

ANALYTICAL REPORT

Job Number: 160-18553-1

Job Description: EA and Cabrera - Hill AFB WR111

For:

EA Engineering, Science, and Technology
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Greenwood Village, CO 80111

Attention: Pamela J Moss



Approved for release.
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9/8/2016 5:45 PM

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09/08/2016

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.

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Definitions/Glossary

Client: EA Engineering, Science, and Technology
Project/Site: EA and Cabrera - Hill AFB WR111

TestAmerica Job ID: 160-18553-1

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, 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)

CASE NARRATIVE

Client: EA Engineering, Science, and Technology

Project: EA and Cabrera - Hill AFB WR111

Report Number: 160-18553-1

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 08/09/2016; the samples arrived in good condition. The temperature of the coolers at receipt was 18.0 C. This is above the recommended temperature of 6.0°C or below. Thermal preservation is not required for the requested analyses; therefore, the laboratory will proceed with the requested analyses and corrective action was deemed unnecessary. The client was notified on 8/9/16.

RADIUM-226 & OTHER GAMMA EMITTERS (GS)

Samples SU01-EXB-022-SS-P-00 (160-18553-1), SU01-EXB-023-SS-P-00 (160-18553-2), SU01-EXB-024-SS-P-00 (160-18553-3), SU01-EXB-025-SS-P-00 (160-18553-4), SU01-EXB-026-SS-P-00 (160-18553-5), SU01-EXB-027-SS-P-00 (160-18553-6), SU01-EXB-028-SS-P-00 (160-18553-7), SU01-EXB-029-SS-P-00 (160-18553-8), SU01-EXB-030-SS-P-00 (160-18553-9), SU01-EXB-031-SS-P-00 (160-18553-10), SU01-EXB-032-SS-P-00 (160-18553-11), SU01-EXB-033-SS-P-00 (160-18553-12), SU01-EXB-034-SS-P-00 (160-18553-13), SU01-EXB-034-SS-DUP-00 (160-18553-14), SU01-EXB-035-SS-P-00 (160-18553-15), SU01-EXB-036-SS-P-00 (160-18553-16), SU01-EXB-037-SS-P-00 (160-18553-17), SU01-EXB-038-SS-P-00 (160-18553-18), SU01-EXB-039-SS-P-00 (160-18553-19) and SU01-EXB-039-SS-DUP-00 (160-18553-20) were analyzed for Radium-226 & Other Gamma Emitters (GS) in accordance with EPA 901.1. The samples were leached on 08/09/2016, prepared on 08/11/2016 and analyzed on 09/01/2016.

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

ISOTOPIC THORIUM

Samples SU01-EXB-022-SS-P-00 (160-18553-1), SU01-EXB-023-SS-P-00 (160-18553-2), SU01-EXB-024-SS-P-00 (160-18553-3), SU01-EXB-025-SS-P-00 (160-18553-4), SU01-EXB-026-SS-P-00 (160-18553-5), SU01-EXB-027-SS-P-00 (160-18553-6), SU01-EXB-028-SS-P-00 (160-18553-7), SU01-EXB-029-SS-P-00 (160-18553-8), SU01-EXB-030-SS-P-00 (160-18553-9), SU01-EXB-031-SS-P-00 (160-18553-10), SU01-EXB-032-SS-P-00 (160-18553-11), SU01-EXB-033-SS-P-00 (160-18553-12), SU01-EXB-034-SS-P-00 (160-18553-13), SU01-EXB-034-SS-DUP-00 (160-18553-14), SU01-EXB-035-SS-P-00 (160-18553-15), SU01-EXB-036-SS-P-00 (160-18553-16), SU01-EXB-037-SS-P-00 (160-18553-17), SU01-EXB-038-SS-P-00 (160-18553-18), SU01-EXB-039-SS-P-00 (160-18553-19) and SU01-EXB-039-SS-DUP-00 (160-18553-20) were analyzed for Isotopic Thorium accordance with A01R_Th. The samples were leached on 08/09/2016, prepared on 08/25/2016 and analyzed on 08/31/2016 and 09/07/2016.

The following samples could not be thoroughly homogenized before sub-sampling was performed due to sample matrix:

SU01-EXB-022-SS-P-00 (160-18553-1), SU01-EXB-023-SS-P-00 (160-18553-2), SU01-EXB-024-SS-P-00 (160-18553-3), SU01-EXB-025-SS-P-00 (160-18553-4), SU01-EXB-026-SS-P-00 (160-18553-5), SU01-EXB-027-SS-P-00 (160-18553-6), SU01-EXB-028-SS-P-00 (160-18553-7), SU01-EXB-029-SS-P-00 (160-18553-8), SU01-EXB-030-SS-P-00 (160-18553-9), SU01-EXB-031-SS-P-00 (160-18553-10), SU01-EXB-032-SS-P-00 (160-18553-11), SU01-EXB-033-SS-P-00 (160-18553-12) and SU01-EXB-034-SS-P-00 (160-18553-13). The samples contained rocks.

The following samples could not be thoroughly homogenized before sub-sampling was performed due to sample matrix:

SU01-EXB-034-SS-DUP-00 (160-18553-14), SU01-EXB-035-SS-P-00 (160-18553-15), SU01-EXB-036-SS-P-00 (160-18553-16), SU01-EXB-037-SS-P-00 (160-18553-17), SU01-EXB-038-SS-P-00 (160-18553-18), SU01-EXB-039-SS-P-00 (160-18553-19), SU01-EXB-039-SS-DUP-00 (160-18553-20) and (160-18553-A-14-A DU). The samples contained rocks.

The following samples have an RER (replicate error ratio) result outside of the acceptance criteria of 1 (1.99) for Th-230:

SU01-EXB-022-SS-P-00 (160-18553-1), SU01-EXB-023-SS-P-00 (160-18553-2), SU01-EXB-024-SS-P-00 (160-18553-3), SU01-EXB-025-SS-P-00 (160-18553-4), SU01-EXB-026-SS-P-00 (160-18553-5), SU01-EXB-027-SS-P-00 (160-18553-6), SU01-EXB-028-SS-P-00 (160-18553-7), SU01-EXB-029-SS-P-00 (160-18553-8), SU01-EXB-030-SS-P-00 (160-18553-9),

SU01-EXB-031-SS-P-00 (160-18553-10), SU01-EXB-032-SS-P-00 (160-18553-11), SU01-EXB-033-SS-P-00 (160-18553-12), SU01-EXB-034-SS-P-00 (160-18553-13), (LCS 160-266485/2-A), (MB 160-266485/1-A), (160-18552-A-1-D) and (160-18552-A-1-E DU). Non-homogeneity of the sample matrix is suspected. The data have been qualified and reported.

The resolution (FWHM) for the Thorium-229 tracer peak for the following sample is greater than the 100 keV limit: SU01-EXB-033-SS-P-00 (160-18553-12). The resolution of the tracer peak in all other samples are within the 100 keV limit indicating an anomaly. The laboratory does not believe this excursion adversely affects the data.

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: EA and Cabrera - Hill AFB WR111

TestAmerica Job ID: 160-18553-1

Client Sample ID: SU01-EXB-022-SS-P-00

Lab Sample ID: 160-18553-1

☐ No Detections.

Client Sample ID: SU01-EXB-023-SS-P-00

Lab Sample ID: 160-18553-2

☐ No Detections.

Client Sample ID: SU01-EXB-024-SS-P-00

Lab Sample ID: 160-18553-3

☐ No Detections.

Client Sample ID: SU01-EXB-025-SS-P-00

Lab Sample ID: 160-18553-4

☐ No Detections.

Client Sample ID: SU01-EXB-026-SS-P-00

Lab Sample ID: 160-18553-5

☐ No Detections.

Client Sample ID: SU01-EXB-027-SS-P-00

Lab Sample ID: 160-18553-6

☐ No Detections.

Client Sample ID: SU01-EXB-028-SS-P-00

Lab Sample ID: 160-18553-7

☐ No Detections.

Client Sample ID: SU01-EXB-029-SS-P-00

Lab Sample ID: 160-18553-8

☐ No Detections.

Client Sample ID: SU01-EXB-030-SS-P-00

Lab Sample ID: 160-18553-9

☐ No Detections.

Client Sample ID: SU01-EXB-031-SS-P-00

Lab Sample ID: 160-18553-10

☐ No Detections.

Client Sample ID: SU01-EXB-032-SS-P-00

Lab Sample ID: 160-18553-11

☐ No Detections.

Client Sample ID: SU01-EXB-033-SS-P-00

Lab Sample ID: 160-18553-12

☐ No Detections.

Client Sample ID: SU01-EXB-034-SS-P-00

Lab Sample ID: 160-18553-13

☐ No Detections.

Client Sample ID: SU01-EXB-034-SS-DUP-00

Lab Sample ID: 160-18553-14

☐ No Detections.

This Detection Summary does not include radiochemical test results.

TestAmerica St. Louis

Detection Summary

Client: EA Engineering, Science, and Technology
Project/Site: EA and Cabrera - Hill AFB WR111

TestAmerica Job ID: 160-18553-1

Client Sample ID: SU01-EXB-035-SS-P-00

Lab Sample ID: 160-18553-15

☐ No Detections.

Client Sample ID: SU01-EXB-036-SS-P-00

Lab Sample ID: 160-18553-16

☐ No Detections.

Client Sample ID: SU01-EXB-037-SS-P-00

Lab Sample ID: 160-18553-17

☐ No Detections.

Client Sample ID: SU01-EXB-038-SS-P-00

Lab Sample ID: 160-18553-18

☐ No Detections.

Client Sample ID: SU01-EXB-039-SS-P-00

Lab Sample ID: 160-18553-19

☐ No Detections.

Client Sample ID: SU01-EXB-039-SS-DUP-00

Lab Sample ID: 160-18553-20

☐ No Detections.

This Detection Summary does not include radiochemical test results.

TestAmerica St. Louis

Client Sample Results

Client: EA Engineering, Science, and Technology
Project/Site: EA and Cabrera - Hill AFB WR111

TestAmerica Job ID: 160-18553-1

Client Sample ID: SU01-EXB-022-SS-P-00

Date Collected: 08/08/16 10:37

Date Received: 08/09/16 09:20

Lab Sample ID: 160-18553-1

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	0.979		0.235	0.256	0.500	0.193	pCi/g	08/11/16 15:30	09/01/16 14:33	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	0.807		0.146	0.161	0.100	0.0364	pCi/g	08/25/16 09:34	08/31/16 19:41	1
Thorium-232	1.42		0.193	0.227	0.100	0.0197	pCi/g	08/25/16 09:34	08/31/16 19:41	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Thorium-229	65.6		30 - 110					08/25/16 09:34	08/31/16 19:41	1

Client Sample ID: SU01-EXB-023-SS-P-00

Date Collected: 08/08/16 10:21

Date Received: 08/09/16 09:20

Lab Sample ID: 160-18553-2

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	1.28		0.212	0.250	0.500	0.137	pCi/g	08/11/16 15:30	09/01/16 14:35	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	1.47		0.184	0.221	0.100	0.0419	pCi/g	08/25/16 09:34	08/31/16 19:41	1
Thorium-232	1.39		0.177	0.212	0.100	0.0312	pCi/g	08/25/16 09:34	08/31/16 19:41	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Thorium-229	75.4		30 - 110					08/25/16 09:34	08/31/16 19:41	1

Client Sample ID: SU01-EXB-024-SS-P-00

Date Collected: 08/08/16 10:26

Date Received: 08/09/16 09:20

Lab Sample ID: 160-18553-3

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	1.15		0.177	0.213	0.500	0.148	pCi/g	08/11/16 15:30	09/01/16 14:42	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	1.35		0.169	0.203	0.100	0.0344	pCi/g	08/25/16 09:34	08/31/16 19:41	1
Thorium-232	1.58		0.181	0.225	0.100	0.0287	pCi/g	08/25/16 09:34	08/31/16 19:41	1

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Client Sample Results

Client: EA Engineering, Science, and Technology
Project/Site: EA and Cabrera - Hill AFB WR111

TestAmerica Job ID: 160-18553-1

Client Sample ID: SU01-EXB-024-SS-P-00

Date Collected: 08/08/16 10:26

Date Received: 08/09/16 09:20

Lab Sample ID: 160-18553-3

Matrix: Solid

Tracer	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Thorium-229	89.5		30 - 110	08/25/16 09:34	08/31/16 19:41	1

Client Sample ID: SU01-EXB-025-SS-P-00

Date Collected: 08/08/16 10:31

Date Received: 08/09/16 09:20

Lab Sample ID: 160-18553-4

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	1.08		0.187	0.218	0.500	0.127	pCi/g	08/11/16 15:30	09/01/16 14:40	1

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

			Count Uncert.	Total Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-230	0.915		0.159	0.176	0.100	0.0449	pCi/g	08/25/16 09:34	08/31/16 19:41	1
Thorium-232	1.41		0.196	0.229	0.100	0.0375	pCi/g	08/25/16 09:34	08/31/16 19:41	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Thorium-229	68.9		30 - 110					08/25/16 09:34	08/31/16 19:41	1

Client Sample ID: SU01-EXB-026-SS-P-00

Date Collected: 08/08/16 10:12

Date Received: 08/09/16 09:20

Lab Sample ID: 160-18553-5

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	1.23		0.208	0.244	0.500	0.152	pCi/g	08/11/16 15:30	09/01/16 15:06	1

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

			Count Uncert.	Total Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-230	5.35		0.341	0.564	0.100	0.0587	pCi/g	08/25/16 09:34	08/31/16 19:41	1
Thorium-232	2.84		0.247	0.344	0.100	0.0297	pCi/g	08/25/16 09:34	08/31/16 19:41	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Thorium-229	85.4		30 - 110					08/25/16 09:34	08/31/16 19:41	1

Client Sample ID: SU01-EXB-027-SS-P-00

Date Collected: 08/08/16 10:17

Date Received: 08/09/16 09:20

Lab Sample ID: 160-18553-6

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	1.50		0.302	0.340	0.500	0.224	pCi/g	08/11/16 15:30	09/01/16 15:08	1

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Client Sample Results

Client: EA Engineering, Science, and Technology
Project/Site: EA and Cabrera - Hill AFB WR111

TestAmerica Job ID: 160-18553-1

Client Sample ID: SU01-EXB-027-SS-P-00

Date Collected: 08/08/16 10:17

Date Received: 08/09/16 09:20

Lab Sample ID: 160-18553-6

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	2.08		0.208	0.272	0.100	0.0306	pCi/g	08/25/16 09:34	08/31/16 19:41	1
Thorium-232	2.12		0.209	0.274	0.100	0.0155	pCi/g	08/25/16 09:34	08/31/16 19:41	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Thorium-229	84.0		30 - 110					08/25/16 09:34	08/31/16 19:41	1

Client Sample ID: SU01-EXB-028-SS-P-00

Date Collected: 08/08/16 10:02

Date Received: 08/09/16 09:20

Lab Sample ID: 160-18553-7

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	0.883		0.211	0.230	0.500	0.185	pCi/g	08/11/16 15:30	09/01/16 15:10	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	0.862		0.140	0.158	0.100	0.0703	pCi/g	08/25/16 09:34	09/07/16 14:28	1
Thorium-232	1.38		0.173	0.208	0.100	0.0565	pCi/g	08/25/16 09:34	09/07/16 14:28	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Thorium-229	77.9		30 - 110					08/25/16 09:34	09/07/16 14:28	1

Client Sample ID: SU01-EXB-029-SS-P-00

Date Collected: 08/08/16 10:07

Date Received: 08/09/16 09:20

Lab Sample ID: 160-18553-8

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	1.07		0.212	0.239	0.500	0.168	pCi/g	08/11/16 15:30	09/01/16 15:15	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	1.17		0.153	0.182	0.100	0.0328	pCi/g	08/25/16 09:34	08/31/16 19:41	1
Thorium-232	1.71		0.184	0.234	0.100	0.0326	pCi/g	08/25/16 09:34	08/31/16 19:41	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Thorium-229	88.5		30 - 110					08/25/16 09:34	08/31/16 19:41	1

Client Sample Results

Client: EA Engineering, Science, and Technology
Project/Site: EA and Cabrera - Hill AFB WR111

TestAmerica Job ID: 160-18553-1

Client Sample ID: SU01-EXB-030-SS-P-00

Date Collected: 08/08/16 09:57

Date Received: 08/09/16 09:20

Lab Sample ID: 160-18553-9

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	1.22		0.273	0.301	0.500	0.238	pCi/g	08/11/16 15:30	09/01/16 15:14	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	1.33		0.169	0.203	0.100	0.0297	pCi/g	08/25/16 09:34	09/07/16 14:28	1
Thorium-232	1.85		0.200	0.253	0.100	0.0431	pCi/g	08/25/16 09:34	09/07/16 14:28	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Thorium-229	87.5		30 - 110					08/25/16 09:34	09/07/16 14:28	1

Client Sample ID: SU01-EXB-031-SS-P-00

Date Collected: 08/08/16 09:51

Date Received: 08/09/16 09:20

Lab Sample ID: 160-18553-10

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	1.57		0.227	0.280	0.500	0.134	pCi/g	08/11/16 15:30	09/01/16 16:11	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	0.848		0.137	0.154	0.100	0.0490	pCi/g	08/25/16 09:34	08/31/16 19:41	1
Thorium-232	1.30		0.168	0.201	0.100	0.0434	pCi/g	08/25/16 09:34	08/31/16 19:41	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Thorium-229	79.7		30 - 110					08/25/16 09:34	08/31/16 19:41	1

Client Sample ID: SU01-EXB-032-SS-P-00

Date Collected: 08/08/16 09:47

Date Received: 08/09/16 09:20

Lab Sample ID: 160-18553-11

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	2.16		0.341	0.408	0.500	0.236	pCi/g	08/11/16 15:30	09/01/16 16:09	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	1.28		0.170	0.201	0.100	0.0169	pCi/g	08/25/16 09:34	08/31/16 19:41	1
Thorium-232	1.31		0.172	0.204	0.100	0.0368	pCi/g	08/25/16 09:34	08/31/16 19:41	1

TestAmerica St. Louis

Client Sample Results

Client: EA Engineering, Science, and Technology
Project/Site: EA and Cabrera - Hill AFB WR111

TestAmerica Job ID: 160-18553-1

Client Sample ID: SU01-EXB-032-SS-P-00

Date Collected: 08/08/16 09:47

Date Received: 08/09/16 09:20

Lab Sample ID: 160-18553-11

Matrix: Solid

Tracer	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Thorium-229	83.2		30 - 110	08/25/16 09:34	08/31/16 19:41	1

Client Sample ID: SU01-EXB-033-SS-P-00

Date Collected: 08/08/16 09:17

Date Received: 08/09/16 09:20

Lab Sample ID: 160-18553-12

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		0.255	0.283	0.500	0.208	pCi/g	08/11/16 15:30	09/01/16 16:08	1

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

			Count Uncert.	Total Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-230	2.91		0.245	0.346	0.100	0.0338	pCi/g	08/25/16 09:34	09/07/16 14:28	1
Thorium-232	1.93		0.199	0.256	0.100	0.0283	pCi/g	08/25/16 09:34	09/07/16 14:28	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Thorium-229	86.6		30 - 110					08/25/16 09:34	09/07/16 14:28	1

Client Sample ID: SU01-EXB-034-SS-P-00

Date Collected: 08/08/16 09:22

Date Received: 08/09/16 09:20

Lab Sample ID: 160-18553-13

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	1.14		0.200	0.232	0.500	0.156	pCi/g	08/11/16 15:30	09/01/16 16:07	1

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

			Count Uncert.	Total Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-230	2.18		0.214	0.282	0.100	0.0292	pCi/g	08/25/16 09:34	08/31/16 19:41	1
Thorium-232	1.46		0.175	0.214	0.100	0.0418	pCi/g	08/25/16 09:34	08/31/16 19:41	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Thorium-229	82.2		30 - 110					08/25/16 09:34	08/31/16 19:41	1

Client Sample ID: SU01-EXB-034-SS-DUP-00

Date Collected: 08/08/16 09:22

Date Received: 08/09/16 09:20

Lab Sample ID: 160-18553-14

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	1.05		0.197	0.226	0.500	0.155	pCi/g	08/11/16 15:30	09/01/16 16:09	1

TestAmerica St. Louis

Client Sample Results

Client: EA Engineering, Science, and Technology
Project/Site: EA and Cabrera - Hill AFB WR111

TestAmerica Job ID: 160-18553-1

Client Sample ID: SU01-EXB-034-SS-DUP-00

Lab Sample ID: 160-18553-14

Date Collected: 08/08/16 09:22

Matrix: Solid

Date Received: 08/09/16 09:20

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	1.13		0.181	0.205	0.100	0.0219	pCi/g	08/25/16 15:51	08/31/16 19:45	1
Thorium-232	1.78		0.228	0.273	0.100	0.0537	pCi/g	08/25/16 15:51	08/31/16 19:45	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Thorium-229	59.8		30 - 110					08/25/16 15:51	08/31/16 19:45	1

Client Sample ID: SU01-EXB-035-SS-P-00

Lab Sample ID: 160-18553-15

Date Collected: 08/08/16 09:29

Matrix: Solid

Date Received: 08/09/16 09:20

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	1.02		0.235	0.258	0.500	0.198	pCi/g	08/11/16 15:30	09/01/16 16:06	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	0.822		0.135	0.151	0.100	0.0304	pCi/g	08/25/16 15:51	08/31/16 19:45	1
Thorium-232	1.80		0.199	0.250	0.100	0.0403	pCi/g	08/25/16 15:51	08/31/16 19:45	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Thorium-229	84.3		30 - 110					08/25/16 15:51	08/31/16 19:45	1

Client Sample ID: SU01-EXB-036-SS-P-00

Lab Sample ID: 160-18553-16

Date Collected: 08/08/16 09:35

Matrix: Solid

Date Received: 08/09/16 09:20

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	1.32		0.260	0.294	0.500	0.201	pCi/g	08/11/16 15:30	09/01/16 16:02	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	1.33		0.167	0.201	0.100	0.0373	pCi/g	08/25/16 15:51	08/31/16 19:45	1
Thorium-232	1.20		0.158	0.187	0.100	0.0287	pCi/g	08/25/16 15:51	08/31/16 19:45	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Thorium-229	88.2		30 - 110					08/25/16 15:51	08/31/16 19:45	1

Client Sample Results

Client: EA Engineering, Science, and Technology
Project/Site: EA and Cabrera - Hill AFB WR111

TestAmerica Job ID: 160-18553-1

Client Sample ID: SU01-EXB-037-SS-P-00

Lab Sample ID: 160-18553-17

Date Collected: 08/08/16 09:41

Matrix: Solid

Date Received: 08/09/16 09:20

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	1.46		0.253	0.295	0.500	0.182	pCi/g	08/11/16 15:30	09/01/16 16:46	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	1.03		0.163	0.185	0.100	0.0469	pCi/g	08/25/16 15:51	08/31/16 19:45	1
Thorium-232	1.67		0.206	0.249	0.100	0.0349	pCi/g	08/25/16 15:51	08/31/16 19:45	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Thorium-229	70.7		30 - 110					08/25/16 15:51	08/31/16 19:45	1

Client Sample ID: SU01-EXB-038-SS-P-00

Lab Sample ID: 160-18553-18

Date Collected: 08/08/16 09:01

Matrix: Solid

Date Received: 08/09/16 09:20

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	1.52		0.230	0.279	0.500	0.183	pCi/g	08/11/16 15:30	09/01/16 16:47	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	1.13		0.159	0.185	0.100	0.0307	pCi/g	08/25/16 15:51	08/31/16 19:45	1
Thorium-232	1.89		0.204	0.259	0.100	0.0166	pCi/g	08/25/16 15:51	08/31/16 19:45	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Thorium-229	79.6		30 - 110					08/25/16 15:51	08/31/16 19:45	1

Client Sample ID: SU01-EXB-039-SS-P-00

Lab Sample ID: 160-18553-19

Date Collected: 08/08/16 09:10

Matrix: Solid

Date Received: 08/09/16 09:20

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	1.26		0.209	0.246	0.500	0.127	pCi/g	08/11/16 15:30	09/01/16 16:48	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	1.22		0.154	0.185	0.100	0.0147	pCi/g	08/25/16 15:51	08/31/16 19:45	1
Thorium-232	1.60		0.177	0.222	0.100	0.0320	pCi/g	08/25/16 15:51	08/31/16 19:45	1

TestAmerica St. Louis

Client Sample Results

Client: EA Engineering, Science, and Technology
Project/Site: EA and Cabrera - Hill AFB WR111

TestAmerica Job ID: 160-18553-1

Client Sample ID: SU01-EXB-039-SS-P-00

Date Collected: 08/08/16 09:10

Date Received: 08/09/16 09:20

Lab Sample ID: 160-18553-19

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	90.1		30 - 110	08/25/16 15:51	08/31/16 19:45	1

Client Sample ID: SU01-EXB-039-SS-DUP-00

Date Collected: 08/08/16 09:10

Date Received: 08/09/16 09:20

Lab Sample ID: 160-18553-20

Matrix: Solid

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

<i>Analyte</i>	<i>Result</i>	<i>Qualifier</i>	<i>Count Uncert. (2σ+/-)</i>	<i>Total Uncert. (2σ+/-)</i>	<i>LOQ</i>	<i>MDC</i>	<i>Unit</i>	<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
Radium-226	1.03		0.187	0.216	0.500	0.128	pCi/g	08/11/16 15:30	09/01/16 16:51	1

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

			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-230	0.812		0.144	0.159	0.100	0.0349	pCi/g	08/25/16 15:51	08/31/16 19:45	1
Thorium-232	1.52		0.195	0.233	0.100	0.0347	pCi/g	08/25/16 15:51	08/31/16 19:45	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Thorium-229	70.5		30 - 110					08/25/16 15:51	08/31/16 19:45	1

Tracer/Carrier Summary

Client: EA Engineering, Science, and Technology
Project/Site: EA and Cabrera - Hill AFB WR111

TestAmerica Job ID: 160-18553-1

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)					
160-18553-1	SU01-EXB-022-SS-P-00	65.6					
160-18553-2	SU01-EXB-023-SS-P-00	75.4					
160-18553-3	SU01-EXB-024-SS-P-00	89.5					
160-18553-4	SU01-EXB-025-SS-P-00	68.9					
160-18553-5	SU01-EXB-026-SS-P-00	85.4					
160-18553-6	SU01-EXB-027-SS-P-00	84.0					
160-18553-7	SU01-EXB-028-SS-P-00	77.9					
160-18553-8	SU01-EXB-029-SS-P-00	88.5					
160-18553-9	SU01-EXB-030-SS-P-00	87.5					
160-18553-10	SU01-EXB-031-SS-P-00	79.7					
160-18553-11	SU01-EXB-032-SS-P-00	83.2					
160-18553-12	SU01-EXB-033-SS-P-00	86.6					
160-18553-13	SU01-EXB-034-SS-P-00	82.2					
160-18553-14	SU01-EXB-034-SS-DUP-00	59.8					
160-18553-14 DU	SU01-EXB-034-SS-DUP-00	61.2					
160-18553-15	SU01-EXB-035-SS-P-00	84.3					
160-18553-16	SU01-EXB-036-SS-P-00	88.2					
160-18553-17	SU01-EXB-037-SS-P-00	70.7					
160-18553-18	SU01-EXB-038-SS-P-00	79.6					
160-18553-19	SU01-EXB-039-SS-P-00	90.1					
160-18553-20	SU01-EXB-039-SS-DUP-00	70.5					
LCS 160-266485/2-A	Lab Control Sample	89.1					
LCS 160-266564/2-A	Lab Control Sample	92.5					
MB 160-266485/1-A	Method Blank	89.8					
MB 160-266564/1-A	Method Blank	101					

Tracer/Carrier Legend

Th-229 = Thorium-229

QC Sample Results

Client: EA Engineering, Science, and Technology
Project/Site: EA and Cabrera - Hill AFB WR111

TestAmerica Job ID: 160-18553-1

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

Lab Sample ID: MB 160-264540/1-A
Matrix: Solid
Analysis Batch: 267763

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 264540

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	-0.04080	U	0.177	0.177	0.500	0.309	pCi/g	08/11/16 15:30	09/01/16 14:31	1

Lab Sample ID: LCS 160-264540/2-A
Matrix: Solid
Analysis Batch: 267762

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 264540

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	%Rec	%Rec. Limits
Americium-241	97.1	96.99		10.2		1.17	pCi/g	100	87 - 116
Cesium-137	29.5	29.23		3.12		0.235	pCi/g	99	87 - 120
Cobalt-60	16.6	15.76		1.63		0.0818	pCi/g	95	87 - 115

Lab Sample ID: 160-18553-1 DU
Matrix: Solid
Analysis Batch: 267763

Client Sample ID: SU01-EXB-022-SS-P-00
Prep Type: Total/NA
Prep Batch: 264540

Analyte	Sample Result	Sample Qual	DU Result	DU Qual	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	RER	RER Limit
Radium-226	0.979		1.106		0.234	0.500	0.140	pCi/g	0.26	1

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

Lab Sample ID: MB 160-266485/1-A
Matrix: Solid
Analysis Batch: 267479

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 266485

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-230	0.1036		0.0442	0.0450	0.100	0.0141	pCi/g	08/25/16 09:34	08/31/16 19:41	1
Thorium-232	0.008202	U	0.0176	0.0176	0.100	0.0346	pCi/g	08/25/16 09:34	08/31/16 19:41	1

Tracer	MB %Yield	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Thorium-229	89.8		30 - 110	08/25/16 09:34	08/31/16 19:41	1

Lab Sample ID: LCS 160-266485/2-A
Matrix: Solid
Analysis Batch: 267480

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 266485

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	%Rec	%Rec. Limits
Thorium-230	24.5	27.65		2.56	0.100	0.0694	pCi/g	113	81 - 118

Tracer	LCS %Yield	LCS Qualifier	Limits
Thorium-229	89.1		30 - 110

QC Sample Results

Client: EA Engineering, Science, and Technology
Project/Site: EA and Cabrera - Hill AFB WR111

TestAmerica Job ID: 160-18553-1

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

Lab Sample ID: MB 160-266564/1-A

Matrix: Solid

Analysis Batch: 267504

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 266564

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-230	0.05641		0.0338	0.0342	0.100	0.0304	pCi/g	08/25/16 15:51	08/31/16 19:45	1
Thorium-232	0.01380		0.0159	0.0160	0.100	0.0138	pCi/g	08/25/16 15:51	08/31/16 19:45	1
Tracer	MB %Yield	MB Qualifier	Limits					Prepared	Analyzed	Dil Fac
Thorium-229	101		30 - 110					08/25/16 15:51	08/31/16 19:45	1

Lab Sample ID: LCS 160-266564/2-A

Matrix: Solid

Analysis Batch: 267505

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 266564

Analyte		Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	%Rec	%Rec. Limits
Thorium-230		24.5	25.71		2.38	0.100	0.0647	pCi/g	105	81 - 118
Tracer	LCS %Yield	LCS Qualifier	Limits							
Thorium-229	92.5		30 - 110							

Lab Sample ID: 160-18553-14 DU

Matrix: Solid

Analysis Batch: 267507

Client Sample ID: SU01-EXB-034-SS-DUP-00

Prep Type: Total/NA

Prep Batch: 266564

Analyte	Sample Result	Sample Qual	DU Result	DU Qual	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	RER	RER Limit
Thorium-230	1.13		0.9890		0.187	0.100	0.0529	pCi/g	0.35	1
Thorium-232	1.78		1.635		0.254	0.100	0.0426	pCi/g	0.28	1
Tracer	DU %Yield	DU Qualifier	Limits							
Thorium-229	61.2		30 - 110							

QC Association Summary

Client: EA Engineering, Science, and Technology
Project/Site: EA and Cabrera - Hill AFB WR111

TestAmerica Job ID: 160-18553-1

Rad

Leach Batch: 264089

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-18553-1	SU01-EXB-022-SS-P-00	Total/NA	Solid	Dry and Grind	
160-18553-2	SU01-EXB-023-SS-P-00	Total/NA	Solid	Dry and Grind	
160-18553-3	SU01-EXB-024-SS-P-00	Total/NA	Solid	Dry and Grind	
160-18553-4	SU01-EXB-025-SS-P-00	Total/NA	Solid	Dry and Grind	
160-18553-5	SU01-EXB-026-SS-P-00	Total/NA	Solid	Dry and Grind	
160-18553-6	SU01-EXB-027-SS-P-00	Total/NA	Solid	Dry and Grind	
160-18553-7	SU01-EXB-028-SS-P-00	Total/NA	Solid	Dry and Grind	
160-18553-8	SU01-EXB-029-SS-P-00	Total/NA	Solid	Dry and Grind	
160-18553-9	SU01-EXB-030-SS-P-00	Total/NA	Solid	Dry and Grind	
160-18553-10	SU01-EXB-031-SS-P-00	Total/NA	Solid	Dry and Grind	
160-18553-11	SU01-EXB-032-SS-P-00	Total/NA	Solid	Dry and Grind	
160-18553-12	SU01-EXB-033-SS-P-00	Total/NA	Solid	Dry and Grind	
160-18553-13	SU01-EXB-034-SS-P-00	Total/NA	Solid	Dry and Grind	
160-18553-14	SU01-EXB-034-SS-DUP-00	Total/NA	Solid	Dry and Grind	
160-18553-15	SU01-EXB-035-SS-P-00	Total/NA	Solid	Dry and Grind	
160-18553-16	SU01-EXB-036-SS-P-00	Total/NA	Solid	Dry and Grind	
160-18553-17	SU01-EXB-037-SS-P-00	Total/NA	Solid	Dry and Grind	
160-18553-18	SU01-EXB-038-SS-P-00	Total/NA	Solid	Dry and Grind	
160-18553-19	SU01-EXB-039-SS-P-00	Total/NA	Solid	Dry and Grind	
160-18553-20	SU01-EXB-039-SS-DUP-00	Total/NA	Solid	Dry and Grind	
160-18553-1 DU	SU01-EXB-022-SS-P-00	Total/NA	Solid	Dry and Grind	
160-18553-14 DU	SU01-EXB-034-SS-DUP-00	Total/NA	Solid	Dry and Grind	

Prep Batch: 264540

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-18553-1	SU01-EXB-022-SS-P-00	Total/NA	Solid	Fill_Geo-21	264089
160-18553-2	SU01-EXB-023-SS-P-00	Total/NA	Solid	Fill_Geo-21	264089
160-18553-3	SU01-EXB-024-SS-P-00	Total/NA	Solid	Fill_Geo-21	264089
160-18553-4	SU01-EXB-025-SS-P-00	Total/NA	Solid	Fill_Geo-21	264089
160-18553-5	SU01-EXB-026-SS-P-00	Total/NA	Solid	Fill_Geo-21	264089
160-18553-6	SU01-EXB-027-SS-P-00	Total/NA	Solid	Fill_Geo-21	264089
160-18553-7	SU01-EXB-028-SS-P-00	Total/NA	Solid	Fill_Geo-21	264089
160-18553-8	SU01-EXB-029-SS-P-00	Total/NA	Solid	Fill_Geo-21	264089
160-18553-9	SU01-EXB-030-SS-P-00	Total/NA	Solid	Fill_Geo-21	264089
160-18553-10	SU01-EXB-031-SS-P-00	Total/NA	Solid	Fill_Geo-21	264089
160-18553-11	SU01-EXB-032-SS-P-00	Total/NA	Solid	Fill_Geo-21	264089
160-18553-12	SU01-EXB-033-SS-P-00	Total/NA	Solid	Fill_Geo-21	264089
160-18553-13	SU01-EXB-034-SS-P-00	Total/NA	Solid	Fill_Geo-21	264089
160-18553-14	SU01-EXB-034-SS-DUP-00	Total/NA	Solid	Fill_Geo-21	264089
160-18553-15	SU01-EXB-035-SS-P-00	Total/NA	Solid	Fill_Geo-21	264089
160-18553-16	SU01-EXB-036-SS-P-00	Total/NA	Solid	Fill_Geo-21	264089
160-18553-17	SU01-EXB-037-SS-P-00	Total/NA	Solid	Fill_Geo-21	264089
160-18553-18	SU01-EXB-038-SS-P-00	Total/NA	Solid	Fill_Geo-21	264089
160-18553-19	SU01-EXB-039-SS-P-00	Total/NA	Solid	Fill_Geo-21	264089
160-18553-20	SU01-EXB-039-SS-DUP-00	Total/NA	Solid	Fill_Geo-21	264089
MB 160-264540/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-264540/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	
160-18553-1 DU	SU01-EXB-022-SS-P-00	Total/NA	Solid	Fill_Geo-21	264089

QC Association Summary

Client: EA Engineering, Science, and Technology
Project/Site: EA and Cabrera - Hill AFB WR111

TestAmerica Job ID: 160-18553-1

Rad (Continued)

Prep Batch: 266485

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-18553-1	SU01-EXB-022-SS-P-00	Total/NA	Solid	ExtChrom	264089
160-18553-2	SU01-EXB-023-SS-P-00	Total/NA	Solid	ExtChrom	264089
160-18553-3	SU01-EXB-024-SS-P-00	Total/NA	Solid	ExtChrom	264089
160-18553-4	SU01-EXB-025-SS-P-00	Total/NA	Solid	ExtChrom	264089
160-18553-5	SU01-EXB-026-SS-P-00	Total/NA	Solid	ExtChrom	264089
160-18553-6	SU01-EXB-027-SS-P-00	Total/NA	Solid	ExtChrom	264089
160-18553-7	SU01-EXB-028-SS-P-00	Total/NA	Solid	ExtChrom	264089
160-18553-8	SU01-EXB-029-SS-P-00	Total/NA	Solid	ExtChrom	264089
160-18553-9	SU01-EXB-030-SS-P-00	Total/NA	Solid	ExtChrom	264089
160-18553-10	SU01-EXB-031-SS-P-00	Total/NA	Solid	ExtChrom	264089
160-18553-11	SU01-EXB-032-SS-P-00	Total/NA	Solid	ExtChrom	264089
160-18553-12	SU01-EXB-033-SS-P-00	Total/NA	Solid	ExtChrom	264089
160-18553-13	SU01-EXB-034-SS-P-00	Total/NA	Solid	ExtChrom	264089
MB 160-266485/1-A	Method Blank	Total/NA	Solid	ExtChrom	
LCS 160-266485/2-A	Lab Control Sample	Total/NA	Solid	ExtChrom	

Prep Batch: 266564

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-18553-14	SU01-EXB-034-SS-DUP-00	Total/NA	Solid	ExtChrom	264089
160-18553-15	SU01-EXB-035-SS-P-00	Total/NA	Solid	ExtChrom	264089
160-18553-16	SU01-EXB-036-SS-P-00	Total/NA	Solid	ExtChrom	264089
160-18553-17	SU01-EXB-037-SS-P-00	Total/NA	Solid	ExtChrom	264089
160-18553-18	SU01-EXB-038-SS-P-00	Total/NA	Solid	ExtChrom	264089
160-18553-19	SU01-EXB-039-SS-P-00	Total/NA	Solid	ExtChrom	264089
160-18553-20	SU01-EXB-039-SS-DUP-00	Total/NA	Solid	ExtChrom	264089
MB 160-266564/1-A	Method Blank	Total/NA	Solid	ExtChrom	
LCS 160-266564/2-A	Lab Control Sample	Total/NA	Solid	ExtChrom	
160-18553-14 DU	SU01-EXB-034-SS-DUP-00	Total/NA	Solid	ExtChrom	264089

Lab Chronicle

Client: EA Engineering, Science, and Technology
Project/Site: EA and Cabrera - Hill AFB WR111

TestAmerica Job ID: 160-18553-1

Client Sample ID: SU01-EXB-022-SS-P-00

Date Collected: 08/08/16 10:37

Date Received: 08/09/16 09:20

Lab Sample ID: 160-18553-1

Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Leach	Dry and Grind			264089	08/09/16 15:11	DRO	TAL SL
Total/NA	Prep	Fill_Geo-21			264540	08/11/16 15:30	R1S	TAL SL
Total/NA	Analysis	901.1		1	267761	09/01/16 14:33	RTM	TAL SL
Total/NA	Leach	Dry and Grind			264089	08/09/16 15:11	DRO	TAL SL
Total/NA	Prep	ExtChrom			266485	08/25/16 09:34	ATS	TAL SL
Total/NA	Analysis	A-01-R		1	267490	08/31/16 19:41	ALD	TAL SL

Client Sample ID: SU01-EXB-023-SS-P-00

Date Collected: 08/08/16 10:21

Date Received: 08/09/16 09:20

Lab Sample ID: 160-18553-2

Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Leach	Dry and Grind			264089	08/09/16 15:11	DRO	TAL SL
Total/NA	Prep	Fill_Geo-21			264540	08/11/16 15:30	R1S	TAL SL
Total/NA	Analysis	901.1		1	267760	09/01/16 14:35	RTM	TAL SL
Total/NA	Leach	Dry and Grind			264089	08/09/16 15:11	DRO	TAL SL
Total/NA	Prep	ExtChrom			266485	08/25/16 09:34	ATS	TAL SL
Total/NA	Analysis	A-01-R		1	267491	08/31/16 19:41	ALD	TAL SL

Client Sample ID: SU01-EXB-024-SS-P-00

Date Collected: 08/08/16 10:26

Date Received: 08/09/16 09:20

Lab Sample ID: 160-18553-3

Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Leach	Dry and Grind			264089	08/09/16 15:11	DRO	TAL SL
Total/NA	Prep	Fill_Geo-21			264540	08/11/16 15:30	R1S	TAL SL
Total/NA	Analysis	901.1		1	267758	09/01/16 14:42	RTM	TAL SL
Total/NA	Leach	Dry and Grind			264089	08/09/16 15:11	DRO	TAL SL
Total/NA	Prep	ExtChrom			266485	08/25/16 09:34	ATS	TAL SL
Total/NA	Analysis	A-01-R		1	267492	08/31/16 19:41	ALD	TAL SL

Client Sample ID: SU01-EXB-025-SS-P-00

Date Collected: 08/08/16 10:31

Date Received: 08/09/16 09:20

Lab Sample ID: 160-18553-4

Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Leach	Dry and Grind			264089	08/09/16 15:11	DRO	TAL SL
Total/NA	Prep	Fill_Geo-21			264540	08/11/16 15:30	R1S	TAL SL
Total/NA	Analysis	901.1		1	267757	09/01/16 14:40	RTM	TAL SL
Total/NA	Leach	Dry and Grind			264089	08/09/16 15:11	DRO	TAL SL
Total/NA	Prep	ExtChrom			266485	08/25/16 09:34	ATS	TAL SL
Total/NA	Analysis	A-01-R		1	267493	08/31/16 19:41	ALD	TAL SL

Lab Chronicle

Client: EA Engineering, Science, and Technology
Project/Site: EA and Cabrera - Hill AFB WR111

TestAmerica Job ID: 160-18553-1

Client Sample ID: SU01-EXB-026-SS-P-00

Lab Sample ID: 160-18553-5

Date Collected: 08/08/16 10:12

Matrix: Solid

Date Received: 08/09/16 09:20

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Leach	Dry and Grind			264089	08/09/16 15:11	DRO	TAL SL
Total/NA	Prep	Fill_Geo-21			264540	08/11/16 15:30	R1S	TAL SL
Total/NA	Analysis	901.1		1	267762	09/01/16 15:06	RTM	TAL SL
Total/NA	Leach	Dry and Grind			264089	08/09/16 15:11	DRO	TAL SL
Total/NA	Prep	ExtChrom			266485	08/25/16 09:34	ATS	TAL SL
Total/NA	Analysis	A-01-R		1	267495	08/31/16 19:41	ALD	TAL SL

Client Sample ID: SU01-EXB-027-SS-P-00

Lab Sample ID: 160-18553-6

Date Collected: 08/08/16 10:17

Matrix: Solid

Date Received: 08/09/16 09:20

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Leach	Dry and Grind			264089	08/09/16 15:11	DRO	TAL SL
Total/NA	Prep	Fill_Geo-21			264540	08/11/16 15:30	R1S	TAL SL
Total/NA	Analysis	901.1		1	267761	09/01/16 15:08	RTM	TAL SL
Total/NA	Leach	Dry and Grind			264089	08/09/16 15:11	DRO	TAL SL
Total/NA	Prep	ExtChrom			266485	08/25/16 09:34	ATS	TAL SL
Total/NA	Analysis	A-01-R		1	267496	08/31/16 19:41	ALD	TAL SL

Client Sample ID: SU01-EXB-028-SS-P-00

Lab Sample ID: 160-18553-7

Date Collected: 08/08/16 10:02

Matrix: Solid

Date Received: 08/09/16 09:20

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Leach	Dry and Grind			264089	08/09/16 15:11	DRO	TAL SL
Total/NA	Prep	Fill_Geo-21			264540	08/11/16 15:30	R1S	TAL SL
Total/NA	Analysis	901.1		1	267760	09/01/16 15:10	RTM	TAL SL
Total/NA	Leach	Dry and Grind			264089	08/09/16 15:11	DRO	TAL SL
Total/NA	Prep	ExtChrom			266485	08/25/16 09:34	ATS	TAL SL
Total/NA	Analysis	A-01-R		1	268503	09/07/16 14:28	ALD	TAL SL

Client Sample ID: SU01-EXB-029-SS-P-00

Lab Sample ID: 160-18553-8

Date Collected: 08/08/16 10:07

Matrix: Solid

Date Received: 08/09/16 09:20

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Leach	Dry and Grind			264089	08/09/16 15:11	DRO	TAL SL
Total/NA	Prep	Fill_Geo-21			264540	08/11/16 15:30	R1S	TAL SL
Total/NA	Analysis	901.1		1	267758	09/01/16 15:15	RTM	TAL SL
Total/NA	Leach	Dry and Grind			264089	08/09/16 15:11	DRO	TAL SL
Total/NA	Prep	ExtChrom			266485	08/25/16 09:34	ATS	TAL SL
Total/NA	Analysis	A-01-R		1	267498	08/31/16 19:41	ALD	TAL SL

Lab Chronicle

Client: EA Engineering, Science, and Technology
Project/Site: EA and Cabrera - Hill AFB WR111

TestAmerica Job ID: 160-18553-1

Client Sample ID: SU01-EXB-030-SS-P-00

Lab Sample ID: 160-18553-9

Date Collected: 08/08/16 09:57

Matrix: Solid

Date Received: 08/09/16 09:20

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Leach	Dry and Grind			264089	08/09/16 15:11	DRO	TAL SL
Total/NA	Prep	Fill_Geo-21			264540	08/11/16 15:30	R1S	TAL SL
Total/NA	Analysis	901.1		1	267757	09/01/16 15:14	RTM	TAL SL
Total/NA	Leach	Dry and Grind			264089	08/09/16 15:11	DRO	TAL SL
Total/NA	Prep	ExtChrom			266485	08/25/16 09:34	ATS	TAL SL
Total/NA	Analysis	A-01-R		1	268502	09/07/16 14:28	ALD	TAL SL

Client Sample ID: SU01-EXB-031-SS-P-00

Lab Sample ID: 160-18553-10

Date Collected: 08/08/16 09:51

Matrix: Solid

Date Received: 08/09/16 09:20

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Leach	Dry and Grind			264089	08/09/16 15:11	DRO	TAL SL
Total/NA	Prep	Fill_Geo-21			264540	08/11/16 15:30	R1S	TAL SL
Total/NA	Analysis	901.1		1	267763	09/01/16 16:11	RTM	TAL SL
Total/NA	Leach	Dry and Grind			264089	08/09/16 15:11	DRO	TAL SL
Total/NA	Prep	ExtChrom			266485	08/25/16 09:34	ATS	TAL SL
Total/NA	Analysis	A-01-R		1	267500	08/31/16 19:41	ALD	TAL SL

Client Sample ID: SU01-EXB-032-SS-P-00

Lab Sample ID: 160-18553-11

Date Collected: 08/08/16 09:47

Matrix: Solid

Date Received: 08/09/16 09:20

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Leach	Dry and Grind			264089	08/09/16 15:11	DRO	TAL SL
Total/NA	Prep	Fill_Geo-21			264540	08/11/16 15:30	R1S	TAL SL
Total/NA	Analysis	901.1		1	267762	09/01/16 16:09	RTM	TAL SL
Total/NA	Leach	Dry and Grind			264089	08/09/16 15:11	DRO	TAL SL
Total/NA	Prep	ExtChrom			266485	08/25/16 09:34	ATS	TAL SL
Total/NA	Analysis	A-01-R		1	267501	08/31/16 19:41	ALD	TAL SL

Client Sample ID: SU01-EXB-033-SS-P-00

Lab Sample ID: 160-18553-12

Date Collected: 08/08/16 09:17

Matrix: Solid

Date Received: 08/09/16 09:20

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Leach	Dry and Grind			264089	08/09/16 15:11	DRO	TAL SL
Total/NA	Prep	Fill_Geo-21			264540	08/11/16 15:30	R1S	TAL SL
Total/NA	Analysis	901.1		1	267761	09/01/16 16:08	RTM	TAL SL
Total/NA	Leach	Dry and Grind			264089	08/09/16 15:11	DRO	TAL SL
Total/NA	Prep	ExtChrom			266485	08/25/16 09:34	ATS	TAL SL
Total/NA	Analysis	A-01-R		1	268501	09/07/16 14:28	ALD	TAL SL

TestAmerica St. Louis

Lab Chronicle

Client: EA Engineering, Science, and Technology
Project/Site: EA and Cabrera - Hill AFB WR111

TestAmerica Job ID: 160-18553-1

Client Sample ID: SU01-EXB-034-SS-P-00

Date Collected: 08/08/16 09:22

Date Received: 08/09/16 09:20

Lab Sample ID: 160-18553-13

Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Leach	Dry and Grind			264089	08/09/16 15:11	DRO	TAL SL
Total/NA	Prep	Fill_Geo-21			264540	08/11/16 15:30	R1S	TAL SL
Total/NA	Analysis	901.1		1	267760	09/01/16 16:07	RTM	TAL SL
Total/NA	Leach	Dry and Grind			264089	08/09/16 15:11	DRO	TAL SL
Total/NA	Prep	ExtChrom			266485	08/25/16 09:34	ATS	TAL SL
Total/NA	Analysis	A-01-R		1	267503	08/31/16 19:41	ALD	TAL SL

Client Sample ID: SU01-EXB-034-SS-DUP-00

Date Collected: 08/08/16 09:22

Date Received: 08/09/16 09:20

Lab Sample ID: 160-18553-14

Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Leach	Dry and Grind			264089	08/09/16 15:11	DRO	TAL SL
Total/NA	Prep	Fill_Geo-21			264540	08/11/16 15:30	R1S	TAL SL
Total/NA	Analysis	901.1		1	267758	09/01/16 16:09	RTM	TAL SL
Total/NA	Leach	Dry and Grind			264089	08/09/16 15:11	DRO	TAL SL
Total/NA	Prep	ExtChrom			266564	08/25/16 15:51	SCB	TAL SL
Total/NA	Analysis	A-01-R		1	267506	08/31/16 19:45	ALD	TAL SL

Client Sample ID: SU01-EXB-035-SS-P-00

Date Collected: 08/08/16 09:29

Date Received: 08/09/16 09:20

Lab Sample ID: 160-18553-15

Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Leach	Dry and Grind			264089	08/09/16 15:11	DRO	TAL SL
Total/NA	Prep	Fill_Geo-21			264540	08/11/16 15:30	R1S	TAL SL
Total/NA	Analysis	901.1		1	267757	09/01/16 16:06	RTM	TAL SL
Total/NA	Leach	Dry and Grind			264089	08/09/16 15:11	DRO	TAL SL
Total/NA	Prep	ExtChrom			266564	08/25/16 15:51	SCB	TAL SL
Total/NA	Analysis	A-01-R		1	267508	08/31/16 19:45	ALD	TAL SL

Client Sample ID: SU01-EXB-036-SS-P-00

Date Collected: 08/08/16 09:35

Date Received: 08/09/16 09:20

Lab Sample ID: 160-18553-16

Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Leach	Dry and Grind			264089	08/09/16 15:11	DRO	TAL SL
Total/NA	Prep	Fill_Geo-21			264540	08/11/16 15:30	R1S	TAL SL
Total/NA	Analysis	901.1		1	267754	09/01/16 16:02	RTM	TAL SL
Total/NA	Leach	Dry and Grind			264089	08/09/16 15:11	DRO	TAL SL
Total/NA	Prep	ExtChrom			266564	08/25/16 15:51	SCB	TAL SL
Total/NA	Analysis	A-01-R		1	267510	08/31/16 19:45	ALD	TAL SL

Lab Chronicle

Client: EA Engineering, Science, and Technology
Project/Site: EA and Cabrera - Hill AFB WR111

TestAmerica Job ID: 160-18553-1

Client Sample ID: SU01-EXB-037-SS-P-00

Lab Sample ID: 160-18553-17

Date Collected: 08/08/16 09:41

Matrix: Solid

Date Received: 08/09/16 09:20

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Leach	Dry and Grind			264089	08/09/16 15:11	DRO	TAL SL
Total/NA	Prep	Fill_Geo-21			264540	08/11/16 15:30	R1S	TAL SL
Total/NA	Analysis	901.1		1	267763	09/01/16 16:46	RTM	TAL SL
Total/NA	Leach	Dry and Grind			264089	08/09/16 15:11	DRO	TAL SL
Total/NA	Prep	ExtChrom			266564	08/25/16 15:51	SCB	TAL SL
Total/NA	Analysis	A-01-R		1	267511	08/31/16 19:45	ALD	TAL SL

Client Sample ID: SU01-EXB-038-SS-P-00

Lab Sample ID: 160-18553-18

Date Collected: 08/08/16 09:01

Matrix: Solid

Date Received: 08/09/16 09:20

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Leach	Dry and Grind			264089	08/09/16 15:11	DRO	TAL SL
Total/NA	Prep	Fill_Geo-21			264540	08/11/16 15:30	R1S	TAL SL
Total/NA	Analysis	901.1		1	267762	09/01/16 16:47	RTM	TAL SL
Total/NA	Leach	Dry and Grind			264089	08/09/16 15:11	DRO	TAL SL
Total/NA	Prep	ExtChrom			266564	08/25/16 15:51	SCB	TAL SL
Total/NA	Analysis	A-01-R		1	267512	08/31/16 19:45	ALD	TAL SL

Client Sample ID: SU01-EXB-039-SS-P-00

Lab Sample ID: 160-18553-19

Date Collected: 08/08/16 09:10

Matrix: Solid

Date Received: 08/09/16 09:20

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Leach	Dry and Grind			264089	08/09/16 15:11	DRO	TAL SL
Total/NA	Prep	Fill_Geo-21			264540	08/11/16 15:30	R1S	TAL SL
Total/NA	Analysis	901.1		1	267761	09/01/16 16:48	RTM	TAL SL
Total/NA	Leach	Dry and Grind			264089	08/09/16 15:11	DRO	TAL SL
Total/NA	Prep	ExtChrom			266564	08/25/16 15:51	SCB	TAL SL
Total/NA	Analysis	A-01-R		1	267513	08/31/16 19:45	ALD	TAL SL

Client Sample ID: SU01-EXB-039-SS-DUP-00

Lab Sample ID: 160-18553-20

Date Collected: 08/08/16 09:10

Matrix: Solid

Date Received: 08/09/16 09:20

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Leach	Dry and Grind			264089	08/09/16 15:11	DRO	TAL SL
Total/NA	Prep	Fill_Geo-21			264540	08/11/16 15:30	R1S	TAL SL
Total/NA	Analysis	901.1		1	267760	09/01/16 16:51	RTM	TAL SL
Total/NA	Leach	Dry and Grind			264089	08/09/16 15:11	DRO	TAL SL
Total/NA	Prep	ExtChrom			266564	08/25/16 15:51	SCB	TAL SL
Total/NA	Analysis	A-01-R		1	267514	08/31/16 19:45	ALD	TAL SL

Lab Chronicle

Client: EA Engineering, Science, and Technology
Project/Site: EA and Cabrera - Hill AFB WR111

TestAmerica Job ID: 160-18553-1

Laboratory References:

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

Certification Summary

Client: EA Engineering, Science, and Technology
Project/Site: EA and Cabrera - Hill AFB WR111

TestAmerica Job ID: 160-18553-1

Laboratory: TestAmerica St. Louis

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

Authority	Program	EPA Region	Certification ID	Expiration Date
Alaska	State Program	10	MO00054	06-30-17
California	State Program	9	2886	03-31-18
Connecticut	State Program	1	PH-0241	03-31-17
Florida	NELAP	4	E87689	06-30-17
Illinois	NELAP	5	003757	11-30-16 *
Iowa	State Program	7	373	12-01-16 *
Kansas	NELAP	7	E-10236	10-31-16 *
Kentucky (DW)	State Program	4	90125	12-31-16
L-A-B	DoD ELAP		L2305	04-06-19
Louisiana	NELAP	6	04080	06-30-17
Louisiana (DW)	NELAP	6	LA160008	12-31-16
Maryland	State Program	3	310	09-30-17
Missouri	State Program	7	780	06-30-17
Nevada	State Program	9	MO000542016-1	07-31-17
New Jersey	NELAP	2	MO002	06-30-17
New York	NELAP	2	11616	03-31-17
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	02-28-17 *
South Carolina	State Program	4	85002001	06-30-16 *
Texas	NELAP	6	T104704193-15-9	07-31-17
USDA	Federal		P330-07-00122	01-09-17
Utah	NELAP	8	MO000542016-8	07-31-17
Virginia	NELAP	3	460230	06-14-17
Washington	State Program	10	C592	08-30-17
West Virginia DEP	State Program	3	381	08-31-16 *

Laboratory: TestAmerica Denver

The certifications listed below are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
A2LA	DoD ELAP		2907.01	10-31-17
Utah	NELAP	8	CO00026	07-31-16 *

* Certification renewal pending - certification considered valid.

TestAmerica St. Louis

Method Summary

Client: EA Engineering, Science, and Technology
Project/Site: EA and Cabrera - Hill AFB WR111

TestAmerica Job ID: 160-18553-1

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: EA and Cabrera - Hill AFB WR111

TestAmerica Job ID: 160-18553-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
160-18553-1	SU01-EXB-022-SS-P-00	Solid	08/08/16 10:37	08/09/16 09:20
160-18553-2	SU01-EXB-023-SS-P-00	Solid	08/08/16 10:21	08/09/16 09:20
160-18553-3	SU01-EXB-024-SS-P-00	Solid	08/08/16 10:26	08/09/16 09:20
160-18553-4	SU01-EXB-025-SS-P-00	Solid	08/08/16 10:31	08/09/16 09:20
160-18553-5	SU01-EXB-026-SS-P-00	Solid	08/08/16 10:12	08/09/16 09:20
160-18553-6	SU01-EXB-027-SS-P-00	Solid	08/08/16 10:17	08/09/16 09:20
160-18553-7	SU01-EXB-028-SS-P-00	Solid	08/08/16 10:02	08/09/16 09:20
160-18553-8	SU01-EXB-029-SS-P-00	Solid	08/08/16 10:07	08/09/16 09:20
160-18553-9	SU01-EXB-030-SS-P-00	Solid	08/08/16 09:57	08/09/16 09:20
160-18553-10	SU01-EXB-031-SS-P-00	Solid	08/08/16 09:51	08/09/16 09:20
160-18553-11	SU01-EXB-032-SS-P-00	Solid	08/08/16 09:47	08/09/16 09:20
160-18553-12	SU01-EXB-033-SS-P-00	Solid	08/08/16 09:17	08/09/16 09:20
160-18553-13	SU01-EXB-034-SS-P-00	Solid	08/08/16 09:22	08/09/16 09:20
160-18553-14	SU01-EXB-034-SS-DUP-00	Solid	08/08/16 09:22	08/09/16 09:20
160-18553-15	SU01-EXB-035-SS-P-00	Solid	08/08/16 09:29	08/09/16 09:20
160-18553-16	SU01-EXB-036-SS-P-00	Solid	08/08/16 09:35	08/09/16 09:20
160-18553-17	SU01-EXB-037-SS-P-00	Solid	08/08/16 09:41	08/09/16 09:20
160-18553-18	SU01-EXB-038-SS-P-00	Solid	08/08/16 09:01	08/09/16 09:20
160-18553-19	SU01-EXB-039-SS-P-00	Solid	08/08/16 09:10	08/09/16 09:20
160-18553-20	SU01-EXB-039-SS-DUP-00	Solid	08/08/16 09:10	08/09/16 09:20

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica St. Louis Job No.: 160-18553-1

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 <div><div></div><div></div></div>			(Purchased Reagent) <div><div></div><div></div></div>		Americium-241	7.466 Bq
							Pu-239	6.897 Bq
							Pulser	
							Thorium-230	7.167 Bq
							U	
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
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
							Pu-239	5.746 Bq

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica St. Louis Job No.: 160-18553-1

SDG No.: _____

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							Pulser Thorium-230 U	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 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

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica St. Louis Job No.: 160-18553-1

SDG No.: _____

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							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 F_00001	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
Source G_00001	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

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica St. Louis Job No.: 160-18553-1

SDG No.: _____

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							Sn-113	7757.8 Bq
							Y-88	12657.4 Bq
Source H_00002	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
							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_00021	08/01/17	07/20/16	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	08/01/17	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

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica St. Louis Job No.: 160-18553-1

SDG No.: _____

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							Thorium-229	740.127 Bq/g
TRM-2_00001	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_00005	10/29/16	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
							Cesium-137	465 Bq
							Co-57	357 Bq
							Cobalt-60	742 Bq
							Hg-203	1208 Bq
							Pb-210	15186 Bq
							Sn-113	943 Bq
Tuna Can_00003	02/09/17	Eckert & Ziegler, Lot 90099			(Purchased Reagent)		Y-88	1571 Bq
							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
Tuna Can_00006	03/01/16	Eckert & Ziegler, Lot 83814-334			(Purchased Reagent)		Sn-113	967 Bq
							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

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

Prep Batch: 266485

Preparation, Extraction
Chromatography Resin Actinide
Separation

Alpha Spectroscopy Analysis Detail Report

Prep Batch: 266485

Lab ID: MB 160-266485/1-A
 Client ID:
 Sigma: 2

Analyzed: 08/31/16 19:41
 Detector: AV148
 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	0.1036	0.0442	0.0450		pCi/g	0.100	0.0141	267479	
Thorium-232	0.008202	0.0176	0.0176	U	pCi/g	0.100	0.0346	267479	
Tracer	MB Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Thorium-229	2.717	0.215	0.314		pCi/g	0.0389	3.03	89.8	30 - 110

Lab ID: LCS 160-266485/2-A
 Client ID:
 Sigma: 2

Analyzed: 08/31/16 19:41
 Detector: AV149
 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	27.65	1.08	2.56		pCi/g	0.100	0.0694	267480	
Tracer	LCS Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Thorium-229	5.399	0.452	0.640		pCi/g	0.0694	6.06	89.1	30 - 110

Lab ID: 160-18553-1
 Client ID: SU01-EXB-022-SS-P-00
 Sigma: 2

Analyzed: 08/31/16 19:41
 Detector: AV161
 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	0.807	0.146	0.161		pCi/g	0.100	0.0364	267490	
Thorium-232	1.42	0.193	0.227		pCi/g	0.100	0.0197	267490	
Tracer	Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Thorium-229	1.99	0.186	0.250		pCi/g	0.0239	3.03	65.6	30 - 110

Lab ID: 160-18553-2
 Client ID: SU01-EXB-023-SS-P-00
 Sigma: 2

Analyzed: 08/31/16 19:41
 Detector: AV162
 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	1.47	0.184	0.221		pCi/g	0.100	0.0419	267491	
Thorium-232	1.39	0.177	0.212		pCi/g	0.100	0.0312	267491	
Tracer	Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Thorium-229	2.28	0.198	0.276		pCi/g	0.0371	3.03	75.4	30 - 110

Alpha Spectroscopy Analysis Detail Report

Prep Batch: 266485

Lab ID: 160-18553-3
 Client ID: SU01-EXB-024-SS-P-00
 Sigma: 2

Analyzed: 08/31/16 19:41
 Detector: AV163
 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	1.35	0.169	0.203		pCi/g	0.100	0.0344	267492	
Thorium-232	1.58	0.181	0.225		pCi/g	0.100	0.0287	267492	
Tracer	Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Thorium-229	2.71	0.226	0.321		pCi/g	0.0377	3.03	89.5	30 - 110

Lab ID: 160-18553-4
 Client ID: SU01-EXB-025-SS-P-00
 Sigma: 2

Analyzed: 08/31/16 19:41
 Detector: AV164
 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	0.915	0.159	0.176		pCi/g	0.100	0.0449	267493	
Thorium-232	1.41	0.196	0.229		pCi/g	0.100	0.0375	267493	
Tracer	Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Thorium-229	2.09	0.199	0.265		pCi/g	0.0478	3.03	68.9	30 - 110

Lab ID: 160-18553-5
 Client ID: SU01-EXB-026-SS-P-00
 Sigma: 2

Analyzed: 08/31/16 19:41
 Detector: AV169
 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	5.35	0.341	0.564		pCi/g	0.100	0.0587	267495	
Thorium-232	2.84	0.247	0.344		pCi/g	0.100	0.0297	267495	
Tracer	Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Thorium-229	2.59	0.220	0.309		pCi/g	0.0590	3.03	85.4	30 - 110

Lab ID: 160-18553-6
 Client ID: SU01-EXB-027-SS-P-00
 Sigma: 2

Analyzed: 08/31/16 19:41
 Detector: AV170
 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	2.08	0.208	0.272		pCi/g	0.100	0.0306	267496	
Thorium-232	2.12	0.209	0.274		pCi/g	0.100	0.0155	267496	
Tracer	Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Thorium-229	2.54	0.211	0.300		pCi/g	0.0321	3.03	84.0	30 - 110

Alpha Spectroscopy Analysis Detail Report

Prep Batch: 266485

Lab ID: 160-18553-7
 Client ID: SU01-EXB-028-SS-P-00
 Sigma: 2

Analyzed: 09/07/16 14:28
 Detector: AV212
 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	0.862	0.140	0.158		pCi/g	0.100	0.0703	268503	
Thorium-232	1.38	0.173	0.208		pCi/g	0.100	0.0565	268503	
Tracer	Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Thorium-229	2.36	0.199	0.281		pCi/g	0.0384	3.03	77.9	30 - 110

Lab ID: 160-18553-8
 Client ID: SU01-EXB-029-SS-P-00
 Sigma: 2

Analyzed: 08/31/16 19:41
 Detector: AV173
 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	1.17	0.153	0.182		pCi/g	0.100	0.0328	267498	
Thorium-232	1.71	0.184	0.234		pCi/g	0.100	0.0326	267498	
Tracer	Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Thorium-229	2.68	0.218	0.313		pCi/g	0.0324	3.03	88.5	30 - 110

Lab ID: 160-18553-9
 Client ID: SU01-EXB-030-SS-P-00
 Sigma: 2

Analyzed: 09/07/16 14:28
 Detector: AV211
 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	1.33	0.169	0.203		pCi/g	0.100	0.0297	268502	
Thorium-232	1.85	0.200	0.253		pCi/g	0.100	0.0431	268502	
Tracer	Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Thorium-229	2.65	0.224	0.316		pCi/g	0.0348	3.03	87.5	30 - 110

Lab ID: 160-18553-10
 Client ID: SU01-EXB-031-SS-P-00
 Sigma: 2

Analyzed: 08/31/16 19:41
 Detector: AV176
 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	0.848	0.137	0.154		pCi/g	0.100	0.0490	267500	
Thorium-232	1.30	0.168	0.201		pCi/g	0.100	0.0434	267500	
Tracer	Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Thorium-229	2.41	0.205	0.288		pCi/g	0.0374	3.03	79.7	30 - 110

Alpha Spectroscopy Analysis Detail Report

Prep Batch: 266485

Lab ID: 160-18553-11
Client ID: SU01-EXB-032-SS-P-00
Sigma: 2

Analyzed: 08/31/16 19:41
Detector: AV177
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	1.28	0.170	0.201		pCi/g	0.100	0.0169	267501	
Thorium-232	1.31	0.172	0.204		pCi/g	0.100	0.0368	267501	
Tracer	Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Thorium-229	2.52	0.218	0.303		pCi/g	0.0377	3.03	83.2	30 - 110

Lab ID: 160-18553-12
Client ID: SU01-EXB-033-SS-P-00
Sigma: 2

Analyzed: 09/07/16 14:28
Detector: AV210
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	2.91	0.245	0.346		pCi/g	0.100	0.0338	268501	
Thorium-232	1.93	0.199	0.256		pCi/g	0.100	0.0283	268501	
Tracer	Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Thorium-229	2.62	0.217	0.309		pCi/g	0.0329	3.03	86.6	30 - 110

Lab ID: 160-18553-13
Client ID: SU01-EXB-034-SS-P-00
Sigma: 2

Analyzed: 08/31/16 19:41
Detector: AV189
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	2.18	0.214	0.282		pCi/g	0.100	0.0292	267503	
Thorium-232	1.46	0.175	0.214		pCi/g	0.100	0.0418	267503	
Tracer	Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Thorium-229	2.49	0.207	0.294		pCi/g	0.0240	3.03	82.2	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 160-266485/1-A	Thorium-230			0.1036		pCi/g							4.601969
MB 160-266485/1-A	Thorium-232			0.008202	U	pCi/g							09 .9319280 6
Lab Control Sample ID:	Analyte	Parent Result	Spike Added	LCS Result	Qualifier	Unit	% Rec	% Rec Limits	RPD	RER	DER	RER Limit	Z Factor
LCS 160-266485/2-A	Thorium-230		24.5	27.65		pCi/g	113	81 - 118					1.841997 2777

Alpha Spectroscopy Analysis Detail Report

Prep Batch: 266485

Glossary:

Ts = Count Duration, Sample

ALPHA SPECTROSCOPY BATCH WORKSHEET

Lab Name: TestAmerica St. Louis Job No.: 160-18553-1

SDG No.: _____

Batch Number: 266485 Batch Start Date: 08/25/16 09:34 Batch Analyst: Sherman, Austin TBatch Method: ExtChrom Batch End Date: 08/31/16 15:04

Lab Sample ID	Client Sample ID	Method Chain	Basis	InitialAmount	Th-229 00021	TRM-2 00001			
MB 160-266485/1		ExtChrom, A-01-R		1.0 g	0.1 mL				
LCS 160-266485/2		ExtChrom, A-01-R		0.4998 g	0.1 mL	0.4998 g			
160-18553-A-1-A	SU01-EXB-022-SS- P-00	ExtChrom, A-01-R	T	0.9999 g	0.1 mL				
160-18553-A-2-A	SU01-EXB-023-SS- P-00	ExtChrom, A-01-R	T	1.0004 g	0.1 mL				
160-18553-A-3-A	SU01-EXB-024-SS- P-00	ExtChrom, A-01-R	T	0.9996 g	0.1 mL				
160-18553-A-4-A	SU01-EXB-025-SS- P-00	ExtChrom, A-01-R	T	0.9996 g	0.1 mL				
160-18553-A-5-A	SU01-EXB-026-SS- P-00	ExtChrom, A-01-R	T	0.9998 g	0.1 mL				
160-18553-A-6-A	SU01-EXB-027-SS- P-00	ExtChrom, A-01-R	T	0.9996 g	0.1 mL				
160-18553-A-7-A	SU01-EXB-028-SS- P-00	ExtChrom, A-01-R	T	0.9999 g	0.1 mL				
160-18553-A-8-A	SU01-EXB-029-SS- P-00	ExtChrom, A-01-R	T	1.0001 g	0.1 mL				
160-18553-A-9-A	SU01-EXB-030-SS- P-00	ExtChrom, A-01-R	T	0.9995 g	0.1 mL				
160-18553-A-10-A	SU01-EXB-031-SS- P-00	ExtChrom, A-01-R	T	1.0002 g	0.1 mL				
160-18553-A-11-A	SU01-EXB-032-SS- P-00	ExtChrom, A-01-R	T	1.0006 g	0.1 mL				
160-18553-A-12-A	SU01-EXB-033-SS- P-00	ExtChrom, A-01-R	T	0.9995 g	0.1 mL				
160-18553-A-13-A	SU01-EXB-034-SS- P-00	ExtChrom, A-01-R	T	0.9997 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.: 160-18553-1

SDG No.: _____

Batch Number: 266485 Batch Start Date: 08/25/16 09:34 Batch Analyst: Sherman, Austin TBatch Method: ExtChrom Batch End Date: 08/31/16 15:04

Batch Notes	
Balance ID	1123433897
Analyst ID - Column	nmn per scb
Column Date	8/31/16
Analyst ID - CoPrecipitation	scb
CoPrecipitation Date	8/31/16
Pipette ID	rad104
Analyst ID - Reagent Drop Witness	jdl
Analyst ID - Reagent Drop	ats
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.

Prep Batch: 266564

Preparation, Extraction
Chromatography Resin Actinide
Separation

Alpha Spectroscopy Analysis Detail Report

Prep Batch: 266564

Lab ID: MB 160-266564/1-A
 Client ID:
 Sigma: 2

Analyzed: 08/31/16 19:45
 Detector: AV191
 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	0.05641	0.0338	0.0342		pCi/g	0.100	0.0304	267504	
Thorium-232	0.01380	0.0159	0.0160		pCi/g	0.100	0.0138	267504	
Tracer	MB Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Thorium-229	3.053	0.239	0.351		pCi/g	0.0376	3.03	101	30 - 110

Lab ID: LCS 160-266564/2-A
 Client ID:
 Sigma: 2

Analyzed: 08/31/16 19:45
 Detector: AV194
 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	25.71	1.01	2.38		pCi/g	0.100	0.0647	267505	
Tracer	LCS Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Thorium-229	5.605	0.452	0.653		pCi/g	0.0599	6.06	92.5	30 - 110

Lab ID: 160-18553-14
 Client ID: SU01-EXB-034-SS-DUP-00
 Sigma: 2

Analyzed: 08/31/16 19:45
 Detector: AV195
 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	1.13	0.181	0.205		pCi/g	0.100	0.0219	267506	
Thorium-232	1.78	0.228	0.273		pCi/g	0.100	0.0537	267506	
Tracer	Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Thorium-229	1.81	0.179	0.235		pCi/g	0.0378	3.03	59.8	30 - 110

Lab ID: 160-18553-14 DU
 Client ID: SU01-EXB-034-SS-DUP-00
 Sigma: 2

Analyzed: 08/31/16 19:45
 Detector: AV196
 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	0.9890	0.167	0.187		pCi/g	0.100	0.0529	267507	
Thorium-232	1.635	0.214	0.254		pCi/g	0.100	0.0426	267507	
Tracer	DU Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Thorium-229	1.853	0.179	0.237		pCi/g	0.0344	3.03	61.2	30 - 110

Alpha Spectroscopy Analysis Detail Report

Prep Batch: 266564

Lab ID: 160-18553-15
 Client ID: SU01-EXB-035-SS-P-00
 Sigma: 2

Analyzed: 08/31/16 19:45
 Detector: AV200
 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	0.822	0.135	0.151		pCi/g	0.100	0.0304	267508	
Thorium-232	1.80	0.199	0.250		pCi/g	0.100	0.0403	267508	
Tracer	Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Thorium-229	2.56	0.218	0.306		pCi/g	0.0373	3.03	84.3	30 - 110

Lab ID: 160-18553-16
 Client ID: SU01-EXB-036-SS-P-00
 Sigma: 2

Analyzed: 08/31/16 19:45
 Detector: AV206
 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	1.33	0.167	0.201		pCi/g	0.100	0.0373	267510	
Thorium-232	1.20	0.158	0.187		pCi/g	0.100	0.0287	267510	
Tracer	Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Thorium-229	2.67	0.222	0.316		pCi/g	0.0399	3.03	88.2	30 - 110

Lab ID: 160-18553-17
 Client ID: SU01-EXB-037-SS-P-00
 Sigma: 2

Analyzed: 08/31/16 19:45
 Detector: AV207
 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	1.03	0.163	0.185		pCi/g	0.100	0.0469	267511	
Thorium-232	1.67	0.206	0.249		pCi/g	0.100	0.0349	267511	
Tracer	Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Thorium-229	2.14	0.196	0.266		pCi/g	0.0135	3.03	70.7	30 - 110

Lab ID: 160-18553-18
 Client ID: SU01-EXB-038-SS-P-00
 Sigma: 2

Analyzed: 08/31/16 19:45
 Detector: AV208
 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	1.13	0.159	0.185		pCi/g	0.100	0.0307	267512	
Thorium-232	1.89	0.204	0.259		pCi/g	0.100	0.0166	267512	
Tracer	Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Thorium-229	2.41	0.207	0.289		pCi/g	0.0291	3.03	79.6	30 - 110

Alpha Spectroscopy Analysis Detail Report

Prep Batch: 266564

Lab ID: 160-18553-19
 Client ID: SU01-EXB-039-SS-P-00
 Sigma: 2

Analyzed: 08/31/16 19:45
 Detector: AV209
 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	1.22	0.154	0.185		pCi/g	0.100	0.0147	267513	
Thorium-232	1.60	0.177	0.222		pCi/g	0.100	0.0320	267513	
Tracer	Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Thorium-229	2.73	0.220	0.318		pCi/g	0.0244	3.03	90.1	30 - 110

Lab ID: 160-18553-20
 Client ID: SU01-EXB-039-SS-DUP-00
 Sigma: 2

Analyzed: 08/31/16 19:45
 Detector: AV210
 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	0.812	0.144	0.159		pCi/g	0.100	0.0349	267514	
Thorium-232	1.52	0.195	0.233		pCi/g	0.100	0.0347	267514	
Tracer	Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Thorium-229	2.13	0.195	0.265		pCi/g	0.0134	3.03	70.5	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 160-266564/1-A	Thorium-230			0.05641		pCi/g							3.302616
MB 160-266564/1-A	Thorium-232			0.01380		pCi/g							1.727485
													91
Lab Control Sample ID:	Analyte	Parent Result	Spike Added	LCS Result	Qualifier	Unit	% Rec	% Rec Limits	RPD	RER	DER	RER Limit	Z Factor
LCS 160-266564/2-A	Thorium-230		24.5	25.71		pCi/g	105	81 - 118					.7320772
													248
Duplicate ID:	Analyte	Parent Result	Spike Added	DU Result	Qualifier	Unit	% Rec	% Rec Limits	RPD	RER	DER	RER Limit	Z Factor
160-18553-14	Thorium-230	1.13		0.9890		pCi/g			13	0.35	0.99	1	
160-18553-14	Thorium-232	1.78		1.635		pCi/g			9	0.28	0.78	1	

Glossary:
 Ts = Count Duration, Sample

ALPHA SPECTROSCOPY BATCH WORKSHEET

Lab Name: TestAmerica St. Louis Job No.: 160-18553-1

SDG No.: _____

Batch Number: 266564 Batch Start Date: 08/25/16 15:51 Batch Analyst: Bernsen, Sarah CBatch Method: ExtChrom Batch End Date: 08/31/16 15:02

Lab Sample ID	Client Sample ID	Method Chain	Basis	InitialAmount	Th-229 00021	TRM-2 00001	AnalysisComment		
MB 160-266564/1		ExtChrom, A-01-R		1.0 g	0.1 mL				
LCS 160-266564/2		ExtChrom, A-01-R		0.4996 g	0.1 mL	0.4998 g	TRM		
160-18553-A-14-A	SU01-EXB-034-SS-DUP-00	ExtChrom, A-01-R	T	0.9999 g	0.1 mL				
160-18553-A-14-A DU	SU01-EXB-034-SS-DUP-00	ExtChrom, A-01-R	T	1.0001 g	0.1 mL				
160-18553-A-15-A	SU01-EXB-035-SS-P-00	ExtChrom, A-01-R	T	0.9992 g	0.1 mL				
160-18553-A-16-A	SU01-EXB-036-SS-P-00	ExtChrom, A-01-R	T	0.9996 g	0.1 mL				
160-18553-A-17-A	SU01-EXB-037-SS-P-00	ExtChrom, A-01-R	T	1.0007 g	0.1 mL				
160-18553-A-18-A	SU01-EXB-038-SS-P-00	ExtChrom, A-01-R	T	0.9999 g	0.1 mL				
160-18553-A-19-A	SU01-EXB-039-SS-P-00	ExtChrom, A-01-R	T	0.9983 g	0.1 mL				
160-18553-A-20-A	SU01-EXB-039-SS-DUP-00	ExtChrom, A-01-R	T	1.0007 g	0.1 mL				

Batch Notes	
Balance ID	0034150065
Analyst ID - Column	nmn per scb
Column Date	8/31/16
Analyst ID - CoPrecipitation	scb
CoPrecipitation Date	8/31/16
Pipette ID	rad104
Analyst ID - Reagent Drop Witness	rjs
Analyst ID - Reagent Drop	ats
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.

A-01-R

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Run Logs

Alpha Spectroscopy Run Log

Detector: AV148

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
10/16/15 16:27	140	IC 160-223445/1		223445			PS
10/26/15 19:10	60	ICV 160-223563/1		223563			PS
07/25/16 13:14	960	ICB 160-261998/1		261998			PS
07/26/16 09:12	60	CCV 160-262320/1		262320			PS
08/31/16 09:06	1	PULSER 160-267479/1		267479			ALD
08/31/16 19:41	400	MB 160-266485/1-A		267479	266485	A-01-R	ALD

Detector: AV149

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
10/16/15 15:51	140	IC 160-223446/1		223446			PS
10/26/15 19:10	60	ICV 160-223564/1		223564			PS
07/22/16 15:43	960	ICB 160-261903/1		261903			PS
07/27/16 07:26	60	CCV 160-262220/1		262220			PS
08/31/16 09:06	1	PULSER 160-267480/1		267480			ALD
08/31/16 19:41	400	LCS 160-266485/2-A		267480	266485	A-01-R	ALD

Detector: AV161

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
10/16/15 18:57	140	IC 160-223458/1		223458			PS
10/26/15 20:26	60	ICV 160-223576/1		223576			PS
07/22/16 15:43	960	ICB 160-261915/1		261915			PS
07/26/16 09:12	60	CCV 160-262331/1		262331			PS
08/31/16 09:06	1	PULSER 160-267490/1		267490			ALD
08/31/16 14:07	180	ZZZZZ		267490			
08/31/16 19:41	400	160-18553-1	SU01-EXB-022-SS-P-00	267490	266485	A-01-R	ALD

Detector: AV162

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
10/16/15 18:57	140	IC 160-223459/1		223459			PS
10/26/15 20:26	60	ICV 160-223577/1		223577			PS
07/25/16 13:14	960	ICB 160-262003/1		262003			PS
07/26/16 10:50	60	CCV 160-262158/1		262158			PS
08/31/16 09:06	1	PULSER 160-267491/1		267491			ALD
08/31/16 14:07	180	ZZZZZ		267491			
08/31/16 19:41	400	160-18553-2	SU01-EXB-023-SS-P-00	267491	266485	A-01-R	ALD

Detector: AV163

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
10/16/15 18:57	140	IC 160-223460/1		223460			PS
10/26/15 20:26	60	ICV 160-223578/1		223578			PS
07/22/16 15:43	960	ICB 160-261917/1		261917			PS
07/27/16 08:33	60	CCV 160-262221/1		262221			PS
08/31/16 09:06	1	PULSER 160-267492/1		267492			ALD
08/31/16 14:07	180	ZZZZZ		267492			
08/31/16 19:41	400	160-18553-3	SU01-EXB-024-SS-P-00	267492	266485	A-01-R	ALD

Alpha Spectroscopy Run Log

Detector: AV164

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
10/16/15 18:57	140	IC 160-223461/1		223461			PS
10/26/15 20:32	60	ICV 160-223579/1		223579			PS
07/22/16 15:43	960	ICB 160-261918/1		261918			PS
07/26/16 10:49	60	CCV 160-262160/1		262160			PS
08/31/16 09:06	1	PULSER 160-267493/1		267493			ALD
08/31/16 14:07	180	ZZZZZ		267493			
08/31/16 19:41	400	160-18553-4	SU01-EXB-025-SS-P-00	267493	266485	A-01-R	ALD

Detector: AV169

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
10/16/15 18:59	140	IC 160-223466/1		223466			PS
10/26/15 20:28	60	ICV 160-223584/1		223584			PS
07/22/16 15:43	960	ICB 160-261923/1		261923			PS
07/26/16 09:35	60	CCV 160-262332/1		262332			PS
08/31/16 09:06	1	PULSER 160-267495/1		267495			ALD
08/31/16 14:07	180	ZZZZZ		267495			
08/31/16 19:41	400	160-18553-5	SU01-EXB-026-SS-P-00	267495	266485	A-01-R	ALD

Detector: AV170

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
10/16/15 18:59	140	IC 160-223467/1		223467			PS
10/26/15 20:28	60	ICV 160-223585/1		223585			PS
07/25/16 13:14	960	ICB 160-262008/1		262008			PS
07/26/16 10:48	60	CCV 160-262162/1		262162			PS
08/31/16 09:06	1	PULSER 160-267496/1		267496			ALD
08/31/16 14:07	180	ZZZZZ		267496			
08/31/16 19:41	400	160-18553-6	SU01-EXB-027-SS-P-00	267496	266485	A-01-R	ALD

Detector: AV173

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
10/16/15 19:04	140	IC 160-223470/1		223470			PS
10/26/15 20:29	60	ICV 160-223588/1		223588			PS
07/25/16 13:14	960	ICB 160-262009/1		262009			PS
07/26/16 10:47	60	CCV 160-262165/1		262165			PS
08/31/16 09:06	1	PULSER 160-267498/1		267498			ALD
08/31/16 14:07	180	ZZZZZ		267498			
08/31/16 19:41	400	160-18553-8	SU01-EXB-029-SS-P-00	267498	266485	A-01-R	ALD

Detector: AV176

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
10/17/15 14:48	140	IC 160-223473/1		223473			PS
10/31/15 14:14	60	ICV 160-223591/1		223591			PS
07/22/16 15:43	960	ICB 160-261930/1		261930			PS
07/26/16 12:11	60	CCV 160-262168/1		262168			PS
08/31/16 09:06	1	PULSER 160-267500/1		267500			ALD
08/31/16 14:07	180	ZZZZZ		267500			
08/31/16 19:41	400	160-18553-10	SU01-EXB-031-SS-P-00	267500	266485	A-01-R	ALD

Alpha Spectroscopy Run Log

Detector: AV177

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
10/17/15 14:55	140	IC 160-223474/1		223474			PS
10/31/15 14:14	60	ICV 160-223592/1		223592			PS
07/22/16 15:43	960	ICB 160-261931/1		261931			PS
07/26/16 12:11	60	CCV 160-262169/1		262169			PS
08/31/16 09:06	1	PULSER 160-267501/1		267501			ALD
08/31/16 14:07	180	ZZZZZ		267501			
08/31/16 19:41	400	160-18553-11	SU01-EXB-032-SS-P-00	267501	266485	A-01-R	ALD

Detector: AV189

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
10/17/15 18:19	140	IC 160-223486/1		223486			PS
11/01/15 14:23	60	ICV 160-223604/1		223604			PS
07/22/16 15:43	960	ICB 160-261935/1		261935			PS
07/26/16 12:12	60	CCV 160-262172/1		262172			PS
08/31/16 09:07	1	PULSER 160-267503/1		267503			ALD
08/31/16 14:07	180	ZZZZZ		267503			
08/31/16 19:41	400	160-18553-13	SU01-EXB-034-SS-P-00	267503	266485	A-01-R	ALD

Detector: AV191

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
10/17/15 18:13	140	IC 160-223488/1		223488			PS
11/01/15 14:23	60	ICV 160-223606/1		223606			
11/01/15 18:11	60	ICV 160-223606/2		223606			PS
07/22/16 15:43	960	ICB 160-261937/1		261937			PS
07/26/16 17:46	60	CCV 160-262173/1		262173			PS
08/31/16 09:07	1	PULSER 160-267504/1		267504			ALD
08/31/16 14:07	180	ZZZZZ		267504			
08/31/16 19:45	400	MB 160-266564/1-A		267504	266564	A-01-R	ALD

Detector: AV194

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
10/17/15 18:13	140	IC 160-223491/1		223491			PS
11/01/15 14:24	60	ICV 160-223609/1		223609			PS
07/22/16 15:43	960	ICB 160-261940/1		261940			PS
07/26/16 11:01	60	CCV 160-262175/1		262175			PS
08/31/16 09:07	1	PULSER 160-267505/1		267505			ALD
08/31/16 14:07	180	ZZZZZ		267505			
08/31/16 19:45	400	LCS 160-266564/2-A		267505	266564	A-01-R	ALD

Detector: AV195

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
10/17/15 18:19	140	IC 160-223492/1		223492			PS
11/01/15 14:28	60	ICV 160-223610/1		223610			PS
07/22/16 15:43	960	ICB 160-261941/1		261941			PS
07/26/16 12:23	60	CCV 160-262176/1		262176			PS
08/31/16 09:07	1	PULSER 160-267506/1		267506			ALD
08/31/16 14:15	180	ZZZZZ		267506			
08/31/16 19:45	400	160-18553-14	SU01-EXB-034-SS-DUP-10	267506	266564	A-01-R	ALD

Alpha Spectroscopy Run Log

Detector: AV196

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
10/17/15 18:14	140	IC 160-223493/1		223493			PS
11/01/15 14:25	60	ICV 160-223611/1		223611			PS
07/22/16 15:43	960	ICB 160-261942/1		261942			PS
07/26/16 09:35	60	CCV 160-262333/1		262333			PS
08/31/16 09:07	1	PULSER 160-267507/1		267507			ALD
08/31/16 14:15	180	ZZZZZ		267507			
08/31/16 19:45	400	160-18553-14 DU	SU01-EXB-034-SS-DUP-1 0 DU	267507	266564	A-01-R	ALD

Detector: AV200

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
10/17/15 18:15	140	IC 160-223497/1		223497			PS
11/01/15 14:26	60	ICV 160-223615/1		223615			PS
07/25/16 13:13	960	ICB 160-262019/1		262019			PS
07/26/16 12:13	60	CCV 160-262177/1		262177			PS
08/31/16 09:07	1	PULSER 160-267508/1		267508			ALD
08/31/16 14:15	180	ZZZZZ		267508			
08/31/16 19:45	400	160-18553-15	SU01-EXB-035-SS-P-00	267508	266564	A-01-R	ALD

Detector: AV206

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
10/18/15 16:10	140	IC 160-223503/1		223503			PS
11/01/15 16:02	60	ICV 160-223621/1		223621			PS
07/25/16 13:14	960	ICB 160-262024/1		262024			PS
07/26/16 19:07	60	CCV 160-262180/1		262180			PS
08/31/16 09:07	1	PULSER 160-267510/1		267510			ALD
08/31/16 14:15	180	ZZZZZ		267510			
08/31/16 19:45	400	160-18553-16	SU01-EXB-036-SS-P-00	267510	266564	A-01-R	ALD

Detector: AV207

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
10/18/15 16:11	140	IC 160-223504/1		223504			PS
11/01/15 16:10	60	ICV 160-223622/1		223622			PS
07/22/16 15:43	960	ICB 160-261952/1		261952			PS
07/26/16 12:13	60	CCV 160-262181/1		262181			PS
08/31/16 09:07	1	PULSER 160-267511/1		267511			ALD
08/31/16 14:15	180	ZZZZZ		267511			
08/31/16 19:45	400	160-18553-17	SU01-EXB-037-SS-P-00	267511	266564	A-01-R	ALD

Detector: AV208

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
10/18/15 16:19	140	IC 160-223505/1		223505			PS
11/01/15 16:11	60	ICV 160-223623/1		223623			PS
07/25/16 13:14	960	ICB 160-262025/1		262025			PS
07/26/16 12:14	60	CCV 160-262182/1		262182			PS
08/31/16 09:07	1	PULSER 160-267512/1		267512			ALD
08/31/16 14:15	180	ZZZZZ		267512			
08/31/16 19:45	400	160-18553-18	SU01-EXB-038-SS-P-00	267512	266564	A-01-R	ALD

Alpha Spectroscopy Run Log

Detector: AV209

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
10/18/15 16:11	140	IC 160-223506/1		223506			PS
11/01/15 16:11	60	ICV 160-223624/1		223624			PS
07/25/16 13:14	960	ICB 160-262026/1		262026			PS
07/26/16 13:39	60	CCV 160-262183/1		262183			PS
08/31/16 09:07	1	PULSER 160-267513/1		267513			ALD
08/31/16 14:15	180	ZZZZZ		267513			
08/31/16 19:45	400	160-18553-19	SU01-EXB-039-SS-P-00	267513	266564	A-01-R	ALD

Detector: AV210

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
10/18/15 16:19	140	IC 160-223507/1		223507			PS
11/01/15 16:03	60	ICV 160-223625/1		223625			PS
07/25/16 13:14	960	ICB 160-262027/1		262027			PS
07/26/16 10:46	60	CCV 160-262184/1		262184			PS
08/31/16 09:07	1	PULSER 160-267514/1		267514			ALD
08/31/16 14:15	180	ZZZZZ		267514			
08/31/16 19:45	400	160-18553-20	SU01-EXB-039-SS-DUP-10	267514	266564	A-01-R	ALD
09/01/16 15:17	960	ICB 160-268073/1		268073			PS
09/06/16 11:23	60	CCV 160-268352/1		268352			PS
09/07/16 12:23	1	PULSER 160-268501/1		268501			ALD
09/07/16 14:28	400	160-18553-12	SU01-EXB-033-SS-P-00	268501	266485	A-01-R	ALD

Detector: AV211

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
10/18/15 16:19	140	IC 160-223508/1		223508			PS
11/01/15 16:11	60	ICV 160-223626/1		223626			PS
09/01/16 15:17	960	ICB 160-268074/1		268074			PS
09/06/16 11:23	60	CCV 160-268353/1		268353			PS
09/07/16 12:29	1	PULSER 160-268502/1		268502			ALD
09/07/16 14:28	400	160-18553-9	SU01-EXB-030-SS-P-00	268502	266485	A-01-R	ALD

Detector: AV212

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
10/18/15 16:12	140	IC 160-223509/1		223509			PS
11/01/15 16:03	60	ICV 160-223627/1		223627			
11/01/15 18:11	60	ICV 160-223627/2		223627			PS
09/01/16 15:17	960	ICB 160-268075/1		268075			PS
09/06/16 11:24	60	CCV 160-268354/1		268354			PS
09/07/16 12:29	1	PULSER 160-268503/1		268503			ALD
09/07/16 14:28	400	160-18553-7	SU01-EXB-028-SS-P-00	268503	266485	A-01-R	ALD

Detector: AV216

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
10/18/15 16:13	140	IC 160-223512/1		223512			PS
11/01/15 16:12	60	ICV 160-223631/1		223631			PS
09/01/16 15:17	960	ICB 160-268079/1		268079			PS
09/07/16 08:38	60	CCV 160-268387/1		268387			PS
09/07/16 12:28	1	PULSER 160-268505/1		268505			ALD

Alpha Spectroscopy Run Log

Detector: AV216 (Continued)

Analysis Date		Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
09/07/16 14:28		400	ZZZZZ		268505			

GAMMA SPECTROSCOPY

Method 901.1

Ra-226

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

Prep Batch: 264540

Fill Geometry, 21-Day In-Growth

Gamma Spectroscopy Analysis Detail Report

Prep Batch: 264540

Lab ID: MB 160-264540/1-A Analyzed: 09/01/16 14:31 Ts: 30 Sigma: 2
 Client ID: Detector: GV17 Decay Corrected: No

Analyte	MB Result	Count Unc	Total Unc	Qualifier	Unit	LOQ	MDC	Anly Batch
Radium-226	-0.04080	0.177	0.177	U	pCi/g	0.500	0.309	267763

Lab ID: LCS 160-264540/2-A Analyzed: 09/01/16 14:32 Ts: 30 Sigma: 2
 Client ID: Detector: GV16 Decay Corrected: No

Analyte	LCS Result	Count Unc	Total Unc	Qualifier	Unit	LOQ	MDC	Anly Batch
Americium-241	96.99	1.58	10.2		pCi/g		1.17	267762
Cesium-137	29.23	0.673	3.12		pCi/g		0.235	267762
Cobalt-60	15.76	0.401	1.63		pCi/g		0.0818	267762

Lab ID: 160-18553-1 Analyzed: 09/01/16 14:33 Ts: 30 Sigma: 2
 Client ID: SU01-EXB-022-SS-P-00 Detector: GV15 Decay Corrected: No

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	LOQ	MDC	Anly Batch
Radium-226	0.979	0.235	0.256		pCi/g	0.500	0.193	267761

Lab ID: 160-18553-1 DU Analyzed: 09/01/16 15:05 Ts: 30 Sigma: 2
 Client ID: SU01-EXB-022-SS-P-00 Detector: GV17 Decay Corrected: No

Analyte	DU Result	Count Unc	Total Unc	Qualifier	Unit	LOQ	MDC	Anly Batch
Radium-226	1.106	0.204	0.234		pCi/g	0.500	0.140	267763

Lab ID: 160-18553-2 Analyzed: 09/01/16 14:35 Ts: 30 Sigma: 2
 Client ID: SU01-EXB-023-SS-P-00 Detector: GV14 Decay Corrected: No

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	LOQ	MDC	Anly Batch
Radium-226	1.28	0.212	0.250		pCi/g	0.500	0.137	267760

Lab ID: 160-18553-3 Analyzed: 09/01/16 14:42 Ts: 30 Sigma: 2
 Client ID: SU01-EXB-024-SS-P-00 Detector: GV13 Decay Corrected: No

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	LOQ	MDC	Anly Batch
Radium-226	1.15	0.177	0.213		pCi/g	0.500	0.148	267758

Gamma Spectroscopy Analysis Detail Report

Prep Batch: 264540

Lab ID: 160-18553-4 Analyzed: 09/01/16 14:40 Ts: 30 Sigma: 2
 Client ID: SU01-EXB-025-SS-P-00 Detector: GV12 Decay Corrected: No

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	LOQ	MDC	Anly Batch
Radium-226	1.08	0.187	0.218		pCi/g	0.500	0.127	267757

Lab ID: 160-18553-5 Analyzed: 09/01/16 15:06 Ts: 30 Sigma: 2
 Client ID: SU01-EXB-026-SS-P-00 Detector: GV16 Decay Corrected: No

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	LOQ	MDC	Anly Batch
Radium-226	1.23	0.208	0.244		pCi/g	0.500	0.152	267762

Lab ID: 160-18553-6 Analyzed: 09/01/16 15:08 Ts: 30 Sigma: 2
 Client ID: SU01-EXB-027-SS-P-00 Detector: GV15 Decay Corrected: No

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	LOQ	MDC	Anly Batch
Radium-226	1.50	0.302	0.340		pCi/g	0.500	0.224	267761

Lab ID: 160-18553-7 Analyzed: 09/01/16 15:10 Ts: 30 Sigma: 2
 Client ID: SU01-EXB-028-SS-P-00 Detector: GV14 Decay Corrected: No

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	LOQ	MDC	Anly Batch
Radium-226	0.883	0.211	0.230		pCi/g	0.500	0.185	267760

Lab ID: 160-18553-8 Analyzed: 09/01/16 15:15 Ts: 30 Sigma: 2
 Client ID: SU01-EXB-029-SS-P-00 Detector: GV13 Decay Corrected: No

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	LOQ	MDC	Anly Batch
Radium-226	1.07	0.212	0.239		pCi/g	0.500	0.168	267758

Lab ID: 160-18553-9 Analyzed: 09/01/16 15:14 Ts: 30 Sigma: 2
 Client ID: SU01-EXB-030-SS-P-00 Detector: GV12 Decay Corrected: No

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	LOQ	MDC	Anly Batch
Radium-226	1.22	0.273	0.301		pCi/g	0.500	0.238	267757

Gamma Spectroscopy Analysis Detail Report

Prep Batch: 264540

Lab ID: 160-18553-10 Analyzed: 09/01/16 16:11 Ts: 30 Sigma: 2
 Client ID: SU01-EXB-031-SS-P-00 Detector: GV17 Decay Corrected: No

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	LOQ	MDC	Anly Batch
Radium-226	1.57	0.227	0.280		pCi/g	0.500	0.134	267763

Lab ID: 160-18553-11 Analyzed: 09/01/16 16:09 Ts: 30 Sigma: 2
 Client ID: SU01-EXB-032-SS-P-00 Detector: GV16 Decay Corrected: No

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	LOQ	MDC	Anly Batch
Radium-226	2.16	0.341	0.408		pCi/g	0.500	0.236	267762

Lab ID: 160-18553-12 Analyzed: 09/01/16 16:08 Ts: 30 Sigma: 2
 Client ID: SU01-EXB-033-SS-P-00 Detector: GV15 Decay Corrected: No

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	LOQ	MDC	Anly Batch
Radium-226	1.18	0.255	0.283		pCi/g	0.500	0.208	267761

Lab ID: 160-18553-13 Analyzed: 09/01/16 16:07 Ts: 30 Sigma: 2
 Client ID: SU01-EXB-034-SS-P-00 Detector: GV14 Decay Corrected: No

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	LOQ	MDC	Anly Batch
Radium-226	1.14	0.200	0.232		pCi/g	0.500	0.156	267760

Lab ID: 160-18553-14 Analyzed: 09/01/16 16:09 Ts: 30 Sigma: 2
 Client ID: SU01-EXB-034-SS-DUP-00 Detector: GV13 Decay Corrected: No

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	LOQ	MDC	Anly Batch
Radium-226	1.05	0.197	0.226		pCi/g	0.500	0.155	267758

Lab ID: 160-18553-15 Analyzed: 09/01/16 16:06 Ts: 30 Sigma: 2
 Client ID: SU01-EXB-035-SS-P-00 Detector: GV12 Decay Corrected: No

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	LOQ	MDC	Anly Batch
Radium-226	1.02	0.235	0.258		pCi/g	0.500	0.198	267757

Gamma Spectroscopy Analysis Detail Report

Prep Batch: 264540

Lab ID: 160-18553-16 Analyzed: 09/01/16 16:02 Ts: 30 Sigma: 2
Client ID: SU01-EXB-036-SS-P-00 Detector: GV5 Decay Corrected: No

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	LOQ	MDC	Anly Batch
Radium-226	1.32	0.260	0.294		pCi/g	0.500	0.201	267754

Lab ID: 160-18553-17 Analyzed: 09/01/16 16:46 Ts: 30 Sigma: 2
Client ID: SU01-EXB-037-SS-P-00 Detector: GV17 Decay Corrected: No

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	LOQ	MDC	Anly Batch
Radium-226	1.46	0.253	0.295		pCi/g	0.500	0.182	267763

Lab ID: 160-18553-18 Analyzed: 09/01/16 16:47 Ts: 30 Sigma: 2
Client ID: SU01-EXB-038-SS-P-00 Detector: GV16 Decay Corrected: No

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	LOQ	MDC	Anly Batch
Radium-226	1.52	0.230	0.279		pCi/g	0.500	0.183	267762

Lab ID: 160-18553-19 Analyzed: 09/01/16 16:48 Ts: 30 Sigma: 2
Client ID: SU01-EXB-039-SS-P-00 Detector: GV15 Decay Corrected: No

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	LOQ	MDC	Anly Batch
Radium-226	1.26	0.209	0.246		pCi/g	0.500	0.127	267761

Lab ID: 160-18553-20 Analyzed: 09/01/16 16:51 Ts: 30 Sigma: 2
Client ID: SU01-EXB-039-SS-DUP-00 Detector: GV14 Decay Corrected: No

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	LOQ	MDC	Anly Batch
Radium-226	1.03	0.187	0.216		pCi/g	0.500	0.128	267760

Gamma Spectroscopy Analysis Detail Report

Prep Batch: 264540

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 160-264540/1-A	Radium-226			-0.04080	U	pCi/g							-.46210227
Lab Control Sample ID:	Analyte	Parent Result	Spike Added	LCS Result	Qualifier	Unit	% Rec	% Rec Limits	RPD	RER	DER	RER Limit	Z Factor
LCS 160-264540/2-A	Americium-241		97.1	96.99		pCi/g	100	87 - 116					-.013784392
LCS 160-264540/2-A	Cesium-137		29.5	29.23		pCi/g	99	87 - 120					-.1191953367
LCS 160-264540/2-A	Cobalt-60		16.6	15.76		pCi/g	95	87 - 115					-.7249588394
Duplicate ID:	Analyte	Parent Result	Spike Added	DU Result	Qualifier	Unit	% Rec	% Rec Limits	RPD	RER	DER	RER Limit	Z Factor
160-18553-1	Radium-226	0.979		1.106		pCi/g			12	0.26	0.73	1	

Glossary:

Ts = Count Duration, Sample

GAMMA SPECTROSCOPY BATCH WORKSHEET

Lab Name: TestAmerica St. Louis Job No.: 160-18553-1

SDG No.: _____

Batch Number: 264540 Batch Start Date: 08/11/16 15:30 Batch Analyst: Sloan, Robert 1Batch Method: Fill_Geo-21 Batch End Date: 08/11/16 17:00

Lab Sample ID	Client Sample ID	Method Chain	Basis	TareWeight	GrossWeight	InitialAmount	IngDecDate1	IngDecDate3	Geometry
MB 160-264540/1		Fill_Geo-21, 901.1				291.18 g	8/11/2016	9/1/2016	Tuna Can
LCS 160-264540/2		Fill_Geo-21, 901.1				341.9 g	8/11/2016	9/1/2016	Tuna Can
160-18553-A-1-A	SU01-EXB-022-SS-P-00	Fill_Geo-21, 901.1	T	46.6 g	355.5 g	308.9 g	8/11/2016	9/1/2016	Tuna Can
160-18553-A-1-A DU	SU01-EXB-022-SS-P-00	Fill_Geo-21, 901.1	T	46.6 g	355.5 g	308.9 g	8/11/2016	9/1/2016	Tuna Can
160-18553-A-2-A	SU01-EXB-023-SS-P-00	Fill_Geo-21, 901.1	T	46.5 g	368.4 g	321.9 g	8/11/2016	9/1/2016	Tuna Can
160-18553-A-3-A	SU01-EXB-024-SS-P-00	Fill_Geo-21, 901.1	T	46.1 g	338.2 g	292.1 g	8/11/2016	9/1/2016	Tuna Can
160-18553-A-4-A	SU01-EXB-025-SS-P-00	Fill_Geo-21, 901.1	T	46.3 g	365.7 g	319.4 g	8/11/2016	9/1/2016	Tuna Can
160-18553-A-5-A	SU01-EXB-026-SS-P-00	Fill_Geo-21, 901.1	T	46.2 g	364.0 g	317.8 g	8/11/2016	9/1/2016	Tuna Can
160-18553-A-6-A	SU01-EXB-027-SS-P-00	Fill_Geo-21, 901.1	T	46.3 g	373.3 g	327 g	8/11/2016	9/1/2016	Tuna Can
160-18553-A-7-A	SU01-EXB-028-SS-P-00	Fill_Geo-21, 901.1	T	46.3 g	350.2 g	303.9 g	8/11/2016	9/1/2016	Tuna Can
160-18553-A-8-A	SU01-EXB-029-SS-P-00	Fill_Geo-21, 901.1	T	46.4 g	373.3 g	326.9 g	8/11/2016	9/1/2016	Tuna Can
160-18553-A-9-A	SU01-EXB-030-SS-P-00	Fill_Geo-21, 901.1	T	46.4 g	287.1 g	240.7 g	8/11/2016	9/1/2016	Tuna Can
160-18553-A-10-A	SU01-EXB-031-SS-P-00	Fill_Geo-21, 901.1	T	46.2 g	367.4 g	321.2 g	8/11/2016	9/1/2016	Tuna Can
160-18553-A-11-A	SU01-EXB-032-SS-P-00	Fill_Geo-21, 901.1	T	46.1 g	324.5 g	278.4 g	8/11/2016	9/1/2016	Tuna Can
160-18553-A-12-A	SU01-EXB-033-SS-P-00	Fill_Geo-21, 901.1	T	46.4 g	382.6 g	336.2 g	8/11/2016	9/1/2016	Tuna Can
160-18553-A-13-A	SU01-EXB-034-SS-P-00	Fill_Geo-21, 901.1	T	46.0 g	369.3 g	323.3 g	8/11/2016	9/1/2016	Tuna Can
160-18553-A-14-A	SU01-EXB-034-SS-DUP-00	Fill_Geo-21, 901.1	T	46.5 g	369.1 g	322.6 g	8/11/2016	9/1/2016	Tuna Can
160-18553-A-15-A	SU01-EXB-035-SS-P-00	Fill_Geo-21, 901.1	T	45.9 g	338.0 g	292.1 g	8/11/2016	9/1/2016	Tuna Can
160-18553-A-16-A	SU01-EXB-036-SS-P-00	Fill_Geo-21, 901.1	T	45.8 g	415.6 g	369.8 g	8/11/2016	9/1/2016	Tuna Can
160-18553-A-17-A	SU01-EXB-037-SS-P-00	Fill_Geo-21, 901.1	T	46.6 g	306.5 g	259.9 g	8/11/2016	9/1/2016	Tuna Can
160-18553-A-18-A	SU01-EXB-038-SS-P-00	Fill_Geo-21, 901.1	T	46.8 g	355.0 g	308.2 g	8/11/2016	9/1/2016	Tuna Can

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.: 160-18553-1

SDG No.: _____

Batch Number: 264540 Batch Start Date: 08/11/16 15:30 Batch Analyst: Sloan, Robert 1

Batch Method: Fill_Geo-21 Batch End Date: 08/11/16 17:00

Lab Sample ID	Client Sample ID	Method Chain	Basis	TareWeight	GrossWeight	InitialAmount	IngDecDate1	IngDecDate3	Geometry
160-18553-A-19-A	SU01-EXB-039-SS-P-00	Fill_Geo-21, 901.1	T	46.7 g	402.5 g	355.8 g	8/11/2016	9/1/2016	Tuna Can
160-18553-A-20-A	SU01-EXB-039-SS-DUP-00	Fill_Geo-21, 901.1	T	46.7 g	384.7 g	338 g	8/11/2016	9/1/2016	Tuna Can

Lab Sample ID	Client Sample ID	Method Chain	Basis	Tuna Can LCS 00005					
MB 160-264540/1		Fill_Geo-21, 901.1							
LCS 160-264540/2		Fill_Geo-21, 901.1		# g					
160-18553-A-1-A	SU01-EXB-022-SS-P-00	Fill_Geo-21, 901.1	T						
160-18553-A-1-A-DU	SU01-EXB-022-SS-P-00	Fill_Geo-21, 901.1	T						
160-18553-A-2-A	SU01-EXB-023-SS-P-00	Fill_Geo-21, 901.1	T						
160-18553-A-3-A	SU01-EXB-024-SS-P-00	Fill_Geo-21, 901.1	T						
160-18553-A-4-A	SU01-EXB-025-SS-P-00	Fill_Geo-21, 901.1	T						
160-18553-A-5-A	SU01-EXB-026-SS-P-00	Fill_Geo-21, 901.1	T						
160-18553-A-6-A	SU01-EXB-027-SS-P-00	Fill_Geo-21, 901.1	T						
160-18553-A-7-A	SU01-EXB-028-SS-P-00	Fill_Geo-21, 901.1	T						
160-18553-A-8-A	SU01-EXB-029-SS-P-00	Fill_Geo-21, 901.1	T						
160-18553-A-9-A	SU01-EXB-030-SS-P-00	Fill_Geo-21, 901.1	T						
160-18553-A-10-A	SU01-EXB-031-SS-P-00	Fill_Geo-21, 901.1	T						
160-18553-A-11-A	SU01-EXB-032-SS-P-00	Fill_Geo-21, 901.1	T						
160-18553-A-12-A	SU01-EXB-033-SS-P-00	Fill_Geo-21, 901.1	T						
160-18553-A-13-A	SU01-EXB-034-SS-P-00	Fill_Geo-21, 901.1	T						
160-18553-A-14-A	SU01-EXB-034-SS-DUP-00	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.: 160-18553-1

SDG No.: _____

Batch Number: 264540 Batch Start Date: 08/11/16 15:30 Batch Analyst: Sloan, Robert 1Batch Method: Fill_Geo-21 Batch End Date: 08/11/16 17:00

Lab Sample ID	Client Sample ID	Method Chain	Basis	Tuna Can LCS 00005					
160-18553-A-15-A	SU01-EXB-035-SS-P-00	Fill_Geo-21, 901.1	T						
160-18553-A-16-A	SU01-EXB-036-SS-P-00	Fill_Geo-21, 901.1	T						
160-18553-A-17-A	SU01-EXB-037-SS-P-00	Fill_Geo-21, 901.1	T						
160-18553-A-18-A	SU01-EXB-038-SS-P-00	Fill_Geo-21, 901.1	T						
160-18553-A-19-A	SU01-EXB-039-SS-P-00	Fill_Geo-21, 901.1	T						
160-18553-A-20-A	SU01-EXB-039-SS-DUP-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: 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
01/28/16 10:21		ACVTOP 160-236240/1		236240			PS
07/30/16 17:50		ICB 160-262848/1		262848			RTM
09/01/16 00:22		CCB 160-267754/1		267754			RTM
09/01/16 05:32		CCV 160-267754/2		267754			
09/01/16 05:54		CCV 160-267754/3		267754			RTM
09/01/16 08:44	30	ZZZZZ		267754			
09/01/16 09:19	30	ZZZZZ		267754			
09/01/16 09:58	30	ZZZZZ		267754			
09/01/16 10:49	30	ZZZZZ		267754			
09/01/16 11:51	30	ZZZZZ		267754			
09/01/16 12:42	30	ZZZZZ		267754			
09/01/16 13:24	30	ZZZZZ		267754			
09/01/16 14:36	30	ZZZZZ		267754			
09/01/16 15:16	30	ZZZZZ		267754			
09/01/16 16:02	30	160-18553-16	SU01-EXB-036-SS-P-00	267754	264540	901.1	RTM
09/01/16 17:10		ZZZZZ		267754			
09/01/16 17:57		ZZZZZ		267754			
09/01/16 19:52	60	ZZZZZ		267754			
09/01/16 21:11	60	ZZZZZ		267754			

Detector: GV12

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
10/02/12 10:16		IC 160-13156/1		13156			JLW
10/04/12 09:10		ICV 160-13156/2		13156			JLW
01/28/16 13:28		ACVTOP 160-235885/1		235885			PS
08/06/16 17:43		ICB 160-263713/1		263713			ALS
09/01/16 00:25		CCV 160-267757/1		267757			
09/01/16 00:48		CCV 160-267757/2		267757			RTM
09/01/16 05:20		CCB 160-267757/3		267757			RTM
09/01/16 08:10	30	ZZZZZ		267757			
09/01/16 08:49	30	ZZZZZ		267757			
09/01/16 09:23	30	ZZZZZ		267757			
09/01/16 10:08	30	ZZZZZ		267757			
09/01/16 10:42	30	ZZZZZ		267757			
09/01/16 11:37	30	ZZZZZ		267757			
09/01/16 12:31	30	ZZZZZ		267757			
09/01/16 13:09	30	ZZZZZ		267757			
09/01/16 14:40	30	160-18553-4	SU01-EXB-025-SS-P-00	267757	264540	901.1	RTM
09/01/16 15:14	30	160-18553-9	SU01-EXB-030-SS-P-00	267757	264540	901.1	RTM
09/01/16 16:06	30	160-18553-15	SU01-EXB-035-SS-P-00	267757	264540	901.1	RTM
09/01/16 16:45		ZZZZZ		267757			
09/01/16 19:55	60	ZZZZZ		267757			
09/01/16 21:14	60	ZZZZZ		267757			

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
04/07/16 10:57		ACVTOP 160-244901/1		244901			PS

Gamma Spectroscopy Run Log

Detector: GV13 (Continued)

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
08/06/16 17:44		ICB 160-263714/1		263714			ALS
09/01/16 00:27		CCV 160-267758/1		267758			
09/01/16 00:50		CCV 160-267758/2		267758			RTM
09/01/16 05:21		CCB 160-267758/3		267758			RTM
09/01/16 08:11	30	ZZZZZ		267758			
09/01/16 08:48	30	ZZZZZ		267758			
09/01/16 09:25	30	ZZZZZ		267758			
09/01/16 10:09	30	ZZZZZ		267758			
09/01/16 10:43	30	ZZZZZ		267758			
09/01/16 11:38	30	ZZZZZ		267758			
09/01/16 12:32	30	ZZZZZ		267758			
09/01/16 13:10	30	ZZZZZ		267758			
09/01/16 14:42	30	160-18553-3	SU01-EXB-024-SS-P-00	267758	264540	901.1	RTM
09/01/16 15:15	30	160-18553-8	SU01-EXB-029-SS-P-00	267758	264540	901.1	RTM
09/01/16 16:09	30	160-18553-14	SU01-EXB-034-SS-DUP-10	267758	264540	901.1	RTM
09/01/16 16:44	30	ZZZZZ		267758			
09/01/16 19:55	60	ZZZZZ		267758			
09/01/16 21:15	60	ZZZZZ		267758			
09/01/16 22:17	60	ZZZZZ		267758			

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
01/25/16 12:29		ACVTOP 160-235877/1		235877			PS
08/06/16 17:41		ICB 160-263717/1		263717			ALS
09/01/16 00:23		CCB 160-267760/1		267760			RTM
09/01/16 05:23		CCV 160-267760/2		267760			
09/01/16 05:48		CCV 160-267760/3		267760			RTM
09/01/16 08:11	30	ZZZZZ		267760			
09/01/16 09:10	30	ZZZZZ		267760			
09/01/16 09:47	30	ZZZZZ		267760			
09/01/16 10:37	30	ZZZZZ		267760			
09/01/16 11:39	30	ZZZZZ		267760			
09/01/16 12:33	30	ZZZZZ		267760			
09/01/16 13:11	30	ZZZZZ		267760			
09/01/16 14:35	30	160-18553-2	SU01-EXB-023-SS-P-00	267760	264540	901.1	RTM
09/01/16 15:10	30	160-18553-7	SU01-EXB-028-SS-P-00	267760	264540	901.1	RTM
09/01/16 16:07	30	160-18553-13	SU01-EXB-034-SS-P-00	267760	264540	901.1	RTM
09/01/16 16:51	30	160-18553-20	SU01-EXB-039-SS-DUP-10	267760	264540	901.1	RTM
09/01/16 19:56	120	ZZZZZ		267760			
09/01/16 22:09	120	ZZZZZ		267760			

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
05/04/16 18:46		ACVTOP 160-249629/1		249629			PS
08/06/16 17:39		ICB 160-263718/1		263718			ALS

Gamma Spectroscopy Run Log

Detector: GV15 (Continued)

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
09/01/16 00:24		CCB 160-267761/1		267761			RTM
09/01/16 05:23		CCV 160-267761/2		267761			
09/01/16 05:48		CCV 160-267761/3		267761			RTM
09/01/16 08:34	30	ZZZZZ		267761			
09/01/16 09:14	30	ZZZZZ		267761			
09/01/16 09:48	30	ZZZZZ		267761			
09/01/16 10:38	30	ZZZZZ		267761			
09/01/16 11:40	30	ZZZZZ		267761			
09/01/16 12:33	30	ZZZZZ		267761			
09/01/16 13:12	30	ZZZZZ		267761			
09/01/16 14:33	30	160-18553-1	SU01-EXB-022-SS-P-00	267761	264540	901.1	RTM
09/01/16 15:08	30	160-18553-6	SU01-EXB-027-SS-P-00	267761	264540	901.1	RTM
09/01/16 16:08	30	160-18553-12	SU01-EXB-033-SS-P-00	267761	264540	901.1	RTM
09/01/16 16:48	30	160-18553-19	SU01-EXB-039-SS-P-00	267761	264540	901.1	RTM
09/01/16 19:57	60	ZZZZZ		267761			
09/01/16 21:16	30	ZZZZZ		267761			

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
01/22/16 10:56		ACVTOP 160-235879/1		235879			PS
08/06/16 17:37		ICB 160-263719/1		263719			ALS
09/01/16 00:26		CCB 160-267762/1		267762			RTM
09/01/16 05:24		CCV 160-267762/2		267762			
09/01/16 05:48		CCV 160-267762/3		267762			RTM
09/01/16 08:31	60	ZZZZZ		267762			
09/01/16 09:49	30	ZZZZZ		267762			
09/01/16 10:39	30	ZZZZZ		267762			
09/01/16 11:46	30	ZZZZZ		267762			
09/01/16 12:35	30	ZZZZZ		267762			
09/01/16 13:13	30	ZZZZZ		267762			
09/01/16 14:32	30	LCS 160-264540/2-A		267762	264540	901.1	RTM
09/01/16 15:06	30	160-18553-5	SU01-EXB-026-SS-P-00	267762	264540	901.1	RTM
09/01/16 16:09	30	160-18553-11	SU01-EXB-032-SS-P-00	267762	264540	901.1	RTM
09/01/16 16:47	30	160-18553-18	SU01-EXB-038-SS-P-00	267762	264540	901.1	RTM
09/01/16 19:58	120	ZZZZZ		267762			

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
01/27/16 15:26		ACVTOP 160-235874/1		235874			PS
08/17/16 09:28		ICB 160-265384/1		265384			ALS
09/01/16 00:28		CCB 160-267763/1		267763			RTM
09/01/16 05:33		CCV 160-267763/2		267763			
09/01/16 05:57		CCV 160-267763/3		267763			RTM
09/01/16 08:17	30	ZZZZZ		267763			
09/01/16 08:51	30	ZZZZZ		267763			
09/01/16 09:51	30	ZZZZZ		267763			
09/01/16 10:41	30	ZZZZZ		267763			

Gamma Spectroscopy Run Log

Detector: GV17 (Continued)

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
09/01/16 11:51	30	ZZZZZ		267763			
09/01/16 12:36	30	ZZZZZ		267763			
09/01/16 13:14	30	ZZZZZ		267763			
09/01/16 14:31	30	MB 160-264540/1-A		267763	264540	901.1	RTM
09/01/16 15:05	30	160-18553-1 DU	SU01-EXB-022-SS-P-00 DU	267763	264540	901.1	RTM
09/01/16 16:11	30	160-18553-10	SU01-EXB-031-SS-P-00	267763	264540	901.1	RTM
09/01/16 16:46	30	160-18553-17	SU01-EXB-037-SS-P-00	267763	264540	901.1	RTM
09/01/16 19:59	120	ZZZZZ		267763			

Shipping and Receiving Documents

Login Sample Receipt Checklist

Client: EA Engineering, Science, and Technology

Job Number: 160-18553-1

Login Number: 18553

List Source: TestAmerica St. Louis

List Number: 1

Creator: Daniels, Brian J

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.	N/A	
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.	False	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	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.	False	