

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: 160-17815-2

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:
7/14/2016 10:34:29 AM

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

LINKS

Review your project
results through
TotalAccess

Have a Question?



Visit us at:
www.testamericainc.com

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.

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



Table of Contents

Cover Page	1
Table of Contents	2
Case Narrative	3
Chain of Custody	4
Receipt Checklists	5
Definitions/Glossary	6
Method Summary	7
Sample Summary	8
Client Sample Results	9
QC Sample Results	10
QC Association Summary	12

Case Narrative

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

TestAmerica Job ID: 160-17815-2

Job ID: 160-17815-2

Laboratory: TestAmerica St. Louis

Narrative

CASE NARRATIVE

Client: Westinghouse Electric Company LLC

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

Report Number: 160-17815-2

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 6/16/2016 11:10 AM; the sample arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 3.6° C.

RADIUM-226 BY GAMMA SPEC (21 DAY INGROWTH)

Sample L08-15-25-P-S-B-00 (160-17815-1) was analyzed for Radium-226 by gamma spec (21 day ingrowth) in accordance with EPA GA_01_R. The samples were leached on 06/16/2016, prepared on 06/20/2016 and analyzed on 07/11/2016.

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

Hematite Decommissioning Project

Procedure HDP-PR-QA-006, Chain of Custody

Revision: 4

Westinghouse Non-Proprietary Class 3

FORM HDP-PR-QA-006-1
CHAIN OF CUSTODY

Instructions: Each time the container is transferred to another organization, a person from each organization should sign the CoC. The Laboratory/End User must verify that the sample is correctly identified before the sample is released for use or analysis and send the completed CoC to HDP.

Chain of Custody ID No. F-061516-01 Page 1/1				Requested Analysis										Laboratory Name:			
Project Name: Westinghouse Electric Company				Comp (C) or Grab (G)	Gamma Spec	Isotopic Uranium	Tc-99	Gamma Spec (21 day ingrow for Ra-226)							Total Containers	TA-MO	
Contact Person: Clark Evers																Laboratory Address: 13715 Rider Trail North	
Phone Number: 314-810-3336																Phone No. 314-298-8566	
Sampler Name: John Michel																Laboratory Contact Person: Ivan Vania	
				Phone No. 708-870-8453													
				Turn Around Time													
				Rush (7 days)													
				Remarks													
Sample ID	Date	Time	Matrix														
L08-15-25-P-S-B-00	6/15/2016	13:45	S	G	X		X	X						1	LSA 08-15 Bias		
Relinquished by: Gorsun <i>Cue 12</i>		Date/Time 6-16-16 0910		Received by: <i>REDA</i>		Date/Time 6-16-16 0910		Total 1		Cooler Temperature: Ambient							
Company Name: WEL				Company Name: CROSSROADS				Cooler ID: 0615-01		Shipper and Number:							
Received by:		Date/Time		Relinquished by:		Date/Time		Comments: N/A									
Company Name:				Company Name:													
Relinquished by: <i>REDA</i> 3815		Date/Time 6-16-16 11:10		Received by: <i>REDA</i>		Date/Time 6-16-16 1110		Verified By: C. Gorsun <i>Cue 12</i> 6-16-16									
Company Name: CROSSROADS				Company Name: CROSSROADS													



160-17815 Chain of Custody



Login Sample Receipt Checklist

Client: Westinghouse Electric Company LLC

Job Number: 160-17815-2

Login Number: 17815

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.	True	
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: 160-17815-2

Qualifiers

Rad

Qualifier	Qualifier Description
U	Result is less than the sample detection limit.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
▫	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: 160-17815-2

Method	Method Description	Protocol	Laboratory
GA-01-R	Radium-226 & Other Gamma Emitters (GS)	DOE	TAL SL

Protocol References:

DOE = U.S. Department of Energy

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: 160-17815-2

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
160-17815-1	L08-15-25-P-S-B-00	Solid	06/15/16 13:45	06/16/16 11:10

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

Client Sample Results

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

TestAmerica Job ID: 160-17815-2

Client Sample ID: L08-15-25-P-S-B-00

Lab Sample ID: 160-17815-1

Date Collected: 06/15/16 13:45

Matrix: Solid

Date Received: 06/16/16 11:10

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	0.274		0.0615	0.0675		0.0433	pCi/g	06/20/16 08:55	07/11/16 21:33	1
Bismuth 212	0.477		0.188	0.195		0.163	pCi/g	06/20/16 08:55	07/11/16 21:33	1
Bismuth 214	0.401		0.0471	0.0629		0.0272	pCi/g	06/20/16 08:55	07/11/16 21:33	1
Lead 212	0.293		0.0316	0.0493		0.0304	pCi/g	06/20/16 08:55	07/11/16 21:33	1
Lead 214	0.408		0.0422	0.0599		0.0365	pCi/g	06/20/16 08:55	07/11/16 21:33	1
Potassium 40	6.92		0.531	0.884		0.128	pCi/g	06/20/16 08:55	07/11/16 21:33	1
Protactinium 231	-0.229	U	0.862	0.863		1.44	pCi/g	06/20/16 08:55	07/11/16 21:33	1
Radium 226	0.401		0.0471	0.0629	1.00	0.0272	pCi/g	06/20/16 08:55	07/11/16 21:33	1
Thorium 232	0.274		0.0615	0.0675		0.0433	pCi/g	06/20/16 08:55	07/11/16 21:33	1
Thorium 234	0.734		0.280	0.290		0.425	pCi/g	06/20/16 08:55	07/11/16 21:33	1
Uranium 235	0.253		0.0923	0.0958		0.0961	pCi/g	06/20/16 08:55	07/11/16 21:33	1
Americium 241	-0.0107	U	0.0504	0.0504		0.0842	pCi/g	06/20/16 08:55	07/11/16 21:33	1
Protactinium 234m	1.08	U	1.80	1.81		4.17	pCi/g	06/20/16 08:55	07/11/16 21:33	1
Other Detected			Count	Total						
Radionuclides			Uncert.	Uncert.						
	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Pb-210	1.60		0.426	0.466		0.469	pCi/g	06/20/16 08:55	07/11/16 21:33	1
Tl-208	0.0906		0.0172	0.0196		0.0129	pCi/g	06/20/16 08:55	07/11/16 21:33	1

QC Sample Results

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

TestAmerica Job ID: 160-17815-2

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

Lab Sample ID: MB 160-257084/1-A
Matrix: Solid
Analysis Batch: 259966

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 257084

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	0.02512	U	0.0222	0.0224		0.0322	pCi/g	06/20/16 08:55	07/11/16 13:36	1
Bismuth 212	-0.002340	U	0.152	0.152		0.288	pCi/g	06/20/16 08:55	07/11/16 13:36	1
Bismuth 214	-0.02178	U	0.0416	0.0417		0.0799	pCi/g	06/20/16 08:55	07/11/16 13:36	1
Lead 212	-0.003926	U	0.0203	0.0203		0.0363	pCi/g	06/20/16 08:55	07/11/16 13:36	1
Lead 214	-0.004965	U	0.0272	0.0272		0.0493	pCi/g	06/20/16 08:55	07/11/16 13:36	1
Potassium 40	-0.01458	U	0.124	0.124		0.254	pCi/g	06/20/16 08:55	07/11/16 13:36	1
Protactinium 231	-0.1077	U	0.614	0.614		1.05	pCi/g	06/20/16 08:55	07/11/16 13:36	1
Radium 226	-0.02178	U	0.0416	0.0417	1.00	0.0799	pCi/g	06/20/16 08:55	07/11/16 13:36	1
Thorium 232	0.02512	U	0.0222	0.0224		0.0322	pCi/g	06/20/16 08:55	07/11/16 13:36	1
Thorium 234	-0.04340	U	0.166	0.166		0.298	pCi/g	06/20/16 08:55	07/11/16 13:36	1
Uranium 235	0.01362	U	0.0698	0.0698		0.121	pCi/g	06/20/16 08:55	07/11/16 13:36	1
Americium 241	-0.002746	U	0.0202	0.0202		0.0301	pCi/g	06/20/16 08:55	07/11/16 13:36	1
Protactinium 234m	0.0000	U	0.330	0.330		2.99	pCi/g	06/20/16 08:55	07/11/16 13:36	1

Lab Sample ID: LCS 160-257084/2-A
Matrix: Solid
Analysis Batch: 259966

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 257084

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits
Americium 241	101	102.6		10.7		0.494	pCi/g	102	87 - 116
Cesium 137	33.9	33.53		3.51		0.174	pCi/g	99	87 - 120
Cobalt 60	30.6	30.06		3.04		0.111	pCi/g	98	87 - 115

Lab Sample ID: 160-17815-1 DU
Matrix: Solid
Analysis Batch: 260176

Client Sample ID: L08-15-25-P-S-B-00
Prep Type: Total/NA
Prep Batch: 257084

Analyte	Sample Result	Sample Qual	DU Result	DU Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	RER	RER Limit
Actinium 228	0.274		0.3455		0.0763		0.0421	pCi/g	0.50	1
Bismuth 212	0.477		0.5870		0.242		0.216	pCi/g	0.25	1
Bismuth 214	0.401		0.3340		0.0649		0.0408	pCi/g	0.52	1
Lead 212	0.293		0.3079		0.0536		0.0340	pCi/g	0.15	1
Lead 214	0.408		0.4165		0.0638		0.0516	pCi/g	0.07	1
Potassium 40	6.92		6.342		0.884		0.193	pCi/g	0.32	1
Protactinium 231	-0.229	U	0.0000	U	0.205		1.09	pCi/g	0.21	1
Radium 226	0.401		0.3340		0.0649	1.00	0.0408	pCi/g	0.52	1
Thorium 232	0.274		0.3455		0.0763		0.0421	pCi/g	0.50	1
Thorium 234	0.734		0.5920		0.191		0.480	pCi/g	0.30	1
Uranium 235	0.253		0.1702		0.0759		0.105	pCi/g	0.48	1
Americium 241	-0.0107	U	0.01752	U	0.0393		0.0553	pCi/g	0.32	1
Protactinium 234m	1.08	U	1.998	U	2.58		4.06	pCi/g	0.21	1
Other Detected Radionuclides	Sample Result	Sample Qual	DU Result	DU Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	RER	RER Limit
Pb-210	1.60		1.465		0.418		0.449	pCi/g	0.15	1

TestAmerica St. Louis

QC Sample Results

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

TestAmerica Job ID: 160-17815-2

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

Lab Sample ID: 160-17815-1 DU
 Matrix: Solid
 Analysis Batch: 260176

Client Sample ID: L08-15-25-P-S-B-00
 Prep Type: Total/NA
 Prep Batch: 257084

Other Detected Radionuclides	Sample Result	Sample Qual	DU Result	DU Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	RER	RER Limit
Tl-208	0.0906		0.09021		0.0252		0.0212	pCi/g	0.01	1

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

QC Association Summary

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

TestAmerica Job ID: 160-17815-2

Rad

Leach Batch: 256800

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-17815-1	L08-15-25-P-S-B-00	Total/NA	Solid	Dry and Grind	
160-17815-1 DU	L08-15-25-P-S-B-00	Total/NA	Solid	Dry and Grind	

Prep Batch: 257084

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-17815-1	L08-15-25-P-S-B-00	Total/NA	Solid	Fill_Geo-21	256800
160-17815-1 DU	L08-15-25-P-S-B-00	Total/NA	Solid	Fill_Geo-21	256800
LCS 160-257084/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	
MB 160-257084/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	