

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: 160-16810-1

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:
4/12/2016 4:08:21 PM

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

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

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Case Narrative

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

TestAmerica Job ID: 160-16810-1

Job ID: 160-16810-1

Laboratory: TestAmerica St. Louis

Narrative

CASE NARRATIVE

Client: Westinghouse Electric Company LLC

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

Report Number: 160-16810-1

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 4/7/2016 11:26 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 L07-01-27-P-S-B-00 (160-16810-1), L07-01-28-P-S-B-00 (160-16810-2) and L07-01-29-P-S-B-00 (160-16810-3) were analyzed for Technetium-99 (ICPMS) in accordance with EPA SW-846 Method 6020A. The samples were prepared on 04/08/2016 and analyzed on 04/11/2016.

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

PERCENT SOLIDS

Samples L07-01-27-P-S-B-00 (160-16810-1), L07-01-28-P-S-B-00 (160-16810-2) and L07-01-29-P-S-B-00 (160-16810-3) were analyzed for percent solids in accordance with EPA Method 160.3 MOD. The samples were analyzed on 04/08/2016.

Case Narrative

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

TestAmerica Job ID: 160-16810-1

Job ID: 160-16810-1 (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 L07-01-27-P-S-B-00 (160-16810-1), L07-01-28-P-S-B-00 (160-16810-2) and L07-01-29-P-S-B-00 (160-16810-3) were analyzed for Cesium-137 & Other Gamma Emitters (GS) in accordance with DOE GA-01-R. The samples were leached on 04/07/2016, and prepared and analyzed on 04/08/2016.

Preparation Batch 160-244963:

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 21-days of 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. The samples are reported with the MDC achieved. L07-01-27-P-S-B-00 (160-16810-1), L07-01-28-P-S-B-00 (160-16810-2), L07-01-29-P-S-B-00 (160-16810-3), (LCS 160-244963/2-A), (MB 160-244963/1-A) and (160-16810-A-1-G DU)

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

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-040716-01		Page	1/1						
Project Name: Westinghouse Electric Company											
Contact Person: Clark Evers											
Phone Number: 314-810-3336											
Sampler Name D. Love											
Laboratory Name: TA-MO											
Laboratory Address: 13715 Rider Trail North											
Phone No. 314-298-8566											
Laboratory Contact Person: Ivan Vania											
Phone No. 708-870-8453											
Turn Around Time Rush (7 days)											
Remarks											
Sample ID	Date	Time	Matrix	Comp (C) or Grab (G)	Gamma Spec	Isotopic Uranium	Gamma Spec (21 day ingrow for Ra-226)	Requested Analysis	Total Containers		
L07-01-27-P-S-B-00	4/6/2016	8:10	S	G	X	X	X		1	LSA-07-01 Bias	
L07-01-28-P-S-B-00	4/6/2016	8:00	S	G	X	X	X		1	LSA-07-01 Bias	
L07-01-29-P-S-B-00	4/6/2016	8:05	S	G	X	X	X		1	LSA-07-01 Bias	
											
160-16810 Chain of Custody											
Relinquished by: Thomas York		Date/Time 4-7-16 09:00		Received by: 156416 3815		Date/Time 4-7-16 09:00		Total 3		Cooler Temperature: Ambient	
Company Name: WEC				Company Name: CROSS ROADS				Cooler ID: 0406-01		Shipper and Number:	
Received by:		Date/Time		Relinquished by:		Date/Time		Comments: N/A			
Company Name:				Company Name:							
Relinquished by: 156416 3815		Date/Time 4-7-16 11:26		Received by: 156416 3815		Date/Time 4-7-16 11:26		Verified By: Thomas York			
Company Name: CROSS ROADS				Company Name: CROSS ROADS							

Login Sample Receipt Checklist

Client: Westinghouse Electric Company LLC

Job Number: 160-16810-1

Login Number: 16810

List Source: TestAmerica St. Louis

List Number: 1

Creator: Dedner, Connie L

Question	Answer	Comment
Radioactivity wasn't checked or is $\leq$ background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is $<6\text{mm}$ (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Definitions/Glossary

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

TestAmerica Job ID: 160-16810-1

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: 160-16810-1

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: 160-16810-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
160-16810-1	L07-01-27-P-S-B-00	Solid	04/06/16 08:10	04/07/16 11:26
160-16810-2	L07-01-28-P-S-B-00	Solid	04/06/16 08:00	04/07/16 11:26
160-16810-3	L07-01-29-P-S-B-00	Solid	04/06/16 08:05	04/07/16 11:26

Client Sample Results

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

TestAmerica Job ID: 160-16810-1

Client Sample ID: L07-01-27-P-S-B-00

Date Collected: 04/06/16 08:10

Date Received: 04/07/16 11:26

Lab Sample ID: 160-16810-1

Matrix: Solid

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	0.805		0.109	0.137		0.0773	pCi/g	04/08/16 09:25	04/08/16 17:16	1
Americium 241	-0.000182	U	0.0559	0.0559		0.0945	pCi/g	04/08/16 09:25	04/08/16 17:16	1
Bismuth 212	1.10		0.373	0.391		0.334	pCi/g	04/08/16 09:25	04/08/16 17:16	1
Bismuth 214	0.606		0.0783	0.100		0.0557	pCi/g	04/08/16 09:25	04/08/16 17:16	1
Lead 212	0.754		0.0665	0.118		0.0574	pCi/g	04/08/16 09:25	04/08/16 17:16	1
Lead 214	0.659		0.0746	0.101		0.0592	pCi/g	04/08/16 09:25	04/08/16 17:16	1
Potassium 40	15.5		1.01	1.88		0.370	pCi/g	04/08/16 09:25	04/08/16 17:16	1
Protactinium 231	0.414	U	0.392	0.395		0.633	pCi/g	04/08/16 09:25	04/08/16 17:16	1
Radium 226	0.606		0.0783	0.100	1.00	0.0557	pCi/g	04/08/16 09:25	04/08/16 17:16	1
Thorium 234	1.32		0.461	0.481	1.00	0.712	pCi/g	04/08/16 09:25	04/08/16 17:16	1
Uranium 235	0.157	U	0.134	0.135		0.216	pCi/g	04/08/16 09:25	04/08/16 17:16	1
Protactinium 234m	0.456	U	2.45	2.45		4.38	pCi/g	04/08/16 09:25	04/08/16 17:16	1
Thorium 232	0.805		0.109	0.137		0.0773	pCi/g	04/08/16 09:25	04/08/16 17:16	1
Other Detected										
Radionuclides	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Tl-208	0.230		0.0328	0.0405		0.0230	pCi/g	04/08/16 09:25	04/08/16 17:16	1

Client Sample ID: L07-01-27-P-S-B-00

Date Collected: 04/06/16 08:10

Date Received: 04/07/16 11:26

Lab Sample ID: 160-16810-1

Matrix: Solid

Percent Solids: 84.5

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Technetium 99	0.000036	J	0.000064	0.000019	mg/Kg	☼	04/08/16 01:57	04/11/16 18:24	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	0.614		0.102	0.116	1.28	0.219	pCi/g	04/08/16 01:57	04/11/16 18:24	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Re	93		30 - 110					04/08/16 01:57	04/11/16 18:24	1

Client Sample ID: L07-01-28-P-S-B-00

Date Collected: 04/06/16 08:00

Date Received: 04/07/16 11:26

Lab Sample ID: 160-16810-2

Matrix: Solid

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	1.11		0.137	0.177		0.120	pCi/g	04/08/16 09:25	04/08/16 17:17	1
Americium 241	-0.000971	U	0.0584	0.0584		0.0987	pCi/g	04/08/16 09:25	04/08/16 17:17	1
Bismuth 212	1.18		0.423	0.441		0.410	pCi/g	04/08/16 09:25	04/08/16 17:17	1
Bismuth 214	0.744		0.0890	0.118		0.0572	pCi/g	04/08/16 09:25	04/08/16 17:17	1
Lead 212	1.02		0.0787	0.154		0.0667	pCi/g	04/08/16 09:25	04/08/16 17:17	1

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Client Sample Results

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

TestAmerica Job ID: 160-16810-1

Client Sample ID: L07-01-28-P-S-B-00

Lab Sample ID: 160-16810-2

Date Collected: 04/06/16 08:00

Matrix: Solid

Date Received: 04/07/16 11:26

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

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Lead 214	0.801		0.0778	0.114		0.0569	pCi/g	04/08/16 09:25	04/08/16 17:17	1
Potassium 40	15.9		1.09	1.96		0.312	pCi/g	04/08/16 09:25	04/08/16 17:17	1
Protactinium 231	0.718		0.383	0.391		0.555	pCi/g	04/08/16 09:25	04/08/16 17:17	1
Radium 226	0.744		0.0890	0.118	1.00	0.0572	pCi/g	04/08/16 09:25	04/08/16 17:17	1
Thorium 234	1.03		0.461	0.473	1.00	0.729	pCi/g	04/08/16 09:25	04/08/16 17:17	1
Uranium 235	0.119	U	0.123	0.123		0.205	pCi/g	04/08/16 09:25	04/08/16 17:17	1
Protactinium 234m	2.02	U	2.63	2.64		4.33	pCi/g	04/08/16 09:25	04/08/16 17:17	1
Thorium 232	1.11		0.137	0.177		0.120	pCi/g	04/08/16 09:25	04/08/16 17:17	1
Other Detected										
Radionuclides	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Pb-210	1.47		0.584	0.609		0.728	pCi/g	04/08/16 09:25	04/08/16 17:17	1
Tl-208	0.379		0.0458	0.0603		0.0274	pCi/g	04/08/16 09:25	04/08/16 17:17	1

Client Sample ID: L07-01-28-P-S-B-00

Lab Sample ID: 160-16810-2

Date Collected: 04/06/16 08:00

Matrix: Solid

Date Received: 04/07/16 11:26

Percent Solids: 77.9

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Technetium 99	ND		0.000070	0.000021	mg/Kg	☼	04/08/16 01:57	04/11/16 18:37	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	0.0837	U	0.0501	0.0507	1.40	0.239	pCi/g	04/08/16 01:57	04/11/16 18:37	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Re	92		30 - 110					04/08/16 01:57	04/11/16 18:37	1

Client Sample ID: L07-01-29-P-S-B-00

Lab Sample ID: 160-16810-3

Date Collected: 04/06/16 08:05

Matrix: Solid

Date Received: 04/07/16 11:26

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	1.07		0.107	0.153		0.0914	pCi/g	04/08/16 09:25	04/08/16 17:18	1
Americium 241	-0.00257	U	0.0458	0.0458		0.0776	pCi/g	04/08/16 09:25	04/08/16 17:18	1
Bismuth 212	0.841		0.310	0.322		0.429	pCi/g	04/08/16 09:25	04/08/16 17:18	1
Bismuth 214	0.740		0.0814	0.112		0.0529	pCi/g	04/08/16 09:25	04/08/16 17:18	1
Lead 212	0.985		0.0750	0.148		0.0609	pCi/g	04/08/16 09:25	04/08/16 17:18	1
Lead 214	0.835		0.0754	0.115		0.0468	pCi/g	04/08/16 09:25	04/08/16 17:18	1
Potassium 40	15.5		0.951	1.85		0.201	pCi/g	04/08/16 09:25	04/08/16 17:18	1
Protactinium 231	0.631	U	0.337	0.344		0.806	pCi/g	04/08/16 09:25	04/08/16 17:18	1
Radium 226	0.740		0.0814	0.112	1.00	0.0529	pCi/g	04/08/16 09:25	04/08/16 17:18	1

TestAmerica St. Louis

Client Sample Results

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

TestAmerica Job ID: 160-16810-1

Client Sample ID: L07-01-29-P-S-B-00

Lab Sample ID: 160-16810-3

Date Collected: 04/06/16 08:05

Matrix: Solid

Date Received: 04/07/16 11:26

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

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium 234	0.696	U	0.255	0.265	1.00	0.750	pCi/g	04/08/16 09:25	04/08/16 17:18	1
Uranium 235	0.118	U	0.122	0.123		0.194	pCi/g	04/08/16 09:25	04/08/16 17:18	1
Protactinium 234m	4.62		2.67	2.71		3.73	pCi/g	04/08/16 09:25	04/08/16 17:18	1
Thorium 232	1.07		0.107	0.153		0.0914	pCi/g	04/08/16 09:25	04/08/16 17:18	1
Other Detected Radionuclides										
Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Tl-208	0.328		0.0392	0.0519		0.0265	pCi/g	04/08/16 09:25	04/08/16 17:18	1

Client Sample ID: L07-01-29-P-S-B-00

Lab Sample ID: 160-16810-3

Date Collected: 04/06/16 08:05

Matrix: Solid

Date Received: 04/07/16 11:26

Percent Solids: 81.4

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Technetium 99	ND		0.000068	0.000020	mg/Kg	☼	04/08/16 01:57	04/11/16 18:54	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	0.102	U	0.0983	0.0987	1.35	0.232	pCi/g	04/08/16 01:57	04/11/16 18:54	1
Carrier	%Yield	Qualifier	Limits							
Re	90		30 - 110							
								Prepared	Analyzed	Dil Fac
								04/08/16 01:57	04/11/16 18:54	1

QC Sample Results

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

TestAmerica Job ID: 160-16810-1

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

Lab Sample ID: MB 160-244934/1-A

Matrix: Solid

Analysis Batch: 245326

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 244934

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Technetium 99	ND		0.000052	0.000015	mg/Kg		04/08/16 01:57	04/11/16 18:15	1

Lab Sample ID: LCS 160-244934/2-A

Matrix: Solid

Analysis Batch: 245326

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 244934

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Technetium 99	0.00119	0.00121		mg/Kg		101	80 - 120

Lab Sample ID: 160-16810-1 MS

Matrix: Solid

Analysis Batch: 245326

Client Sample ID: L07-01-27-P-S-B-00

Prep Type: Total/NA

Prep Batch: 244934

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Technetium 99	0.000036	J	0.00141	0.00146		mg/Kg	☼	101	75 - 125

Lab Sample ID: 160-16810-1 MSD

Matrix: Solid

Analysis Batch: 245326

Client Sample ID: L07-01-27-P-S-B-00

Prep Type: Total/NA

Prep Batch: 244934

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Technetium 99	0.000036	J	0.00141	0.00147		mg/Kg	☼	101	75 - 125	1	30

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

Lab Sample ID: MB 160-244934/1-A

Matrix: Solid

Analysis Batch: 245327

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 244934

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Technetium 99	-0.007056	U	0.0278	0.0278	1.03	0.176	pCi/g	04/08/16 01:57	04/11/16 18:15	1

Carrier	MB %Yield	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Re	97		30 - 110	04/08/16 01:57	04/11/16 18:15	1

Lab Sample ID: LCS 160-244934/2-A

Matrix: Solid

Analysis Batch: 245327

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 244934

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits
Technetium 99	20.4	20.68		2.00	1.05	0.180	pCi/g	101	80 - 120

Carrier	LCS %Yield	LCS Qualifier	Limits
Re	95		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: 160-16810-1

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

Lab Sample ID: 160-16810-1 MS

Matrix: Solid

Analysis Batch: 245327

Client Sample ID: L07-01-27-P-S-B-00

Prep Type: Total/NA

Prep Batch: 244934

Analyte	Sample Result	Sample Qual	Spike Added	MS Result	MS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits
Technetium 99	0.614		24.2	24.98		2.36	1.29	0.220	pCi/g	101	75 - 125
Carrier	MS %Yield	MS Qualifier	Limits								
Re	92		30 - 110								

Lab Sample ID: 160-16810-1 MSD

Matrix: Solid

Analysis Batch: 245327

Client Sample ID: L07-01-27-P-S-B-00

Prep Type: Total/NA

Prep Batch: 244934

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	0.614		24.2	25.17		2.53	1.28	0.219	pCi/g	101	75 - 125	0.04	1
Carrier	MSD %Yield	MSD Qualifier	Limits										
Re	93		30 - 110										

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

Lab Sample ID: MB 160-244963/1-A

Matrix: Solid

Analysis Batch: 244981

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 244963

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	0.0000	U	0.0159	0.0159		0.0414	pCi/g	04/08/16 09:25	04/08/16 16:30	1
Americium 241	-0.004100	U	0.0131	0.0131		0.0234	pCi/g	04/08/16 09:25	04/08/16 16:30	1
Bismuth 212	0.01515	U	0.135	0.135		0.263	pCi/g	04/08/16 09:25	04/08/16 16:30	1
Bismuth 214	0.005530	U	0.0235	0.0235		0.0457	pCi/g	04/08/16 09:25	04/08/16 16:30	1
Lead 212	-0.006230	U	0.0644	0.0644		0.0278	pCi/g	04/08/16 09:25	04/08/16 16:30	1
Lead 214	-0.009250	U	0.370	0.370		0.0317	pCi/g	04/08/16 09:25	04/08/16 16:30	1
Potassium 40	-0.0008850	U	0.107	0.107		0.278	pCi/g	04/08/16 09:25	04/08/16 16:30	1
Protactinium 231	0.0000	U	0.171	0.171		0.489	pCi/g	04/08/16 09:25	04/08/16 16:30	1
Radium 226	0.005530	U	0.0235	0.0235	1.00	0.0457	pCi/g	04/08/16 09:25	04/08/16 16:30	1
Thorium 234	0.01983	U	0.0561	0.0561	1.00	0.264	pCi/g	04/08/16 09:25	04/08/16 16:30	1
Uranium 235	-0.005787	U	0.0166	0.0166		0.0726	pCi/g	04/08/16 09:25	04/08/16 16:30	1
Protactinium 234m	-0.2885	U	8.74	8.74		2.91	pCi/g	04/08/16 09:25	04/08/16 16:30	1
Thorium 232	0.0000	U	0.0159	0.0159		0.0414	pCi/g	04/08/16 09:25	04/08/16 16:30	1
Other Detected Radionuclides	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Other Detected Radionuclide	None						pCi/g	04/08/16 09:25	04/08/16 16:30	1

TestAmerica St. Louis

QC Sample Results

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

TestAmerica Job ID: 160-16810-1

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

Lab Sample ID: LCS 160-244963/2-A
Matrix: Solid
Analysis Batch: 244981

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 244963

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits
Americium 241	101	101.7		10.6		0.598	pCi/g	101	87 - 116
Cesium 137	34.1	34.22		3.59	0.200	0.203	pCi/g	100	87 - 120
Cobalt 60	31.6	31.49		3.19		0.116	pCi/g	100	87 - 115

Lab Sample ID: 160-16810-1 DU
Matrix: Solid
Analysis Batch: 245032

Client Sample ID: L07-01-27-P-S-B-00
Prep Type: Total/NA
Prep Batch: 244963

Analyte	Sample Result	Sample Qual	DU Result	DU Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	RER	RER Limit
Actinium 228	0.805		0.6658		0.153		0.108	pCi/g	0.48	1
Americium 241	-0.00018	U	-0.00096	U	0.0524		0.0889	pCi/g	0.01	1
Bismuth 212	1.10		1.002		0.412		0.375	pCi/g	0.12	1
Bismuth 214	0.606		0.6108		0.104		0.0544	pCi/g	0.02	1
Lead 212	0.754		0.8109		0.129		0.0657	pCi/g	0.23	1
Lead 214	0.659		0.6022		0.0958		0.0656	pCi/g	0.29	1
Potassium 40	15.5		15.15		1.90		0.231	pCi/g	0.09	1
Protactinium 231	0.414	U	0.4424	U	0.194		0.954	pCi/g	0.05	1
Radium 226	0.606		0.6108		0.104	1.00	0.0544	pCi/g	0.02	1
Thorium 234	1.32		0.9549		0.329	1.00	0.799	pCi/g	0.45	1
Uranium 235	0.157	U	0.1389	U	0.103		0.169	pCi/g	0.07	1
Protactinium 234m	0.456	U	2.691	U	2.41		4.78	pCi/g	0.46	1
Thorium 232	0.805		0.6658		0.153		0.108	pCi/g	0.48	1
Other Detected Radionuclides	Sample Result	Sample Qual	DU Result	DU Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	RER	RER Limit
Tl-208	0.230		0.2692		0.0562		0.0385	pCi/g	0.41	1

TestAmerica St. Louis

QC Association Summary

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

TestAmerica Job ID: 160-16810-1

Metals

Prep Batch: 244934

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-16810-1	L07-01-27-P-S-B-00	Total/NA	Solid	None	
160-16810-1 MS	L07-01-27-P-S-B-00	Total/NA	Solid	None	
160-16810-1 MSD	L07-01-27-P-S-B-00	Total/NA	Solid	None	
160-16810-2	L07-01-28-P-S-B-00	Total/NA	Solid	None	
160-16810-3	L07-01-29-P-S-B-00	Total/NA	Solid	None	
LCS 160-244934/2-A	Lab Control Sample	Total/NA	Solid	None	
MB 160-244934/1-A	Method Blank	Total/NA	Solid	None	

Analysis Batch: 245326

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-16810-1	L07-01-27-P-S-B-00	Total/NA	Solid	6020A	244934
160-16810-1 MS	L07-01-27-P-S-B-00	Total/NA	Solid	6020A	244934
160-16810-1 MSD	L07-01-27-P-S-B-00	Total/NA	Solid	6020A	244934
160-16810-2	L07-01-28-P-S-B-00	Total/NA	Solid	6020A	244934
160-16810-3	L07-01-29-P-S-B-00	Total/NA	Solid	6020A	244934
LCS 160-244934/2-A	Lab Control Sample	Total/NA	Solid	6020A	244934
MB 160-244934/1-A	Method Blank	Total/NA	Solid	6020A	244934

General Chemistry

Analysis Batch: 244933

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-16810-1	L07-01-27-P-S-B-00	Total/NA	Solid	Moisture	
160-16810-1 DU	L07-01-27-P-S-B-00	Total/NA	Solid	Moisture	
160-16810-2	L07-01-28-P-S-B-00	Total/NA	Solid	Moisture	
160-16810-3	L07-01-29-P-S-B-00	Total/NA	Solid	Moisture	

Rad

Leach Batch: 244893

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-16810-1	L07-01-27-P-S-B-00	Total/NA	Solid	Dry and Grind	
160-16810-1 DU	L07-01-27-P-S-B-00	Total/NA	Solid	Dry and Grind	
160-16810-2	L07-01-28-P-S-B-00	Total/NA	Solid	Dry and Grind	
160-16810-3	L07-01-29-P-S-B-00	Total/NA	Solid	Dry and Grind	

Prep Batch: 244934

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-16810-1	L07-01-27-P-S-B-00	Total/NA	Solid	None	
160-16810-1 MS	L07-01-27-P-S-B-00	Total/NA	Solid	None	
160-16810-1 MSD	L07-01-27-P-S-B-00	Total/NA	Solid	None	
160-16810-2	L07-01-28-P-S-B-00	Total/NA	Solid	None	
160-16810-3	L07-01-29-P-S-B-00	Total/NA	Solid	None	
LCS 160-244934/2-A	Lab Control Sample	Total/NA	Solid	None	
MB 160-244934/1-A	Method Blank	Total/NA	Solid	None	

Prep Batch: 244963

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-16810-1	L07-01-27-P-S-B-00	Total/NA	Solid	Fill_Geo-0	244893
160-16810-1 DU	L07-01-27-P-S-B-00	Total/NA	Solid	Fill_Geo-0	244893

TestAmerica St. Louis

QC Association Summary

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

TestAmerica Job ID: 160-16810-1

Rad (Continued)

Prep Batch: 244963 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-16810-2	L07-01-28-P-S-B-00	Total/NA	Solid	Fill_Geo-0	244893
160-16810-3	L07-01-29-P-S-B-00	Total/NA	Solid	Fill_Geo-0	244893
LCS 160-244963/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-0	
MB 160-244963/1-A	Method Blank	Total/NA	Solid	Fill_Geo-0	

Tracer/Carrier Summary

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

TestAmerica Job ID: 160-16810-1

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)
160-16810-1	L07-01-27-P-S-B-00	93
160-16810-1 MS	L07-01-27-P-S-B-00	92
160-16810-1 MSD	L07-01-27-P-S-B-00	93
160-16810-2	L07-01-28-P-S-B-00	92
160-16810-3	L07-01-29-P-S-B-00	90
LCS 160-244934/2-A	Lab Control Sample	95
MB 160-244934/1-A	Method Blank	97

Tracer/Carrier Legend

Re = Re