	05/17/16 13:08	06/07/16 10:47	1
Thorium 234	1.19		0.342	0.364		0.889	pCi/g	05/17/16 13:08	06/07/16 10:47	1
Uranium 235	0.318		0.127	0.131		0.191	pCi/g	05/17/16 13:08	06/07/16 10:47	1
Americium 241	-0.0145	U	0.0928	0.0928		0.124	pCi/g	05/17/16 13:08	06/07/16 10:47	1
Protactinium 234m	10.7		4.68	4.80		6.93	pCi/g	05/17/16 13:08	06/07/16 10:47	1
<i>Other Detected</i>			Count	Total						
<i>Radionuclides</i>			Uncert.	Uncert.						
Tl-208	0.334		0.0469	0.0583		0.0327	pCi/g	05/17/16 13:08	06/07/16 10:47	1

TestAmerica St. Louis

Client Sample Results

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

TestAmerica Job ID: 160-17387-2

Client Sample ID: L12-07-19-P-S-Q-00
Date Collected: 05/10/16 15:40
Date Received: 05/13/16 15:30

Lab Sample ID: 160-17387-15
Matrix: Solid

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

Analyte	Result	Qualifier	Count	Total	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	(2σ+/-)						
Actinium 228	0.971		0.105	0.145		0.0867	pCi/g	05/17/16 13:08	06/07/16 11:39	1
Bismuth 212	1.23		0.352	0.375		0.304	pCi/g	05/17/16 13:08	06/07/16 11:39	1
Bismuth 214	0.860		0.0815	0.121		0.0582	pCi/g	05/17/16 13:08	06/07/16 11:39	1
Lead 212	0.960		0.0648	0.140		0.0528	pCi/g	05/17/16 13:08	06/07/16 11:39	1
Lead 214	0.953		0.0896	0.134		0.0654	pCi/g	05/17/16 13:08	06/07/16 11:39	1
Potassium 40	15.8		1.00	1.90		0.347	pCi/g	05/17/16 13:08	06/07/16 11:39	1
Protactinium 231	-0.273	U	0.751	0.751		1.26	pCi/g	05/17/16 13:08	06/07/16 11:39	1
Radium 226	0.860		0.0815	0.121	1.00	0.0582	pCi/g	05/17/16 13:08	06/07/16 11:39	1
Thorium 232	0.971		0.105	0.145		0.0867	pCi/g	05/17/16 13:08	06/07/16 11:39	1
Thorium 234	1.60		0.513	0.540		0.780	pCi/g	05/17/16 13:08	06/07/16 11:39	1
Uranium 235	0.337		0.129	0.133		0.174	pCi/g	05/17/16 13:08	06/07/16 11:39	1
Americium 241	0.0332	U	0.0473	0.0474		0.0782	pCi/g	05/17/16 13:08	06/07/16 11:39	1
Protactinium 234m	0.249	U	0.438	0.439		8.83	pCi/g	05/17/16 13:08	06/07/16 11:39	1
<i>Other Detected</i>			Count	Total						
<i>Radionuclides</i>			Uncert.	Uncert.						
Tl-208	0.297		0.0403	0.0507		0.0297	pCi/g	05/17/16 13:08	06/07/16 11:39	1

Client Sample ID: L12-07-20-P-R-S-00

Date Collected: 05/10/16 15:50
Date Received: 05/13/16 15:30

Lab Sample ID: 160-17387-16
Matrix: Solid

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

Analyte	Result	Qualifier	Count	Total	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	(2σ+/-)						
Actinium 228	1.03		0.156	0.188		0.0947	pCi/g	05/17/16 13:08	06/07/16 11:40	1
Bismuth 212	1.47		0.410	0.438		0.369	pCi/g	05/17/16 13:08	06/07/16 11:40	1
Bismuth 214	1.02		0.112	0.155		0.0737	pCi/g	05/17/16 13:08	06/07/16 11:40	1
Lead 212	0.940		0.0711	0.141		0.0650	pCi/g	05/17/16 13:08	06/07/16 11:40	1
Lead 214	1.09		0.0877	0.143		0.0784	pCi/g	05/17/16 13:08	06/07/16 11:40	1
Potassium 40	17.4		1.16	2.12		0.329	pCi/g	05/17/16 13:08	06/07/16 11:40	1
Protactinium 231	0.251	U	0.717	0.718		1.94	pCi/g	05/17/16 13:08	06/07/16 11:40	1
Radium 226	1.02		0.112	0.155	1.00	0.0737	pCi/g	05/17/16 13:08	06/07/16 11:40	1
Thorium 232	1.03		0.156	0.188		0.0947	pCi/g	05/17/16 13:08	06/07/16 11:40	1
Thorium 234	0.868		0.276	0.290		0.773	pCi/g	05/17/16 13:08	06/07/16 11:40	1
Uranium 235	-0.00602	U	0.0818	0.0818		0.386	pCi/g	05/17/16 13:08	06/07/16 11:40	1
Americium 241	-0.0319	U	0.0778	0.0779		0.109	pCi/g	05/17/16 13:08	06/07/16 11:40	1
Protactinium 234m	1.92	U	3.02	3.03		8.41	pCi/g	05/17/16 13:08	06/07/16 11:40	1
<i>Other Detected</i>			Count	Total						
<i>Radionuclides</i>			Uncert.	Uncert.						
Tl-208	0.328		0.0490	0.0596		0.0354	pCi/g	05/17/16 13:08	06/07/16 11:40	1

TestAmerica St. Louis

Client Sample Results

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

TestAmerica Job ID: 160-17387-2

Client Sample ID: L12-07-22-P-S-S-00

Lab Sample ID: 160-17387-17

Matrix: Solid

Date Collected: 05/10/16 15:10
 Date Received: 05/13/16 15:30

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

Analyte	Result	Qualifier	Count	Total	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	(2σ+/-)						
Actinium 228	0.803		0.165	0.184		0.168	pCi/g	05/17/16 13:08	06/07/16 11:40	1
Bismuth 212	1.39		0.412	0.436		0.361	pCi/g	05/17/16 13:08	06/07/16 11:40	1
Bismuth 214	0.673		0.0977	0.120		0.0731	pCi/g	05/17/16 13:08	06/07/16 11:40	1
Lead 212	0.871		0.0724	0.134		0.0579	pCi/g	05/17/16 13:08	06/07/16 11:40	1
Lead 214	0.877		0.0845	0.124		0.0652	pCi/g	05/17/16 13:08	06/07/16 11:40	1
Potassium 40	15.9		1.22	2.03		0.171	pCi/g	05/17/16 13:08	06/07/16 11:40	1
Protactinium 231	-0.530	U	1.57	1.57		2.63	pCi/g	05/17/16 13:08	06/07/16 11:40	1
Radium 226	0.673		0.0977	0.120	1.00	0.0731	pCi/g	05/17/16 13:08	06/07/16 11:40	1
Thorium 232	0.803		0.165	0.184		0.168	pCi/g	05/17/16 13:08	06/07/16 11:40	1
Thorium 234	1.26		0.526	0.542		0.809	pCi/g	05/17/16 13:08	06/07/16 11:40	1
Uranium 235	-0.132	U	0.188	0.189		0.632	pCi/g	05/17/16 13:08	06/07/16 11:40	1
Americium 241	-0.0112	U	0.101	0.101		0.169	pCi/g	05/17/16 13:08	06/07/16 11:40	1
Protactinium 234m	1.97	U	2.83	2.84		9.69	pCi/g	05/17/16 13:08	06/07/16 11:40	1
<i>Other Detected</i>			Count	Total						
<i>Radionuclides</i>			Uncert.	Uncert.						
Tl-208	0.296		0.0493	0.0581		0.0339	pCi/g	05/17/16 13:08	06/07/16 11:40	1

Client Sample ID: L12-07-23-P-R-S-00

Lab Sample ID: 160-17387-18

Matrix: Solid

Date Collected: 05/10/16 15:30
 Date Received: 05/13/16 15:30

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

Analyte	Result	Qualifier	Count	Total	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	(2σ+/-)						
Actinium 228	1.16		0.114	0.163		0.0879	pCi/g	05/17/16 13:08	06/07/16 11:42	1
Bismuth 212	1.58		0.523	0.548		0.449	pCi/g	05/17/16 13:08	06/07/16 11:42	1
Bismuth 214	1.09		0.104	0.153		0.0702	pCi/g	05/17/16 13:08	06/07/16 11:42	1
Lead 212	1.17		0.0713	0.168		0.0621	pCi/g	05/17/16 13:08	06/07/16 11:42	1
Lead 214	1.18		0.0957	0.156		0.0745	pCi/g	05/17/16 13:08	06/07/16 11:42	1
Potassium 40	21.3		1.10	2.41		0.269	pCi/g	05/17/16 13:08	06/07/16 11:42	1
Protactinium 231	0.432	U	0.961	0.962		2.14	pCi/g	05/17/16 13:08	06/07/16 11:42	1
Radium 226	1.09		0.104	0.153	1.00	0.0702	pCi/g	05/17/16 13:08	06/07/16 11:42	1
Thorium 232	1.16		0.114	0.163		0.0879	pCi/g	05/17/16 13:08	06/07/16 11:42	1
Thorium 234	1.25		0.479	0.497		0.744	pCi/g	05/17/16 13:08	06/07/16 11:42	1
Uranium 235	0.107	U	0.121	0.121		0.187	pCi/g	05/17/16 13:08	06/07/16 11:42	1
Americium 241	0.0214	U	0.0857	0.0857		0.143	pCi/g	05/17/16 13:08	06/07/16 11:42	1
Protactinium 234m	1.09	U	1.54	1.55		8.90	pCi/g	05/17/16 13:08	06/07/16 11:42	1
<i>Other Detected</i>			Count	Total						
<i>Radionuclides</i>			Uncert.	Uncert.						
Tl-208	0.389		0.0516	0.0653		0.0369	pCi/g	05/17/16 13:08	06/07/16 11:42	1

TestAmerica St. Louis

QC Sample Results

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

TestAmerica Job ID: 160-17387-2

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

Lab Sample ID: MB 160-251623/1-A

Matrix: Solid

Analysis Batch: 255254

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 251623

Analyte	Result	MB	MB	Count		Total		RL	MDC	Unit	Prepared	Analyzed	Dil Fac
				Uncert.	(2σ+/-)	Uncert.	(2σ+/-)						
Actinium 228	0.01908	U		0.0283		0.0283			0.0421	pCi/g	05/17/16 13:08	06/07/16 08:43	1
Bismuth 212	0.06636	U		0.200		0.200			0.345	pCi/g	05/17/16 13:08	06/07/16 08:43	1
Bismuth 214	-0.005898	U		0.0104		0.0104			0.0888	pCi/g	05/17/16 13:08	06/07/16 08:43	1
Lead 212	-0.002459	U		0.0209		0.0209			0.0368	pCi/g	05/17/16 13:08	06/07/16 08:43	1
Lead 214	0.03451			0.0223		0.0226			0.0329	pCi/g	05/17/16 13:08	06/07/16 08:43	1
Potassium 40	-0.07733	U		0.174		0.174			0.281	pCi/g	05/17/16 13:08	06/07/16 08:43	1
Protactinium 231	0.09421	U		0.168		0.168			0.438	pCi/g	05/17/16 13:08	06/07/16 08:43	1
Radium 226	-0.005898	U		0.0104		0.0104	1.00		0.0888	pCi/g	05/17/16 13:08	06/07/16 08:43	1
Thorium 232	0.01908	U		0.0283		0.0283			0.0421	pCi/g	05/17/16 13:08	06/07/16 08:43	1
Thorium 234	-0.1307	U		0.247		0.247			0.406	pCi/g	05/17/16 13:08	06/07/16 08:43	1
Uranium 235	-0.003936	U		0.00816		0.00817			0.134	pCi/g	05/17/16 13:08	06/07/16 08:43	1
Americium 241	-0.003191	U		0.0239		0.0239			0.0411	pCi/g	05/17/16 13:08	06/07/16 08:43	1
Protactinium 234m	-0.5084	U		2.46		2.46			4.30	pCi/g	05/17/16 13:08	06/07/16 08:43	1
Other Detected		MB	MB	Count		Total							
Radionuclides	Result	MB	Qualifier	Uncert.		Uncert.		RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Other Detected	None			(2σ+/-)		(2σ+/-)				pCi/g	05/17/16 13:08	06/07/16 08:43	1
Radionuclide													

Lab Sample ID: LCS 160-251623/2-A

Matrix: Solid

Analysis Batch: 254991

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 251623

Analyte	Spike Added	LCS Result	LCS Qual	Total		RL	MDC	Unit	%Rec	Limits
				Uncert.	(2σ+/-)					
Americium 241	101	91.80		9.56			0.529	pCi/g	91	87 - 116
Cesium 137	33.9	30.37		3.19			0.195	pCi/g	90	87 - 120
Cobalt 60	31.0	27.76		2.81			0.141	pCi/g	90	87 - 115

Lab Sample ID: 160-17387-2 DU

Matrix: Solid

Analysis Batch: 255254

Client Sample ID: L12-07-02-P-R-S-00

Prep Type: Total/NA

Prep Batch: 251623

Analyte	Sample Result	Sample Qual	DU		Uncert. (2σ+/-)	RL	MDC	Unit	RER	Limit
			Result	Qual						
Actinium 228	1.03		1.169		0.186		0.0714	pCi/g	0.38	1
Bismuth 212	1.79		1.509		0.440		0.332	pCi/g	0.27	1
Bismuth 214	1.10		0.9062		0.134		0.0630	pCi/g	0.62	1
Lead 212	1.09		1.055		0.152		0.0535	pCi/g	0.11	1
Lead 214	1.20		1.076		0.137		0.0656	pCi/g	0.40	1
Potassium 40	19.2		18.06		2.14		0.390	pCi/g	0.26	1
Protactinium 231	0.000	U	0.2986	U	0.976		1.99	pCi/g	0.21	1
Radium 226	1.10		0.9062		0.134	1.00	0.0630	pCi/g	0.62	1
Thorium 232	1.03		1.169		0.186		0.0714	pCi/g	0.38	1
Thorium 234	0.984	U	0.8436		0.278		0.718	pCi/g	0.13	1
Uranium 235	0.318		-0.09123	U	0.295		0.490	pCi/g	0.84	1
Americium 241	0.0398	U	0.03718	U	0.0909		0.151	pCi/g	0.01	1

TestAmerica St. Louis

QC Sample Results

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

TestAmerica Job ID: 160-17387-2

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

Lab Sample ID: 160-17387-2 DU

Client Sample ID: L12-07-02-P-R-S-00

Matrix: Solid

Prep Type: Total/NA

Analysis Batch: 255254

Prep Batch: 251623

Analyte	Sample	Sample			Total		RL	MDC	Unit	RER	RER Limit
	Result	Qual	DU	DU	Uncert. (2σ+/-)						
Protactinium 234m	4.95	U	-0.2899	U	0.325			8.32	pCi/g	0.83	1
<i>Total</i>											
<i>Other Detected Radionuclides</i>	Sample	Sample	DU	DU	Uncert.						
<i>Tl-208</i>	Result	Qual	Result	Qual	(2σ+/-)		RL	MDC	Unit	RER	Limit
	0.362		0.3216		0.0508			0.0279	pCi/g	0.33	1

QC Association Summary

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

TestAmerica Job ID: 160-17387-2

Rad

Leach Batch: 251244

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-17387-1	L12-07-01-P-S-S-00	Total/NA	Solid	Dry and Grind	
160-17387-2	L12-07-02-P-R-S-00	Total/NA	Solid	Dry and Grind	
160-17387-2 DU	L12-07-02-P-R-S-00	Total/NA	Solid	Dry and Grind	
160-17387-3	L12-07-04-P-S-S-00	Total/NA	Solid	Dry and Grind	
160-17387-4	L12-07-05-P-R-S-00	Total/NA	Solid	Dry and Grind	
160-17387-5	L12-07-07-P-S-S-00	Total/NA	Solid	Dry and Grind	
160-17387-6	L12-07-08-P-R-S-00	Total/NA	Solid	Dry and Grind	
160-17387-7	L12-07-10-P-S-S-00	Total/NA	Solid	Dry and Grind	
160-17387-8	L12-07-11-P-R-S-00	Total/NA	Solid	Dry and Grind	
160-17387-9	L12-07-13-P-S-S-00	Total/NA	Solid	Dry and Grind	
160-17387-10	L12-07-14-P-R-S-00	Total/NA	Solid	Dry and Grind	
160-17387-11	L12-07-16-P-S-S-00	Total/NA	Solid	Dry and Grind	
160-17387-12	L12-07-16-P-S-Q-00	Total/NA	Solid	Dry and Grind	
160-17387-13	L12-07-17-P-R-S-00	Total/NA	Solid	Dry and Grind	
160-17387-14	L12-07-19-P-S-S-00	Total/NA	Solid	Dry and Grind	
160-17387-15	L12-07-19-P-S-Q-00	Total/NA	Solid	Dry and Grind	
160-17387-16	L12-07-20-P-R-S-00	Total/NA	Solid	Dry and Grind	
160-17387-17	L12-07-22-P-S-S-00	Total/NA	Solid	Dry and Grind	
160-17387-18	L12-07-23-P-R-S-00	Total/NA	Solid	Dry and Grind	

Prep Batch: 251623

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-17387-1	L12-07-01-P-S-S-00	Total/NA	Solid	Fill_Geo-21	251244
160-17387-2	L12-07-02-P-R-S-00	Total/NA	Solid	Fill_Geo-21	251244
160-17387-2 DU	L12-07-02-P-R-S-00	Total/NA	Solid	Fill_Geo-21	251244
160-17387-3	L12-07-04-P-S-S-00	Total/NA	Solid	Fill_Geo-21	251244
160-17387-4	L12-07-05-P-R-S-00	Total/NA	Solid	Fill_Geo-21	251244
160-17387-5	L12-07-07-P-S-S-00	Total/NA	Solid	Fill_Geo-21	251244
160-17387-6	L12-07-08-P-R-S-00	Total/NA	Solid	Fill_Geo-21	251244
160-17387-7	L12-07-10-P-S-S-00	Total/NA	Solid	Fill_Geo-21	251244
160-17387-8	L12-07-11-P-R-S-00	Total/NA	Solid	Fill_Geo-21	251244
160-17387-9	L12-07-13-P-S-S-00	Total/NA	Solid	Fill_Geo-21	251244
160-17387-10	L12-07-14-P-R-S-00	Total/NA	Solid	Fill_Geo-21	251244
160-17387-11	L12-07-16-P-S-S-00	Total/NA	Solid	Fill_Geo-21	251244
160-17387-12	L12-07-16-P-S-Q-00	Total/NA	Solid	Fill_Geo-21	251244
160-17387-13	L12-07-17-P-R-S-00	Total/NA	Solid	Fill_Geo-21	251244
160-17387-14	L12-07-19-P-S-S-00	Total/NA	Solid	Fill_Geo-21	251244
160-17387-15	L12-07-19-P-S-Q-00	Total/NA	Solid	Fill_Geo-21	251244
160-17387-16	L12-07-20-P-R-S-00	Total/NA	Solid	Fill_Geo-21	251244
160-17387-17	L12-07-22-P-S-S-00	Total/NA	Solid	Fill_Geo-21	251244
160-17387-18	L12-07-23-P-R-S-00	Total/NA	Solid	Fill_Geo-21	251244
LCS 160-251623/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	
MB 160-251623/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	