

# 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: 160-1974-1

Client Project/Site: RFP-CBA-022 (21 DAY TAT)

For:

Westinghouse Electric Company LLC  
3300 State Road P  
Festus, Missouri 63028

Attn: Martin Swanson



Authorized for release by:  
4/30/2013 3:49:24 PM

Ivan Vania  
Project Manager I  
[ivan.vania@testamericainc.com](mailto: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: RFP-CBA-022 (21 DAY TAT)

TestAmerica Job ID: 160-1974-1

**Job ID: 160-1974-1**

**Laboratory: TestAmerica St. Louis**

**Narrative**

### CASE NARRATIVE

**Client: Westinghouse Electric Company LLC**

**Project: RFP-CBA-022 (21 DAY TAT)**

**Report Number: 160-1974-1**

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 04/03/2013; the samples arrived in good condition, properly preserved and on ice. The temperature of the coolers at receipt was 19.0°C.

#### TECHNETIUM-99 (ICPMS)

Samples L050103TUB00 (160-1974-1), L050104TUB00 (160-1974-2), L050176TUB00 (160-1974-3), L050177TUB00 (160-1974-4), L050186TUB00 (160-1974-5) and L050187TUB00 (160-1974-6) were analyzed for Technetium-99 (ICPMS) in accordance with EPA SW-846 Method 6020A. The samples were prepared on 04/24/2013 and analyzed on 04/25/2013.

No difficulties were encountered during the Tc-99 analyses. All quality control parameters were within the acceptance limits.

#### PERCENT SOLIDS

Samples L050103TUB00 (160-1974-1), L050104TUB00 (160-1974-2), L050176TUB00 (160-1974-3), L050177TUB00 (160-1974-4), L050186TUB00 (160-1974-5) and L050187TUB00 (160-1974-6) were analyzed for percent solids in accordance with EPA Method 160.3 MOD. The samples were analyzed on 04/04/2013.

## Case Narrative

Client: Westinghouse Electric Company LLC  
Project/Site: RFP-CBA-022 (21 DAY TAT)

TestAmerica Job ID: 160-1974-1

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### Job ID: 160-1974-1 (Continued)

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#### Laboratory: TestAmerica St. Louis (Continued)

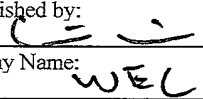
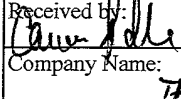

No difficulties were encountered during the % solids analyses. All quality control parameters were within the acceptance limits.

#### RADIUM-226 BY GAMMA SPEC (21 DAY INGROWTH)

Samples L050103TUB00 (160-1974-1), L050104TUB00 (160-1974-2), L050176TUB00 (160-1974-3), L050177TUB00 (160-1974-4), L050186TUB00 (160-1974-5) and L050187TUB00 (160-1974-6) were analyzed for Radium-226 by gamma spec (21 day ingrowth) in accordance with EPA GA\_01\_R. The samples were leached on 04/04/2013, prepared on 04/08/2013 and analyzed on 04/29/2013.

Americium 241, Cobalt 60 and Protactinium 234m exceeded the rpd limit for the duplicate of sample 160-1973-1; however, the RER was within QC limits.

Refer to the QC report for details. No other difficulties were encountered during the Radium 226 analyses. All other quality control parameters were within the acceptance limits.

Hematite Decommissioning Project				Procedure HDP-PR-QA-006, Chain of Custody												Page 1 of 1					
				Revision: 3																	
				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-040313-01 Page 1/1				Requested Analysis												Laboratory Name: TA-MO					
Project Name: Westinghouse Electric Company  Contact Person: Gerald Rood  Phone Number: 314-810-3382  Sampler Name Josh Bushman				Comp (C) or Grab (G)	Gamma Spec	Isotopic Uranium	Tc-99	Gamma Spec (21 day ingrow for Ra-226)							Total Containers						
																Laboratory Address: 13715 Rider Trail North					
																		Laboratory Phone No. 314-298-8566			
																				Laboratory Contact Person: Joe Walker	
Turn Around Time																					
Normal (21 days)																					
Remarks																					
Sample ID	Date	Time	Matrix																		
L050103TUB00	3/26/2013	11:45	S	G	X		X								1						
L050104TUB00	3/26/2013	11:50	S	G	X		X								1						
L050176TUB00	3/26/2013	11:45	S	G	X		X								1						
L050177TUB00	3/26/2013	11:40	S	G	X		X								1						
L050186TUB00	3/26/2013	11:30	S	G	X		X								1						
L050187TUB00	3/26/2013	11:35	S	G	X		X								1						
Relinquished by: 	Date/Time 4/3/13 14:55	Received by: 		Date/Time 4/3/13 14:55	Total 6	Cooler Temperature: Ambient															
Company Name: WEL		Company Name: TA			Cooler ID: 0326-04	Shipper and Number:															
Received by:	Date/Time	Relinquished by:		Date/Time	Verified By: 																
Company Name:		Company Name:																			
Relinquished by:	Date/Time	Received by:		Date/Time																	
Company Name:		Company Name:																			

1974

## Login Sample Receipt Checklist

Client: Westinghouse Electric Company LLC

Job Number: 160-1974-1

Login Number: 1974

List Source: TestAmerica St. Louis

List Number: 1

Creator: Clarke, Jill

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.	True	
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.	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: RFP-CBA-022 (21 DAY TAT)

TestAmerica Job ID: 160-1974-1

### 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
F	Duplicate RPD exceeds the control limit
U	Indicates the analyte was analyzed for but not detected.

### 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
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
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)
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: RFP-CBA-022 (21 DAY TAT)

TestAmerica Job ID: 160-1974-1

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	Radium-226 & 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: RFP-CBA-022 (21 DAY TAT)

TestAmerica Job ID: 160-1974-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
160-1974-1	L050103TUB00	Solid	03/26/13 11:45	04/03/13 14:55
160-1974-2	L050104TUB00	Solid	03/26/13 11:50	04/03/13 14:55
160-1974-3	L050176TUB00	Solid	03/26/13 11:45	04/03/13 14:55
160-1974-4	L050177TUB00	Solid	03/26/13 11:40	04/03/13 14:55
160-1974-5	L050186TUB00	Solid	03/26/13 11:30	04/03/13 14:55
160-1974-6	L050187TUB00	Solid	03/26/13 11:35	04/03/13 14:55

# Client Sample Results

Client: Westinghouse Electric Company LLC  
Project/Site: RFP-CBA-022 (21 DAY TAT)

TestAmerica Job ID: 160-1974-1

**Client Sample ID: L050103TUB00**

**Lab Sample ID: 160-1974-1**

**Date Collected: 03/26/13 11:45**

**Matrix: Solid**

**Date Received: 04/03/13 14:55**

**Percent Solids: 78.7**

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
<b>Technetium 99</b>	<b>0.00016</b>	<b>J</b>	0.00070	0.000021	mg/Kg	☼	04/24/13 09:40	04/25/13 16:52	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
<b>Technetium 99</b>	<b>2.76</b>		0.206	0.363	1.41	0.241	pCi/g	04/24/13 09:40	04/25/13 16:52	1
<b>Carrier</b>	<b>%Yield</b>	<b>Qualifier</b>	<b>Limits</b>					<b>Prepared</b>	<b>Analyzed</b>	<b>Dil Fac</b>
Re	90		30 - 110					04/24/13 09:40	04/25/13 16:52	1

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

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
<b>Actinium 228</b>	<b>0.604</b>		0.0774	0.0989		0.0527	pCi/g	04/08/13 10:44	04/29/13 18:49	1
<b>Bismuth 212</b>	<b>0.925</b>		0.267	0.284		0.197	pCi/g	04/08/13 10:44	04/29/13 18:49	1
<b>Bismuth 214</b>	<b>0.609</b>		0.0790	0.101		0.0577	pCi/g	04/08/13 10:44	04/29/13 18:49	1
<b>Lead 212</b>	<b>0.554</b>		0.0526	0.0889		0.0507	pCi/g	04/08/13 10:44	04/29/13 18:49	1
<b>Lead 214</b>	<b>0.712</b>		0.0790	0.108		0.0584	pCi/g	04/08/13 10:44	04/29/13 18:49	1
<b>Potassium 40</b>	<b>11.3</b>		0.860	1.44		0.322	pCi/g	04/08/13 10:44	04/29/13 18:49	1
Protactinium 231	0.295	U	0.191	0.194		0.804	pCi/g	04/08/13 10:44	04/29/13 18:49	1
<b>Radium 226</b>	<b>0.609</b>		0.0790	0.101	1.00	0.0577	pCi/g	04/08/13 10:44	04/29/13 18:49	1
<b>Thorium 232</b>	<b>0.604</b>		0.0774	0.0989		0.0527	pCi/g	04/08/13 10:44	04/29/13 18:49	1
<b>Thorium 234</b>	<b>0.801</b>		0.504	0.511		0.664	pCi/g	04/08/13 10:44	04/29/13 18:49	1
Uranium 235	0.0564	U	0.135	0.135		0.191	pCi/g	04/08/13 10:44	04/29/13 18:49	1
Americium 241	-0.00680	U	0.0499	0.0499		0.0842	pCi/g	04/08/13 10:44	04/29/13 18:49	1
Protactinium 234m	-0.429	U	11.6	11.6		3.44	pCi/g	04/08/13 10:44	04/29/13 18:49	1

**Client Sample ID: L050104TUB00**

**Lab Sample ID: 160-1974-2**

**Date Collected: 03/26/13 11:50**

**Matrix: Solid**

**Date Received: 04/03/13 14:55**

**Percent Solids: 76.7**

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
<b>Technetium 99</b>	<b>0.00012</b>	<b>J</b>	0.00072	0.000022	mg/Kg	☼	04/24/13 10:41	04/25/13 17:29	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
<b>Technetium 99</b>	<b>2.08</b>		0.230	0.331	1.44	0.246	pCi/g	04/24/13 10:41	04/25/13 17:29	1
<b>Carrier</b>	<b>%Yield</b>	<b>Qualifier</b>	<b>Limits</b>					<b>Prepared</b>	<b>Analyzed</b>	<b>Dil Fac</b>
Re	90		30 - 110					04/24/13 10:41	04/25/13 17:29	1

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

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
<b>Actinium 228</b>	<b>1.28</b>		0.176	0.215		0.104	pCi/g	04/08/13 10:44	04/29/13 13:16	1

TestAmerica St. Louis

# Client Sample Results

Client: Westinghouse Electric Company LLC  
Project/Site: RFP-CBA-022 (21 DAY TAT)

TestAmerica Job ID: 160-1974-1

**Client Sample ID: L050104TUB00**

**Lab Sample ID: 160-1974-2**

Date Collected: 03/26/13 11:50

Matrix: Solid

Date Received: 04/03/13 14:55

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

Analyte	Result	Qualifier	Count	Total	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Bismuth 212	1.47		0.573	0.591		0.510	pCi/g	04/08/13 10:44	04/29/13 13:16	1
Bismuth 214	1.34		0.139	0.191		0.0897	pCi/g	04/08/13 10:44	04/29/13 13:16	1
Lead 212	1.31		0.0900	0.167		0.0768	pCi/g	04/08/13 10:44	04/29/13 13:16	1
Lead 214	1.59		0.124	0.198		0.0684	pCi/g	04/08/13 10:44	04/29/13 13:16	1
Potassium 40	21.1		1.40	2.47		0.554	pCi/g	04/08/13 10:44	04/29/13 13:16	1
Protactinium 231	0.807	U	0.348	0.357		1.41	pCi/g	04/08/13 10:44	04/29/13 13:16	1
Radium 226	1.34		0.139	0.191	1.00	0.0897	pCi/g	04/08/13 10:44	04/29/13 13:16	1
Thorium 232	1.28		0.176	0.215		0.104	pCi/g	04/08/13 10:44	04/29/13 13:16	1
Thorium 234	1.95		0.790	0.813		0.967	pCi/g	04/08/13 10:44	04/29/13 13:16	1
Uranium 235	0.225	U	0.151	0.153		0.241	pCi/g	04/08/13 10:44	04/29/13 13:16	1
Americium 241	-0.107	U	0.808	0.808		0.120	pCi/g	04/08/13 10:44	04/29/13 13:16	1
Protactinium 234m	0.951	U	3.63	3.63		6.33	pCi/g	04/08/13 10:44	04/29/13 13:16	1

**Client Sample ID: L050176TUB00**

**Lab Sample ID: 160-1974-3**

Date Collected: 03/26/13 11:45

Matrix: Solid

Date Received: 04/03/13 14:55

Percent Solids: 75.4

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Technetium 99	0.000033	J	0.00072	0.000022	mg/Kg	☆	04/24/13 11:01	04/25/13 17:36	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	0.568		0.155	0.177	1.43	0.245	pCi/g	04/24/13 11:01	04/25/13 17:36	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Re	93		30 - 110					04/24/13 11:01	04/25/13 17:36	1

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

Analyte	Result	Qualifier	Count	Total	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	1.16		0.136	0.180		0.0863	pCi/g	04/08/13 10:44	04/29/13 18:50	1
Bismuth 212	1.49		0.460	0.485		0.426	pCi/g	04/08/13 10:44	04/29/13 18:50	1
Bismuth 214	1.19		0.122	0.174		0.0769	pCi/g	04/08/13 10:44	04/29/13 18:50	1
Lead 212	1.16		0.0789	0.169		0.0578	pCi/g	04/08/13 10:44	04/29/13 18:50	1
Lead 214	1.22		0.0953	0.159		0.0806	pCi/g	04/08/13 10:44	04/29/13 18:50	1
Potassium 40	17.8		1.28	2.23		0.432	pCi/g	04/08/13 10:44	04/29/13 18:50	1
Protactinium 231	0.601	U	0.232	0.241		1.14	pCi/g	04/08/13 10:44	04/29/13 18:50	1
Radium 226	1.19		0.122	0.174	1.00	0.0769	pCi/g	04/08/13 10:44	04/29/13 18:50	1
Thorium 232	1.16		0.136	0.180		0.0863	pCi/g	04/08/13 10:44	04/29/13 18:50	1
Thorium 234	1.28		0.604	0.619		0.817	pCi/g	04/08/13 10:44	04/29/13 18:50	1
Uranium 235	0.127	U	0.146	0.147		0.248	pCi/g	04/08/13 10:44	04/29/13 18:50	1
Americium 241	-0.0310	U	0.119	0.119		0.104	pCi/g	04/08/13 10:44	04/29/13 18:50	1
Protactinium 234m	-0.514	U	3.26	3.26		5.79	pCi/g	04/08/13 10:44	04/29/13 18:50	1

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# Client Sample Results

Client: Westinghouse Electric Company LLC  
Project/Site: RFP-CBA-022 (21 DAY TAT)

TestAmerica Job ID: 160-1974-1

Client Sample ID: L050177TUB00

Lab Sample ID: 160-1974-4

Date Collected: 03/26/13 11:40

Matrix: Solid

Date Received: 04/03/13 14:55

Percent Solids: 77.8

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Technetium 99	0.000088	J	0.00073	0.000022	mg/Kg	☼	04/24/13 11:22	04/25/13 17:44	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	1.51		0.100	0.196	1.46	0.251	pCi/g	04/24/13 11:22	04/25/13 17:44	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Re	87		30 - 110					04/24/13 11:22	04/25/13 17:44	1

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

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	1.16		0.188	0.219		0.170	pCi/g	04/08/13 10:44	04/29/13 19:04	1
Bismuth 212	0.634	U	0.514	0.518		0.807	pCi/g	04/08/13 10:44	04/29/13 19:04	1
Bismuth 214	1.24		0.158	0.199		0.103	pCi/g	04/08/13 10:44	04/29/13 19:04	1
Lead 212	0.874		0.164	0.189		0.160	pCi/g	04/08/13 10:44	04/29/13 19:04	1
Lead 214	1.23		0.165	0.203		0.127	pCi/g	04/08/13 10:44	04/29/13 19:04	1
Potassium 40	19.7		1.67	2.53		0.594	pCi/g	04/08/13 10:44	04/29/13 19:04	1
Protactinium 231	0.773	U	0.595	0.600		0.922	pCi/g	04/08/13 10:44	04/29/13 19:04	1
Radium 226	1.24		0.158	0.199	1.00	0.103	pCi/g	04/08/13 10:44	04/29/13 19:04	1
Thorium 232	1.16		0.188	0.219		0.170	pCi/g	04/08/13 10:44	04/29/13 19:04	1
Thorium 234	0.510	U	0.504	0.506		1.34	pCi/g	04/08/13 10:44	04/29/13 19:04	1
Uranium 235	0.121	U	0.212	0.213		0.331	pCi/g	04/08/13 10:44	04/29/13 19:04	1
Americium 241	0.0220	U	0.0799	0.0799		0.134	pCi/g	04/08/13 10:44	04/29/13 19:04	1
Protactinium 234m	0.629	U	4.62	4.62		8.28	pCi/g	04/08/13 10:44	04/29/13 19:04	1

Client Sample ID: L050186TUB00

Lab Sample ID: 160-1974-5

Date Collected: 03/26/13 11:30

Matrix: Solid

Date Received: 04/03/13 14:55

Percent Solids: 80.1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Technetium 99	0.000063	J	0.00069	0.000021	mg/Kg	☼	04/24/13 11:42	04/25/13 17:51	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	1.08		0.109	0.164	1.38	0.236	pCi/g	04/24/13 11:42	04/25/13 17:51	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Re	90		30 - 110					04/24/13 11:42	04/25/13 17:51	1

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

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	0.677		0.0928	0.116		0.0958	pCi/g	04/08/13 10:44	04/29/13 20:12	1

TestAmerica St. Louis

# Client Sample Results

Client: Westinghouse Electric Company LLC  
Project/Site: RFP-CBA-022 (21 DAY TAT)

TestAmerica Job ID: 160-1974-1

Client Sample ID: L050186TUB00

Lab Sample ID: 160-1974-5

Date Collected: 03/26/13 11:30

Matrix: Solid

Date Received: 04/03/13 14:55

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

Analyte	Result	Qualifier	Count	Total	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Bismuth 212	0.747		0.275	0.286		0.251	pCi/g	04/08/13 10:44	04/29/13 20:12	1
Bismuth 214	0.798		0.0865	0.120		0.0550	pCi/g	04/08/13 10:44	04/29/13 20:12	1
Lead 212	0.706		0.0608	0.110		0.0557	pCi/g	04/08/13 10:44	04/29/13 20:12	1
Lead 214	0.846		0.0784	0.118		0.0627	pCi/g	04/08/13 10:44	04/29/13 20:12	1
Potassium 40	12.4		0.900	1.55		0.209	pCi/g	04/08/13 10:44	04/29/13 20:12	1
Protactinium 231	0.308	U	0.285	0.287		0.759	pCi/g	04/08/13 10:44	04/29/13 20:12	1
Radium 226	0.798		0.0865	0.120	1.00	0.0550	pCi/g	04/08/13 10:44	04/29/13 20:12	1
Thorium 232	0.677		0.0928	0.116		0.0958	pCi/g	04/08/13 10:44	04/29/13 20:12	1
Thorium 234	0.778	U	0.295	0.306		0.788	pCi/g	04/08/13 10:44	04/29/13 20:12	1
Uranium 235	0.121	U	0.119	0.119		0.204	pCi/g	04/08/13 10:44	04/29/13 20:12	1
Americium 241	-0.00388	U	0.0494	0.0494		0.0836	pCi/g	04/08/13 10:44	04/29/13 20:12	1
Protactinium 234m	1.86	U	1.47	1.48		5.31	pCi/g	04/08/13 10:44	04/29/13 20:12	1

Client Sample ID: L050187TUB00

Lab Sample ID: 160-1974-6

Date Collected: 03/26/13 11:35

Matrix: Solid

Date Received: 04/03/13 14:55

Percent Solids: 78.2

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Technetium 99	0.000092	J	0.00072	0.000021	mg/Kg	☆	04/24/13 12:02	04/25/13 17:59	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	1.57		0.0929	0.193	1.43	0.245	pCi/g	04/24/13 12:02	04/25/13 17:59	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Re	89		30 - 110					04/24/13 12:02	04/25/13 17:59	1

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

Analyte	Result	Qualifier	Count	Total	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.805		0.101	0.130		0.101	pCi/g	04/08/13 10:44	04/29/13 20:11	1
Bismuth 212	0.671		0.328	0.336		0.479	pCi/g	04/08/13 10:44	04/29/13 20:11	1
Bismuth 214	0.780		0.0852	0.118		0.0699	pCi/g	04/08/13 10:44	04/29/13 20:11	1
Lead 212	0.828		0.0648	0.125		0.0541	pCi/g	04/08/13 10:44	04/29/13 20:11	1
Lead 214	1.08		0.0916	0.145		0.0632	pCi/g	04/08/13 10:44	04/29/13 20:11	1
Potassium 40	13.6		0.983	1.70		0.355	pCi/g	04/08/13 10:44	04/29/13 20:11	1
Protactinium 231	0.217	U	0.178	0.179		1.01	pCi/g	04/08/13 10:44	04/29/13 20:11	1
Radium 226	0.780		0.0852	0.118	1.00	0.0699	pCi/g	04/08/13 10:44	04/29/13 20:11	1
Thorium 232	0.805		0.101	0.130		0.101	pCi/g	04/08/13 10:44	04/29/13 20:11	1
Thorium 234	1.38		0.647	0.663		0.799	pCi/g	04/08/13 10:44	04/29/13 20:11	1
Uranium 235	0.227		0.130	0.132		0.173	pCi/g	04/08/13 10:44	04/29/13 20:11	1
Americium 241	0.00332	U	0.0590	0.0590		0.0997	pCi/g	04/08/13 10:44	04/29/13 20:11	1
Protactinium 234m	1.04	U	2.61	2.61		4.58	pCi/g	04/08/13 10:44	04/29/13 20:11	1

TestAmerica St. Louis

# QC Sample Results

Client: Westinghouse Electric Company LLC  
Project/Site: RFP-CBA-022 (21 DAY TAT)

TestAmerica Job ID: 160-1974-1

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

Lab Sample ID: MB 160-46432/1-A

Matrix: Solid

Analysis Batch: 47954

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 46432

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Technetium 99	ND		0.00051	0.000015	mg/Kg		04/24/13 09:00	04/25/13 16:37	1

Lab Sample ID: LCS 160-46432/2-A

Matrix: Solid

Analysis Batch: 47954

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 46432

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Technetium 99	0.0123	0.0120		mg/Kg		97	80 - 120

Lab Sample ID: 160-1974-1 MS

Matrix: Solid

Analysis Batch: 47954

Client Sample ID: L050103TUB00

Prep Type: Total/NA

Prep Batch: 46432

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Technetium 99	0.00016	J	0.0163	0.0151		mg/Kg	☼	92	75 - 125

Lab Sample ID: 160-1974-1 MSD

Matrix: Solid

Analysis Batch: 47954

Client Sample ID: L050103TUB00

Prep Type: Total/NA

Prep Batch: 46432

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Technetium 99	0.00016	J	0.0166	0.0152		mg/Kg	☼	90	75 - 125	1	30

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

Lab Sample ID: MB 160-46432/1-A

Matrix: Solid

Analysis Batch: 47955

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 46432

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Technetium 99	0.05072	U	0.0300	0.0311	1.03	0.176	pCi/g	04/24/13 09:00	04/25/13 16:37	1

Carrier	MB %Yield	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Re	98		30 - 110	04/24/13 09:00	04/25/13 16:37	1

Lab Sample ID: LCS 160-46432/2-A

Matrix: Solid

Analysis Batch: 47955

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 46432

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits
Technetium 99	211	204.9		20.0	1.03	0.176	pCi/g	97	80 - 120

Carrier	LCS %Yield	LCS Qualifier	Limits
Re	97		30 - 110

TestAmerica St. Louis

# QC Sample Results

Client: Westinghouse Electric Company LLC  
Project/Site: RFP-CBA-022 (21 DAY TAT)

TestAmerica Job ID: 160-1974-1

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

Lab Sample ID: 160-1974-1 MS

Matrix: Solid

Analysis Batch: 47955

Client Sample ID: L050103TUB00

Prep Type: Total/NA

Prep Batch: 46432

Analyte	Sample Result	Sample Qual	Spike Added	MS Result	MS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits
Technetium 99	2.76		279	258.6		26.6	1.36	0.233	pCi/g	92	75 - 125
Carrier	MS %Yield	MS Qualifier	Limits								
Re	93		30 - 110								

Lab Sample ID: 160-1974-1 MSD

Matrix: Solid

Analysis Batch: 47955

Client Sample ID: L050103TUB00

Prep Type: Total/NA

Prep Batch: 46432

Analyte	Sample Result	Sample Qual	Spike Added	MSD Result	MSD Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits	RPD	RPD Limit
Technetium 99	2.76		285	260.1		27.9	1.39	0.237	pCi/g	90	75 - 125	1	30
Carrier	MSD %Yield	MSD Qualifier	Limits										
Re	92		30 - 110										

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

Lab Sample ID: MB 160-44755/1-A

Matrix: Solid

Analysis Batch: 48156

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 44755

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	0.008513	U	0.0485	0.0486		0.0919	pCi/g	04/08/13 10:44	04/29/13 20:09	1
Bismuth 212	0.04528	U	0.153	0.153		0.282	pCi/g	04/08/13 10:44	04/29/13 20:09	1
Bismuth 214	0.003745	U	0.0206	0.0206		0.0392	pCi/g	04/08/13 10:44	04/29/13 20:09	1
Lead 212	-0.005785	U	0.0377	0.0377		0.0227	pCi/g	04/08/13 10:44	04/29/13 20:09	1
Lead 214	0.005287	U	0.0190	0.0190		0.0342	pCi/g	04/08/13 10:44	04/29/13 20:09	1
Potassium 40	0.1108	U	0.153	0.153		0.251	pCi/g	04/08/13 10:44	04/29/13 20:09	1
Protactinium 231	0.0000	U	0.135	0.135		0.489	pCi/g	04/08/13 10:44	04/29/13 20:09	1
Radium 226	0.003745	U	0.0206	0.0206	1.00	0.0392	pCi/g	04/08/13 10:44	04/29/13 20:09	1
Thorium 232	0.008513	U	0.0485	0.0486		0.0919	pCi/g	04/08/13 10:44	04/29/13 20:09	1
Thorium 234	-0.04186	U	0.216	0.216		0.297	pCi/g	04/08/13 10:44	04/29/13 20:09	1
Uranium 235	0.02972	U	0.0365	0.0366		0.0654	pCi/g	04/08/13 10:44	04/29/13 20:09	1
Americium 241	0.005776	U	0.0125	0.0125		0.0219	pCi/g	04/08/13 10:44	04/29/13 20:09	1
Protactinium 234m	0.0000	U	0.424	0.424		3.73	pCi/g	04/08/13 10:44	04/29/13 20:09	1

Lab Sample ID: LCS 160-44755/2-A

Matrix: Solid

Analysis Batch: 48157

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 44755

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits
Americium 241	97.8	97.85		10.2		0.955	pCi/g	100	87 - 116
Cesium 137	31.9	31.49		3.31		0.194	pCi/g	99	87 - 120

TestAmerica St. Louis

# QC Sample Results

Client: Westinghouse Electric Company LLC  
Project/Site: RFP-CBA-022 (21 DAY TAT)

TestAmerica Job ID: 160-1974-1

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

Lab Sample ID: LCS 160-44755/2-A  
Matrix: Solid  
Analysis Batch: 48157

Client Sample ID: Lab Control Sample  
Prep Type: Total/NA  
Prep Batch: 44755

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits
Cobalt 60	25.9	25.22		2.55		0.108	pCi/g	97	87 - 115

Lab Sample ID: 160-1973-A-1-D DU  
Matrix: Solid  
Analysis Batch: 48161

Client Sample ID: Duplicate  
Prep Type: Total/NA  
Prep Batch: 44755

Analyte	Sample Result	Sample Qual	DU Result	DU Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	RPD	Limit
Actinium 228	0.911		0.8787		0.139		0.124	pCi/g	4	40
Bismuth 212	1.27		0.8676		0.317		0.402	pCi/g	38	40
Bismuth 214	1.17		1.053		0.149		0.0625	pCi/g	10	40
Lead 212	1.08		0.9931		0.146		0.0605	pCi/g	8	40
Lead 214	1.34		1.135		0.143		0.0758	pCi/g	16	40
Potassium 40	18.5		17.42		2.09		0.366	pCi/g	6	40
Protactinium 231	0.573	U	0.4713	U	0.324		1.04	pCi/g	20	40
Radium 226	1.17		1.053		0.149	1.00	0.0625	pCi/g	10	40
Thorium 232	0.911		0.8787		0.139		0.124	pCi/g	4	40
Thorium 234	4.32		3.967		1.11		1.13	pCi/g	9	40
Uranium 235	0.758		0.9068		0.220		0.244	pCi/g	18	40
Americium 241	0.0133	U	0.006286	U F	0.0699		0.117	pCi/g	72	40
Protactinium 234m	1.41	U	4.480	U F	3.48		5.52	pCi/g	104	40



# QC Association Summary

Client: Westinghouse Electric Company LLC  
Project/Site: RFP-CBA-022 (21 DAY TAT)

TestAmerica Job ID: 160-1974-1

## Metals

### Prep Batch: 46432

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-1974-1	L050103TUB00	Total/NA	Solid	None	
160-1974-1 MS	L050103TUB00	Total/NA	Solid	None	
160-1974-1 MSD	L050103TUB00	Total/NA	Solid	None	
160-1974-2	L050104TUB00	Total/NA	Solid	None	
160-1974-3	L050176TUB00	Total/NA	Solid	None	
160-1974-4	L050177TUB00	Total/NA	Solid	None	
160-1974-5	L050186TUB00	Total/NA	Solid	None	
160-1974-6	L050187TUB00	Total/NA	Solid	None	
LCS 160-46432/2-A	Lab Control Sample	Total/NA	Solid	None	
MB 160-46432/1-A	Method Blank	Total/NA	Solid	None	

### Analysis Batch: 47954

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-1974-1	L050103TUB00	Total/NA	Solid	6020A	46432
160-1974-1 MS	L050103TUB00	Total/NA	Solid	6020A	46432
160-1974-1 MSD	L050103TUB00	Total/NA	Solid	6020A	46432
160-1974-2	L050104TUB00	Total/NA	Solid	6020A	46432
160-1974-3	L050176TUB00	Total/NA	Solid	6020A	46432
160-1974-4	L050177TUB00	Total/NA	Solid	6020A	46432
160-1974-5	L050186TUB00	Total/NA	Solid	6020A	46432
160-1974-6	L050187TUB00	Total/NA	Solid	6020A	46432
LCS 160-46432/2-A	Lab Control Sample	Total/NA	Solid	6020A	46432
MB 160-46432/1-A	Method Blank	Total/NA	Solid	6020A	46432

## General Chemistry

### Analysis Batch: 44123

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-1974-1	L050103TUB00	Total/NA	Solid	Moisture	
160-1974-2	L050104TUB00	Total/NA	Solid	Moisture	
160-1974-3	L050176TUB00	Total/NA	Solid	Moisture	
160-1974-4	L050177TUB00	Total/NA	Solid	Moisture	
160-1974-5	L050186TUB00	Total/NA	Solid	Moisture	
160-1974-6	L050187TUB00	Total/NA	Solid	Moisture	
160-1974-6 DU	L050187TUB00	Total/NA	Solid	Moisture	

## Rad

### Leach Batch: 44137

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-1973-A-1-D DU	Duplicate	Total/NA	Solid	Dry and Grind	

### Leach Batch: 44155

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-1974-1	L050103TUB00	Total/NA	Solid	Dry and Grind	
160-1974-2	L050104TUB00	Total/NA	Solid	Dry and Grind	
160-1974-3	L050176TUB00	Total/NA	Solid	Dry and Grind	
160-1974-4	L050177TUB00	Total/NA	Solid	Dry and Grind	
160-1974-5	L050186TUB00	Total/NA	Solid	Dry and Grind	
160-1974-6	L050187TUB00	Total/NA	Solid	Dry and Grind	

TestAmerica St. Louis

## QC Association Summary

Client: Westinghouse Electric Company LLC  
Project/Site: RFP-CBA-022 (21 DAY TAT)

TestAmerica Job ID: 160-1974-1

### Rad (Continued)

#### Prep Batch: 44755

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-1973-A-1-D DU	Duplicate	Total/NA	Solid	Fill_Geo-21	44137
160-1974-1	L050103TUB00	Total/NA	Solid	Fill_Geo-21	44155
160-1974-2	L050104TUB00	Total/NA	Solid	Fill_Geo-21	44155
160-1974-3	L050176TUB00	Total/NA	Solid	Fill_Geo-21	44155
160-1974-4	L050177TUB00	Total/NA	Solid	Fill_Geo-21	44155
160-1974-5	L050186TUB00	Total/NA	Solid	Fill_Geo-21	44155
160-1974-6	L050187TUB00	Total/NA	Solid	Fill_Geo-21	44155
LCS 160-44755/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	
MB 160-44755/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	

#### Prep Batch: 46432

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-1974-1	L050103TUB00	Total/NA	Solid	None	
160-1974-1 MS	L050103TUB00	Total/NA	Solid	None	
160-1974-1 MSD	L050103TUB00	Total/NA	Solid	None	
160-1974-2	L050104TUB00	Total/NA	Solid	None	
160-1974-3	L050176TUB00	Total/NA	Solid	None	
160-1974-4	L050177TUB00	Total/NA	Solid	None	
160-1974-5	L050186TUB00	Total/NA	Solid	None	
160-1974-6	L050187TUB00	Total/NA	Solid	None	
LCS 160-46432/2-A	Lab Control Sample	Total/NA	Solid	None	
MB 160-46432/1-A	Method Blank	Total/NA	Solid	None	

## Tracer/Carrier Summary

Client: Westinghouse Electric Company LLC  
Project/Site: RFP-CBA-022 (21 DAY TAT)

TestAmerica Job ID: 160-1974-1

**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)	
160-1974-1	L050103TUB00	90	
160-1974-1 MS	L050103TUB00	93	
160-1974-1 MSD	L050103TUB00	92	
160-1974-2	L050104TUB00	90	
160-1974-3	L050176TUB00	93	
160-1974-4	L050177TUB00	87	
160-1974-5	L050186TUB00	90	
160-1974-6	L050187TUB00	89	
LCS 160-46432/2-A	Lab Control Sample	97	
MB 160-46432/1-A	Method Blank	98	
<b>Tracer/Carrier Legend</b>			
Re = Re			