

## ANALYTICAL REPORT

Job Number: 160-22327-1

Job Description: WR 111 - Little Mountain Test Annex

For:

EA Engineering, Science, and Technology  
7995 E. Prentice Ave, Suite 206E  
Greenwood Village, CO 80111

Attention: Pamela J Moss



Approved for release.  
Stephanie K Rothmeyer  
Project Manager I  
6/12/2017 12:36 PM

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Stephanie K Rothmeyer, Project Manager I  
4955 Yarrow Street, Arvada, CO, 80002  
(303)736-0182  
stephanie.rothmeyer@testamericainc.com  
06/12/2017

The test results in this report relate only to the samples in this report and meet all requirements of NELAP, with any exceptions noted. Pursuant to NELAP, this report shall not be reproduced except in full, without the written approval of the laboratory. All questions regarding this report should be directed to the TestAmerica Denver Project Manager.

The Lab Certification ID# is 4025.

Reporting limits are adjusted for sample size used, dilutions and moisture content if applicable.

**TestAmerica Laboratories, Inc.**

TestAmerica St. Louis 13715 Rider Trail North, Earth City, MO 63045  
Tel (314) 298-8566 Fax (314) 298-8757 [www.testamericainc.com](http://www.testamericainc.com)



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# Definitions/Glossary

Client: EA Engineering, Science, and Technology  
Project/Site: WR 111 - Little Mountain Test Annex

TestAmerica Job ID: 160-22327-1

## Qualifiers

### Rad

Qualifier	Qualifier Description
U	Undetected at the Limit of Detection.

## 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	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
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 (Radiochemistry)
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)

## **CASE NARRATIVE**

**Client: EA Engineering, Science, and Technology**

**Project: WR 111 - Little Mountain Test Annex**

**Report Number: 160-22327-1**

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.

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.

### **RECEIPT**

The samples were received on 5/15/2017 at 9:30 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 18.0° C.

The Sampler field on the COC was not filled out. The client was notified on 5/15/17.

### **RADIUM-226 & OTHER GAMMA EMITTERS (GS)**

Samples SU01-EXB-026-SS-P-01 (160-22327-1), SU01-EXB-023-SS-P-01 (160-22327-2), SU01-EXB-076-SS-P-01 (160-22327-3), SU02-EXB-051-SS-P-01 (160-22327-4), SU01-EXB-083-SS-P-00 (160-22327-5), SU01-EXB-084-SS-P-00 (160-22327-6), SU01-EXB-085-SS-P-00 (160-22327-7), SU01-EXB-086-SS-P-00 (160-22327-8), SU03-S-087-SS-P-00 (160-22327-9), SU03-S-088-SS-P-00 (160-22327-10) and SU03-S-089-SS-P-00 (160-22327-11) were analyzed for Radium-226 & Other Gamma Emitters (GS) in accordance with EPA 901.1. The samples were leached on 05/15/2017, prepared on 05/17/2017 and analyzed on 06/07/2017.

Americium-241, Cesium-137 and Cobalt-60 exceeded the RPD limit for the duplicate of sample SU01-EXB-026-SS-P-01 (160-22327-1). Refer to the QC report for details.

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

## Detection Summary

Client: EA Engineering, Science, and Technology  
Project/Site: WR 111 - Little Mountain Test Annex

TestAmerica Job ID: 160-22327-1

**Client Sample ID: SU01-EXB-026-SS-P-01**

**Lab Sample ID: 160-22327-1**

☐ No Detections.

**Client Sample ID: SU01-EXB-023-SS-P-01**

**Lab Sample ID: 160-22327-2**

☐ No Detections.

**Client Sample ID: SU01-EXB-076-SS-P-01**

**Lab Sample ID: 160-22327-3**

☐ No Detections.

**Client Sample ID: SU02-EXB-051-SS-P-01**

**Lab Sample ID: 160-22327-4**

☐ No Detections.

**Client Sample ID: SU01-EXB-083-SS-P-00**

**Lab Sample ID: 160-22327-5**

☐ No Detections.

**Client Sample ID: SU01-EXB-084-SS-P-00**

**Lab Sample ID: 160-22327-6**

☐ No Detections.

**Client Sample ID: SU01-EXB-085-SS-P-00**

**Lab Sample ID: 160-22327-7**

☐ No Detections.

**Client Sample ID: SU01-EXB-086-SS-P-00**

**Lab Sample ID: 160-22327-8**

☐ No Detections.

**Client Sample ID: SU03-S-087-SS-P-00**

**Lab Sample ID: 160-22327-9**

☐ No Detections.

**Client Sample ID: SU03-S-088-SS-P-00**

**Lab Sample ID: 160-22327-10**

☐ No Detections.

**Client Sample ID: SU03-S-089-SS-P-00**

**Lab Sample ID: 160-22327-11**

☐ No Detections.

This Detection Summary does not include radiochemical test results.

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# Client Sample Results

Client: EA Engineering, Science, and Technology  
Project/Site: WR 111 - Little Mountain Test Annex

TestAmerica Job ID: 160-22327-1

**Client Sample ID: SU01-EXB-026-SS-P-01**

**Date Collected: 05/10/17 14:30**

**Date Received: 05/15/17 09:30**

**Lab Sample ID: 160-22327-1**

**Matrix: Solid**

## Method: 901.1 - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	1.15		0.262	0.288	0.500	0.183	pCi/g	05/17/17 12:55	06/07/17 09:57	1

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

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-230	0.725		0.132	0.145	0.100	0.0700	pCi/g	05/18/17 13:59	06/08/17 19:02	1
Thorium-232	1.39		0.178	0.213	0.100	0.0541	pCi/g	05/18/17 13:59	06/08/17 19:02	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Thorium-229	85.9		30 - 110					05/18/17 13:59	06/08/17 19:02	1

**Client Sample ID: SU01-EXB-023-SS-P-01**

**Date Collected: 05/10/17 14:35**

**Date Received: 05/15/17 09:30**

**Lab Sample ID: 160-22327-2**

**Matrix: Solid**

## Method: 901.1 - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.913		0.170	0.195	0.500	0.128	pCi/g	05/17/17 12:55	06/07/17 09:54	1

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

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-230	0.639		0.117	0.129	0.100	0.0424	pCi/g	05/18/17 13:59	06/08/17 19:02	1
Thorium-232	1.47		0.176	0.216	0.100	0.0406	pCi/g	05/18/17 13:59	06/08/17 19:02	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Thorium-229	87.1		30 - 110					05/18/17 13:59	06/08/17 19:02	1

**Client Sample ID: SU01-EXB-076-SS-P-01**

**Date Collected: 05/10/17 14:40**

**Date Received: 05/15/17 09:30**

**Lab Sample ID: 160-22327-3**

**Matrix: Solid**

## Method: 901.1 - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	1.27		0.214	0.251	0.500	0.158	pCi/g	05/17/17 12:55	06/07/17 09:58	1

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

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-230	0.826		0.137	0.153	0.100	0.0499	pCi/g	05/18/17 13:59	06/10/17 16:17	1
Thorium-232	0.822		0.136	0.152	0.100	0.0461	pCi/g	05/18/17 13:59	06/10/17 16:17	1

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# Client Sample Results

Client: EA Engineering, Science, and Technology  
Project/Site: WR 111 - Little Mountain Test Annex

TestAmerica Job ID: 160-22327-1

**Client Sample ID: SU01-EXB-076-SS-P-01**

**Date Collected: 05/10/17 14:40**

**Date Received: 05/15/17 09:30**

**Lab Sample ID: 160-22327-3**

**Matrix: Solid**

Tracer	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Thorium-229	83.3		30 - 110	05/18/17 13:59	06/10/17 16:17	1

**Client Sample ID: SU02-EXB-051-SS-P-01**

**Date Collected: 05/10/17 14:35**

**Date Received: 05/15/17 09:30**

**Lab Sample ID: 160-22327-4**

**Matrix: Solid**

## Method: 901.1 - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	2.51		0.322	0.414	0.500	0.192	pCi/g	05/17/17 12:55	06/07/17 09:53	1

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

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-230	2.14		0.215	0.280	0.100	0.0464	pCi/g	05/18/17 13:59	06/08/17 19:02	1
Thorium-232	2.19		0.216	0.284	0.100	0.0295	pCi/g	05/18/17 13:59	06/08/17 19:02	1
Tracer	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac				
Thorium-229	82.8		30 - 110	05/18/17 13:59	06/08/17 19:02	1				

**Client Sample ID: SU01-EXB-083-SS-P-00**

**Date Collected: 05/11/17 12:15**

**Date Received: 05/15/17 09:30**

**Lab Sample ID: 160-22327-5**

**Matrix: Solid**

## Method: 901.1 - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	1.63		0.326	0.367	0.500	0.232	pCi/g	05/17/17 12:55	06/07/17 09:54	1

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

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-230	1.86		0.197	0.251	0.100	0.0381	pCi/g	05/18/17 13:59	06/08/17 19:02	1
Thorium-232	1.30		0.163	0.196	0.100	0.0154	pCi/g	05/18/17 13:59	06/08/17 19:02	1
Tracer	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac				
Thorium-229	87.8		30 - 110	05/18/17 13:59	06/08/17 19:02	1				

**Client Sample ID: SU01-EXB-084-SS-P-00**

**Date Collected: 05/11/17 12:20**

**Date Received: 05/15/17 09:30**

**Lab Sample ID: 160-22327-6**

**Matrix: Solid**

## Method: 901.1 - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	1.54		0.253	0.299	0.500	0.182	pCi/g	05/17/17 12:55	06/07/17 09:59	1

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# Client Sample Results

Client: EA Engineering, Science, and Technology  
Project/Site: WR 111 - Little Mountain Test Annex

TestAmerica Job ID: 160-22327-1

**Client Sample ID: SU01-EXB-084-SS-P-00**

**Date Collected: 05/11/17 12:20**

**Date Received: 05/15/17 09:30**

**Lab Sample ID: 160-22327-6**

**Matrix: Solid**

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

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-230	1.18		0.156	0.185	0.100	0.0334	pCi/g	05/18/17 13:59	06/08/17 19:02	1
Thorium-232	1.28		0.162	0.194	0.100	0.0421	pCi/g	05/18/17 13:59	06/08/17 19:02	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Thorium-229	91.6		30 - 110					05/18/17 13:59	06/08/17 19:02	1

**Client Sample ID: SU01-EXB-085-SS-P-00**

**Date Collected: 05/11/17 13:05**

**Date Received: 05/15/17 09:30**

**Lab Sample ID: 160-22327-7**

**Matrix: Solid**

## Method: 901.1 - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	1.55		0.267	0.312	0.500	0.204	pCi/g	05/17/17 12:55	06/07/17 10:01	1

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

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-230	2.43		0.213	0.295	0.100	0.0426	pCi/g	05/18/17 13:59	06/08/17 19:02	1
Thorium-232	1.22		0.150	0.182	0.100	0.0138	pCi/g	05/18/17 13:59	06/08/17 19:02	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Thorium-229	91.9		30 - 110					05/18/17 13:59	06/08/17 19:02	1

**Client Sample ID: SU01-EXB-086-SS-P-00**

**Date Collected: 05/11/17 13:10**

**Date Received: 05/15/17 09:30**

**Lab Sample ID: 160-22327-8**

**Matrix: Solid**

## Method: 901.1 - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	1.18		0.252	0.280	0.500	0.206	pCi/g	05/17/17 12:55	06/07/17 09:56	1

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

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-230	1.24		0.149	0.182	0.100	0.0327	pCi/g	05/18/17 13:59	06/08/17 19:02	1
Thorium-232	0.976		0.131	0.155	0.100	0.0244	pCi/g	05/18/17 13:59	06/08/17 19:02	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Thorium-229	103		30 - 110					05/18/17 13:59	06/08/17 19:02	1

# Client Sample Results

Client: EA Engineering, Science, and Technology  
Project/Site: WR 111 - Little Mountain Test Annex

TestAmerica Job ID: 160-22327-1

**Client Sample ID: SU03-S-087-SS-P-00**

**Date Collected: 05/11/17 13:15**

**Date Received: 05/15/17 09:30**

**Lab Sample ID: 160-22327-9**

**Matrix: Solid**

## Method: 901.1 - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	1.67		0.305	0.352	0.500	0.215	pCi/g	05/17/17 12:55	06/07/17 09:55	1

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

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-230	5.62		0.341	0.582	0.100	0.0285	pCi/g	05/18/17 13:59	06/08/17 19:02	1
Thorium-232	1.89		0.198	0.254	0.100	0.0379	pCi/g	05/18/17 13:59	06/08/17 19:02	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Thorium-229	92.5		30 - 110					05/18/17 13:59	06/08/17 19:02	1

**Client Sample ID: SU03-S-088-SS-P-00**

**Date Collected: 05/11/17 13:20**

**Date Received: 05/15/17 09:30**

**Lab Sample ID: 160-22327-10**

**Matrix: Solid**

## Method: 901.1 - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	1.93		0.298	0.359	0.500	0.197	pCi/g	05/17/17 12:55	06/07/17 11:15	1

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

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-230	4.95		0.318	0.524	0.100	0.0377	pCi/g	05/18/17 13:59	06/08/17 19:02	1
Thorium-232	1.76		0.189	0.240	0.100	0.0335	pCi/g	05/18/17 13:59	06/08/17 19:02	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Thorium-229	88.5		30 - 110					05/18/17 13:59	06/08/17 19:02	1

**Client Sample ID: SU03-S-089-SS-P-00**

**Date Collected: 05/11/17 13:25**

**Date Received: 05/15/17 09:30**

**Lab Sample ID: 160-22327-11**

**Matrix: Solid**

## Method: 901.1 - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	1.48		0.215	0.265	0.500	0.107	pCi/g	05/17/17 12:55	06/07/17 11:23	1

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

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-230	1.24		0.161	0.191	0.100	0.0381	pCi/g	05/18/17 13:59	06/08/17 19:02	1
Thorium-232	0.920		0.138	0.158	0.100	0.0154	pCi/g	05/18/17 13:59	06/08/17 19:02	1

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## Client Sample Results

Client: EA Engineering, Science, and Technology  
Project/Site: WR 111 - Little Mountain Test Annex

TestAmerica Job ID: 160-22327-1

**Client Sample ID: SU03-S-089-SS-P-00**

**Date Collected: 05/11/17 13:25**

**Date Received: 05/15/17 09:30**

**Lab Sample ID: 160-22327-11**

**Matrix: Solid**

<i>Tracer</i>	<i>%Yield</i>	<i>Qualifier</i>	<i>Limits</i>	<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
Thorium-229	81.2		30 - 110	05/18/17 13:59	06/08/17 19:02	1

## Tracer/Carrier Summary

Client: EA Engineering, Science, and Technology  
Project/Site: WR 111 - Little Mountain Test Annex

TestAmerica Job ID: 160-22327-1

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

**Matrix: Solid**

**Prep Type: Total/NA**

		Percent Yield (Acceptance Limits)					
Lab Sample ID	Client Sample ID	Th-229 (30-110)					
160-22327-1	SU01-EXB-026-SS-P-01	85.9					
160-22327-1 DU	SU01-EXB-026-SS-P-01	91.2					
160-22327-2	SU01-EXB-023-SS-P-01	87.1					
160-22327-3	SU01-EXB-076-SS-P-01	83.3					
160-22327-4	SU02-EXB-051-SS-P-01	82.8					
160-22327-5	SU01-EXB-083-SS-P-00	87.8					
160-22327-6	SU01-EXB-084-SS-P-00	91.6					
160-22327-7	SU01-EXB-085-SS-P-00	91.9					
160-22327-8	SU01-EXB-086-SS-P-00	103					
160-22327-9	SU03-S-087-SS-P-00	92.5					
160-22327-10	SU03-S-088-SS-P-00	88.5					
160-22327-11	SU03-S-089-SS-P-00	81.2					
LCS 160-309374/2-A	Lab Control Sample	95.7					
MB 160-309374/1-A	Method Blank	93.5					

### Tracer/Carrier Legend

Th-229 = Thorium-229

# QC Sample Results

Client: EA Engineering, Science, and Technology  
Project/Site: WR 111 - Little Mountain Test Annex

TestAmerica Job ID: 160-22327-1

## Method: 901.1 - Radium-226 & Other Gamma Emitters (GS)

Lab Sample ID: MB 160-309155/1-A  
Matrix: Solid  
Analysis Batch: 312292

Client Sample ID: Method Blank  
Prep Type: Total/NA  
Prep Batch: 309155

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	-0.09557	U	0.283	0.284	0.500	0.481	pCi/g	05/17/17 12:55	06/07/17 09:55	1

Lab Sample ID: LCS 160-309155/2-A  
Matrix: Solid  
Analysis Batch: 312295

Client Sample ID: Lab Control Sample  
Prep Type: Total/NA  
Prep Batch: 309155

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	%Rec	%Rec. Limits
Americium-241	97.0	96.89		10.2		1.20	pCi/g	100	87 - 116
Cesium-137	29.0	28.38		3.03		0.244	pCi/g	98	87 - 120
Cobalt-60	15.0	15.10		1.57		0.0997	pCi/g	100	87 - 115

Lab Sample ID: 160-22327-1 DU  
Matrix: Solid  
Analysis Batch: 312295

Client Sample ID: SU01-EXB-026-SS-P-01  
Prep Type: Total/NA  
Prep Batch: 309155

Analyte	Sample Result	Sample Qual	DU Result	DU Qual	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	RER	RER Limit
Radium-226	1.15		1.218		0.307	0.500	0.259	pCi/g	0.11	1

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

Lab Sample ID: MB 160-309374/1-A  
Matrix: Solid  
Analysis Batch: 312929

Client Sample ID: Method Blank  
Prep Type: Total/NA  
Prep Batch: 309374

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-230	0.04086	U	0.0340	0.0342	0.100	0.0447	pCi/g	05/18/17 13:59	06/10/17 16:17	1
Thorium-232	0.002568	U	0.0206	0.0206	0.100	0.0472	pCi/g	05/18/17 13:59	06/10/17 16:17	1

Tracer	MB %Yield	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Thorium-229	93.5		30 - 110	05/18/17 13:59	06/10/17 16:17	1

Lab Sample ID: LCS 160-309374/2-A  
Matrix: Solid  
Analysis Batch: 312785

Client Sample ID: Lab Control Sample  
Prep Type: Total/NA  
Prep Batch: 309374

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	%Rec	%Rec. Limits
Thorium-230	24.5	25.03		2.32	0.100	0.0824	pCi/g	102	81 - 118

  

Tracer	LCS %Yield	LCS Qualifier	Limits
Thorium-229	95.7		30 - 110

# QC Sample Results

Client: EA Engineering, Science, and Technology  
Project/Site: WR 111 - Little Mountain Test Annex

TestAmerica Job ID: 160-22327-1

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

Lab Sample ID: 160-22327-1 DU

Matrix: Solid

Analysis Batch: 312787

Client Sample ID: SU01-EXB-026-SS-P-01

Prep Type: Total/NA

Prep Batch: 309374

Analyte	Sample		DU		Total	LOQ	MDC	Unit	RER	
	Result	Qual	Result	Qual	Uncert. (2 $\sigma$ +/-)				RER	Limit
Thorium-230	0.725		0.6509		0.129	0.100	0.0618	pCi/g	0.27	1
Thorium-232	1.39		1.369		0.201	0.100	0.0379	pCi/g	0.06	1

Tracer	DU		Limits
	%Yield	Qualifier	
Thorium-229	91.2		30 - 110

# QC Association Summary

Client: EA Engineering, Science, and Technology  
Project/Site: WR 111 - Little Mountain Test Annex

TestAmerica Job ID: 160-22327-1

## Rad

### Leach Batch: 308589

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-22327-1	SU01-EXB-026-SS-P-01	Total/NA	Solid	Dry and Grind	
160-22327-2	SU01-EXB-023-SS-P-01	Total/NA	Solid	Dry and Grind	
160-22327-3	SU01-EXB-076-SS-P-01	Total/NA	Solid	Dry and Grind	
160-22327-4	SU02-EXB-051-SS-P-01	Total/NA	Solid	Dry and Grind	
160-22327-5	SU01-EXB-083-SS-P-00	Total/NA	Solid	Dry and Grind	
160-22327-6	SU01-EXB-084-SS-P-00	Total/NA	Solid	Dry and Grind	
160-22327-7	SU01-EXB-085-SS-P-00	Total/NA	Solid	Dry and Grind	
160-22327-8	SU01-EXB-086-SS-P-00	Total/NA	Solid	Dry and Grind	
160-22327-9	SU03-S-087-SS-P-00	Total/NA	Solid	Dry and Grind	
160-22327-10	SU03-S-088-SS-P-00	Total/NA	Solid	Dry and Grind	
160-22327-11	SU03-S-089-SS-P-00	Total/NA	Solid	Dry and Grind	
160-22327-1 DU	SU01-EXB-026-SS-P-01	Total/NA	Solid	Dry and Grind	

### Prep Batch: 309155

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-22327-1	SU01-EXB-026-SS-P-01	Total/NA	Solid	Fill_Geo-21	308589
160-22327-2	SU01-EXB-023-SS-P-01	Total/NA	Solid	Fill_Geo-21	308589
160-22327-3	SU01-EXB-076-SS-P-01	Total/NA	Solid	Fill_Geo-21	308589
160-22327-4	SU02-EXB-051-SS-P-01	Total/NA	Solid	Fill_Geo-21	308589
160-22327-5	SU01-EXB-083-SS-P-00	Total/NA	Solid	Fill_Geo-21	308589
160-22327-6	SU01-EXB-084-SS-P-00	Total/NA	Solid	Fill_Geo-21	308589
160-22327-7	SU01-EXB-085-SS-P-00	Total/NA	Solid	Fill_Geo-21	308589
160-22327-8	SU01-EXB-086-SS-P-00	Total/NA	Solid	Fill_Geo-21	308589
160-22327-9	SU03-S-087-SS-P-00	Total/NA	Solid	Fill_Geo-21	308589
160-22327-10	SU03-S-088-SS-P-00	Total/NA	Solid	Fill_Geo-21	308589
160-22327-11	SU03-S-089-SS-P-00	Total/NA	Solid	Fill_Geo-21	308589
MB 160-309155/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-309155/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	
160-22327-1 DU	SU01-EXB-026-SS-P-01	Total/NA	Solid	Fill_Geo-21	308589

### Prep Batch: 309374

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-22327-1	SU01-EXB-026-SS-P-01	Total/NA	Solid	ExtChrom	308589
160-22327-2	SU01-EXB-023-SS-P-01	Total/NA	Solid	ExtChrom	308589
160-22327-3	SU01-EXB-076-SS-P-01	Total/NA	Solid	ExtChrom	308589
160-22327-4	SU02-EXB-051-SS-P-01	Total/NA	Solid	ExtChrom	308589
160-22327-5	SU01-EXB-083-SS-P-00	Total/NA	Solid	ExtChrom	308589
160-22327-6	SU01-EXB-084-SS-P-00	Total/NA	Solid	ExtChrom	308589
160-22327-7	SU01-EXB-085-SS-P-00	Total/NA	Solid	ExtChrom	308589
160-22327-8	SU01-EXB-086-SS-P-00	Total/NA	Solid	ExtChrom	308589
160-22327-9	SU03-S-087-SS-P-00	Total/NA	Solid	ExtChrom	308589
160-22327-10	SU03-S-088-SS-P-00	Total/NA	Solid	ExtChrom	308589
160-22327-11	SU03-S-089-SS-P-00	Total/NA	Solid	ExtChrom	308589
MB 160-309374/1-A	Method Blank	Total/NA	Solid	ExtChrom	
LCS 160-309374/2-A	Lab Control Sample	Total/NA	Solid	ExtChrom	
160-22327-1 DU	SU01-EXB-026-SS-P-01	Total/NA	Solid	ExtChrom	308589

# Lab Chronicle

Client: EA Engineering, Science, and Technology  
Project/Site: WR 111 - Little Mountain Test Annex

TestAmerica Job ID: 160-22327-1

**Client Sample ID: SU01-EXB-026-SS-P-01**

**Date Collected: 05/10/17 14:30**

**Date Received: 05/15/17 09:30**

**Lab Sample ID: 160-22327-1**

**Matrix: Solid**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Leach	Dry and Grind			308589	05/15/17 15:49	DRO	TAL SL
Total/NA	Prep	Fill_Geo-21			309155	05/17/17 12:55	KRS	TAL SL
Total/NA	Analysis	901.1		1	312291	06/07/17 09:57	CDR	TAL SL
Total/NA	Leach	Dry and Grind			308589	05/15/17 15:49	DRO	TAL SL
Total/NA	Prep	ExtChrom			309374	05/18/17 13:59	MBC	TAL SL
Total/NA	Analysis	A-01-R		1	312786	06/08/17 19:02	ALD	TAL SL

**Client Sample ID: SU01-EXB-023-SS-P-01**

**Date Collected: 05/10/17 14:35**

**Date Received: 05/15/17 09:30**

**Lab Sample ID: 160-22327-2**

**Matrix: Solid**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Leach	Dry and Grind			308589	05/15/17 15:49	DRO	TAL SL
Total/NA	Prep	Fill_Geo-21			309155	05/17/17 12:55	KRS	TAL SL
Total/NA	Analysis	901.1		1	312296	06/07/17 09:54	CDR	TAL SL
Total/NA	Leach	Dry and Grind			308589	05/15/17 15:49	DRO	TAL SL
Total/NA	Prep	ExtChrom			309374	05/18/17 13:59	MBC	TAL SL
Total/NA	Analysis	A-01-R		1	312788	06/08/17 19:02	ALD	TAL SL

**Client Sample ID: SU01-EXB-076-SS-P-01**

**Date Collected: 05/10/17 14:40**

**Date Received: 05/15/17 09:30**

**Lab Sample ID: 160-22327-3**

**Matrix: Solid**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Leach	Dry and Grind			308589	05/15/17 15:49	DRO	TAL SL
Total/NA	Prep	Fill_Geo-21			309155	05/17/17 12:55	KRS	TAL SL
Total/NA	Analysis	901.1		1	312294	06/07/17 09:58	CDR	TAL SL
Total/NA	Leach	Dry and Grind			308589	05/15/17 15:49	DRO	TAL SL
Total/NA	Prep	ExtChrom			309374	05/18/17 13:59	MBC	TAL SL
Total/NA	Analysis	A-01-R		1	312931	06/10/17 16:17	ALD	TAL SL

**Client Sample ID: SU02-EXB-051-SS-P-01**

**Date Collected: 05/10/17 14:35**

**Date Received: 05/15/17 09:30**

**Lab Sample ID: 160-22327-4**

**Matrix: Solid**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Leach	Dry and Grind			308589	05/15/17 15:49	DRO	TAL SL
Total/NA	Prep	Fill_Geo-21			309155	05/17/17 12:55	KRS	TAL SL
Total/NA	Analysis	901.1		1	312301	06/07/17 09:53	CDR	TAL SL
Total/NA	Leach	Dry and Grind			308589	05/15/17 15:49	DRO	TAL SL
Total/NA	Prep	ExtChrom			309374	05/18/17 13:59	MBC	TAL SL
Total/NA	Analysis	A-01-R		1	312790	06/08/17 19:02	ALD	TAL SL

## Lab Chronicle

Client: EA Engineering, Science, and Technology  
Project/Site: WR 111 - Little Mountain Test Annex

TestAmerica Job ID: 160-22327-1

**Client Sample ID: SU01-EXB-083-SS-P-00**

**Lab Sample ID: 160-22327-5**

**Date Collected: 05/11/17 12:15**

**Matrix: Solid**

**Date Received: 05/15/17 09:30**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Leach	Dry and Grind			308589	05/15/17 15:49	DRO	TAL SL
Total/NA	Prep	Fill_Geo-21			309155	05/17/17 12:55	KRS	TAL SL
Total/NA	Analysis	901.1		1	312302	06/07/17 09:54	CDR	TAL SL
Total/NA	Leach	Dry and Grind			308589	05/15/17 15:49	DRO	TAL SL
Total/NA	Prep	ExtChrom			309374	05/18/17 13:59	MBC	TAL SL
Total/NA	Analysis	A-01-R		1	312791	06/08/17 19:02	ALD	TAL SL

**Client Sample ID: SU01-EXB-084-SS-P-00**

**Lab Sample ID: 160-22327-6**

**Date Collected: 05/11/17 12:20**

**Matrix: Solid**

**Date Received: 05/15/17 09:30**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Leach	Dry and Grind			308589	05/15/17 15:49	DRO	TAL SL
Total/NA	Prep	Fill_Geo-21			309155	05/17/17 12:55	KRS	TAL SL
Total/NA	Analysis	901.1		1	312299	06/07/17 09:59	CDR	TAL SL
Total/NA	Leach	Dry and Grind			308589	05/15/17 15:49	DRO	TAL SL
Total/NA	Prep	ExtChrom			309374	05/18/17 13:59	MBC	TAL SL
Total/NA	Analysis	A-01-R		1	312792	06/08/17 19:02	ALD	TAL SL

**Client Sample ID: SU01-EXB-085-SS-P-00**

**Lab Sample ID: 160-22327-7**

**Date Collected: 05/11/17 13:05**

**Matrix: Solid**

**Date Received: 05/15/17 09:30**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Leach	Dry and Grind			308589	05/15/17 15:49	DRO	TAL SL
Total/NA	Prep	Fill_Geo-21			309155	05/17/17 12:55	KRS	TAL SL
Total/NA	Analysis	901.1		1	312300	06/07/17 10:01	CDR	TAL SL
Total/NA	Leach	Dry and Grind			308589	05/15/17 15:49	DRO	TAL SL
Total/NA	Prep	ExtChrom			309374	05/18/17 13:59	MBC	TAL SL
Total/NA	Analysis	A-01-R		1	312793	06/08/17 19:02	ALD	TAL SL

**Client Sample ID: SU01-EXB-086-SS-P-00**

**Lab Sample ID: 160-22327-8**

**Date Collected: 05/11/17 13:10**

**Matrix: Solid**

**Date Received: 05/15/17 09:30**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Leach	Dry and Grind			308589	05/15/17 15:49	DRO	TAL SL
Total/NA	Prep	Fill_Geo-21			309155	05/17/17 12:55	KRS	TAL SL
Total/NA	Analysis	901.1		1	312290	06/07/17 09:56	CDR	TAL SL
Total/NA	Leach	Dry and Grind			308589	05/15/17 15:49	DRO	TAL SL
Total/NA	Prep	ExtChrom			309374	05/18/17 13:59	MBC	TAL SL
Total/NA	Analysis	A-01-R		1	312794	06/08/17 19:02	ALD	TAL SL

## Lab Chronicle

Client: EA Engineering, Science, and Technology  
Project/Site: WR 111 - Little Mountain Test Annex

TestAmerica Job ID: 160-22327-1

**Client Sample ID: SU03-S-087-SS-P-00**

**Lab Sample ID: 160-22327-9**

**Date Collected: 05/11/17 13:15**

**Matrix: Solid**

**Date Received: 05/15/17 09:30**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Leach	Dry and Grind			308589	05/15/17 15:49	DRO	TAL SL
Total/NA	Prep	Fill_Geo-21			309155	05/17/17 12:55	KRS	TAL SL
Total/NA	Analysis	901.1		1	312293	06/07/17 09:55	CDR	TAL SL
Total/NA	Leach	Dry and Grind			308589	05/15/17 15:49	DRO	TAL SL
Total/NA	Prep	ExtChrom			309374	05/18/17 13:59	MBC	TAL SL
Total/NA	Analysis	A-01-R		1	312795	06/08/17 19:02	ALD	TAL SL

**Client Sample ID: SU03-S-088-SS-P-00**

**Lab Sample ID: 160-22327-10**

**Date Collected: 05/11/17 13:20**

**Matrix: Solid**

**Date Received: 05/15/17 09:30**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Leach	Dry and Grind			308589	05/15/17 15:49	DRO	TAL SL
Total/NA	Prep	Fill_Geo-21			309155	05/17/17 12:55	KRS	TAL SL
Total/NA	Analysis	901.1		1	312296	06/07/17 11:15	CDR	TAL SL
Total/NA	Leach	Dry and Grind			308589	05/15/17 15:49	DRO	TAL SL
Total/NA	Prep	ExtChrom			309374	05/18/17 13:59	MBC	TAL SL
Total/NA	Analysis	A-01-R		1	312796	06/08/17 19:02	ALD	TAL SL

**Client Sample ID: SU03-S-089-SS-P-00**

**Lab Sample ID: 160-22327-11**

**Date Collected: 05/11/17 13:25**

**Matrix: Solid**

**Date Received: 05/15/17 09:30**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Leach	Dry and Grind			308589	05/15/17 15:49	DRO	TAL SL
Total/NA	Prep	Fill_Geo-21			309155	05/17/17 12:55	KRS	TAL SL
Total/NA	Analysis	901.1		1	312294	06/07/17 11:23	CDR	TAL SL
Total/NA	Leach	Dry and Grind			308589	05/15/17 15:49	DRO	TAL SL
Total/NA	Prep	ExtChrom			309374	05/18/17 13:59	MBC	TAL SL
Total/NA	Analysis	A-01-R		1	312798	06/08/17 19:02	ALD	TAL SL

### Laboratory References:

TAL SL = TestAmerica St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

# Accreditation/Certification Summary

Client: EA Engineering, Science, and Technology  
Project/Site: WR 111 - Little Mountain Test Annex

TestAmerica Job ID: 160-22327-1

## Laboratory: TestAmerica St. Louis

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska	State Program	10	MO00054	06-30-17 *
California	State Program	9	2886	03-31-18 *
Connecticut	State Program	1	PH-0241	03-31-19
Florida	NELAP	4	E87689	06-30-17 *
Illinois	NELAP	5	200023	11-30-17
Iowa	State Program	7	373	02-01-18
Kansas	NELAP	7	E-10236	10-31-17
Kentucky (DW)	State Program	4	90125	12-31-17
L-A-B	DoD ELAP		L2305	04-06-19
Louisiana	NELAP	6	04080	06-30-17 *
Louisiana (DW)	NELAP	6	LA170011	12-31-17
Maryland	State Program	3	310	09-30-17
Missouri	State Program	7	780	06-30-17 *
Nevada	State Program	9	MO000542017-1	07-31-17 *
New Jersey	NELAP	2	MO002	06-30-17 *
New York	NELAP	2	11616	03-31-18
North Dakota	State Program	8	R207	06-30-17 *
NRC	NRC		24-24817-01	12-31-22
Oklahoma	State Program	6	9997	08-31-17
Pennsylvania	NELAP	3	68-00540	02-21-18
South Carolina	State Program	4	85002001	06-30-17 *
Texas	NELAP	6	T104704193-16-10	07-31-17 *
US Fish & Wildlife	Federal		LE058448-0	10-31-17
USDA	Federal		P330-17-0028	02-02-20
Utah	NELAP	8	MO000542016-8	07-31-17 *
Virginia	NELAP	3	460230	06-14-18
Washington	State Program	10	C592	08-30-17
West Virginia DEP	State Program	3	381	08-31-17 *

## Laboratory: TestAmerica Denver

The accreditations/certifications listed below are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
A2LA	DoD ELAP		2907.01	10-31-17
Utah	NELAP	8	CO00026	07-31-17

\* Accreditation/Certification renewal pending - accreditation/certification considered valid.

TestAmerica St. Louis

# Method Summary

Client: EA Engineering, Science, and Technology  
Project/Site: WR 111 - Little Mountain Test Annex

TestAmerica Job ID: 160-22327-1

Method	Method Description	Protocol	Laboratory
901.1	Radium-226 & Other Gamma Emitters (GS)	EPA	TAL SL
A-01-R	Isotopic Thorium (Alpha Spectrometry)	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: EA Engineering, Science, and Technology  
Project/Site: WR 111 - Little Mountain Test Annex

TestAmerica Job ID: 160-22327-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
160-22327-1	SU01-EXB-026-SS-P-01	Solid	05/10/17 14:30	05/15/17 09:30
160-22327-2	SU01-EXB-023-SS-P-01	Solid	05/10/17 14:35	05/15/17 09:30
160-22327-3	SU01-EXB-076-SS-P-01	Solid	05/10/17 14:40	05/15/17 09:30
160-22327-4	SU02-EXB-051-SS-P-01	Solid	05/10/17 14:35	05/15/17 09:30
160-22327-5	SU01-EXB-083-SS-P-00	Solid	05/11/17 12:15	05/15/17 09:30
160-22327-6	SU01-EXB-084-SS-P-00	Solid	05/11/17 12:20	05/15/17 09:30
160-22327-7	SU01-EXB-085-SS-P-00	Solid	05/11/17 13:05	05/15/17 09:30
160-22327-8	SU01-EXB-086-SS-P-00	Solid	05/11/17 13:10	05/15/17 09:30
160-22327-9	SU03-S-087-SS-P-00	Solid	05/11/17 13:15	05/15/17 09:30
160-22327-10	SU03-S-088-SS-P-00	Solid	05/11/17 13:20	05/15/17 09:30
160-22327-11	SU03-S-089-SS-P-00	Solid	05/11/17 13:25	05/15/17 09:30

# REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica St. Louis Job No.: 160-22327-1

SDG No.: \_\_\_\_\_

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
82232-334_00001	06/03/60	Eckert & Ziegler, Lot 82232-334			(Purchased Reagent)		Americium-241	7.281 Bq
							Pu-239	7.137 Bq
							Thorium-230	7.63 Bq
82233-334_00001	06/03/60	Eckert & Zigler, Lot 82233-334			(Purchased Reagent)		Americium-241	5.114 Bq
							Pu-239	6.064 Bq
							Thorium-230	4.95 Bq
82234-334_00001	06/02/60	Eckert & Zigler, Lot 82234-334			(Purchased Reagent)		Americium-241	5.652 Bq
							Pu-239	5.936 Bq
							Thorium-230	5.685 Bq
82235-334_00001	06/04/60	Eckert & Ziegler, Lot 82235-334			(Purchased Reagent)		Americium-241	7.466 Bq
							Pu-239	6.897 Bq
							Thorium-230	7.167 Bq
82236-334_00001	06/02/60	Eckert & Ziegler, Lot 82236-334			(Purchased Reagent)		Americium-241	6.891 Bq
							Pu-239	6.664 Bq
							Thorium-230	7.107 Bq
82237-334_00003	06/01/60	Eckert & Ziegler, Lot 82237-334			(Purchased Reagent)		Americium-241	5.608 Bq
							Pu-239	6.424 Bq
							Thorium-230	5.856 Bq
82238-334_00001	06/01/60	Eckert & Ziegler, Lot 82238-334			(Purchased Reagent)		Americium-241	5.932 Bq
							Pu-239	6.753 Bq
							Thorium-230	7.099 Bq
82240-334_00001	06/08/60	Eckert & Ziegler, Lot 82240-334			(Purchased Reagent)		Americium-241	8.298 Bq
							Pu-239	7.163 Bq
							Thorium-230	6.304 Bq
82241-334_00001	06/08/60	Eckert & Ziegler, Lot 82241-334			(Purchased Reagent)		Americium-241	6.638 Bq
							Pu-239	6.797 Bq
							Thorium-230	6.629 Bq
82242-334_00001	06/08/60	Eckert & Ziegler, Lot 82242-334			(Purchased Reagent)		Americium-241	7.145 Bq
							Pu-239	6.414 Bq
							Thorium-230	6.583 Bq
82243-334_00001	06/09/60	Eckert & Ziegler, Lot 82243-334			(Purchased Reagent)		Americium-241	6.39 Bq
							Pu-239	5.979 Bq
							Thorium-230	5.856 Bq
82244-334_00001	06/09/60	Eckert & Zigler, Lot 82244-334			(Purchased Reagent)		Americium-241	6.897 Bq
							Pu-239	6.717 Bq
							Thorium-230	7.352 Bq
82245-334_00001	06/09/60	Eckert & Ziegler, Lot 82245-334			(Purchased Reagent)		Americium-241	5.528 Bq
							Pu-239	5.437 Bq
							Thorium-230	6.727 Bq
82246-334_00001	06/09/60	Eckert & Ziegler, Lot 82246-334			(Purchased Reagent)		Americium-241	6.002 Bq
							Pu-239	5.353 Bq
							Thorium-230	5.57 Bq
82247-334_00001	06/10/60	Eckert & Ziegler, Lot 82247-334			(Purchased Reagent)		Americium-241	6.291 Bq

# REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica St. Louis Job No.: 160-22327-1

SDG No.: \_\_\_\_\_

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							Pu-239	5.746 Bq
							Thorium-230	6.251 Bq
Marn Soil_00002	03/01/16	Eckert & Ziegler, Lot 83814-334			(Purchased Reagent)		Americium-241	2870 Bq
							Cd-109	39231 Bq
							Ce-139	1302 Bq
							Cesium-137	1087 Bq
							Co-57	849 Bq
							Cobalt-60	1788 Bq
							Hg-203	2820 Bq
							Pb-210	35040 Bq
							Sn-113	2306 Bq
							Y-88	3762 Bq
MarnSolid_00002	02/09/17	Eckert & Ziegler, Lot 90099			(Purchased Reagent)		Americium-241	2797 Bq
							Cd-109	39337 Bq
							Ce-139	1320 Bq
							Cesium-137	1122 Bq
							Co-57	870 Bq
							Hg-203	2814 Bq
							Pb-210	35883 Bq
							Sn-113	2322 Bq
							Y-88	3821 Bq
Source A_00001	04/01/59	02/23/11	water, Lot 79670-334	0.9986 Source	Gamma Ampuole_00001	0.9986 g	Americium-241	9.4429 Bq
							Cd-109	132.909 Bq
							Ce-139	4.4538 Bq
							Cesium-137	3.7296 Bq
							Co-57	2.9513 Bq
							Cobalt-60	6.2002 Bq
							Hg-203	9.6996 Bq
							Sn-113	7.6266 Bq
							Y-88	12.712 Bq
.Gamma Ampuole_00001	04/07/59		Analytics, Lot 79670-334		(Purchased Reagent)		Americium-241	9442.9 Bq
							Cd-109	132909 Bq
							Ce-139	4453.8 Bq
							Cesium-137	3729.6 Bq
							Co-57	2951.3 Bq
							Cobalt-60	6200.2 Bq
							Hg-203	9699.6 Bq
							Sn-113	7626.6 Bq
							Y-88	12712 Bq
Source C_00001	04/01/59	02/23/12	water, Lot 79670-334	1.0148 g	Gamma Ampuole_00001	1.0148 g	Americium-241	9442.9 Bq
							Cd-109	132909 Bq
							Ce-139	4453.8 Bq
							Cesium-137	3729.6 Bq
							Co-57	2951.3 Bq
							Cobalt-60	6200.2 Bq
							Hg-203	9699.6 Bq

# REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica St. Louis Job No.: 160-22327-1

SDG No.: \_\_\_\_\_

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							Sn-113	7626.6 Bq
							Y-88	12712 Bq
.Gamma Ampuole_00001	04/07/59	Analytics, Lot 79670-334			(Purchased Reagent)		Americium-241	9442.9 Bq
							Cd-109	132909 Bq
							Ce-139	4453.8 Bq
							Cesium-137	3729.6 Bq
							Co-57	2951.3 Bq
							Cobalt-60	6200.2 Bq
							Hg-203	9699.6 Bq
							Sn-113	7626.6 Bq
							Y-88	12712 Bq
Source D_00001	04/01/59	02/23/11	water, Lot 79670-334	0.9781 g	Gamma Ampuole_00001	0.9781 g	Americium-241	9442.9 Bq
							Cd-109	132909 Bq
							Ce-139	4453.8 Bq
							Cesium-137	3729.6 Bq
							Co-57	2951.3 Bq
							Cobalt-60	6200.2 Bq
							Hg-203	9699.6 Bq
							Sn-113	7626.6 Bq
							Y-88	12712 Bq
.Gamma Ampuole_00001	04/07/59	Analytics, Lot 79670-334			(Purchased Reagent)		Americium-241	9442.9 Bq
							Cd-109	132909 Bq
							Ce-139	4453.8 Bq
							Cesium-137	3729.6 Bq
							Co-57	2951.3 Bq
							Cobalt-60	6200.2 Bq
							Hg-203	9699.6 Bq
							Sn-113	7626.6 Bq
							Y-88	12712 Bq
Source E_00001	04/01/59	02/23/11	water, Lot 79670-334	1.0205 g	Gamma Ampuole_00001	1.0205 g	Americium-241	9442.9 Bq
							Cd-109	132909 Bq
							Ce-139	4453.8 Bq
							Cesium-137	3729.6 Bq
							Co-57	2951.3 Bq
							Cobalt-60	6200.2 Bq
							Hg-203	9699.6 Bq
							Sn-113	7626.6 Bq
							Y-88	12712 Bq
.Gamma Ampuole_00001	04/07/59	Analytics, Lot 79670-334			(Purchased Reagent)		Americium-241	9442.9 Bq
							Cd-109	132909 Bq
							Ce-139	4453.8 Bq
							Cesium-137	3729.6 Bq
							Co-57	2951.3 Bq
							Cobalt-60	6200.2 Bq
							Hg-203	9699.6 Bq
							Sn-113	7626.6 Bq
							Y-88	12712 Bq

# REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica St. Louis Job No.: 160-22327-1

SDG No.: \_\_\_\_\_

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
<b>Source F_00001</b>	01/01/61	02/23/11	water, Lot 83725-334	10 mL	Gamma Ampuole_00003	2.0327 mL	Americium-241	1846.42 Bq
							Cd-109	26819.3 Bq
							Ce-139	890.424 Bq
							Cesium-137	743.562 Bq
							Co-57	580.6 Bq
							Cobalt-60	1222.38 Bq
							Hg-203	1926.02 Bq
							Sn-113	1576.93 Bq
							Y-88	2572.87 Bq
.Gamma Ampuole_00003	01/19/61		Analytics, Lot 83725-334		(Purchased Reagent)		Americium-241	9083.6 Bq
							Cd-109	131939 Bq
							Ce-139	4380.5 Bq
							Cesium-137	3658 Bq
							Co-57	2856.3 Bq
							Cobalt-60	6013.6 Bq
							Hg-203	9475.2 Bq
							Sn-113	7757.8 Bq
							Y-88	12657.4 Bq
<b>Source G_00001</b>	01/01/61	01/01/11	water, Lot 83725-334	10 mL	Gamma Ampuole_00003	1.8639 g	Americium-241	1693.09 Bq
							Cd-109	24592.1 Bq
							Ce-139	816.481 Bq
							Cesium-137	681.815 Bq
							Co-57	532.386 Bq
							Cobalt-60	1120.87 Bq
							Hg-203	1766.08 Bq
							Sn-113	1445.98 Bq
							Y-88	2359.21 Bq
.Gamma Ampuole_00003	01/19/61		Analytics, Lot 83725-334		(Purchased Reagent)		Americium-241	9083.6 Bq
							Cd-109	131939 Bq
							Ce-139	4380.5 Bq
							Cesium-137	3658 Bq
							Co-57	2856.3 Bq
							Cobalt-60	6013.6 Bq
							Hg-203	9475.2 Bq
							Sn-113	7757.8 Bq
							Y-88	12657.4 Bq
<b>Source H_00002</b>	01/01/51	01/01/12	wataer, Lot 83725-334	10 mL	Gamma Ampuole_00003	2.1184 g	Americium-241	1924.27 Bq
							Cd-109	27950 Bq
							Ce-139	927.965 Bq
							Cesium-137	774.911 Bq
							Co-57	605.079 Bq
							Cobalt-60	1273.92 Bq
							Hg-203	2007.23 Bq
							Sn-113	1643.41 Bq
							Y-88	2681.34 Bq
.Gamma Ampuole_00003	01/19/61		Analytics, Lot 83725-334		(Purchased Reagent)		Americium-241	9083.6 Bq

# REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica St. Louis Job No.: 160-22327-1

SDG No.: \_\_\_\_\_

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							Cd-109	131939 Bq
							Ce-139	4380.5 Bq
							Cesium-137	3658 Bq
							Co-57	2856.3 Bq
							Cobalt-60	6013.6 Bq
							Hg-203	9475.2 Bq
							Sn-113	7757.8 Bq
							Y-88	12657.4 Bq
Source I_00001	01/01/61	01/01/12	wataer, Lot 83725-334	10 mL	Gamma Ampuole_00003	1.9559 g	Americium-241	1776.66 Bq
							Cd-109	25806 Bq
							Ce-139	856.782 Bq
							Cesium-137	715.468 Bq
							Co-57	558.664 Bq
							Cobalt-60	1176.2 Bq
							Hg-203	1853.25 Bq
							Sn-113	1517.35 Bq
							Y-88	2475.66 Bq
.Gamma Ampuole_00003	01/19/61		Analytics, Lot 83725-334		(Purchased Reagent)		Americium-241	9083.6 Bq
							Cd-109	131939 Bq
							Ce-139	4380.5 Bq
							Cesium-137	3658 Bq
							Co-57	2856.3 Bq
							Cobalt-60	6013.6 Bq
							Hg-203	9475.2 Bq
							Sn-113	7757.8 Bq
							Y-88	12657.4 Bq
Th-229_00022	03/26/18	03/24/17	0.1M HNO3, Lot n/a	500 mL	Th-229_00017	15 mL	At-217	67.2296 dpm/mL
							Thorium-229	67.2296 dpm/mL
.Th-229_00017	03/26/18	08/20/14	0.1M HNO3, Lot n/a	100 mL	Th-229_00016	5.0464 g	At-217	2240.99 dpm/mL
							Thorium-229	2240.99 dpm/mL
..Th-229_00016	08/06/64		Analytics, Lot 97790		(Purchased Reagent)		At-217	740.127 Bq/g
							Thorium-229	740.127 Bq/g
TRM-2_00002	03/20/50		DOE, Lot TRM-2		(Purchased Reagent)		Pb-210	22.1 pCi/g
							Radium-226	25.4 pCi/g
							Thorium-230	24.5 pCi/g
							U-234	6.2 pCi/g
							U-238	6 pCi/g
Tuna Can LCS_00006	09/29/17		Analytics, Lot 74139-334		(Purchased Reagent)		Americium-241	219 dpm/g
							Cesium-137	82.3 dpm/g
							Cobalt-60	136 dpm/g
Tuna Can_00002	02/03/15		Eckert & Ziegler, Lot 81427-334		(Purchased Reagent)		Americium-241	1164 Bq
							Cd-109	16063 Bq
							Ce-139	546 Bq

# REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica St. Louis Job No.: 160-22327-1

SDG No.: \_\_\_\_\_

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							Cesium-137	465 Bq
							Co-57	357 Bq
							Cobalt-60	742 Bq
							Hg-203	1208 Bq
							Pb-210	15186 Bq
							Sn-113	943 Bq
							Y-88	1571 Bq
<b>Tuna Can_00003</b>	02/09/17	Eckert & Ziegler, Lot 90099			(Purchased Reagent)		Americium-241	1164 Bq
							Cd-109	16373 Bq
							Ce-139	549 Bq
							Cesium-137	467 Bq
							Co-57	362 Bq
							Cobalt-60	735 Bq
							Hg-203	1171 Bq
							Pb-210	14936 Bq
							Sn-113	967 Bq
<b>Tuna Can_00006</b>	03/01/16	Eckert & Ziegler, Lot 83814-334			(Purchased Reagent)		Y-88	1590 Bq
							Americium-241	1195 Bq
							Cd-109	16353 Bq
							Ce-139	543 Bq
							Cesium-137	453 Bq
							Co-57	354 Bq
							Cobalt-60	745 Bq
							Hg-203	1175 Bq
							Pb-210	14606 Bq
							Sn-113	961 Bq
							Y-88	1568 Bq

# **ALPHA SPECTROSCOPY**

# Method A-01-R Th

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Isotopic Thorium (Alpha  
Spectrometry) by Method A-01-R

# Prep Batch: 309374

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Preparation, Extraction  
Chromatography Resin Actinide  
Separation

# Alpha Spectroscopy Analysis Detail Report

## Prep Batch: 309374

Lab ID: MB 160-309374/1-A  
 Client ID:  
 Sigma: 2

Analyzed: 06/10/17 16:17  
 Detector: AV150  
 Dil Fac: 1

Decay Corrected: No  
 Yield Truncated: No  
 Ts: 400

Analyte	MB Result	Count Unc	Total Unc	Qualifier	Unit	LOQ	MDC	Anly Batch	
Thorium-230	0.04086	0.0340	0.0342	U	pCi/g	0.100	0.0447	312929	
Thorium-232	0.002568	0.0206	0.0206	U	pCi/g	0.100	0.0472	312929	
Tracer	MB Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Thorium-229	2.832	0.235	0.335		pCi/g	0.0601	3.03	93.5	30 - 110

Lab ID: LCS 160-309374/2-A  
 Client ID:  
 Sigma: 2

Analyzed: 06/08/17 19:02  
 Detector: AV64  
 Dil Fac: 1

Decay Corrected: No  
 Yield Truncated: No  
 Ts: 400

Analyte	LCS Result	Count Unc	Total Unc	Qualifier	Unit	LOQ	MDC	Anly Batch	
Thorium-230	25.03	0.977	2.32		pCi/g	0.100	0.0824	312785	
Tracer	LCS Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Thorium-229	5.728	0.459	0.665		pCi/g	0.0509	5.98	95.7	30 - 110

Lab ID: 160-22327-1  
 Client ID: SU01-EXB-026-SS-P-01  
 Sigma: 2

Analyzed: 06/08/17 19:02  
 Detector: AV65  
 Dil Fac: 1

Decay Corrected: No  
 Yield Truncated: No  
 Ts: 400

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	LOQ	MDC	Anly Batch	
Thorium-230	0.725	0.132	0.145		pCi/g	0.100	0.0700	312786	
Thorium-232	1.39	0.178	0.213		pCi/g	0.100	0.0541	312786	
Tracer	Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Thorium-229	2.60	0.226	0.315		pCi/g	0.0677	3.03	85.9	30 - 110

Lab ID: 160-22327-1 DU  
 Client ID: SU01-EXB-026-SS-P-01  
 Sigma: 2

Analyzed: 06/08/17 19:02  
 Detector: AV66  
 Dil Fac: 1

Decay Corrected: No  
 Yield Truncated: No  
 Ts: 400

Analyte	DU Result	Count Unc	Total Unc	Qualifier	Unit	LOQ	MDC	Anly Batch	
Thorium-230	0.6509	0.117	0.129		pCi/g	0.100	0.0618	312787	
Thorium-232	1.369	0.165	0.201		pCi/g	0.100	0.0379	312787	
Tracer	DU Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Thorium-229	2.770	0.224	0.323		pCi/g	0.0136	3.04	91.2	30 - 110

# Alpha Spectroscopy Analysis Detail Report

## Prep Batch: 309374

Lab ID: 160-22327-2  
 Client ID: SU01-EXB-023-SS-P-01  
 Sigma: 2

Analyzed: 06/08/17 19:02  
 Detector: AV68  
 Dil Fac: 1

Decay Corrected: No  
 Yield Truncated: No  
 Ts: 400

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	LOQ	MDC	Anly Batch	
Thorium-230	0.639	0.117	0.129		pCi/g	0.100	0.0424	312788	
Thorium-232	1.47	0.176	0.216		pCi/g	0.100	0.0406	312788	
Tracer	Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Thorium-229	2.66	0.221	0.314		pCi/g	0.0422	3.05	87.1	30 - 110

Lab ID: 160-22327-3  
 Client ID: SU01-EXB-076-SS-P-01  
 Sigma: 2

Analyzed: 06/10/17 16:17  
 Detector: AV155  
 Dil Fac: 1

Decay Corrected: No  
 Yield Truncated: No  
 Ts: 400

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	LOQ	MDC	Anly Batch	
Thorium-230	0.826	0.137	0.153		pCi/g	0.100	0.0499	312931	
Thorium-232	0.822	0.136	0.152		pCi/g	0.100	0.0461	312931	
Tracer	Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Thorium-229	2.54	0.217	0.304		pCi/g	0.0398	3.05	83.3	30 - 110

Lab ID: 160-22327-4  
 Client ID: SU02-EXB-051-SS-P-01  
 Sigma: 2

Analyzed: 06/08/17 19:02  
 Detector: AV70  
 Dil Fac: 1

Decay Corrected: No  
 Yield Truncated: No  
 Ts: 400

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	LOQ	MDC	Anly Batch	
Thorium-230	2.14	0.215	0.280		pCi/g	0.100	0.0464	312790	
Thorium-232	2.19	0.216	0.284		pCi/g	0.100	0.0295	312790	
Tracer	Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Thorium-229	2.51	0.212	0.298		pCi/g	0.0384	3.03	82.8	30 - 110

Lab ID: 160-22327-5  
 Client ID: SU01-EXB-083-SS-P-00  
 Sigma: 2

Analyzed: 06/08/17 19:02  
 Detector: AV71  
 Dil Fac: 1

Decay Corrected: No  
 Yield Truncated: No  
 Ts: 400

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	LOQ	MDC	Anly Batch	
Thorium-230	1.86	0.197	0.251		pCi/g	0.100	0.0381	312791	
Thorium-232	1.30	0.163	0.196		pCi/g	0.100	0.0154	312791	
Tracer	Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Thorium-229	2.68	0.221	0.316		pCi/g	0.0335	3.05	87.8	30 - 110

# Alpha Spectroscopy Analysis Detail Report

## Prep Batch: 309374

Lab ID: 160-22327-6  
 Client ID: SU01-EXB-084-SS-P-00  
 Sigma: 2

Analyzed: 06/08/17 19:02  
 Detector: AV72  
 Dil Fac: 1

Decay Corrected: No  
 Yield Truncated: No  
 Ts: 400

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	LOQ	MDC	Anly Batch	
Thorium-230	1.18	0.156	0.185		pCi/g	0.100	0.0334	312792	
Thorium-232	1.28	0.162	0.194		pCi/g	0.100	0.0421	312792	
Tracer	Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Thorium-229	2.80	0.229	0.328		pCi/g	0.0344	3.05	91.6	30 - 110

Lab ID: 160-22327-7  
 Client ID: SU01-EXB-085-SS-P-00  
 Sigma: 2

Analyzed: 06/08/17 19:02  
 Detector: AV73  
 Dil Fac: 1

Decay Corrected: No  
 Yield Truncated: No  
 Ts: 400

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	LOQ	MDC	Anly Batch	
Thorium-230	2.43	0.213	0.295		pCi/g	0.100	0.0426	312793	
Thorium-232	1.22	0.150	0.182		pCi/g	0.100	0.0138	312793	
Tracer	Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Thorium-229	2.79	0.219	0.321		pCi/g	0.0283	3.03	91.9	30 - 110

Lab ID: 160-22327-8  
 Client ID: SU01-EXB-086-SS-P-00  
 Sigma: 2

Analyzed: 06/08/17 19:02  
 Detector: AV74  
 Dil Fac: 1

Decay Corrected: No  
 Yield Truncated: No  
 Ts: 400

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	LOQ	MDC	Anly Batch	
Thorium-230	1.24	0.149	0.182		pCi/g	0.100	0.0327	312794	
Thorium-232	0.976	0.131	0.155		pCi/g	0.100	0.0244	312794	
Tracer	Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Thorium-229	3.09	0.238	0.352		pCi/g	0.0337	3.00	103	30 - 110

Lab ID: 160-22327-9  
 Client ID: SU03-S-087-SS-P-00  
 Sigma: 2

Analyzed: 06/08/17 19:02  
 Detector: AV75  
 Dil Fac: 1

Decay Corrected: No  
 Yield Truncated: No  
 Ts: 400

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	LOQ	MDC	Anly Batch	
Thorium-230	5.62	0.341	0.582		pCi/g	0.100	0.0285	312795	
Thorium-232	1.89	0.198	0.254		pCi/g	0.100	0.0379	312795	
Tracer	Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Thorium-229	2.81	0.232	0.331		pCi/g	0.0384	3.04	92.5	30 - 110

# Alpha Spectroscopy Analysis Detail Report

## Prep Batch: 309374

Lab ID: 160-22327-10  
 Client ID: SU03-S-088-SS-P-00  
 Sigma: 2

Analyzed: 06/08/17 19:02  
 Detector: AV76  
 Dil Fac: 1

Decay Corrected: No  
 Yield Truncated: No  
 Ts: 400

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	LOQ	MDC	Anly Batch	
Thorium-230	4.95	0.318	0.524		pCi/g	0.100	0.0377	312796	
Thorium-232	1.76	0.189	0.240		pCi/g	0.100	0.0335	312796	
Tracer	Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Thorium-229	2.69	0.222	0.317		pCi/g	0.0300	3.04	88.5	30 - 110

Lab ID: 160-22327-11  
 Client ID: SU03-S-089-SS-P-00  
 Sigma: 2

Analyzed: 06/08/17 19:02  
 Detector: AV79  
 Dil Fac: 1

Decay Corrected: No  
 Yield Truncated: No  
 Ts: 400

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	LOQ	MDC	Anly Batch	
Thorium-230	1.24	0.161	0.191		pCi/g	0.100	0.0381	312798	
Thorium-232	0.920	0.138	0.158		pCi/g	0.100	0.0154	312798	
Tracer	Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Thorium-229	2.45	0.203	0.289		pCi/g	0.0232	3.02	81.2	30 - 110

### Quality Control Summary

Method Blank ID:	Analyte	Parent Result	Spike Added	MB Result	Qualifier	Unit	% Rec	% Rec Limits	RPD	RER	DER	RER Limit	Z Factor
MB 160-309374/1-A	Thorium-230			0.04086	U	pCi/g							2.389288 81
MB 160-309374/1-A	Thorium-232			0.002568	U	pCi/g							.2486944 3
Lab Control Sample ID:	Analyte	Parent Result	Spike Added	LCS Result	Qualifier	Unit	% Rec	% Rec Limits	RPD	RER	DER	RER Limit	Z Factor
LCS 160-309374/2-A	Thorium-230		24.5	25.03		pCi/g	102	81 - 118					.3315068 045
Duplicate ID:	Analyte	Parent Result	Spike Added	DU Result	Qualifier	Unit	% Rec	% Rec Limits	RPD	RER	DER	RER Limit	Z Factor
160-22327-1	Thorium-230	0.725		0.6509		pCi/g			11	0.27	0.77	1	
160-22327-1	Thorium-232	1.39		1.369		pCi/g			2	0.06	0.16	1	

Glossary:  
 Ts = Count Duration, Sample

## ALPHA SPECTROSCOPY BATCH WORKSHEET

Lab Name: TestAmerica St. Louis Job No.: 160-22327-1

SDG No.: \_\_\_\_\_

Batch Number: 309374 Batch Start Date: 05/18/17 13:59 Batch Analyst: Colbert, Madalyn BBatch Method: ExtChrom Batch End Date: 06/07/17 12:19

Lab Sample ID	Client Sample ID	Method Chain	Basis	InitialAmount	Th-229 00022	TRM-2 00002			
MB 160-309374/1		ExtChrom, A-01-R		1.0 g	0.1 mL				
LCS 160-309374/2		ExtChrom, A-01-R		0.5060 g	0.1 mL	0.506 g			
160-22327-A-1-A	SU01-EXB-026-SS-P-01	ExtChrom, A-01-R	T	0.9994 g	0.1 mL				
160-22327-A-1-A DU	SU01-EXB-026-SS-P-01	ExtChrom, A-01-R	T	0.9963 g	0.1 mL				
160-22327-A-2-A	SU01-EXB-023-SS-P-01	ExtChrom, A-01-R	T	0.9936 g	0.1 mL				
160-22327-A-3-A	SU01-EXB-076-SS-P-01	ExtChrom, A-01-R	T	0.9929 g	0.1 mL				
160-22327-A-4-A	SU02-EXB-051-SS-P-01	ExtChrom, A-01-R	T	1.0007 g	0.1 mL				
160-22327-A-5-A	SU01-EXB-083-SS-P-00	ExtChrom, A-01-R	T	0.9914 g	0.1 mL				
160-22327-A-6-A	SU01-EXB-084-SS-P-00	ExtChrom, A-01-R	T	0.9914 g	0.1 mL				
160-22327-A-7-A	SU01-EXB-085-SS-P-00	ExtChrom, A-01-R	T	0.9989 g	0.1 mL				
160-22327-A-8-A	SU01-EXB-086-SS-P-00	ExtChrom, A-01-R	T	1.0093 g	0.1 mL				
160-22327-A-9-A	SU03-S-087-SS-P-00	ExtChrom, A-01-R	T	0.9958 g	0.1 mL				
160-22327-A-10-A	SU03-S-088-SS-P-00	ExtChrom, A-01-R	T	0.9946 g	0.1 mL				
160-22327-A-11-A	SU03-S-089-SS-P-00	ExtChrom, A-01-R	T	1.0022 g	0.1 mL				

The pound sign (#) in the amount added field denotes that the reagent was used undiluted. All calculations are performed using the stated concentration for this reagent.

A-01-R

Page 1 of 2

## ALPHA SPECTROSCOPY BATCH WORKSHEET

Lab Name: TestAmerica St. Louis Job No.: 160-22327-1

SDG No.: \_\_\_\_\_

Batch Number: 309374 Batch Start Date: 05/18/17 13:59 Batch Analyst: Colbert, Madalyn BBatch Method: ExtChrom Batch End Date: 06/07/17 12:19

Batch Notes	
Balance ID	0034150037
Analyst ID - Column	nmn
Column Date	6/6/17
Analyst ID - CoPrecipitation	nmn
CoPrecipitation Date	6/7/17
Pipette ID	Rad104
Analyst ID - Reagent Drop Witness	nmn per scb
Analyst ID - Reagent Drop	scb
SOP Number	ST-RC-0003, ST-RC-0004, ST-RC-0100, ST-RC-0242

Basis	Basis Description
T	Total/NA

The pound sign (#) in the amount added field denotes that the reagent was used undiluted. All calculations are performed using the stated concentration for this reagent.

# Run Logs

# Alpha Spectroscopy Run Log

## Detector: AV64

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
08/31/16 09:16	140.015 332031 25	IC 160-267744/1		267744			PS
09/02/16 13:12	60	ICV 160-268892/1		268892			PS
05/22/17 08:35	960	ICB 160-309988/1		309988			PS
05/23/17 14:13	60	CCV 160-310350/1		310350			PS
06/08/17 14:01	1	PULSER 160-312785/1		312785			ALD
06/08/17 19:02	400	LCS 160-309374/2-A		312785	309374	A-01-R	ALD

## Detector: AV65

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
08/31/16 09:31	140	IC 160-267745/1		267745			PS
09/02/16 13:15	60	ICV 160-268893/1		268893			PS
05/22/17 08:35	960	ICB 160-309989/1		309989			PS
05/23/17 14:17	60	CCV 160-310351/1		310351			PS
06/08/17 14:01	1	PULSER 160-312786/1		312786			ALD
06/08/17 19:02	400	160-22327-1	SU01-EXB-026-SS-P-01	312786	309374	A-01-R	ALD

## Detector: AV66

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
08/31/16 09:32	140	IC 160-267746/1		267746			PS
09/02/16 13:15	60	ICV 160-268894/1		268894			PS
05/19/17 10:36	960	ICB 160-309943/1		309943			PS
05/23/17 14:14	60	CCV 160-310352/1		310352			PS
06/08/17 14:01	1	PULSER 160-312787/1		312787			ALD
06/08/17 19:02	400	160-22327-1 DU	SU01-EXB-026-SS-P-01 DU	312787	309374	A-01-R	ALD

## Detector: AV68

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
08/31/16 09:15	140	IC 160-267747/1		267747			PS
09/02/16 13:14	60	ICV 160-268895/1		268895			PS
05/19/17 10:36	960	ICB 160-309944/1		309944			PS
05/23/17 14:14	60	CCV 160-310353/1		310353			PS
06/08/17 14:01	1	PULSER 160-312788/1		312788			ALD
06/08/17 19:02	400	160-22327-2	SU01-EXB-023-SS-P-01	312788	309374	A-01-R	ALD

## Detector: AV70

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
08/30/16 14:57	140	IC 160-267723/1		267723			PS
09/02/16 13:17	60	ICV 160-268897/1		268897			PS
05/19/17 10:36	960	ICB 160-309947/1		309947			PS
05/23/17 12:57	60	CCV 160-310355/1		310355			PS
06/08/17 14:01	1	PULSER 160-312790/1		312790			ALD
06/08/17 19:02	400	160-22327-4	SU02-EXB-051-SS-P-01	312790	309374	A-01-R	ALD

# Alpha Spectroscopy Run Log

## Detector: AV71

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
08/30/16 14:57	140	IC 160-267724/1		267724			PS
09/02/16 13:12	60	ICV 160-268898/1		268898			PS
05/19/17 10:36	960	ICB 160-309948/1		309948			PS
05/23/17 12:57	60	CCV 160-310356/1		310356			PS
06/08/17 14:01	1	PULSER 160-312791/1		312791			ALD
06/08/17 19:02	400	160-22327-5	SU01-EXB-083-SS-P-00	312791	309374	A-01-R	ALD

## Detector: AV72

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
08/30/16 14:58	140	IC 160-267725/1		267725			PS
09/02/16 13:17	60	ICV 160-268899/1		268899			PS
05/19/17 10:36	960	ICB 160-309949/1		309949			PS
05/23/17 12:58	60	CCV 160-310357/1		310357			PS
06/08/17 14:01	1	PULSER 160-312792/1		312792			ALD
06/08/17 19:02	400	160-22327-6	SU01-EXB-084-SS-P-00	312792	309374	A-01-R	ALD

## Detector: AV73

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
09/01/16 08:34	140	IC 160-267748/1		267748			PS
09/02/16 13:18	60	ICV 160-268900/1		268900			PS
05/19/17 10:36	960	ICB 160-309950/1		309950			PS
05/23/17 12:58	60	CCV 160-310358/1		310358			PS
06/08/17 14:01	1	PULSER 160-312793/1		312793			ALD
06/08/17 19:02	400	160-22327-7	SU01-EXB-085-SS-P-00	312793	309374	A-01-R	ALD

## Detector: AV74

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
08/30/16 15:07	140	IC 160-267726/1		267726			PS
09/02/16 13:13	60	ICV 160-268901/1		268901			PS
05/22/17 08:35	960	ICB 160-309990/1		309990			PS
05/23/17 13:03	60	CCV 160-310359/1		310359			PS
06/08/17 14:01	1	PULSER 160-312794/1		312794			ALD
06/08/17 19:02	400	160-22327-8	SU01-EXB-086-SS-P-00	312794	309374	A-01-R	ALD

## Detector: AV75

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
07/27/16 14:41	1	PULSER 160-267667/1		267667			
07/27/16 14:56	140	IC 160-267667/2		267667			PS
09/02/16 13:13	60	ICV 160-268902/1		268902			PS
05/19/17 10:36	960	ICB 160-309952/1		309952			PS
05/23/17 12:59	60	CCV 160-310360/1		310360			PS
06/08/17 14:01	1	PULSER 160-312795/1		312795			ALD
06/08/17 19:02	400	160-22327-9	SU03-S-087-SS-P-00	312795	309374	A-01-R	ALD

## Detector: AV76

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
07/27/16 14:56	140	IC 160-267668/1		267668			PS

# Alpha Spectroscopy Run Log

## Detector: AV76 (Continued)

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
09/02/16 13:14	60	ICV 160-268903/1		268903			PS
05/19/17 10:36	960	ICB 160-309953/1		309953			PS
05/23/17 12:59	60	CCV 160-310361/1		310361			PS
06/08/17 14:01	1	PULSER 160-312796/1		312796			ALD
06/08/17 19:02	400	160-22327-10	SU03-S-088-SS-P-00	312796	309374	A-01-R	ALD

## Detector: AV79

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
07/27/16 14:59	140	IC 160-267671/1		267671			PS
09/02/16 14:36	60	ICV 160-268906/1		268906			PS
05/22/17 08:35	960	ICB 160-309993/1		309993			PS
05/23/17 13:00	60	CCV 160-310363/1		310363			PS
06/08/17 14:01	1	PULSER 160-312798/1		312798			ALD
06/08/17 19:02	400	160-22327-11	SU03-S-089-SS-P-00	312798	309374	A-01-R	ALD

## Detector: AV150

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
11/10/16 12:20	140	IC 160-279038/1		279038			PS
12/16/16 08:42	60	ICV 160-284325/1		284325			PS
05/12/17 15:53	960	ICB 160-308617/1		308617			PS
05/17/17 13:06	60	CCV 160-309276/1		309276			PS
06/10/17 09:29	1	PULSER 160-312929/1		312929			
06/10/17 09:44	1	PULSER 160-312929/2		312929			ALD
06/10/17 16:17	400	MB 160-309374/1-A		312929	309374	A-01-R	ALD

## Detector: AV155

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
11/10/16 12:22	140	IC 160-279043/1		279043			PS
12/16/16 08:38	60	ICV 160-284330/1		284330			PS
05/15/17 09:12	960	ICB 160-308911/1		308911			PS
05/17/17 09:17	60	CCV 160-309280/1		309280			PS
06/10/17 09:29	1	PULSER 160-312931/1		312931			
06/10/17 09:44	1	PULSER 160-312931/2		312931			ALD
06/10/17 16:17	400	160-22327-3	SU01-EXB-076-SS-P-01	312931	309374	A-01-R	ALD

# **GAMMA SPECTROSCOPY**

# Method 901.1

## Ra-226

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Radium-226 & Other Gamma Emitters  
(GS) by Method 901.1

# Prep Batch: 309155

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Fill Geometry, 21-Day In-Growth

# Gamma Spectroscopy Analysis Detail Report

## Prep Batch: 309155

Lab ID: MB 160-309155/1-A Analyzed: 06/07/17 09:55 Ts: 30 Sigma: 2  
 Client ID: Detector: GV8 Decay Corrected: No

Analyte	MB Result	Count Unc	Total Unc	Qualifier	Unit	LOQ	MDC	Anly Batch
Radium-226	-0.09557	0.283	0.284	U	pCi/g	0.500	0.481	312292

Lab ID: LCS 160-309155/2-A Analyzed: 06/07/17 10:00 Ts: 30 Sigma: 2  
 Client ID: Detector: GV10 Decay Corrected: No

Analyte	LCS Result	Count Unc	Total Unc	Qualifier	Unit	LOQ	MDC	Anly Batch
Americium-241	96.89	1.64	10.2		pCi/g		1.20	312295
Cesium-137	28.38	0.696	3.03		pCi/g		0.244	312295
Cobalt-60	15.10	0.408	1.57		pCi/g		0.0997	312295

Lab ID: 160-22327-1 Analyzed: 06/07/17 09:57 Ts: 30 Sigma: 2  
 Client ID: SU01-EXB-026-SS-P-01 Detector: GV5 Decay Corrected: No

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	LOQ	MDC	Anly Batch
Radium-226	1.15	0.262	0.288		pCi/g	0.500	0.183	312291

Lab ID: 160-22327-1 DU Analyzed: 06/07/17 11:20 Ts: 30 Sigma: 2  
 Client ID: SU01-EXB-026-SS-P-01 Detector: GV10 Decay Corrected: No

Analyte	DU Result	Count Unc	Total Unc	Qualifier	Unit	LOQ	MDC	Anly Batch
Radium-226	1.218	0.280	0.307		pCi/g	0.500	0.259	312295

Lab ID: 160-22327-2 Analyzed: 06/07/17 09:54 Ts: 30 Sigma: 2  
 Client ID: SU01-EXB-023-SS-P-01 Detector: GV9 Decay Corrected: No

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	LOQ	MDC	Anly Batch
Radium-226	0.913	0.170	0.195		pCi/g	0.500	0.128	312296

Lab ID: 160-22327-3 Analyzed: 06/07/17 09:58 Ts: 30 Sigma: 2  
 Client ID: SU01-EXB-076-SS-P-01 Detector: GV13 Decay Corrected: No

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	LOQ	MDC	Anly Batch
Radium-226	1.27	0.214	0.251		pCi/g	0.500	0.158	312294

# Gamma Spectroscopy Analysis Detail Report

## Prep Batch: 309155

Lab ID: 160-22327-4      Analyzed: 06/07/17 09:53      Ts: 30      Sigma: 2  
 Client ID: SU02-EXB-051-SS-P-01      Detector: GV14      Decay Corrected: No

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	LOQ	MDC	Anly Batch
Radium-226	2.51	0.322	0.414		pCi/g	0.500	0.192	312301

Lab ID: 160-22327-5      Analyzed: 06/07/17 09:54      Ts: 30      Sigma: 2  
 Client ID: SU01-EXB-083-SS-P-00      Detector: GV15      Decay Corrected: No

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	LOQ	MDC	Anly Batch
Radium-226	1.63	0.326	0.367		pCi/g	0.500	0.232	312302

Lab ID: 160-22327-6      Analyzed: 06/07/17 09:59      Ts: 30      Sigma: 2  
 Client ID: SU01-EXB-084-SS-P-00      Detector: GV16      Decay Corrected: No

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	LOQ	MDC	Anly Batch
Radium-226	1.54	0.253	0.299		pCi/g	0.500	0.182	312299

Lab ID: 160-22327-7      Analyzed: 06/07/17 10:01      Ts: 30      Sigma: 2  
 Client ID: SU01-EXB-085-SS-P-00      Detector: GV17      Decay Corrected: No

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	LOQ	MDC	Anly Batch
Radium-226	1.55	0.267	0.312		pCi/g	0.500	0.204	312300

Lab ID: 160-22327-8      Analyzed: 06/07/17 09:56      Ts: 30      Sigma: 2  
 Client ID: SU01-EXB-086-SS-P-00      Detector: GV7      Decay Corrected: No

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	LOQ	MDC	Anly Batch
Radium-226	1.18	0.252	0.280		pCi/g	0.500	0.206	312290

Lab ID: 160-22327-9      Analyzed: 06/07/17 09:55      Ts: 30      Sigma: 2  
 Client ID: SU03-S-087-SS-P-00      Detector: GV3      Decay Corrected: No

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	LOQ	MDC	Anly Batch
Radium-226	1.67	0.305	0.352		pCi/g	0.500	0.215	312293

# Gamma Spectroscopy Analysis Detail Report

## Prep Batch: 309155

Lab ID: 160-22327-10	Analyzed: 06/07/17 11:15	Ts: 30	Sigma: 2
Client ID: SU03-S-088-SS-P-00	Detector: GV9	Decay Corrected: No	

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	LOQ	MDC	Anly Batch
Radium-226	1.93	0.298	0.359		pCi/g	0.500	0.197	312296

Lab ID: 160-22327-11	Analyzed: 06/07/17 11:23	Ts: 30	Sigma: 2
Client ID: SU03-S-089-SS-P-00	Detector: GV13	Decay Corrected: No	

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	LOQ	MDC	Anly Batch
Radium-226	1.48	0.215	0.265		pCi/g	0.500	0.107	312294

### Quality Control Summary

Method Blank ID:	Analyte	Parent Result	Spike Added	MB Result	Qualifier	Unit	% Rec	% Rec Limits	RPD	RER	DER	RER Limit	Z Factor
MB 160-309155/1-A	Radium-226			-0.09557	U	pCi/g							-.6739412 1
Lab Control Sample ID:	Analyte	Parent Result	Spike Added	LCS Result	Qualifier	Unit	% Rec	% Rec Limits	RPD	RER	DER	RER Limit	Z Factor
LCS 160-309155/2-A	Americium-241		97.0	96.89		pCi/g	100	87 - 116					-.0113187 354
LCS 160-309155/2-A	Cesium-137		29.0	28.38		pCi/g	98	87 - 120					-.2771373 841
LCS 160-309155/2-A	Cobalt-60		15.0	15.10		pCi/g	100	87 - 115					.0547460 599
Duplicate ID:	Analyte	Parent Result	Spike Added	DU Result	Qualifier	Unit	% Rec	% Rec Limits	RPD	RER	DER	RER Limit	Z Factor
160-22327-1	Radium-226	1.15		1.218		pCi/g			6	0.11	0.31	1	

Glossary:

Ts = Count Duration, Sample

GAMMA SPECTROSCOPY BATCH WORKSHEET

Lab Name: TestAmerica St. Louis Job No.: 160-22327-1

SDG No.: \_\_\_\_\_

Batch Number: 309155 Batch Start Date: 05/17/17 12:55 Batch Analyst: Slama, Kurt R

Batch Method: Fill\_Geo-21 Batch End Date: 05/17/17 13:54

Lab Sample ID	Client Sample ID	Method Chain	Basis	TareWeight	GrossWeight	InitialAmount	IngDecDate1	IngDecDate3	Geometry
MB 160-309155/1		Fill_Geo-21, 901.1				291.18 g	5/17/17	6/7/17	tuna can
LCS 160-309155/2		Fill_Geo-21, 901.1				341.9 g	5/17/17	6/7/17	tuna can
160-22327-A-1-A	SU01-EXB-026-SS-P-01	Fill_Geo-21, 901.1	T	47.1 g	312.9 g	265.8 g	5/17/17	6/7/17	tuna can
160-22327-A-1-A DU	SU01-EXB-026-SS-P-01	Fill_Geo-21, 901.1	T	47.1 g	312.9 g	265.8 g	5/17/17	6/7/17	tuna can
160-22327-A-2-A	SU01-EXB-023-SS-P-01	Fill_Geo-21, 901.1	T	47.1 g	373.2 g	326.1 g	5/17/17	6/7/17	tuna can
160-22327-A-3-A	SU01-EXB-076-SS-P-01	Fill_Geo-21, 901.1	T	46.5 g	384.3 g	337.8 g	5/17/17	6/7/17	tuna can
160-22327-A-4-A	SU02-EXB-051-SS-P-01	Fill_Geo-21, 901.1	T	47.0 g	344.2 g	297.2 g	5/17/17	6/7/17	tuna can
160-22327-A-5-A	SU01-EXB-083-SS-P-00	Fill_Geo-21, 901.1	T	47.4 g	331.9 g	284.5 g	5/17/17	6/7/17	tuna can
160-22327-A-6-A	SU01-EXB-084-SS-P-00	Fill_Geo-21, 901.1	T	46.6 g	331.0 g	284.4 g	5/17/17	6/7/17	tuna can
160-22327-A-7-A	SU01-EXB-085-SS-P-00	Fill_Geo-21, 901.1	T	46.6 g	347.8 g	301.2 g	5/17/17	6/7/17	tuna can
160-22327-A-8-A	SU01-EXB-086-SS-P-00	Fill_Geo-21, 901.1	T	46.7 g	336.6 g	289.9 g	5/17/17	6/7/17	tuna can
160-22327-A-9-A	SU03-S-087-SS-P-00	Fill_Geo-21, 901.1	T	46.9 g	318.5 g	271.6 g	5/17/17	6/7/17	tuna can
160-22327-A-10-A	SU03-S-088-SS-P-00	Fill_Geo-21, 901.1	T	47.1 g	319.3 g	272.2 g	5/17/17	6/7/17	tuna can
160-22327-A-11-A	SU03-S-089-SS-P-00	Fill_Geo-21, 901.1	T	46.8 g	304.1 g	257.3 g	5/17/17	6/7/17	tuna can

Lab Sample ID	Client Sample ID	Method Chain	Basis	Tuna Can LCS 00006					
MB 160-309155/1		Fill_Geo-21, 901.1							
LCS 160-309155/2		Fill_Geo-21, 901.1		# g					
160-22327-A-1-A	SU01-EXB-026-SS-P-01	Fill_Geo-21, 901.1	T						
160-22327-A-1-A DU	SU01-EXB-026-SS-P-01	Fill_Geo-21, 901.1	T						
160-22327-A-2-A	SU01-EXB-023-SS-P-01	Fill_Geo-21, 901.1	T						

The pound sign (#) in the amount added field denotes that the reagent was used undiluted. All calculations are performed using the stated concentration for this reagent.

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## GAMMA SPECTROSCOPY BATCH WORKSHEET

Lab Name: TestAmerica St. Louis Job No.: 160-22327-1

SDG No.: \_\_\_\_\_

Batch Number: 309155 Batch Start Date: 05/17/17 12:55 Batch Analyst: Slama, Kurt RBatch Method: Fill\_Geo-21 Batch End Date: 05/17/17 13:54

Lab Sample ID	Client Sample ID	Method Chain	Basis	Tuna Can LCS 00006					
160-22327-A-3-A	SU01-EXB-076-SS-P-01	Fill_Geo-21, 901.1	T						
160-22327-A-4-A	SU02-EXB-051-SS-P-01	Fill_Geo-21, 901.1	T						
160-22327-A-5-A	SU01-EXB-083-SS-P-00	Fill_Geo-21, 901.1	T						
160-22327-A-6-A	SU01-EXB-084-SS-P-00	Fill_Geo-21, 901.1	T						
160-22327-A-7-A	SU01-EXB-085-SS-P-00	Fill_Geo-21, 901.1	T						
160-22327-A-8-A	SU01-EXB-086-SS-P-00	Fill_Geo-21, 901.1	T						
160-22327-A-9-A	SU03-S-087-SS-P-00	Fill_Geo-21, 901.1	T						
160-22327-A-10-A	SU03-S-088-SS-P-00	Fill_Geo-21, 901.1	T						
160-22327-A-11-A	SU03-S-089-SS-P-00	Fill_Geo-21, 901.1	T						

Batch Notes	
Balance ID	1121432711
SOP Number	ST-RC-0003 ST-RC-0025

Basis	Basis Description
T	Total/NA

The pound sign (#) in the amount added field denotes that the reagent was used undiluted. All calculations are performed using the stated concentration for this reagent.

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# Run Logs

# Gamma Spectroscopy Run Log

## Detector: GV3

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
03/27/12 18:49		IC 160-11762/1		11762			JLW
03/27/12 22:50		ICV 160-11762/2		11762			JLW
12/09/16 08:29		ACVTOP 160-283293/1		283293			PS
06/03/17 14:18		ICB 160-311828/1		311828			RTM
06/07/17 00:08		CCB 160-312293/1		312293			CDR
06/07/17 01:05		CCV 160-312293/2		312293			
06/07/17 01:27		CCV 160-312293/3		312293			CDR
06/07/17 06:40	30	ZZZZZ		312293			
06/07/17 07:36	30	ZZZZZ		312293			
06/07/17 08:23	30	ZZZZZ		312293			
06/07/17 09:03	30	ZZZZZ		312293			
06/07/17 09:55	30	160-22327-9	SU03-S-087-SS-P-00	312293	309155	901.1	CDR
06/07/17 11:19		ZZZZZ		312293			
06/07/17 11:19	30	ZZZZZ		312293			
06/07/17 12:13	30	ZZZZZ		312293			
06/07/17 12:54	30	ZZZZZ		312293			
06/07/17 13:32	30	ZZZZZ		312293			
06/07/17 14:05		ZZZZZ		312293			
06/07/17 16:25		TCCLBA		312293			
		160-312307/1-A					
06/07/17 16:40		TCCLBC		312293			
		160-312307/3-A					
06/07/17 16:55		TCCLBB		312293			
		160-312307/2-A					
06/07/17 17:30	30	ZZZZZ		312293			
06/07/17 20:00		ZZZZZ		312293			
06/07/17 20:31		ZZZZZ		312293			
06/07/17 20:57		ZZZZZ		312293			
06/07/17 21:26		ZZZZZ		312293			
06/07/17 21:42		ZZZZZ		312293			
06/07/17 21:56		ZZZZZ		312293			

## Detector: GV5

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
03/26/12 15:05		IC 160-12297/1		12297			JLW
03/27/12 10:12		ICV 160-12297/2		12297			JLW
12/07/16 01:00		CCB 160-282801/1		282801			
12/07/16 01:42		CCV 160-282801/2		282801			
12/07/16 02:04		CCV 160-282801/3		282801			
12/07/16 07:35	30	ZZZZZ		282801			
12/07/16 08:34	30	ZZZZZ		282801			
12/07/16 09:33		ACVTOP 160-282801/6		282801			KLS
12/07/16 09:33		ACVTOP 160-282835/1		282835			PS
06/03/17 14:18		ICB 160-311830/1		311830			RTM
06/07/17 00:08		CCV 160-312291/1		312291			
06/07/17 00:30		CCV 160-312291/2		312291			CDR
06/07/17 01:05		CCB 160-312291/3		312291			CDR
06/07/17 06:40	30	ZZZZZ		312291			
06/07/17 07:30	30	ZZZZZ		312291			
06/07/17 08:27	30	ZZZZZ		312291			
06/07/17 09:08	30	ZZZZZ		312291			
06/07/17 09:57	30	160-22327-1	SU01-EXB-026-SS-P-01	312291	309155	901.1	CDR

## Gamma Spectroscopy Run Log

### Detector: GV5 (Continued)

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
06/07/17 11:19	30	ZZZZZ		312291			
06/07/17 12:07	30	ZZZZZ		312291			
06/07/17 12:56	30	ZZZZZ		312291			
06/07/17 13:31	30	ZZZZZ		312291			
06/07/17 14:05	30	ZZZZZ		312291			
06/07/17 14:38	30	ZZZZZ		312291			
06/07/17 16:25		TCCLBB 160-312307/2-A		312291			
06/07/17 16:40		TCCLBA 160-312307/1-A		312291			
06/07/17 16:54		TCCLBC 160-312307/3-A		312291			
06/07/17 17:30	30	ZZZZZ		312291			
06/07/17 19:57		ZZZZZ		312291			
06/07/17 20:32		ZZZZZ		312291			
06/07/17 20:56		ZZZZZ		312291			
06/07/17 21:23		ZZZZZ		312291			
06/07/17 21:41		ZZZZZ		312291			
06/07/17 21:56		ZZZZZ		312291			

### Detector: GV7

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
03/05/12 14:07		IC 160-12302/1		12302			JLW
03/27/12 15:25		ICV 160-12302/2		12302			JLW
12/06/16 16:15		ACVTOP 160-282836/1		282836			PS
06/03/17 14:16		ICB 160-311831/1		311831			RTM
06/07/17 00:09		CCV 160-312290/1		312290			
06/07/17 00:32		CCV 160-312290/2		312290			CDR
06/07/17 01:07		CCB 160-312290/3		312290			CDR
06/07/17 06:38	30	ZZZZZ		312290			
06/07/17 07:32	30	ZZZZZ		312290			
06/07/17 08:23	30	ZZZZZ		312290			
06/07/17 09:07	30	ZZZZZ		312290			
06/07/17 09:56	30	160-22327-8	SU01-EXB-086-SS-P-00	312290	309155	901.1	CDR
06/07/17 11:24	30	ZZZZZ		312290			
06/07/17 12:12	30	ZZZZZ		312290			
06/07/17 12:55	30	ZZZZZ		312290			
06/07/17 13:30	30	ZZZZZ		312290			
06/07/17 14:06	30	ZZZZZ		312290			
06/07/17 14:45	120	ZZZZZ		312290			
06/07/17 16:52	30	ZZZZZ		312290			
06/07/17 17:29	120	ZZZZZ		312290			

### Detector: GV8

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
03/27/12 10:58		IC 160-12311/1		12311			JLW
03/29/12 01:58		ICV 160-12311/2		12311			JLW
12/06/16 10:28		ACVTOP 160-282755/1		282755			PS
06/03/17 14:15		ICB 160-311829/1		311829			RTM
06/07/17 00:11		CCV 160-312292/1		312292			
06/07/17 00:34		CCV 160-312292/2		312292			CDR

## Gamma Spectroscopy Run Log

### Detector: GV8 (Continued)

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
06/07/17 01:22		CCB 160-312292/3		312292			CDR
06/07/17 06:37	30	ZZZZZ		312292			
06/07/17 07:33	30	ZZZZZ		312292			
06/07/17 08:22	30	ZZZZZ		312292			
06/07/17 09:06	30	ZZZZZ		312292			
06/07/17 09:55	30	MB 160-309155/1-A		312292	309155	901.1	CDR
06/07/17 11:16	30	ZZZZZ		312292			
06/07/17 12:04	30	ZZZZZ		312292			
06/07/17 12:54	30	ZZZZZ		312292			
06/07/17 13:29	30	ZZZZZ		312292			
06/07/17 14:07	30	ZZZZZ		312292			
06/07/17 16:26		TCCLBC 160-312307/3-A		312292			
06/07/17 16:42		TCCLBB 160-312307/2-A		312292			
06/07/17 16:55		TCCLBA 160-312307/1-A		312292			
06/07/17 19:26	30	ZZZZZ		312292			
06/07/17 19:59		ZZZZZ		312292			
06/07/17 20:31		ZZZZZ		312292			
06/07/17 20:57		ZZZZZ		312292			
06/07/17 21:25		ZZZZZ		312292			
06/07/17 21:43		ZZZZZ		312292			
06/07/17 21:57		ZZZZZ		312292			

### Detector: GV9

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
05/03/12 13:37		IC 160-12326/1		12326			JLW
06/14/12 10:54		ICV 160-12326/2		12326			JLW
12/05/16 11:08		ACVTOP 160-282744/1		282744			PS
06/03/17 14:40		ICB 160-311834/1		311834			RTM
06/07/17 00:07		CCV 160-312296/1		312296			
06/07/17 00:30		CCV 160-312296/2		312296			CDR
06/07/17 01:04		CCB 160-312296/3		312296			CDR
06/07/17 06:39	30	ZZZZZ		312296			
06/07/17 07:23	30	ZZZZZ		312296			
06/07/17 08:22	30	ZZZZZ		312296			
06/07/17 09:00		ZZZZZ		312296			
06/07/17 09:17	30	ZZZZZ		312296			
06/07/17 09:54	30	160-22327-2	SU01-EXB-023-SS-P-01	312296	309155	901.1	CDR
06/07/17 11:15	30	160-22327-10	SU03-S-088-SS-P-00	312296	309155	901.1	CDR
06/07/17 12:17	30	ZZZZZ		312296			
06/07/17 12:56	30	ZZZZZ		312296			
06/07/17 13:31	30	ZZZZZ		312296			
06/07/17 16:49	30	ZZZZZ		312296			
06/07/17 17:34	30	ZZZZZ		312296			
06/07/17 19:39	30	ZZZZZ		312296			

### Detector: GV10

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
03/28/12 22:11		IC 160-12330/1		12330			JLW

## Gamma Spectroscopy Run Log

### Detector: GV10 (Continued)

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
03/29/12 03:37		ICV 160-12330/2		12330			JLW
12/05/16 14:53		ACVTOP 160-282745/1		282745			PS
06/03/17 14:20		ICB 160-311832/1		311832			RTM
06/07/17 00:09		CCV 160-312295/1		312295			
06/07/17 00:32		CCV 160-312295/2		312295			CDR
06/07/17 01:07		CCB 160-312295/3		312295			CDR
06/07/17 06:41	30	ZZZZZ		312295			
06/07/17 07:24	30	ZZZZZ		312295			
06/07/17 08:24	30	ZZZZZ		312295			
06/07/17 09:03		ZZZZZ		312295			
06/07/17 09:24	30	ZZZZZ		312295			
06/07/17 10:00	30	LCS 160-309155/2-A		312295	309155	901.1	CDR
06/07/17 11:20	30	160-22327-1 DU	SU01-EXB-026-SS-P-01 DU	312295	309155	901.1	CDR
06/07/17 12:13	30	ZZZZZ		312295			
06/07/17 12:51	30	ZZZZZ		312295			
06/07/17 13:28	30	ZZZZZ		312295			
06/07/17 15:51	30	ZZZZZ		312295			
06/07/17 16:45	30	ZZZZZ		312295			
06/07/17 17:27	120	ZZZZZ		312295			

### Detector: GV13

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
03/27/12 15:23		IC 160-12348/1		12348			JLW
03/27/12 18:51		ICV 160-12348/2		12348			JLW
12/05/16 22:06		ACVTOP 160-282749/1		282749			PS
06/03/17 15:31		ICB 160-311833/1		311833			RTM
06/07/17 01:01		CCV 160-312294/1		312294			
06/07/17 01:23		CCV 160-312294/2		312294			CDR
06/07/17 01:43		CCB 160-312294/3		312294			CDR
06/07/17 06:46	30	ZZZZZ		312294			
06/07/17 07:28	30	ZZZZZ		312294			
06/07/17 08:26	30	ZZZZZ		312294			
06/07/17 09:14	30	ZZZZZ		312294			
06/07/17 09:58	30	160-22327-3	SU01-EXB-076-SS-P-01	312294	309155	901.1	CDR
06/07/17 11:23	30	160-22327-11	SU03-S-089-SS-P-00	312294	309155	901.1	CDR
06/07/17 12:10	30	ZZZZZ		312294			
06/07/17 12:49	30	ZZZZZ		312294			
06/07/17 13:26	30	ZZZZZ		312294			
06/07/17 16:43	30	ZZZZZ		312294			
06/07/17 17:32	120	ZZZZZ		312294			

### Detector: GV14

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
04/23/12 09:56		IC 160-12359/1		12359			JLW
04/24/12 08:12		ICV 160-12359/2		12359			JLW
12/06/16 19:00		ACVTOP 160-282843/1		282843			PS
06/03/17 17:00		ICB 160-311835/1		311835			RTM
06/07/17 00:07		CCB 160-312301/1		312301			CDR
06/07/17 01:04		CCV 160-312301/2		312301			
06/07/17 01:28		CCV 160-312301/3		312301			CDR

## Gamma Spectroscopy Run Log

### Detector: GV14 (Continued)

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
06/07/17 06:36	30	ZZZZZ		312301			
06/07/17 07:25	30	ZZZZZ		312301			
06/07/17 08:24	30	ZZZZZ		312301			
06/07/17 09:08	30	ZZZZZ		312301			
06/07/17 09:53	30	160-22327-4	SU02-EXB-051-SS-P-01	312301	309155	901.1	CDR
06/07/17 11:16	30	ZZZZZ		312301			
06/07/17 12:14	30	ZZZZZ		312301			
06/07/17 12:49	30	ZZZZZ		312301			
06/07/17 13:28	30	ZZZZZ		312301			
06/07/17 14:04	120	ZZZZZ		312301			
06/07/17 16:18	120	ZZZZZ		312301			
06/07/17 18:59	120	ZZZZZ		312301			

### Detector: GV15

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
03/22/12 11:06		IC 160-12362/1		12362			JLW
03/23/12 06:10		ICV 160-12362/2		12362			JLW
12/02/16 13:12		ACVTOP 160-282704/1		282704			PS
06/03/17 16:58		ICB 160-311836/1		311836			RTM
06/07/17 00:08		CCB 160-312302/1		312302			CDR
06/07/17 01:06		CCV 160-312302/2		312302			
06/07/17 01:30		CCV 160-312302/3		312302			CDR
06/07/17 06:39	30	ZZZZZ		312302			
06/07/17 07:27	30	ZZZZZ		312302			
06/07/17 08:25	30	ZZZZZ		312302			
06/07/17 09:09	30	ZZZZZ		312302			
06/07/17 09:54	30	160-22327-5	SU01-EXB-083-SS-P-00	312302	309155	901.1	CDR
06/07/17 11:21	30	ZZZZZ		312302			
06/07/17 12:14	30	ZZZZZ		312302			
06/07/17 12:51	30	ZZZZZ		312302			
06/07/17 13:25	30	ZZZZZ		312302			
06/07/17 14:02	120	ZZZZZ		312302			
06/07/17 16:14	120	ZZZZZ		312302			
06/07/17 19:00	120	ZZZZZ		312302			

### Detector: GV16

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
07/10/12 10:35		IC 160-12382/1		12382			JLW
07/17/12 11:27		ICV 160-12382/2		12382			JLW
12/06/16 03:13		ACVTOP 160-282705/1		282705			PS
06/03/17 16:56		ICB 160-311837/1		311837			RTM
06/07/17 00:10		CCB 160-312299/1		312299			CDR
06/07/17 01:06		CCV 160-312299/2		312299			
06/07/17 01:32		CCV 160-312299/3		312299			CDR
06/07/17 06:41	30	ZZZZZ		312299			
06/07/17 07:29	30	ZZZZZ		312299			
06/07/17 08:26	30	ZZZZZ		312299			
06/07/17 09:13	30	ZZZZZ		312299			
06/07/17 09:59	30	160-22327-6	SU01-EXB-084-SS-P-00	312299	309155	901.1	CDR
06/07/17 11:24	30	ZZZZZ		312299			
06/07/17 12:19	30	ZZZZZ		312299			

## Gamma Spectroscopy Run Log

### Detector: GV16 (Continued)

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
06/07/17 12:52	30	ZZZZZ		312299			
06/07/17 13:24	30	ZZZZZ		312299			
06/07/17 14:01	30	ZZZZZ		312299			
06/07/17 14:41	120	ZZZZZ		312299			
06/07/17 16:52	120	ZZZZZ		312299			
06/07/17 21:21	120	ZZZZZ		312299			

### Detector: GV17

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
03/26/12 06:29		IC 160-12390/1		12390			JLW
03/26/12 09:29		ICV 160-12390/2		12390			JLW
11/30/16 17:05		ACVTOP 160-282698/1		282698			PS
06/03/17 16:56		ICB 160-311943/1		311943			RTM
06/07/17 00:12		CCB 160-312300/1		312300			CDR
06/07/17 01:22		CCV 160-312300/2		312300			
06/07/17 01:47		CCV 160-312300/3		312300			CDR
06/07/17 06:47	30	ZZZZZ		312300			
06/07/17 07:34	30	ZZZZZ		312300			
06/07/17 08:28	30	ZZZZZ		312300			
06/07/17 09:15	30	ZZZZZ		312300			
06/07/17 10:01	30	160-22327-7	SU01-EXB-085-SS-P-00	312300	309155	901.1	CDR
06/07/17 11:26	30	ZZZZZ		312300			
06/07/17 12:22	30	ZZZZZ		312300			
06/07/17 13:22	30	ZZZZZ		312300			
06/07/17 14:00	30	ZZZZZ		312300			
06/07/17 14:44	120	ZZZZZ		312300			
06/07/17 16:49	120	ZZZZZ		312300			

# Shipping and Receiving Documents



## Login Sample Receipt Checklist

Client: EA Engineering, Science, and Technology

Job Number: 160-22327-1

**Login Number: 22327**

**List Source: TestAmerica St. Louis**

**List Number: 1**

**Creator: Taylor, Kristene N**

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