

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: 160-17038-1

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:
4/26/2016 3:28:42 PM

Ivan Vania, Project Manager II
(314)298-8566
ivan.vania@testamericainc.com

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

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

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Case Narrative

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

TestAmerica Job ID: 160-17038-1

Job ID: 160-17038-1

Laboratory: TestAmerica St. Louis

Narrative

CASE NARRATIVE

Client: Westinghouse Electric Company LLC

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

Report Number: 160-17038-1

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 4/19/2016 1:00 PM; 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 3875-SS-160418-00-01 (160-17038-1), 3875-SS-160418-00-02 (160-17038-2), 3875-SS-160418-00-03 (160-17038-3), 3875-SS-160418-00-04 (160-17038-4), 3875-SS-160418-00-05 (160-17038-5), 3875-SS-160418-00-06 (160-17038-6) and 3875-SS-160418-00-07 (160-17038-7) were analyzed for Technetium-99 (ICPMS) in accordance with EPA SW-846 Method 6020A. The samples were prepared on 04/21/2016 and analyzed on 04/22/2016.

Preparation Batch 160-246991, Analytical Batch 160-247604:

The matrix spike / matrix spike duplicate (MS/MSD) recovery and precision for technetium was outside control limits, indicating a matrix interference. The sample was a non-homogeneous mixture of soil. The LCS was within acceptable limits. (160-17030-A-25-F MS) and (160-17030-A-25-G MSD)

Case Narrative

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

TestAmerica Job ID: 160-17038-1

Job ID: 160-17038-1 (Continued)

Laboratory: TestAmerica St. Louis (Continued)

Preparation Batch 160-246991, Analytical Batch 160-247605:

The matrix spike / matrix spike duplicate (MS/MSD) recovery and precision for technetium was outside control limits, indicating a matrix interference. The sample was a non-homogeneous mixture of soil. The LCS was within acceptable limits. (160-17030-A-25-F MS) and (160-17030-A-25-G MSD)

Preparation Batch 160-246991, Analytical batch 160-247605

The Relative Error Ratio and Duplicate Error Ratio were outside control limits for technetium. Sample matrix interference and/or non-homogeneity are suspected because the associated laboratory control samples were within acceptance limits.(160-17030-A-25-F MS) and (160-17030-A-25-G MSD)

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

PERCENT SOLIDS

Samples 3875-SS-160418-00-01 (160-17038-1), 3875-SS-160418-00-02 (160-17038-2), 3875-SS-160418-00-03 (160-17038-3), 3875-SS-160418-00-04 (160-17038-4), 3875-SS-160418-00-05 (160-17038-5), 3875-SS-160418-00-06 (160-17038-6) and 3875-SS-160418-00-07 (160-17038-7) were analyzed for percent solids in accordance with EPA Method 160.3 MOD. The samples were analyzed on 04/21/2016.

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 3875-SS-160418-00-01 (160-17038-1), 3875-SS-160418-00-02 (160-17038-2), 3875-SS-160418-00-03 (160-17038-3), 3875-SS-160418-00-04 (160-17038-4), 3875-SS-160418-00-05 (160-17038-5), 3875-SS-160418-00-06 (160-17038-6) and 3875-SS-160418-00-07 (160-17038-7) were analyzed for Cesium-137 & Other Gamma Emitters (GS) in accordance with DOE GA-01-R. The samples were leached on 04/20/2016, prepared on 04/21/2016 and analyzed on 04/24/2016.

Preparation Batch 160-247140:

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. 3875-SS-160418-00-01 (160-17038-1), 3875-SS-160418-00-02 (160-17038-2), 3875-SS-160418-00-03 (160-17038-3), 3875-SS-160418-00-04 (160-17038-4), 3875-SS-160418-00-05 (160-17038-5), 3875-SS-160418-00-06 (160-17038-6), 3875-SS-160418-00-07 (160-17038-7), (LCS 160-247140/2-A), (MB 160-247140/1-A), (160-17033-A-1-D) and (160-17033-A-1-E 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. 041816-01 Page 1/1				Requested Analysis										Laboratory Name:				
Project Name: Westinghouse Electric Company Contact Person: W. Clark Evers Phone Number: 314-810-3336 Sampler Name: Mike Dekeyser				Comp (C) or Grab (G)	Gamma Spec	Isotopic Uranium	Tc-99	Gamma Spec (21 day ingrow for Ra-226)								Total Containers	TA-MO	
																	Laboratory Address: 13715 Rider Trail North Earth City, MO 63045	
																	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															
3875-SS-160418-00-01	3/31/2016	10:45	S	G	X		X	X							1	SWTP samples LSA 04-04		
3875-SS-160418-00-02	3/31/2016	13:40	S	G	X		X	X							1	SWTP samples LSA 08-15		
3875-SS-160418-00-03	4/13/2016	9:40	S	G	X		X	X							1	SWTP samples LSA 08-10		
3875-SS-160418-00-04	4/13/2016	11:05	S	G	X		X	X							1	SWTP samples LSA 08-10		
3875-SS-160418-00-05	4/14/2016	8:30	S	G	X		X	X							1	SWTP samples LSA 08-10		
3875-SS-160418-00-06	4/18/2016	8:55	S	G	X		X	X							1	SWTP samples LSA 08-15		
3875-SS-160418-00-07	4/18/2016	10:00	S	G	X		X	X							1	SWTP samples LSA 04-04		



160-17038 Chain of Custody

Relinquished by: <i>Gorski</i> <i>Chapman</i>	Date/Time 4-19-16	Received by: <i>R Gorski</i>	Date/Time 4-19-16	Total Number of Containers: 7	Cooler Temperature: Ambient
Company Name: WEC	1150	Company Name: CROSSCOA03	1150	Container ID: 0331-01	Shipper and Number:
Received by:	Date/Time	Relinquished by:	Date/Time	Comments: PO #4500404709	
Company Name:		Company Name:			
Relinquished by: <i>R Gorski</i> <i>Crossroads</i>	Date/Time 4-19-16	Received by: <i>C Dednor</i>	Date/Time 4-19-16	Verified By: <i>C. Gorski</i> <i>Chapman</i> 4-19-16	
Company Name: CROSSROADS	13:00	Company Name: TA-St. Louis	1300		

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Login Sample Receipt Checklist

Client: Westinghouse Electric Company LLC

Job Number: 160-17038-1

Login Number: 17038

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: 160-17038-1

Qualifiers

Metals

Qualifier	Qualifier Description
F1	MS and/or MSD Recovery is outside acceptance limits.
F2	MS/MSD RPD exceeds control limits
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
F1	MS and/or MSD Recovery is outside acceptance limits.
F	MS/MSD Recovery and/or RPD exceeds the control limits
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: 160-17038-1

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: 160-17038-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
160-17038-1	3875-SS-160418-00-01	Solid	03/31/16 10:45	04/19/16 13:00
160-17038-2	3875-SS-160418-00-02	Solid	03/31/16 13:40	04/19/16 13:00
160-17038-3	3875-SS-160418-00-03	Solid	04/13/16 09:40	04/19/16 13:00
160-17038-4	3875-SS-160418-00-04	Solid	04/13/16 11:05	04/19/16 13:00
160-17038-5	3875-SS-160418-00-05	Solid	04/14/16 08:30	04/19/16 13:00
160-17038-6	3875-SS-160418-00-06	Solid	04/18/16 08:55	04/19/16 13:00
160-17038-7	3875-SS-160418-00-07	Solid	04/18/16 10:00	04/19/16 13:00

Client Sample Results

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

TestAmerica Job ID: 160-17038-1

Client Sample ID: 3875-SS-160418-00-01

Lab Sample ID: 160-17038-1

Date Collected: 03/31/16 10:45

Matrix: Solid

Date Received: 04/19/16 13:00

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	1.08		0.150	0.186		0.0762	pCi/g	04/21/16 12:38	04/24/16 16:22	1
Americium 241	-0.00398	U	0.0713	0.0713		0.121	pCi/g	04/21/16 12:38	04/24/16 16:22	1
Bismuth 212	1.41		0.529	0.548		0.469	pCi/g	04/21/16 12:38	04/24/16 16:22	1
Bismuth 214	1.14		0.124	0.171		0.0661	pCi/g	04/21/16 12:38	04/24/16 16:22	1
Lead 212	1.13		0.0933	0.173		0.0726	pCi/g	04/21/16 12:38	04/24/16 16:22	1
Lead 214	1.12		0.110	0.161		0.112	pCi/g	04/21/16 12:38	04/24/16 16:22	1
Potassium 40	19.1		1.41	2.41		0.259	pCi/g	04/21/16 12:38	04/24/16 16:22	1
Protactinium 231	0.478	U	0.428	0.432		1.45	pCi/g	04/21/16 12:38	04/24/16 16:22	1
Radium 226	1.14		0.124	0.171	1.00	0.0661	pCi/g	04/21/16 12:38	04/24/16 16:22	1
Thorium 234	1.47		0.627	0.645	1.00	0.988	pCi/g	04/21/16 12:38	04/24/16 16:22	1
Uranium 235	0.0851	U	0.139	0.139		0.258	pCi/g	04/21/16 12:38	04/24/16 16:22	1
Protactinium 234m	2.06	U	3.79	3.80		6.58	pCi/g	04/21/16 12:38	04/24/16 16:22	1
Thorium 232	1.08		0.150	0.186		0.0762	pCi/g	04/21/16 12:38	04/24/16 16:22	1
Other Detected Radionuclides			Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Tl-208	0.357		0.0512	0.0632		0.0306	pCi/g	04/21/16 12:38	04/24/16 16:22	1

Client Sample ID: 3875-SS-160418-00-01

Lab Sample ID: 160-17038-1

Date Collected: 03/31/16 10:45

Matrix: Solid

Date Received: 04/19/16 13:00

Percent Solids: 82.6

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Technetium 99		ND	0.000062	0.000018	mg/Kg	☼	04/21/16 01:34	04/22/16 15:26	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	0.118	U F	0.0266	0.0287	1.23	0.211	pCi/g	04/21/16 01:34	04/22/16 15:26	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Re	98		30 - 110					04/21/16 01:34	04/22/16 15:26	1

Client Sample ID: 3875-SS-160418-00-02

Lab Sample ID: 160-17038-2

Date Collected: 03/31/16 13:40

Matrix: Solid

Date Received: 04/19/16 13:00

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		0.124	0.165		0.108	pCi/g	04/21/16 12:38	04/24/16 17:00	1
Americium 241	-0.0155	U	0.0576	0.0577		0.0965	pCi/g	04/21/16 12:38	04/24/16 17:00	1
Bismuth 212	1.46		0.446	0.471		0.380	pCi/g	04/21/16 12:38	04/24/16 17:00	1
Bismuth 214	0.973		0.0950	0.139		0.0606	pCi/g	04/21/16 12:38	04/24/16 17:00	1
Lead 212	1.04		0.0781	0.156		0.0664	pCi/g	04/21/16 12:38	04/24/16 17:00	1

TestAmerica St. Louis

Client Sample Results

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

TestAmerica Job ID: 160-17038-1

Client Sample ID: 3875-SS-160418-00-02

Lab Sample ID: 160-17038-2

Date Collected: 03/31/16 13:40

Matrix: Solid

Date Received: 04/19/16 13:00

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	1.06		0.0832	0.138		0.0722	pCi/g	04/21/16 12:38	04/24/16 17:00	1
Potassium 40	18.8		1.04	2.19		0.251	pCi/g	04/21/16 12:38	04/24/16 17:00	1
Protactinium 231	0.317	U	0.174	0.178		1.05	pCi/g	04/21/16 12:38	04/24/16 17:00	1
Radium 226	0.973		0.0950	0.139	1.00	0.0606	pCi/g	04/21/16 12:38	04/24/16 17:00	1
Thorium 234	1.40		0.482	0.504	1.00	0.749	pCi/g	04/21/16 12:38	04/24/16 17:00	1
Uranium 235	0.0634	U	0.141	0.141		0.227	pCi/g	04/21/16 12:38	04/24/16 17:00	1
Protactinium 234m	4.51		2.26	2.30		4.05	pCi/g	04/21/16 12:38	04/24/16 17:00	1
Thorium 232	1.07		0.124	0.165		0.108	pCi/g	04/21/16 12:38	04/24/16 17:00	1
Other Detected			Count	Total						
Radionuclides			Uncert.	Uncert.	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Tl-208	0.353		0.0443	0.0575		0.0324	pCi/g	04/21/16 12:38	04/24/16 17:00	1

Client Sample ID: 3875-SS-160418-00-02

Lab Sample ID: 160-17038-2

Date Collected: 03/31/16 13:40

Matrix: Solid

Date Received: 04/19/16 13:00

Percent Solids: 83.3

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Technetium 99	0.000019	J	0.000061	0.000018	mg/Kg	☼	04/21/16 01:34	04/22/16 15:30	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	0.331	F	0.118	0.122	1.22	0.208	pCi/g	04/21/16 01:34	04/22/16 15:30	1
Carrier			Limits					Prepared	Analyzed	Dil Fac
Re			98	30 - 110				04/21/16 01:34	04/22/16 15:30	1

Client Sample ID: 3875-SS-160418-00-03

Lab Sample ID: 160-17038-3

Date Collected: 04/13/16 09:40

Matrix: Solid

Date Received: 04/19/16 13:00

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		0.134	0.172		0.110	pCi/g	04/21/16 12:38	04/24/16 17:01	1
Americium 241	-0.0253	U	0.0669	0.0669		0.112	pCi/g	04/21/16 12:38	04/24/16 17:01	1
Bismuth 212	1.72		0.462	0.495		0.365	pCi/g	04/21/16 12:38	04/24/16 17:01	1
Bismuth 214	0.946		0.100	0.140		0.0462	pCi/g	04/21/16 12:38	04/24/16 17:01	1
Lead 212	1.01		0.0853	0.156		0.0688	pCi/g	04/21/16 12:38	04/24/16 17:01	1
Lead 214	0.973		0.0981	0.141		0.0748	pCi/g	04/21/16 12:38	04/24/16 17:01	1
Potassium 40	18.7		1.31	2.32		0.357	pCi/g	04/21/16 12:38	04/24/16 17:01	1
Protactinium 231	0.504	U	0.327	0.332		1.01	pCi/g	04/21/16 12:38	04/24/16 17:01	1
Radium 226	0.946		0.100	0.140	1.00	0.0462	pCi/g	04/21/16 12:38	04/24/16 17:01	1
Thorium 234	1.06		0.477	0.490	1.00	0.748	pCi/g	04/21/16 12:38	04/24/16 17:01	1

TestAmerica St. Louis

Client Sample Results

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

TestAmerica Job ID: 160-17038-1

Client Sample ID: 3875-SS-160418-00-03

Lab Sample ID: 160-17038-3

Date Collected: 04/13/16 09:40

Matrix: Solid

Date Received: 04/19/16 13:00

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	0.187	U	0.131	0.132		0.212	pCi/g	04/21/16 12:38	04/24/16 17:01	1
Protactinium 234m	-0.0869	U	3.65	3.65		6.54	pCi/g	04/21/16 12:38	04/24/16 17:01	1
Thorium 232	1.05		0.134	0.172		0.110	pCi/g	04/21/16 12:38	04/24/16 17:01	1
Other Detected			Count	Total						
Radionuclides			Uncert.	Uncert.						
	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Tl-208	0.374		0.0513	0.0644		0.0335	pCi/g	04/21/16 12:38	04/24/16 17:01	1

Client Sample ID: 3875-SS-160418-00-03

Lab Sample ID: 160-17038-3

Date Collected: 04/13/16 09:40

Matrix: Solid

Date Received: 04/19/16 13:00

Percent Solids: 79.4

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Technetium 99	ND		0.000064	0.000019	mg/Kg	☼	04/21/16 01:34	04/22/16 15:34	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	0.128	U F	0.0381	0.0399	1.29	0.221	pCi/g	04/21/16 01:34	04/22/16 15:34	1
Carrier			%Yield	Limits				Prepared	Analyzed	Dil Fac
Re	98		30 - 110					04/21/16 01:34	04/22/16 15:34	1

Client Sample ID: 3875-SS-160418-00-04

Lab Sample ID: 160-17038-4

Date Collected: 04/13/16 11:05

Matrix: Solid

Date Received: 04/19/16 13:00

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	1.28		0.134	0.185		0.107	pCi/g	04/21/16 12:38	04/24/16 17:03	1
Americium 241	-0.0184	U	0.162	0.162		0.0937	pCi/g	04/21/16 12:38	04/24/16 17:03	1
Bismuth 212	1.42		0.392	0.418		0.331	pCi/g	04/21/16 12:38	04/24/16 17:03	1
Bismuth 214	1.04		0.110	0.153		0.0744	pCi/g	04/21/16 12:38	04/24/16 17:03	1
Lead 212	1.11		0.0809	0.166		0.0698	pCi/g	04/21/16 12:38	04/24/16 17:03	1
Lead 214	1.02		0.0772	0.131		0.0683	pCi/g	04/21/16 12:38	04/24/16 17:03	1
Potassium 40	21.7		1.12	2.45		0.313	pCi/g	04/21/16 12:38	04/24/16 17:03	1
Protactinium 231	0.516	U	0.293	0.298		1.14	pCi/g	04/21/16 12:38	04/24/16 17:03	1
Radium 226	1.04		0.110	0.153	1.00	0.0744	pCi/g	04/21/16 12:38	04/24/16 17:03	1
Thorium 234	1.44		0.501	0.523	1.00	0.785	pCi/g	04/21/16 12:38	04/24/16 17:03	1
Uranium 235	0.250		0.124	0.126		0.185	pCi/g	04/21/16 12:38	04/24/16 17:03	1
Protactinium 234m	1.34	U	3.13	3.14		5.33	pCi/g	04/21/16 12:38	04/24/16 17:03	1
Thorium 232	1.28		0.134	0.185		0.107	pCi/g	04/21/16 12:38	04/24/16 17:03	1

TestAmerica St. Louis

Client Sample Results

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

TestAmerica Job ID: 160-17038-1

Client Sample ID: 3875-SS-160418-00-04

Lab Sample ID: 160-17038-4

Date Collected: 04/13/16 11:05

Matrix: Solid

Date Received: 04/19/16 13:00

Other Detected		Count	Total								
Radionuclides		Result	Qualifier	Uncert.	Uncert.	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
		(2σ+/-)	(2σ+/-)								
Pb-210		1.54		0.587	0.614		0.727	pCi/g	04/21/16 12:38	04/24/16 17:03	1
Tl-208		0.382		0.0422	0.0577		0.0292	pCi/g	04/21/16 12:38	04/24/16 17:03	1

Client Sample ID: 3875-SS-160418-00-04

Lab Sample ID: 160-17038-4

Date Collected: 04/13/16 11:05

Matrix: Solid

Date Received: 04/19/16 13:00

Percent Solids: 80.6

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Technetium 99	0.000039	J	0.000069	0.000021	mg/Kg	☼	04/21/16 01:34	04/22/16 15:39	1

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

Analyte		Count	Total								
Result		Uncert.	Uncert.	RL	MDC	Unit	Prepared	Analyzed	Dil Fac		
		(2σ+/-)	(2σ+/-)								
Technetium 99		0.676	F	0.0984	0.116	1.37	0.235	pCi/g	04/21/16 01:34	04/22/16 15:39	1
Carrier		%Yield	Qualifier	Limits							
Re		91		30 - 110							
							Prepared	Analyzed	Dil Fac		
							04/21/16 01:34	04/22/16 15:39	1		

Client Sample ID: 3875-SS-160418-00-05

Lab Sample ID: 160-17038-5

Date Collected: 04/14/16 08:30

Matrix: Solid

Date Received: 04/19/16 13:00

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

Analyte		Count	Total									
Result		Uncert.	Uncert.	RL	MDC	Unit	Prepared	Analyzed	Dil Fac			
		(2σ+/-)	(2σ+/-)									
Actinium 228		1.12			0.124	pCi/g	04/21/16 12:38	04/24/16 17:02	1			
Americium 241		-0.0203	U	0.0760	0.0761		0.127	pCi/g	04/21/16 12:38	04/24/16 17:02	1	
Bismuth 212		1.51			0.364	pCi/g	04/21/16 12:38	04/24/16 17:02	1			
Bismuth 214		0.977			0.121	0.158	0.0739	pCi/g	04/21/16 12:38	04/24/16 17:02	1	
Lead 212		1.11			0.0922	0.170	0.0746	pCi/g	04/21/16 12:38	04/24/16 17:02	1	
Lead 214		1.08			0.119	0.164	0.102	pCi/g	04/21/16 12:38	04/24/16 17:02	1	
Potassium 40		17.3			1.34	2.23	0.260	pCi/g	04/21/16 12:38	04/24/16 17:02	1	
Protactinium 231		0.288	U	0.207	0.209		1.51	pCi/g	04/21/16 12:38	04/24/16 17:02	1	
Radium 226		0.977			0.121	0.158	1.00	0.0739	pCi/g	04/21/16 12:38	04/24/16 17:02	1
Thorium 234		0.864	U	0.348	0.359		1.00	0.969	pCi/g	04/21/16 12:38	04/24/16 17:02	1
Uranium 235		0.124	U	0.167	0.167			0.275	pCi/g	04/21/16 12:38	04/24/16 17:02	1
Protactinium 234m		-0.341	U	3.69	3.69			6.63	pCi/g	04/21/16 12:38	04/24/16 17:02	1
Thorium 232		1.12			0.153	0.191		0.124	pCi/g	04/21/16 12:38	04/24/16 17:02	1
Other Detected		Count	Total									
Radionuclides		Result	Qualifier	Uncert.	Uncert.	RL	MDC	Unit	Prepared	Analyzed	Dil Fac	
		(2σ+/-)	(2σ+/-)									
Tl-208		0.386		0.0599	0.0721		0.0419	pCi/g	04/21/16 12:38	04/24/16 17:02	1	

TestAmerica St. Louis

Client Sample Results

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

TestAmerica Job ID: 160-17038-1

Client Sample ID: 3875-SS-160418-00-05

Lab Sample ID: 160-17038-5

Date Collected: 04/14/16 08:30

Matrix: Solid

Date Received: 04/19/16 13:00

Percent Solids: 81.0

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Technetium 99	0.00012		0.000064	0.000019	mg/Kg	☼	04/21/16 01:34	04/22/16 15:56	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	2.00	F	0.268	0.325	1.27	0.218	pCi/g	04/21/16 01:34	04/22/16 15:56	1

Carrier	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Re	97		30 - 110	04/21/16 01:34	04/22/16 15:56	1

Client Sample ID: 3875-SS-160418-00-06

Lab Sample ID: 160-17038-6

Date Collected: 04/18/16 08:55

Matrix: Solid

Date Received: 04/19/16 13:00

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	1.13		0.115	0.163		0.0856	pCi/g	04/21/16 12:38	04/24/16 17:35	1
Americium 241	-0.0193	U	0.0618	0.0619		0.103	pCi/g	04/21/16 12:38	04/24/16 17:35	1
Bismuth 212	1.30		0.308	0.336		0.251	pCi/g	04/21/16 12:38	04/24/16 17:35	1
Bismuth 214	0.957		0.0904	0.134		0.0531	pCi/g	04/21/16 12:38	04/24/16 17:35	1
Lead 212	1.02		0.0810	0.154		0.0683	pCi/g	04/21/16 12:38	04/24/16 17:35	1
Lead 214	0.936		0.0758	0.123		0.0690	pCi/g	04/21/16 12:38	04/24/16 17:35	1
Potassium 40	18.2		1.02	2.13		0.247	pCi/g	04/21/16 12:38	04/24/16 17:35	1
Protactinium 231	0.391	U	0.239	0.243		0.983	pCi/g	04/21/16 12:38	04/24/16 17:35	1
Radium 226	0.957		0.0904	0.134	1.00	0.0531	pCi/g	04/21/16 12:38	04/24/16 17:35	1
Thorium 234	0.902		0.275	0.291	1.00	0.755	pCi/g	04/21/16 12:38	04/24/16 17:35	1
Uranium 235	0.138	U	0.137	0.138		0.218	pCi/g	04/21/16 12:38	04/24/16 17:35	1
Protactinium 234m	0.800	U	1.52	1.52		4.41	pCi/g	04/21/16 12:38	04/24/16 17:35	1
Thorium 232	1.13		0.115	0.163		0.0856	pCi/g	04/21/16 12:38	04/24/16 17:35	1

Other Detected Radionuclides	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Tl-208	0.335		0.0430	0.0552		0.0323	pCi/g	04/21/16 12:38	04/24/16 17:35	1

Client Sample ID: 3875-SS-160418-00-06

Lab Sample ID: 160-17038-6

Date Collected: 04/18/16 08:55

Matrix: Solid

Date Received: 04/19/16 13:00

Percent Solids: 79.9

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Technetium 99	0.000021	J	0.000067	0.000020	mg/Kg	☼	04/21/16 01:34	04/22/16 16:00	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	0.352	F	0.113	0.118	1.34	0.230	pCi/g	04/21/16 01:34	04/22/16 16:00	1

TestAmerica St. Louis

Client Sample Results

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

TestAmerica Job ID: 160-17038-1

Client Sample ID: 3875-SS-160418-00-06

Date Collected: 04/18/16 08:55

Date Received: 04/19/16 13:00

Lab Sample ID: 160-17038-6

Matrix: Solid

Percent Solids: 79.9

Carrier	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Re	93		30 - 110	04/21/16 01:34	04/22/16 16:00	1

Client Sample ID: 3875-SS-160418-00-07

Date Collected: 04/18/16 10:00

Date Received: 04/19/16 13:00

Lab Sample ID: 160-17038-7

Matrix: Solid

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	1.16		0.153	0.193		0.0863	pCi/g	04/21/16 12:38	04/24/16 17:35	1
Americium 241	-0.0212	U	0.0621	0.0622		0.104	pCi/g	04/21/16 12:38	04/24/16 17:35	1
Bismuth 212	1.42		0.465	0.488		0.394	pCi/g	04/21/16 12:38	04/24/16 17:35	1
Bismuth 214	1.03		0.108	0.152		0.0668	pCi/g	04/21/16 12:38	04/24/16 17:35	1
Lead 212	1.00		0.0788	0.152		0.0653	pCi/g	04/21/16 12:38	04/24/16 17:35	1
Lead 214	0.973		0.0920	0.137		0.0812	pCi/g	04/21/16 12:38	04/24/16 17:35	1
Potassium 40	18.6		1.20	2.25		0.298	pCi/g	04/21/16 12:38	04/24/16 17:35	1
Protactinium 231	0.606	U	0.408	0.413		0.727	pCi/g	04/21/16 12:38	04/24/16 17:35	1
Radium 226	1.03		0.108	0.152	1.00	0.0668	pCi/g	04/21/16 12:38	04/24/16 17:35	1
Thorium 234	0.934		0.264	0.282	1.00	0.706	pCi/g	04/21/16 12:38	04/24/16 17:35	1
Uranium 235	0.0703	U	0.110	0.110		0.222	pCi/g	04/21/16 12:38	04/24/16 17:35	1
Protactinium 234m	2.32	U	3.18	3.19		4.77	pCi/g	04/21/16 12:38	04/24/16 17:35	1
Thorium 232	1.16		0.153	0.193		0.0863	pCi/g	04/21/16 12:38	04/24/16 17:35	1
Other Detected Radionuclides			Count	Total						
	Result	Qualifier	Uncert.	Uncert.	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Tl-208	0.326		0.0463	0.0573		0.0352	pCi/g	04/21/16 12:38	04/24/16 17:35	1

Client Sample ID: 3875-SS-160418-00-07

Date Collected: 04/18/16 10:00

Date Received: 04/19/16 13:00

Lab Sample ID: 160-17038-7

Matrix: Solid

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	0.000062	0.000019	mg/Kg	☼	04/21/16 01:34	04/22/16 16:04	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	0.266	F	0.0389	0.0459	1.24	0.213	pCi/g	04/21/16 01:34	04/22/16 16:04	1
Carrier			Count	Total						
	Result	Qualifier	Uncert.	Uncert.	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Re	99		30 - 110					04/21/16 01:34	04/22/16 16:04	1

QC Sample Results

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

TestAmerica Job ID: 160-17038-1

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

Lab Sample ID: MB 160-246991/1-A
Matrix: Solid
Analysis Batch: 247604

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 246991

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Technetium 99	ND		0.000050	0.000015	mg/Kg		04/21/16 01:34	04/22/16 14:04	1

Lab Sample ID: LCS 160-246991/2-A
Matrix: Solid
Analysis Batch: 247604

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 246991

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Technetium 99	0.00119	0.00114		mg/Kg		96	80 - 120

Lab Sample ID: 160-17030-A-25-F MS
Matrix: Solid
Analysis Batch: 247604

Client Sample ID: Matrix Spike
Prep Type: Total/NA
Prep Batch: 246991

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Technetium 99	0.00058	F1 F2	0.00143	0.000873	F1	mg/Kg	☼	20	75 - 125

Lab Sample ID: 160-17030-A-25-G MSD
Matrix: Solid
Analysis Batch: 247604

Client Sample ID: Matrix Spike Duplicate
Prep Type: Total/NA
Prep Batch: 246991

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Technetium 99	0.00058	F1 F2	0.00142	0.00142	F1 F2	mg/Kg	☼	59	75 - 125	48	30

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

Lab Sample ID: MB 160-246991/1-A
Matrix: Solid
Analysis Batch: 247605

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 246991

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Technetium 99	0.001696	U	0.0205	0.0205	0.991	0.170	pCi/g	04/21/16 01:34	04/22/16 14:04	1
Carrier	MB %Yield	MB Qualifier	Limits							
Re	101		30 - 110	Prepared	Analyzed	Dil Fac				
				04/21/16 01:34	04/22/16 14:04	1				

Lab Sample ID: LCS 160-246991/2-A
Matrix: Solid
Analysis Batch: 247605

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 246991

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	Limits
Technetium 99	20.3	19.55		1.86	1.01	0.174	pCi/g	96	80 - 120
Carrier	LCS %Yield	LCS Qualifier	Limits						
Re	98		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: 160-17038-1

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

Lab Sample ID: 160-17030-A-25-F MS

Matrix: Solid
Analysis Batch: 247605

Client Sample ID: Matrix Spike
Prep Type: Total/NA
Prep Batch: 246991

Analyte	Sample Result	Sample Qual	Spike Added	MS Result	MS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits
Technetium 99	9.96	F	24.5	14.95	F1	1.45	1.54	0.264	pCi/g	20	75 - 125
Carrier	%Yield	MS Qualifier	Limits								
Re	78		30 - 110								

Lab Sample ID: 160-17030-A-25-G MSD

Matrix: Solid
Analysis Batch: 247605

Client Sample ID: Matrix Spike Duplicate
Prep Type: Total/NA
Prep Batch: 246991

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	9.96	F	24.3	24.40	F1 F	2.26	1.23	0.211	pCi/g	59	75 - 125	2.55	1
Carrier	%Yield	MSD Qualifier	Limits										
Re	97		30 - 110										

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

Lab Sample ID: MB 160-247140/1-A

Matrix: Solid
Analysis Batch: 247502

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 247140

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	0.006256	U	0.0223	0.0223		0.0514	pCi/g	04/21/16 12:38	04/24/16 15:01	1
Americium 241	0.005275	U	0.00836	0.00838		0.0142	pCi/g	04/21/16 12:38	04/24/16 15:01	1
Bismuth 212	0.0000	U	0.0817	0.0817		0.0752	pCi/g	04/21/16 12:38	04/24/16 15:01	1
Bismuth 214	-0.002220	U	0.0246	0.0246		0.0348	pCi/g	04/21/16 12:38	04/24/16 15:01	1
Lead 212	-0.001614	U	0.0135	0.0135		0.0204	pCi/g	04/21/16 12:38	04/24/16 15:01	1
Lead 214	-0.0009023	U	0.00316	0.00316		0.0334	pCi/g	04/21/16 12:38	04/24/16 15:01	1
Potassium 40	-0.05688	U	2.28	2.28		0.164	pCi/g	04/21/16 12:38	04/24/16 15:01	1
Protactinium 231	0.01899	U	0.129	0.129		0.324	pCi/g	04/21/16 12:38	04/24/16 15:01	1
Radium 226	-0.002220	U	0.0246	0.0246	1.00	0.0348	pCi/g	04/21/16 12:38	04/24/16 15:01	1
Thorium 234	-0.002484	U	0.125	0.125	1.00	0.249	pCi/g	04/21/16 12:38	04/24/16 15:01	1
Uranium 235	-0.001002	U	0.00662	0.00662		0.0616	pCi/g	04/21/16 12:38	04/24/16 15:01	1
Protactinium 234m	-0.1895	U	2.73	2.73		1.86	pCi/g	04/21/16 12:38	04/24/16 15:01	1
Thorium 232	0.006256	U	0.0223	0.0223		0.0514	pCi/g	04/21/16 12:38	04/24/16 15:01	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	04/21/16 12:38	04/24/16 15:01	1

TestAmerica St. Louis

QC Sample Results

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

TestAmerica Job ID: 160-17038-1

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

Lab Sample ID: LCS 160-247140/2-A
Matrix: Solid
Analysis Batch: 247506

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 247140

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec Limits
Americium 241	101	103.4		10.8		0.527	pCi/g	103	87 - 116
Cesium 137	34.0	36.87		3.81	0.200	0.153	pCi/g	108	87 - 120
Cobalt 60	31.4	33.62		3.33		0.0953	pCi/g	107	87 - 115

Lab Sample ID: 160-17033-A-1-E DU
Matrix: Solid
Analysis Batch: 247502

Client Sample ID: Duplicate
Prep Type: Total/NA
Prep Batch: 247140

Analyte	Sample Result	Sample Qual	DU Result	DU Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	RER	RER Limit
Actinium 228	0.925		0.9977		0.171		0.0859	pCi/g	0.23	1
Americium 241	-0.00049	U	0.01433	U	0.0553		0.0925	pCi/g	0.14	1
Bismuth 212	0.975		1.246		0.324		0.271	pCi/g	0.42	1
Bismuth 214	0.889		0.8808		0.127		0.0616	pCi/g	0.03	1
Lead 212	1.05		0.9868		0.149		0.0662	pCi/g	0.20	1
Lead 214	0.967		0.9661		0.131		0.0627	pCi/g	0.01	1
Potassium 40	18.3		18.18		2.12		0.372	pCi/g	0.03	1
Protactinium 231	0.486	U	0.3102	U	0.341		0.553	pCi/g	0.29	1
Radium 226	0.889		0.8808		0.127	1.00	0.0616	pCi/g	0.03	1
Thorium 234	0.771		0.7545		0.276	1.00	0.701	pCi/g	0.03	1
Uranium 235	0.233		0.1060	U	0.116		0.217	pCi/g	0.51	1
Protactinium 234m	0.652	U	1.194	U	2.17		3.72	pCi/g	0.11	1
Thorium 232	0.925		0.9977		0.171		0.0859	pCi/g	0.23	1
Other Detected Radionuclides	Sample Result	Sample Qual	DU Result	DU Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	RER	RER Limit
Tl-208	0.371		0.3385		0.0557		0.0328	pCi/g	0.27	1

QC Association Summary

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

TestAmerica Job ID: 160-17038-1

Metals

Prep Batch: 246991

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-17030-A-25-F MS	Matrix Spike	Total/NA	Solid	None	
160-17030-A-25-G MSD	Matrix Spike Duplicate	Total/NA	Solid	None	
160-17038-1	3875-SS-160418-00-01	Total/NA	Solid	None	
160-17038-2	3875-SS-160418-00-02	Total/NA	Solid	None	
160-17038-3	3875-SS-160418-00-03	Total/NA	Solid	None	
160-17038-4	3875-SS-160418-00-04	Total/NA	Solid	None	
160-17038-5	3875-SS-160418-00-05	Total/NA	Solid	None	
160-17038-6	3875-SS-160418-00-06	Total/NA	Solid	None	
160-17038-7	3875-SS-160418-00-07	Total/NA	Solid	None	
LCS 160-246991/2-A	Lab Control Sample	Total/NA	Solid	None	
MB 160-246991/1-A	Method Blank	Total/NA	Solid	None	

Analysis Batch: 247604

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-17030-A-25-F MS	Matrix Spike	Total/NA	Solid	6020A	246991
160-17030-A-25-G MSD	Matrix Spike Duplicate	Total/NA	Solid	6020A	246991
160-17038-1	3875-SS-160418-00-01	Total/NA	Solid	6020A	246991
160-17038-2	3875-SS-160418-00-02	Total/NA	Solid	6020A	246991
160-17038-3	3875-SS-160418-00-03	Total/NA	Solid	6020A	246991
160-17038-4	3875-SS-160418-00-04	Total/NA	Solid	6020A	246991
160-17038-5	3875-SS-160418-00-05	Total/NA	Solid	6020A	246991
160-17038-6	3875-SS-160418-00-06	Total/NA	Solid	6020A	246991
160-17038-7	3875-SS-160418-00-07	Total/NA	Solid	6020A	246991
LCS 160-246991/2-A	Lab Control Sample	Total/NA	Solid	6020A	246991
MB 160-246991/1-A	Method Blank	Total/NA	Solid	6020A	246991

General Chemistry

Analysis Batch: 246992

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-17035-A-1 DU	Duplicate	Total/NA	Solid	Moisture	
160-17038-1	3875-SS-160418-00-01	Total/NA	Solid	Moisture	
160-17038-2	3875-SS-160418-00-02	Total/NA	Solid	Moisture	
160-17038-3	3875-SS-160418-00-03	Total/NA	Solid	Moisture	
160-17038-4	3875-SS-160418-00-04	Total/NA	Solid	Moisture	
160-17038-5	3875-SS-160418-00-05	Total/NA	Solid	Moisture	
160-17038-6	3875-SS-160418-00-06	Total/NA	Solid	Moisture	
160-17038-7	3875-SS-160418-00-07	Total/NA	Solid	Moisture	

Rad

Leach Batch: 246909

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-17033-A-1-E DU	Duplicate	Total/NA	Solid	Dry and Grind	
160-17038-1	3875-SS-160418-00-01	Total/NA	Solid	Dry and Grind	
160-17038-2	3875-SS-160418-00-02	Total/NA	Solid	Dry and Grind	
160-17038-3	3875-SS-160418-00-03	Total/NA	Solid	Dry and Grind	
160-17038-4	3875-SS-160418-00-04	Total/NA	Solid	Dry and Grind	
160-17038-5	3875-SS-160418-00-05	Total/NA	Solid	Dry and Grind	
160-17038-6	3875-SS-160418-00-06	Total/NA	Solid	Dry and Grind	

TestAmerica St. Louis

QC Association Summary

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

TestAmerica Job ID: 160-17038-1

Rad (Continued)

Leach Batch: 246909 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-17038-7	3875-SS-160418-00-07	Total/NA	Solid	Dry and Grind	

Prep Batch: 246991

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-17030-A-25-F MS	Matrix Spike	Total/NA	Solid	None	
160-17030-A-25-G MSD	Matrix Spike Duplicate	Total/NA	Solid	None	
160-17038-1	3875-SS-160418-00-01	Total/NA	Solid	None	
160-17038-2	3875-SS-160418-00-02	Total/NA	Solid	None	
160-17038-3	3875-SS-160418-00-03	Total/NA	Solid	None	
160-17038-4	3875-SS-160418-00-04	Total/NA	Solid	None	
160-17038-5	3875-SS-160418-00-05	Total/NA	Solid	None	
160-17038-6	3875-SS-160418-00-06	Total/NA	Solid	None	
160-17038-7	3875-SS-160418-00-07	Total/NA	Solid	None	
LCS 160-246991/2-A	Lab Control Sample	Total/NA	Solid	None	
MB 160-246991/1-A	Method Blank	Total/NA	Solid	None	

Prep Batch: 247140

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-17033-A-1-E DU	Duplicate	Total/NA	Solid	Fill_Geo-0	246909
160-17038-1	3875-SS-160418-00-01	Total/NA	Solid	Fill_Geo-0	246909
160-17038-2	3875-SS-160418-00-02	Total/NA	Solid	Fill_Geo-0	246909
160-17038-3	3875-SS-160418-00-03	Total/NA	Solid	Fill_Geo-0	246909
160-17038-4	3875-SS-160418-00-04	Total/NA	Solid	Fill_Geo-0	246909
160-17038-5	3875-SS-160418-00-05	Total/NA	Solid	Fill_Geo-0	246909
160-17038-6	3875-SS-160418-00-06	Total/NA	Solid	Fill_Geo-0	246909
160-17038-7	3875-SS-160418-00-07	Total/NA	Solid	Fill_Geo-0	246909
LCS 160-247140/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-0	
MB 160-247140/1-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: 160-17038-1

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)
160-17030-A-25-F MS	Matrix Spike	78
160-17030-A-25-G MSD	Matrix Spike Duplicate	97
160-17038-1	3875-SS-160418-00-01	98
160-17038-2	3875-SS-160418-00-02	98
160-17038-3	3875-SS-160418-00-03	98
160-17038-4	3875-SS-160418-00-04	91
160-17038-5	3875-SS-160418-00-05	97
160-17038-6	3875-SS-160418-00-06	93
160-17038-7	3875-SS-160418-00-07	99
LCS 160-246991/2-A	Lab Control Sample	98
MB 160-246991/1-A	Method Blank	101

Tracer/Carrier Legend

Re = Re