

# 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: 160-17454-1

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

For:

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

Attn: Mr. Martin Swanson



Authorized for release by:  
6/27/2016 11:56:43 AM

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 (21 DAY TAT)

TestAmerica Job ID: 160-17454-1

**Job ID: 160-17454-1**

**Laboratory: TestAmerica St. Louis**

## Narrative

**Client: Westinghouse Electric Company LLC**

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

**Report Number: 160-17454-1**

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 sample was received on 5/19/2016 11:30 AM; the sample arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 20.0° C.

### **RADIUM-226 (GFPC)-21 DAY INGROWTH**

Sample 3970-EA-160519-00-01 (160-17454-1) was analyzed for Radium-226 (GFPC)-21 day ingrowth in accordance with EPA Method 903.0. The samples were prepared on 05/31/2016 and analyzed on 06/22/2016.

Preparation Batch 160-253972:

Insufficient sample volume was available to perform a sample duplicate (DUP) for sample 3970-EA-160519-00-01 (160-17454-1). A laboratory control sample/ laboratory control sample duplicate (LCS/LCSD) were prepared instead. The sample was a filter that was dissolved and split between multiple analyses.

The method blank (MB) has radium-226 activity above the MDC and RL. The following associated samples are non-detect for the contaminant, therefore re-analysis is not required. The data have been qualified and reported. 3970-EA-160519-00-01 (160-17454-1), (LCS 160-253972/2-A), (LCSD 160-253972/3-A) and (MB 160-253972/1-A).

# Case Narrative

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

TestAmerica Job ID: 160-17454-1

## Job ID: 160-17454-1 (Continued)

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

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

#### ISOTOPIC THORIUM (ALPHA SPECTROMETRY)

Sample 3970-EA-160519-00-01 (160-17454-1) was analyzed for Isotopic Thorium (Alpha Spectrometry) in accordance with A-01-R. The samples were prepared on 06/01/2016 and analyzed on 06/13/2016.

Preparation Batch 160-254002:

This filter sample was split among several analyses; an LCSD was prepared in batch 254002 to meet QC requirements.  
3970-EA-160519-00-01 (160-17454-1)

Thorium-230 was detected in method blank MB 160-254002/1-A at a level that was above the method detection limit but below the reporting limit. The value should be considered an estimate.

The Laboratory Control Sample (LCS) spike recovery (129%) associated with the following sample is outside the upper QC limit of (81-118%) indicating a potential positive bias for that analyte : 3970-EA-160519-00-01 (160-17454-1), (LCS 160-254002/2-A), (LCSD 160-254002/3-A) and (MB 160-254002/1-A). This analyte was not observed above the requested limit in the associated samples; therefore the sample data was not adversely affected by this excursion. The data have been qualified and reported.

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

#### ISOTOPIC URANIUM (ALPHA SPECTROMETRY)

Sample 3970-EA-160519-00-01 (160-17454-1) was analyzed for Isotopic Uranium (Alpha Spectrometry) in accordance with A-01-R. The samples were prepared on 06/01/2016 and analyzed on 06/13/2016.

Preparation Batch 160-254004:

This filter sample was split among several analyses; an LCSD was prepared in batch 254004 to meet QC requirements.  
3970-EA-160519-00-01 (160-17454-1)

Uranium 234 and Uranium 238 were detected in method blank MB 160-254004/1-A at levels that were above the method detection limit but below the reporting limit. The values should be considered estimates.

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

#### TECHNETIUM-99 (LSC)

Sample 3970-EA-160519-00-01 (160-17454-1) was analyzed for Technetium-99 (LSC) in accordance with DOE Tc-02-RC. The samples were prepared on 06/01/2016 and analyzed on 06/06/2016.

Preparation Batch 160-254097:

This filter sample was split among several analyses; an LCSD was prepared in batch 254097 to meet QC requirements.  
3970-EA-160519-00-01 (160-17454-1)

The detection goal of 1.00 pCi/Samples were not met for the following samples due to insufficient sample available for analysis.  
3970-EA-160519-00-01 (160-17454-1) and (MB 160-254097/1-A). Analytical results are reported with the detection limit achieved.

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.

<b>Chain of Custody ID No.</b> 051916-01		<b>Page</b> 1/1		<b>Requested Analysis</b>										<b>Laboratory Name:</b>			
<b>Project Name:</b> Westinghouse Electric Company				Comp (C) or Grab (G)	Isotopic Uranium (filter)	Th-232 (filter)	Pb-210 (filter)	Ra-226 (filter)	Tc-99 (filter)						Total Containers	TA-MO	
<b>Contact Person:</b> W. Clark Evers																<b>Laboratory Address:</b> 13715 Rider Trail North Earth City, MO 63045	
<b>Phone Number:</b> 314-810-3336																<b>Phone No.</b> 314-298-8566	
<b>Sampler Name:</b> C. Gorski																<b>Laboratory Contact Person:</b> Ivan Vania	
				<b>Phone No.</b> 708-870-8453													
				<b>Turn Around Time</b>													
				Normal (21 days)													
				Remarks													
<b>Sample ID</b>	<b>Date</b>	<b>Time</b>	<b>Matrix</b>														
3970-EA-160519-00-01	5/19/2016	7:30	F	C	X	X	X	X						1	BSA02-20 Comp		



160-17454 Chain of Custody

<b>Relinquished by:</b> Gorski <i>C. Gorski</i>	<b>Date/Time:</b> 5-19-16 9:30	<b>Received by:</b> <i>[Signature]</i>	<b>Date/Time:</b> 5-19-16 9:30	<b>Total Number of Containers:</b> 1	<b>Cooler Temperature:</b> Ambient
<b>Company Name:</b> WEC		<b>Company Name:</b> CROSSROADS		<b>Container ID:</b> 0519-01	<b>Shipper and Number:</b>
<b>Received by:</b>	<b>Date/Time:</b>	<b>Relinquished by:</b>	<b>Date/Time:</b>	<b>Comments:</b> PO #4500404709	
<b>Company Name:</b>		<b>Company Name:</b>			
<b>Relinquished by:</b> <i>[Signature]</i> 3815	<b>Date/Time:</b> 5-19-16 11:30	<b>Received by:</b> <i>[Signature]</i>	<b>Date/Time:</b> 5-19-16 11:30	<b>Verified By:</b> C. Gorski <i>C. Gorski</i> 5/19/16	
<b>Company Name:</b> CROSSROADS		<b>Company Name:</b> CROSSROADS			

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# Login Sample Receipt Checklist

Client: Westinghouse Electric Company LLC

Job Number: 160-17454-1

**Login Number: 17454**

**List Number: 1**

**Creator: Clarke, Jill C**

**List Source: TestAmerica St. Louis**

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 (21 DAY TAT)

TestAmerica Job ID: 160-17454-1

## Qualifiers

### Rad

Qualifier	Qualifier Description
U	Result is less than the sample detection limit.
G	The Sample MDC is greater than the requested RL.
*	LCS or LCSD is outside acceptance limits.

## 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 (21 DAY TAT)

TestAmerica Job ID: 160-17454-1

Method	Method Description	Protocol	Laboratory
903.0	Radium-226 (GFPC)	EPA	TAL SL
A-01-R	Isotopic Thorium (Alpha Spectrometry)	DOE	TAL SL
A-01-R	Isotopic Uranium (Alpha Spectrometry)	DOE	TAL SL
TC-02-RC	Technetium-99 (LSC)	DOE	TAL SL

**Protocol References:**

DOE = U.S. Department of Energy

EPA = US Environmental Protection Agency

**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 (21 DAY TAT)

TestAmerica Job ID: 160-17454-1

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Lab Sample ID	Client Sample ID	Matrix	Collected	Received
160-17454-1	3970-EA-160519-00-01	Filter	05/19/16 07:30	05/19/16 11:30

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# Client Sample Results

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

TestAmerica Job ID: 160-17454-1

**Client Sample ID: 3970-EA-160519-00-01**

**Lab Sample ID: 160-17454-1**

**Date Collected: 05/19/16 07:30**

**Matrix: Filter**

**Date Received: 05/19/16 11:30**

### Method: 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.274	U	0.361	0.362	1.00	0.603	pCi/Sample	05/31/16 19:09	06/22/16 07:45	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	88.6		40 - 110					05/31/16 19:09	06/22/16 07:45	1

### Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-232	0.0266	U	0.0367	0.0368	1.00	0.0570	pCi/Sample	06/01/16 08:50	06/13/16 12:42	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Thorium-229	85.8		30 - 110					06/01/16 08:50	06/13/16 12:42	1

### Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Uranium 234	0.491		0.166	0.171	1.00	0.0763	pCi/Sample	06/01/16 08:50	06/13/16 12:45	1
Uranium 235	0.000	U	0.0143	0.0143	1.00	0.0515	pCi/Sample	06/01/16 08:50	06/13/16 12:45	1
Uranium 238	0.193		0.103	0.104	1.00	0.0413	pCi/Sample	06/01/16 08:50	06/13/16 12:45	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Uranium 232	66.2		30 - 110					06/01/16 08:50	06/13/16 12:45	1

### Method: TC-02-RC - Technetium-99 (LSC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Technetium 99	-6.00	U G	4.07	4.11	1.00	7.21	pCi/Sample	06/01/16 10:37	06/24/16 02:00	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Tc-99m	88.6		30 - 110					06/01/16 10:37	06/24/16 02:00	1

# QC Sample Results

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

TestAmerica Job ID: 160-17454-1

## Method: 903.0 - Radium-226 (GFPC)

**Lab Sample ID: MB 160-253972/1-A**  
**Matrix: Filter**  
**Analysis Batch: 257502**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 253972**

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	1.022		0.432	0.441	1.00	0.495	pCi/Sample	05/31/16 19:09	06/22/16 07:45	1
Carrier	MB %Yield	MB Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	82.1		40 - 110					05/31/16 19:09	06/22/16 07:45	1

**Lab Sample ID: LCS 160-253972/2-A**  
**Matrix: Filter**  
**Analysis Batch: 257502**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 253972**

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits
Radium-226	74.4	80.52		7.88	1.00	0.503	pCi/Sam	108	65 - 140
Carrier	LCS %Yield	LCS Qualifier	Limits						
Ba Carrier	86.9		40 - 110						

**Lab Sample ID: LCSD 160-253972/3-A**  
**Matrix: Filter**  
**Analysis Batch: 257502**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 253972**

Analyte	Spike Added	LCSD Result	LCSD Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits	RER	RER Limit
Radium-226	74.4	82.89		8.11	1.00	0.499	pCi/Sam	111	65 - 140	0.15	1
Carrier	LCSD %Yield	LCSD Qualifier	Limits								
Ba Carrier	86.9		40 - 110								

## Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)

**Lab Sample ID: MB 160-254002/1-A**  
**Matrix: Filter**  
**Analysis Batch: 256227**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 254002**

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-232	0.006574	U	0.0244	0.0244	1.00	0.0623	pCi/Sample	06/01/16 08:50	06/13/16 12:42	1
Tracer	MB %Yield	MB Qualifier	Limits					Prepared	Analyzed	Dil Fac
Thorium-229	78.8		30 - 110					06/01/16 08:50	06/13/16 12:42	1

# QC Sample Results

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

TestAmerica Job ID: 160-17454-1

## Method: A-01-R - Isotopic Thorium (Alpha Spectrometry) (Continued)

**Lab Sample ID: LCS 160-254002/2-A**  
**Matrix: Filter**  
**Analysis Batch: 256416**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 254002**

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits	
Thorium-230	8.03	10.33	*	1.10	1.00	0.0626	pCi/Sam	129	81 - 118	
<b>Tracer</b>	<b>%Yield</b>	<b>LCS Qualifier</b>	<b>Limits</b>							
Thorium-229	75.6		30 - 110							

**Lab Sample ID: LCSD 160-254002/3-A**  
**Matrix: Filter**  
**Analysis Batch: 256418**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 254002**

Analyte	Spike Added	LCSD Result	LCSD Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits	RER	RER Limit
Thorium-230	8.03	9.373		1.01	1.00	0.0599	pCi/Sam	117	81 - 118	0.45	1
<b>Tracer</b>	<b>%Yield</b>	<b>LCSD Qualifier</b>	<b>Limits</b>								
Thorium-229	82.0		30 - 110								

## Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

**Lab Sample ID: MB 160-254004/1-A**  
**Matrix: Filter**  
**Analysis Batch: 256233**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 254004**

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Uranium 234	0.05750		0.0575	0.0577	1.00	0.0431	pCi/Sample	06/01/16 08:50	06/13/16 12:45	1
Uranium 235	0.0000	U	0.0149	0.0149	1.00	0.0537	pCi/Sample	06/01/16 08:50	06/13/16 12:45	1
Uranium 238	0.04304		0.0497	0.0498	1.00	0.0430	pCi/Sample	06/01/16 08:50	06/13/16 12:45	1
<b>Tracer</b>	<b>%Yield</b>	<b>MB Qualifier</b>	<b>Limits</b>			<b>Prepared</b>	<b>Analyzed</b>	<b>Dil Fac</b>		
Uranium 232	59.4		30 - 110			06/01/16 08:50	06/13/16 12:45	1		

**Lab Sample ID: LCS 160-254004/2-A**  
**Matrix: Filter**  
**Analysis Batch: 256415**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 254004**

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits
Uranium 234	12.7	13.14		1.36	1.00	0.0664	pCi/Sam	103	84 - 120
Uranium 238	13.0	13.36		1.38	1.00	0.0663	pCi/Sam	103	82 - 122
<b>Tracer</b>	<b>%Yield</b>	<b>LCS Qualifier</b>	<b>Limits</b>						
Uranium 232	75.8		30 - 110						

TestAmerica St. Louis

# QC Sample Results

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

TestAmerica Job ID: 160-17454-1

## Method: A-01-R - Isotopic Uranium (Alpha Spectrometry) (Continued)

**Lab Sample ID: LCSD 160-254004/3-A**  
**Matrix: Filter**  
**Analysis Batch: 256235**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 254004**

Analyte	Spike Added	LCSD Result	LCSD Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits		RER	RER Limit
									84 - 120	0.06	1	
Uranium 234	12.7	12.98		1.38	1.00	0.173	pCi/Sam	102	84 - 120	0.06		1
Uranium 238	13.0	13.52		1.42	1.00	0.0886	pCi/Sam	104	82 - 122	0.06		1
<b>Tracer</b>	<b>%Yield</b>	<b>LCSD Qualifier</b>	<b>Limits</b>									
Uranium 232	64.5		30 - 110									

## Method: TC-02-RC - Technetium-99 (LSC)

**Lab Sample ID: MB 160-254097/1-A**  
**Matrix: Filter**  
**Analysis Batch: 257865**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 254097**

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Technetium 99	-2.135	U G	3.56	3.56	1.00	6.02	pCi/Sample	06/01/16 10:37	06/23/16 20:15	1
<b>Tracer</b>	<b>%Yield</b>	<b>MB Qualifier</b>	<b>Limits</b>							
Tc-99m	94.9		30 - 110							

**Lab Sample ID: LCS 160-254097/2-A**  
**Matrix: Filter**  
**Analysis Batch: 257865**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 254097**

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits	
									75 - 125	
Technetium 99	1030	1038		101	1.00	7.09	pCi/Sam	101	75 - 125	
<b>Tracer</b>	<b>%Yield</b>	<b>LCS Qualifier</b>	<b>Limits</b>							
Tc-99m	97.2		30 - 110							

**Lab Sample ID: LCSD 160-254097/3-A**  
**Matrix: Filter**  
**Analysis Batch: 257865**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 254097**

Analyte	Spike Added	LCSD Result	LCSD Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits		RER	RER Limit
									75 - 125	0.15	1	
Technetium 99	1030	1009		98.2	1.00	6.88	pCi/Sam	98	75 - 125	0.15		1
<b>Tracer</b>	<b>%Yield</b>	<b>LCSD Qualifier</b>	<b>Limits</b>									
Tc-99m	103		30 - 110									

# QC Association Summary

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

TestAmerica Job ID: 160-17454-1

## Rad

### Prep Batch: 253972

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-17454-1	3970-EA-160519-00-01	Total/NA	Filter	DPS-21	
LCS 160-253972/2-A	Lab Control Sample	Total/NA	Filter	DPS-21	
LCSD 160-253972/3-A	Lab Control Sample Dup	Total/NA	Filter	DPS-21	
MB 160-253972/1-A	Method Blank	Total/NA	Filter	DPS-21	

### Prep Batch: 254002

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-17454-1	3970-EA-160519-00-01	Total/NA	Filter	ExtChrom	
LCS 160-254002/2-A	Lab Control Sample	Total/NA	Filter	ExtChrom	
LCSD 160-254002/3-A	Lab Control Sample Dup	Total/NA	Filter	ExtChrom	
MB 160-254002/1-A	Method Blank	Total/NA	Filter	ExtChrom	

### Prep Batch: 254004

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-17454-1	3970-EA-160519-00-01	Total/NA	Filter	ExtChrom	
LCS 160-254004/2-A	Lab Control Sample	Total/NA	Filter	ExtChrom	
LCSD 160-254004/3-A	Lab Control Sample Dup	Total/NA	Filter	ExtChrom	
MB 160-254004/1-A	Method Blank	Total/NA	Filter	ExtChrom	

### Prep Batch: 254097

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-17454-1	3970-EA-160519-00-01	Total/NA	Filter	Ext_Chrom_LSC	
LCS 160-254097/2-A	Lab Control Sample	Total/NA	Filter	Ext_Chrom_LSC	
LCSD 160-254097/3-A	Lab Control Sample Dup	Total/NA	Filter	Ext_Chrom_LSC	
MB 160-254097/1-A	Method Blank	Total/NA	Filter	Ext_Chrom_LSC	

# Tracer/Carrier Summary

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

TestAmerica Job ID: 160-17454-1

## Method: 903.0 - Radium-226 (GFPC)

Matrix: Filter

Prep Type: Total/NA

### Percent Yield (Acceptance Limits)

Lab Sample ID	Client Sample ID	Ba (40-110)
160-17454-1	3970-EA-160519-00-01	88.6
LCS 160-253972/2-A	Lab Control Sample	86.9
LCSD 160-253972/3-A	Lab Control Sample Dup	86.9
MB 160-253972/1-A	Method Blank	82.1

#### Tracer/Carrier Legend

Ba = Ba Carrier

## Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)

Matrix: Filter

Prep Type: Total/NA

### Percent Yield (Acceptance Limits)

Lab Sample ID	Client Sample ID	Th-229 (30-110)
160-17454-1	3970-EA-160519-00-01	85.8
LCS 160-254002/2-A	Lab Control Sample	75.6
LCSD 160-254002/3-A	Lab Control Sample Dup	82.0
MB 160-254002/1-A	Method Blank	78.8

#### Tracer/Carrier Legend

Th-229 = Thorium-229

## Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Matrix: Filter

Prep Type: Total/NA

### Percent Yield (Acceptance Limits)

Lab Sample ID	Client Sample ID	U-232 (30-110)
160-17454-1	3970-EA-160519-00-01	66.2
LCS 160-254004/2-A	Lab Control Sample	75.8
LCSD 160-254004/3-A	Lab Control Sample Dup	64.5
MB 160-254004/1-A	Method Blank	59.4

#### Tracer/Carrier Legend

U-232 = Uranium 232

## Method: TC-02-RC - Technetium-99 (LSC)

Matrix: Filter

Prep Type: Total/NA

### Percent Yield (Acceptance Limits)

Lab Sample ID	Client Sample ID	Tc-99m (30-110)
160-17454-1	3970-EA-160519-00-01	88.6
LCS 160-254097/2-A	Lab Control Sample	97.2
LCSD 160-254097/3-A	Lab Control Sample Dup	103
MB 160-254097/1-A	Method Blank	94.9

#### Tracer/Carrier Legend

Tc-99m = Tc-99m

TestAmerica St. Louis