

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: 160-17639-1

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:
6/9/2016 5:56:45 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: 160-17639-1

Job ID: 160-17639-1

Laboratory: TestAmerica St. Louis

Narrative

CASE NARRATIVE

Client: Westinghouse Electric Company LLC

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

Report Number: 160-17639-1

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 6/3/2016 11:10 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 20.0° C.

TECHNETIUM-99 (ICPMS)

Samples L11-02-41-P-S-S-00 (160-17639-1), L11-02-42-P-R-S-00 (160-17639-2) and L11-02-42-P-R-Q-00 (160-17639-3) were analyzed for Technetium-99 (ICPMS) in accordance with EPA SW-846 Method 6020A. The samples were prepared on 06/06/2016 and analyzed on 06/08/2016.

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

PERCENT SOLIDS

Samples L11-02-41-P-S-S-00 (160-17639-1), L11-02-42-P-R-S-00 (160-17639-2) and L11-02-42-P-R-Q-00 (160-17639-3) were analyzed for percent solids in accordance with EPA Method 160.3 MOD. The samples were analyzed on 06/06/2016.

Case Narrative

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

TestAmerica Job ID: 160-17639-1

Job ID: 160-17639-1 (Continued)

Laboratory: TestAmerica St. Louis (Continued)

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

CESIUM-137 & OTHER GAMMA EMITTERS (GS)

Samples L11-02-41-P-S-S-00 (160-17639-1), L11-02-42-P-R-S-00 (160-17639-2) and L11-02-42-P-R-Q-00 (160-17639-3) were analyzed for Cesium-137 & Other Gamma Emitters (GS) in accordance with DOE GA-01-R. The samples were leached on 06/03/2016, and prepared and analyzed on 06/06/2016.

Preparation Batch 160-254923:

Radium-226 is reported in these samples at the client's request. Radium-226 is reported from the 609.31 keV line of bismuth-214. Because the samples have not had a 21-day ingrowth, the activity for radium-226 is an estimated value and may be biased low. This bias is caused by the disruption of secular equilibrium between radium-226 and bismuth-214 by the loss of radon-222 during sample preparation. L11-02-41-P-S-S-00 (160-17639-1), L11-02-42-P-R-S-00 (160-17639-2), L11-02-42-P-R-Q-00 (160-17639-3), (LCS 160-254923/2-A), (MB 160-254923/1-A) and (160-17639-A-1-D 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

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-060216-03 Page 1/1				Requested Analysis										Laboratory Name:			
Project Name: Westinghouse Electric Company				Comp (C) or Grab (G)	Gamma Spec	Isotopic Uranium	Tc-99	Gamma Spec (21 day ingrow for Ra-226)							Total Containers	TA-MO	
Contact Person: Clark Evers																Laboratory Address: 13715 Rider Trail North	
Phone Number: 314-810-3336																Phone No. 314-298-8566	
Sampler Name: John Michel																Laboratory Contact Person: Ivan Vania	
				Phone No. 708-870-8453													
				Turn Around Time													
				Rush (7 days)													
				Remarks													
Sample ID	Date	Time	Matrix	Comp (C) or Grab (G)	Gamma Spec	Isotopic Uranium	Tc-99	Gamma Spec (21 day ingrow for Ra-226)									
L11-02-41-P-S-S-00	6/1/2016	14:00	S	G	X		X	X						1	LSA 11-02		
L11-02-42-P-R-S-00	6/1/2016	14:05	S	C	X		X	X						1	LSA 11-02		
L11-02-42-P-R-Q-00	6/1/2016	14:05	S	C	X		X	X						1	LSA 11-02		



160-17639 Chain of Custody

Relinquished by: <i>S. Michel</i>	Date/Time <i>6/3/16</i>	Received by: <i>KL...</i>	Date/Time <i>6-3-16</i>	Total 3	Cooler Temperature: Ambient
Company Name: <i>WEC</i>	<i>0935</i>	Company Name: <i>Cross HATS</i>	<i>09:25</i>	Cooler ID:	Shipper and Number:
Received by:	Date/Time	Relinquished by:	Date/Time	Comments: N/A <i>0602-03/04 Thomas Y...</i>	
Company Name:		Company Name:		Verified By: <i>[Signature]</i> <i>6-3-16</i>	
Relinquished by: <i>LAB 3815</i>	Date/Time <i>6-3-16</i>	Received by: <i>[Signature]</i>	Date/Time <i>060316</i>		
Company Name: <i>CROSS HATS</i>	<i>11:10</i>	Company Name: <i>TH STL</i>			



Login Sample Receipt Checklist

Client: Westinghouse Electric Company LLC

Job Number: 160-17639-1

Login Number: 17639

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.	False	
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: 160-17639-1

Qualifiers

Metals

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

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.
α	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: 160-17639-1

Method	Method Description	Protocol	Laboratory
6020A	Metals (ICP/MS), Tc-99	SW846	TAL SL
Moisture	Percent Moisture	EPA	TAL SL
6020A	Metals (ICP/MS), Tc-99 in Activity	SW846	TAL SL
GA-01-R	Cesium-137 & Other Gamma Emitters (GS)	DOE	TAL SL

Protocol References:

DOE = U.S. Department of Energy

EPA = US Environmental Protection Agency

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

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: 160-17639-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
160-17639-1	L11-02-41-P-S-S-00	Solid	06/01/16 14:00	06/03/16 11:10
160-17639-2	L11-02-42-P-R-S-00	Solid	06/01/16 14:05	06/03/16 11:10
160-17639-3	L11-02-42-P-R-Q-00	Solid	06/01/16 14:05	06/03/16 11:10

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Client Sample Results

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

TestAmerica Job ID: 160-17639-1

Client Sample ID: L11-02-41-P-S-S-00

Lab Sample ID: 160-17639-1

Date Collected: 06/01/16 14:00

Matrix: Solid

Date Received: 06/03/16 11:10

Method: GA-01-R - Cesium-137 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	0.369		0.205	0.209		0.210	pCi/g	06/06/16 12:59	06/06/16 19:11	1
Americium 241	0.00662	U	0.0751	0.0751		0.101	pCi/g	06/06/16 12:59	06/06/16 19:11	1
Bismuth 212	0.337	U	0.580	0.581		0.971	pCi/g	06/06/16 12:59	06/06/16 19:11	1
Bismuth 214	0.721		0.100	0.125		0.0533	pCi/g	06/06/16 12:59	06/06/16 19:11	1
Lead 212	0.520		0.0598	0.0900		0.0493	pCi/g	06/06/16 12:59	06/06/16 19:11	1
Lead 214	0.708		0.0797	0.108		0.0658	pCi/g	06/06/16 12:59	06/06/16 19:11	1
Potassium 40	12.8		1.19	1.77		0.288	pCi/g	06/06/16 12:59	06/06/16 19:11	1
Protactinium 231	-0.483	U	1.53	1.53		2.56	pCi/g	06/06/16 12:59	06/06/16 19:11	1
Radium 226	0.721		0.100	0.125	1.00	0.0533	pCi/g	06/06/16 12:59	06/06/16 19:11	1
Thorium 234	1.07		0.319	0.338	1.00	0.782	pCi/g	06/06/16 12:59	06/06/16 19:11	1
Uranium 235	0.178	U	0.150	0.151		0.181	pCi/g	06/06/16 12:59	06/06/16 19:11	1
Protactinium 234m	2.60	U	3.84	3.85		10.2	pCi/g	06/06/16 12:59	06/06/16 19:11	1
Thorium 232	0.369		0.205	0.209		0.210	pCi/g	06/06/16 12:59	06/06/16 19:11	1
Other Detected Radionuclides			Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
<i>Tl-208</i>	<i>0.157</i>		<i>0.0375</i>	<i>0.0409</i>		<i>0.0289</i>	<i>pCi/g</i>	<i>06/06/16 12:59</i>	<i>06/06/16 19:11</i>	<i>1</i>

Client Sample ID: L11-02-41-P-S-S-00

Lab Sample ID: 160-17639-1

Date Collected: 06/01/16 14:00

Matrix: Solid

Date Received: 06/03/16 11:10

Percent Solids: 80.5

Method: 6020A - Metals (ICP/MS), Tc-99

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Technetium 99	0.000025	J	0.000070	0.000021	mg/Kg	☼	06/06/16 12:58	06/08/16 08:46	1

Method: 6020A - Metals (ICP/MS), Tc-99 in Activity

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Technetium 99	0.432		0.0598	0.0718	1.40	0.240	pCi/g	06/06/16 12:58	06/08/16 08:46	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
<i>Re</i>	<i>89</i>		<i>30 - 110</i>					<i>06/06/16 12:58</i>	<i>06/08/16 08:46</i>	<i>1</i>

Client Sample ID: L11-02-42-P-R-S-00

Lab Sample ID: 160-17639-2

Date Collected: 06/01/16 14:05

Matrix: Solid

Date Received: 06/03/16 11:10

Method: GA-01-R - Cesium-137 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	1.27		0.184	0.224		0.126	pCi/g	06/06/16 12:59	06/06/16 19:57	1
Americium 241	0.0598	U	0.0482	0.0486		0.0782	pCi/g	06/06/16 12:59	06/06/16 19:57	1
Bismuth 212	1.34		0.418	0.440		0.388	pCi/g	06/06/16 12:59	06/06/16 19:57	1
Bismuth 214	1.00		0.0977	0.142		0.0653	pCi/g	06/06/16 12:59	06/06/16 19:57	1
Lead 212	1.22		0.0720	0.174		0.0569	pCi/g	06/06/16 12:59	06/06/16 19:57	1

TestAmerica St. Louis

Client Sample Results

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

TestAmerica Job ID: 160-17639-1

Client Sample ID: L11-02-42-P-R-S-00

Lab Sample ID: 160-17639-2

Date Collected: 06/01/16 14:05

Matrix: Solid

Date Received: 06/03/16 11:10

Method: GA-01-R - Cesium-137 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Lead 214	1.11		0.0962	0.150		0.0800	pCi/g	06/06/16 12:59	06/06/16 19:57	1
Potassium 40	21.2		1.13	2.41		0.324	pCi/g	06/06/16 12:59	06/06/16 19:57	1
Protactinium 231	0.108	U	0.681	0.681		2.14	pCi/g	06/06/16 12:59	06/06/16 19:57	1
Radium 226	1.00		0.0977	0.142	1.00	0.0653	pCi/g	06/06/16 12:59	06/06/16 19:57	1
Thorium 234	1.35		0.509	0.529	1.00	0.790	pCi/g	06/06/16 12:59	06/06/16 19:57	1
Uranium 235	0.0868	U	0.194	0.194		0.497	pCi/g	06/06/16 12:59	06/06/16 19:57	1
Protactinium 234m	2.30	U	3.64	3.65		8.36	pCi/g	06/06/16 12:59	06/06/16 19:57	1
Thorium 232	1.27		0.184	0.224		0.126	pCi/g	06/06/16 12:59	06/06/16 19:57	1
Other Detected			Count	Total						
Radionuclides			Uncert.	Uncert.	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Tl-208	0.378		0.0421	0.0573		0.0298	pCi/g	06/06/16 12:59	06/06/16 19:57	1

Client Sample ID: L11-02-42-P-R-S-00

Lab Sample ID: 160-17639-2

Date Collected: 06/01/16 14:05

Matrix: Solid

Date Received: 06/03/16 11:10

Percent Solids: 78.7

Method: 6020A - Metals (ICP/MS), Tc-99

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Technetium 99	ND		0.000072	0.000022	mg/Kg	☼	06/06/16 12:58	06/08/16 08:51	1

Method: 6020A - Metals (ICP/MS), Tc-99 in Activity

Analyte	Result	Qualifier	Count	Total	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Technetium 99	-0.0147	U	0.00946	0.00955	1.43	0.246	pCi/g	06/06/16 12:58	06/08/16 08:51	1
Carrier			Limits					Prepared	Analyzed	Dil Fac
Re	88		30 - 110					06/06/16 12:58	06/08/16 08:51	1

Client Sample ID: L11-02-42-P-R-Q-00

Lab Sample ID: 160-17639-3

Date Collected: 06/01/16 14:05

Matrix: Solid

Date Received: 06/03/16 11:10

Method: GA-01-R - Cesium-137 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	1.05		0.160	0.192		0.124	pCi/g	06/06/16 12:59	06/06/16 19:26	1
Americium 241	0.0444	U	0.103	0.103		0.171	pCi/g	06/06/16 12:59	06/06/16 19:26	1
Bismuth 212	0.300	U	0.574	0.575		0.962	pCi/g	06/06/16 12:59	06/06/16 19:26	1
Bismuth 214	0.917		0.130	0.161		0.0918	pCi/g	06/06/16 12:59	06/06/16 19:26	1
Lead 212	1.09		0.0804	0.162		0.0634	pCi/g	06/06/16 12:59	06/06/16 19:26	1
Lead 214	1.01		0.0993	0.144		0.0779	pCi/g	06/06/16 12:59	06/06/16 19:26	1
Potassium 40	17.0		1.29	2.17		0.346	pCi/g	06/06/16 12:59	06/06/16 19:26	1
Protactinium 231	0.000	U	0.404	0.404		2.71	pCi/g	06/06/16 12:59	06/06/16 19:26	1
Radium 226	0.917		0.130	0.161	1.00	0.0918	pCi/g	06/06/16 12:59	06/06/16 19:26	1
Thorium 234	0.809	U	0.562	0.568	1.00	0.902	pCi/g	06/06/16 12:59	06/06/16 19:26	1

TestAmerica St. Louis

Client Sample Results

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

TestAmerica Job ID: 160-17639-1

Client Sample ID: L11-02-42-P-R-Q-00

Lab Sample ID: 160-17639-3

Date Collected: 06/01/16 14:05

Matrix: Solid

Date Received: 06/03/16 11:10

Method: GA-01-R - Cesium-137 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Uranium 235	-0.140	U	0.195	0.195		0.643	pCi/g	06/06/16 12:59	06/06/16 19:26	1
Protactinium 234m	3.81	U	6.17	6.19		9.66	pCi/g	06/06/16 12:59	06/06/16 19:26	1
Thorium 232	1.05		0.160	0.192		0.124	pCi/g	06/06/16 12:59	06/06/16 19:26	1
Other Detected Radionuclides			Count	Total						
			Uncert.	Uncert.						
	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Tl-208	0.350		0.0524	0.0638		0.0364	pCi/g	06/06/16 12:59	06/06/16 19:26	1

Client Sample ID: L11-02-42-P-R-Q-00

Lab Sample ID: 160-17639-3

Date Collected: 06/01/16 14:05

Matrix: Solid

Date Received: 06/03/16 11:10

Percent Solids: 78.9

Method: 6020A - Metals (ICP/MS), Tc-99

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Technetium 99	ND		0.000072	0.000021	mg/Kg	☼	06/06/16 12:58	06/08/16 08:55	1

Method: 6020A - Metals (ICP/MS), Tc-99 in Activity

Analyte	Result	Qualifier	Count	Total	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Technetium 99	0.0343	U	0.0200	0.0203	1.43	0.245	pCi/g	06/06/16 12:58	06/08/16 08:55	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Re	89		30 - 110					06/06/16 12:58	06/08/16 08:55	1

QC Sample Results

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

TestAmerica Job ID: 160-17639-1

Method: 6020A - Metals (ICP/MS), Tc-99

Lab Sample ID: MB 160-254919/1-A
Matrix: Solid
Analysis Batch: 255473

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 254919

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Technetium 99	ND		0.000053	0.000016	mg/Kg		06/06/16 12:58	06/08/16 08:25	1

Lab Sample ID: LCS 160-254919/2-A
Matrix: Solid
Analysis Batch: 255473

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 254919

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Technetium 99	0.00119	0.00124		mg/Kg		104	80 - 120

Lab Sample ID: 160-17619-A-1-H MS
Matrix: Solid
Analysis Batch: 255473

Client Sample ID: Matrix Spike
Prep Type: Total/NA
Prep Batch: 254919

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Technetium 99	ND		0.00145	0.00147		mg/Kg	☼	102	75 - 125

Lab Sample ID: 160-17619-A-1-I MSD
Matrix: Solid
Analysis Batch: 255473

Client Sample ID: Matrix Spike Duplicate
Prep Type: Total/NA
Prep Batch: 254919

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Technetium 99	ND		0.00145	0.00148		mg/Kg	☼	102	75 - 125	0	30

Method: 6020A - Metals (ICP/MS), Tc-99 in Activity

Lab Sample ID: MB 160-254919/1-A
Matrix: Solid
Analysis Batch: 255474

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 254919

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Technetium 99	0.05985	U	0.0595	0.0597	1.06	0.181	pCi/g	06/06/16 12:58	06/08/16 08:25	1
Carrier	MB %Yield	MB Qualifier	Limits							
Re	95		30 - 110	Prepared	Analyzed	Dil Fac				
				06/06/16 12:58	06/08/16 08:25	1				

Lab Sample ID: LCS 160-254919/2-A
Matrix: Solid
Analysis Batch: 255474

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 254919

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	Limits
Technetium 99	20.4	21.15		1.96	1.07	0.184	pCi/g	104	80 - 120
Carrier	LCS %Yield	LCS Qualifier	Limits						
Re	93		30 - 110						

TestAmerica St. Louis

QC Sample Results

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

TestAmerica Job ID: 160-17639-1

Method: 6020A - Metals (ICP/MS), Tc-99 in Activity (Continued)

Lab Sample ID: 160-17619-A-1-H MS
Matrix: Solid
Analysis Batch: 255474

Client Sample ID: Matrix Spike
Prep Type: Total/NA
Prep Batch: 254919

Analyte	Sample Result	Sample Qual	Spike Added	MS Result	MS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits
Technetium 99	-0.0141	U	24.8	25.20		3.05	1.40	0.240	pCi/g	102	75 - 125
Carrier	%Yield	MS Qualifier	Limits								
Re	87		30 - 110								

Lab Sample ID: 160-17619-A-1-I MSD
Matrix: Solid
Analysis Batch: 255474

Client Sample ID: Matrix Spike Duplicate
Prep Type: Total/NA
Prep Batch: 254919

Analyte	Sample Result	Sample Qual	Spike Added	MSD Result	MSD Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits	RER	RER Limit
Technetium 99	-0.0141	U	24.8	25.30		2.47	1.39	0.238	pCi/g	102	75 - 125	0.02	1
Carrier	%Yield	MSD Qualifier	Limits										
Re	88		30 - 110										

Method: GA-01-R - Cesium-137 & Other Gamma Emitters (GS)

Lab Sample ID: MB 160-254923/1-A
Matrix: Solid
Analysis Batch: 254911

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 254923

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	0.009084	U	0.0230	0.0230		0.0786	pCi/g	06/06/16 12:59	06/06/16 17:57	1
Americium 241	0.006842	U	0.0166	0.0166		0.0235	pCi/g	06/06/16 12:59	06/06/16 17:57	1
Bismuth 212	-0.1604	U	0.270	0.271		0.457	pCi/g	06/06/16 12:59	06/06/16 17:57	1
Bismuth 214	0.01203	U	0.0417	0.0417		0.0729	pCi/g	06/06/16 12:59	06/06/16 17:57	1
Lead 212	-0.004176	U	0.0248	0.0248		0.0444	pCi/g	06/06/16 12:59	06/06/16 17:57	1
Lead 214	-0.01368	U	0.0294	0.0294		0.0505	pCi/g	06/06/16 12:59	06/06/16 17:57	1
Potassium 40	-0.06798	U	0.186	0.186		0.251	pCi/g	06/06/16 12:59	06/06/16 17:57	1
Protactinium 231	0.0000	U	0.148	0.148		0.831	pCi/g	06/06/16 12:59	06/06/16 17:57	1
Radium 226	0.01203	U	0.0417	0.0417	1.00	0.0729	pCi/g	06/06/16 12:59	06/06/16 17:57	1
Thorium 234	-0.1101	U	0.187	0.188	1.00	0.350	pCi/g	06/06/16 12:59	06/06/16 17:57	1
Uranium 235	-0.03924	U	0.0276	0.0279		0.186	pCi/g	06/06/16 12:59	06/06/16 17:57	1
Protactinium 234m	0.1866	U	0.308	0.308		5.92	pCi/g	06/06/16 12:59	06/06/16 17:57	1
Thorium 232	0.009084	U	0.0230	0.0230		0.0786	pCi/g	06/06/16 12:59	06/06/16 17:57	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	06/06/16 12:59	06/06/16 17:57	1

TestAmerica St. Louis

QC Sample Results

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

TestAmerica Job ID: 160-17639-1

Method: GA-01-R - Cesium-137 & Other Gamma Emitters (GS) (Continued)

Lab Sample ID: LCS 160-254923/2-A
Matrix: Solid
Analysis Batch: 254911

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 254923

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec Limits
Americium 241	101	103.0		10.7		0.613	pCi/g	102	87 - 116
Cesium 137	33.9	34.01		3.57	0.200	0.210	pCi/g	100	87 - 120
Cobalt 60	31.0	31.02		3.14		0.128	pCi/g	100	87 - 115

Lab Sample ID: 160-17639-1 DU
Matrix: Solid
Analysis Batch: 254918

Client Sample ID: L11-02-41-P-S-S-00
Prep Type: Total/NA
Prep Batch: 254923

Analyte	Sample Result	Sample Qual	DU Result	DU Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	RER	RER Limit
Actinium 228	0.369		0.6045		0.111		0.0854	pCi/g	0.74	1
Americium 241	0.00662	U	0.03305	U	0.0824		0.137	pCi/g	0.17	1
Bismuth 212	0.337	U	1.062		0.342		0.220	pCi/g	0.79	1
Bismuth 214	0.721		0.5576		0.122		0.0801	pCi/g	0.66	1
Lead 212	0.520		0.4950		0.0877		0.0572	pCi/g	0.14	1
Lead 214	0.708		0.6096		0.105		0.0656	pCi/g	0.46	1
Potassium 40	12.8		12.85		1.73		0.182	pCi/g	0.02	1
Protactinium 231	-0.483	U	-0.5419	U	1.63		2.72	pCi/g	0.02	1
Radium 226	0.721		0.5576		0.122	1.00	0.0801	pCi/g	0.66	1
Thorium 234	1.07		0.9384		0.478	1.00	0.722	pCi/g	0.16	1
Uranium 235	0.178	U	0.2775		0.150		0.164	pCi/g	0.33	1
Protactinium 234m	2.60	U	2.122	U	3.61		9.70	pCi/g	0.06	1
Thorium 232	0.369		0.6045		0.111		0.0854	pCi/g	0.74	1
Other Detected Radionuclides	Sample Result	Sample Qual	DU Result	DU Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	RER	RER Limit
Tl-208	0.157		0.1783		0.0428		0.0281	pCi/g	0.25	1

QC Association Summary

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

TestAmerica Job ID: 160-17639-1

Metals

Prep Batch: 254919

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-17619-A-1-H MS	Matrix Spike	Total/NA	Solid	None	
160-17619-A-1-I MSD	Matrix Spike Duplicate	Total/NA	Solid	None	
160-17639-1	L11-02-41-P-S-S-00	Total/NA	Solid	None	
160-17639-2	L11-02-42-P-R-S-00	Total/NA	Solid	None	
160-17639-3	L11-02-42-P-R-Q-00	Total/NA	Solid	None	
LCS 160-254919/2-A	Lab Control Sample	Total/NA	Solid	None	
MB 160-254919/1-A	Method Blank	Total/NA	Solid	None	

Analysis Batch: 255473

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-17619-A-1-H MS	Matrix Spike	Total/NA	Solid	6020A	254919
160-17619-A-1-I MSD	Matrix Spike Duplicate	Total/NA	Solid	6020A	254919
160-17639-1	L11-02-41-P-S-S-00	Total/NA	Solid	6020A	254919
160-17639-2	L11-02-42-P-R-S-00	Total/NA	Solid	6020A	254919
160-17639-3	L11-02-42-P-R-Q-00	Total/NA	Solid	6020A	254919
LCS 160-254919/2-A	Lab Control Sample	Total/NA	Solid	6020A	254919
MB 160-254919/1-A	Method Blank	Total/NA	Solid	6020A	254919

General Chemistry

Analysis Batch: 254896

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-17634-A-56 DU	Duplicate	Total/NA	Solid	Moisture	
160-17639-1	L11-02-41-P-S-S-00	Total/NA	Solid	Moisture	
160-17639-2	L11-02-42-P-R-S-00	Total/NA	Solid	Moisture	
160-17639-3	L11-02-42-P-R-Q-00	Total/NA	Solid	Moisture	

Rad

Leach Batch: 254761

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-17639-1	L11-02-41-P-S-S-00	Total/NA	Solid	Dry and Grind	
160-17639-1 DU	L11-02-41-P-S-S-00	Total/NA	Solid	Dry and Grind	
160-17639-2	L11-02-42-P-R-S-00	Total/NA	Solid	Dry and Grind	
160-17639-3	L11-02-42-P-R-Q-00	Total/NA	Solid	Dry and Grind	

Prep Batch: 254919

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-17619-A-1-H MS	Matrix Spike	Total/NA	Solid	None	
160-17619-A-1-I MSD	Matrix Spike Duplicate	Total/NA	Solid	None	
160-17639-1	L11-02-41-P-S-S-00	Total/NA	Solid	None	
160-17639-2	L11-02-42-P-R-S-00	Total/NA	Solid	None	
160-17639-3	L11-02-42-P-R-Q-00	Total/NA	Solid	None	
LCS 160-254919/2-A	Lab Control Sample	Total/NA	Solid	None	
MB 160-254919/1-A	Method Blank	Total/NA	Solid	None	

Prep Batch: 254923

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-17639-1	L11-02-41-P-S-S-00	Total/NA	Solid	Fill_Geo-0	254761
160-17639-1 DU	L11-02-41-P-S-S-00	Total/NA	Solid	Fill_Geo-0	254761

TestAmerica St. Louis

QC Association Summary

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

TestAmerica Job ID: 160-17639-1

Rad (Continued)

Prep Batch: 254923 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-17639-2	L11-02-42-P-R-S-00	Total/NA	Solid	Fill_Geo-0	254761
160-17639-3	L11-02-42-P-R-Q-00	Total/NA	Solid	Fill_Geo-0	254761
LCS 160-254923/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-0	
MB 160-254923/1-A	Method Blank	Total/NA	Solid	Fill_Geo-0	

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12

Tracer/Carrier Summary

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

TestAmerica Job ID: 160-17639-1

Method: 6020A - Metals (ICP/MS), Tc-99 in Activity

Matrix: Solid

Prep Type: Total/NA

Percent Yield (Acceptance Limits)

Lab Sample ID	Client Sample ID	Re (30-110)
160-17619-A-1-H MS	Matrix Spike	87
160-17619-A-1-I MSD	Matrix Spike Duplicate	88
160-17639-1	L11-02-41-P-S-S-00	89
160-17639-2	L11-02-42-P-R-S-00	88
160-17639-3	L11-02-42-P-R-Q-00	89
LCS 160-254919/2-A	Lab Control Sample	93
MB 160-254919/1-A	Method Blank	95

Tracer/Carrier Legend

Re = Re